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11 000 years of fire history and climate in the mountain hemlock rain forests of southwestern British Columbia based on sedimentary charcoal

Type Journal Article
Author Douglas J. Hallett
Author Dana S. Lepofsky
Author Rolf W. Mathewes
Author Kenneth P. Lertzman
Abstract Little is known about the role of fire in the mountain hemlock (Tsuga mertensiana (Bong.) Carrière) rain forests of southern British Columbia. High-resolution analysis of macroscopic charcoal from lake sediment cores, along with 102 accelerator mass spectrometry (AMS) ages on soil charcoal, was used to reconstruct the long-term fire history around two subalpine lakes in the southern Coast and North Cascade Mountains. AMS ages on soil charcoal provide independent evidence of local fire around a lake and support the interpretation of peaks in lake sediment charcoal as distinct fire events during the Holocene. Local fires are rare, with intervals ranging from centuries to several millennia at some sites. Overall fire frequency varied continuously throughout the Holocene, suggesting that fire regimes are linked to climate via large-scale atmospheric circulation patterns. Fires were frequent between 11 000 and 8800 calendar years BP during the warm and dry early Holocene. The onset of humid conditions in the mid-Holocene, as rain forest taxa established in the region, produced a variable fire period until 3500 calendar years BP. A synchronous decrease in fire frequency from 3500 to 2400 calendar years BP corresponds to Neoglacial advances in the region and cool humid climate. A return of frequent fire between 2400 and 1300 calendar years BP suggests that prolonged summer drought occurred more often during this interval, which we name the Fraser Valley Fire Period. The present-day fire regime was established after 1300 calendar years BP.
Publication Canadian Journal of Forest Research
Volume 33
Issue 2
Pages 292–312
Date February 2003
Journal Abbr Can. J. For. Res.
DOI 10.1139/X02-177
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x02-177
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:32:17 2011

1910 fres - USFS history

Type Web Page
Author Forest History Society
Abstract The United States Forest Service, an agency within the U.S. Department of Agriculture, has existed for more than one hundred years with the express purpose of managing public forests and grasslands. Much can be learned about the changing attitudes of the American people toward nature, natural resources, and each other, by examining the history of the USFS. These webpages are intended to document some of that long history......
Website Title U.S. Forest Service History
URL http://www.foresthistory.org/ASPNET/Policy/Fire/FamousFires/1910Fires.aspx

Extra http://www.foresthistory.org/
Date Added Mon Aug 29 05:19:52 2011
Modified Mon Aug 29 05:19:52 2011

2010 Annual State of the Climate Global Analysis

Type Web Page
Author NOAA NCDC
Website Title State of the Climate Global Analysis Annual 2010
Website Type NCDC - Global Analysis
Date 2011
URL http://www.ncdc.noaa.gov/sotc/global/2010/13
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

2500 years of European climate variability and human susceptibility

Type Journal Article
Author Ulf Büntgen
Author Willy Tegel
Author Kurt Nicolussi
Author Michael McCormick
Author David Frank
Author Valerie Trouet
Author Jed O. Kaplan
Author Franz Herzig
Author Karl-Uwe Heussner
Author Heinz Wanner
Author Jürg Luterbacher
Author Jan Esper
Abstract Climate variations have influenced the agricultural productivity, health risk, and conflict level of preindustrial societies. Discrimination between environmental and anthropogenic impacts on past civilizations, however, remains difficult because of the paucity of high-resolution palaeoclimatic evidence. Here, we present tree ring–based reconstructions of Central European summer precipitation and temperature variability over the past 2500 years. Recent warming is unprecedented, but modern hydroclimatic variations may have at times been exceeded in magnitude and duration. Wet and warm summers occurred during periods of Roman and medieval prosperity. Increased climate variability from ~AD 250 to 600 coincided with the demise of the Western Roman Empire and the turmoil of the Migration Period. Historical circumstances may challenge recent political and fiscal reluctance to mitigate projected climate change.
Publication Science
Volume 331
Issue 6017
Pages 578-582
Date 4 February 2011
Journal Abbr Science
DOI 10.1126/science.1197175
ISSN 0036-8075
URL http://www.sciencemag.org/content/331/6017/578.full
Date Added Thu Aug 25 10:47:25 2011
Modified Wed Aug 31 00:34:11 2011

A 1,200-year perspective of 21st century drought in southwestern North America

Type Journal Article
Author Connie A. Woodhouse
Author David M. Meko
Author Glen M. MacDonald
Author Dave W. Stahle
Author Edward R. Cook
Abstract A key feature of anticipated 21st century droughts in Southwest North America is the concurrence of elevated temperatures and increased aridity. Instrumental records and paleoclimatic evidence for past prolonged drought in the Southwest that coincide with elevated temperatures can be assessed to provide insights on temperature-drought relations and to develop worst-case scenarios for the future. In particular, during the medieval period, ~AD 900–1300, the Northern Hemisphere experienced temperatures warmer than all but the most recent decades. Paleoclimatic and model data indicate increased temperatures in western North America of approximately 1 °C over the long-term mean. This was a period of extensive and persistent aridity over western North America. Paleoclimatic evidence suggests drought in the mid-12th century far exceeded the severity, duration, and extent of subsequent droughts. The driest decade of this drought was anomalously warm, though not as warm as the late 20th and early 21st centuries. The convergence of prolonged warming and arid conditions suggests the mid-12th century may serve as a conservative analogue for severe droughts that might occur in the future. The severity, extent, and persistence of the 12th century drought that occurred under natural climate variability, have important implications for water resource management. The causes of past and future drought will not be identical but warm droughts, inferred from paleoclimatic records, demonstrate the plausibility of extensive, severe droughts, provide a long-term perspective on the ongoing drought conditions in the Southwest, and suggest the need for regional sustainability planning for the future.
Publication Proceedings of the National Academy of Sciences
Volume 107
Issue 50
Pages 21283 -21288
Date December 14 , 2010
Journal Abbr PNAS
DOI 10.1073/pnas.0911197107
ISSN 0027-8424
URL http://www.pnas.org/content/107/50/21283.abstract
Extra Keywords: climate change; water resources; paleoclimatology; medieval period.
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:26:46 2011

A 10,000 year record of dune activity, dust storms, and severe drought in the central Great Plains

Type Journal Article
Author Xiaodong Miao
Author Joseph A. Mason
Author James B. Swinehart
Author David B. Loope
Author Paul R. Hanson
Author Ronald J. Goble
Author Xiaodong Liu
Abstract Dune fields and loess deposits of the Great Plains of North America contain stratigraphic records of eolian activity that can be used to extend the short observational record of drought. We present a 10,000 yr reconstruction of dune activity and dust production in the central Great Plains region, based on 95 optically stimulated luminescence ages. The integration of data from both eolian sand and loess is an important new aspect of this record. Clusters of ages define episodes of extensive eolian activity, which we interpret as a response to frequent severe drought, at 1.0–0.7 ka and 2.3–4.5 ka (with peaks centered on 2.5 and 3.8 ka); sustained eolian activity occurred from 9.6 to 6.5 ka. Parts of this record may be consistent with hypotheses

linking Holocene drought to sea surface temperature anomalies in the Pacific or Atlantic oceans, or to the El Niño-Southern Oscillation phenomenon, but the record as a whole is difficult to reconcile with any of these hypotheses.

Publication Geology
Volume 35
Issue 2
Pages 119-122
Date February 2007
Journal Abbr Geology
DOI 10.1130/G23133A.1
ISSN 0091-7613
URL http://geology.gsapubs.org/cgi/doi/10.1130/G23133A.1
Extra Keywords: drought; eolian sand; loess; OSL dating; Great Plains; Holocene; Medieval Climate Anomaly.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:22:50 2011

A 14 000 year sedimentary charcoal record of fire from the northern Sierra Nevada, Lake Tahoe Basin, California, USA

Type Journal Article
Author R. Matthew Beaty
Author Alan H. Taylor
Abstract This research examines how the controls of fire episode frequency in the northern Sierra Nevada have varied at different temporal scales through the Holocene. A 5.5 m long sediment core was collected from Lily Pond, a ~2.5 ha lake in the General Creek Watershed on the west shore of Lake Tahoe in the northern Sierra Nevada in California, USA. Dendrochronology was used to reconstruct the recent history of fire, and high-resolution charcoal analysis was used to reconstruct fire episodes for the last 14 000 cal. yr BP. Fire episode frequency was low during the Lateglacial period but increased through the middle Holocene to a maximum frequency around 6500 cal. yr BP. During the late Holocene fire episode frequency generally declined except for noted peaks around 3000 cal. yr BP and 1000–800 cal. yr BP. These variations track major climatic and vegetation changes driven by millennial-timescale variation in the seasonal cycle of insolation and regional decadal- and centennial-scale variation in effective moisture in the mid and late Holocene in the Sierra Nevada. Fire episode frequency during the Holocene in the Lake Tahoe Basin varied in response to decadal-, centennialand millennial-scale climatic variability. Current fire episode frequency on the west shore of Lake Tahoe is at one of its lowest points in at least the last 14 000 years. Given the strong relationship between climate and fire episode frequency, warming due to increased levels of greenhouse gases in the atmosphere may increase fire episode frequency to levels experienced during the ‘Mediaeval Warm Period’ or the early-Holocene summer insolation maximum as periods of drought intensify.
Publication The Holocene
Volume 19
Issue 3
Pages 347–358
Date May 2009
Journal Abbr Holocene
DOI 10.1177/0959683608101386
ISSN 1477-0911
URL http://hol.sagepub.com/content/19/3/347.abstract
Extra Keywords: charcoal; climate change; Holocene; fire history; Sierra Nevada; California.
Date Added Tue Aug 23 02:05:29 2011
Modified Wed Aug 24 04:41:39 2011

A 2,300-year-long annually resolved record of the South American summer monsoon from the Peruvian Andes

Type Journal Article
Author Broxton W. Bird
Author Mark B. Abbott
Author Mathias Vuille
Author Donald T. Rodbell
Author Nathan D. Stansell
Author Michael F. Rosenmeier
Abstract Decadal and centennial mean state changes in South American summer monsoon (SASM) precipitation during the last 2,300 years are detailed using an annually resolved authigenic calcite record of precipitation $\delta^{18}O$ from a varved lake in the Central Peruvian Andes. This unique sediment record shows that $\delta^{18}O$ peaked during the Medieval Climate Anomaly (MCA) from A.D. 900 to 1100, providing evidence that the SASM weakened considerably during this period. Minimum $\delta^{18}O$ values occurred during the Little Ice Age (LIA) between A.D. 1400 and 1820, reflecting a prolonged intensification of the SASM that was regionally synchronous. After the LIA, $\delta^{18}O$ increased rapidly, particularly during the current warm period (CWP; A.D. 1900 to present), indicating a return to reduced SASM precipitation that was more abrupt and sustained than the onset of the MCA. Diminished SASM precipitation during the MCA and CWP tracks reconstructed Northern Hemisphere and North Atlantic warming and a northward displacement of the Intertropical Convergence Zone (ITCZ) over the Atlantic, and likely the Pacific. Intensified SASM precipitation during the LIA follows reconstructed Northern Hemisphere and North Atlantic cooling, El Niño-like warming in the Pacific, and a southward displacement of the ITCZ over both oceans. These results suggest that SASM mean state changes are sensitive to ITCZ variability as mediated by Western Hemisphere tropical sea surface temperatures, particularly in the Atlantic. Continued Northern Hemisphere and North Atlantic warming may therefore help perpetuate the recent reductions in SASM precipitation that characterize the last 100 years, which would negatively impact Andean water resources.
Publication Proceedings of the National Academy of Sciences
Volume 108
Issue 21
Pages 8583-8588
Date May 24, 2011
Journal Abbr PNAS
DOI 10.1073/pnas.1003719108
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1003719108
Call Number 0000
Extra Keywords: oxygen isotopes; varves; tropical hydroclimate.
Date Added Tue Aug 23 02:37:31 2011
Modified Wed Aug 24 04:40:05 2011

A 200-year fire history in a remnant oak savanna in southeastern Wisconsin

Type Journal Article
Author Joy Wolf
Abstract In oak (Quercus) savannas in the Midwest region of the United States, fire continues to play a significant role in its persistence within the landscape; however, in southeastern Wisconsin, quantified fire history records are limited. This study documented occurrences of fire for the last 200 y using 16 cross-dated oak sections from an oak savanna remnant in Kenosha County, Wisconsin. Fire history was reconstructed by: (1) obtaining fire-scarred cross sections from cut down oaks in an area planned for an industrial park, (2) preparing sample surfaces to count rings, (3) creating skeleton plots to crossdate samples, (4) dating fire scars, (5) calculating intervals between fires and (6) determining seasonality of the fire. In addition, a master chronology was

constructed for the oak savanna using the cross sections to correlate with precipitation. Throughout the entire time series, only 50% of the fire dates were associated with significantly dry years. Although the overall Weibull median interval was 4.59 y, fire frequency fluctuations and gaps reflected specific time periods of human activities. Although some studies report a high fire frequency during Euro-American settlement, in this study the mean fire interval (MFI) was 19.5 y in the early settlement years in 1840–1872 and 4.77 y in the post settlement years in 1873–1979. From 1980 to the present, MFI was 6.7 y. In addition, the data revealed time periods with no fire events: (1) during early Euro-American settlement (1840–1872), (2) land fragmentation and deforestation (1904–1920) and (3) increased industrial zoning (1989–present). Although lightning strikes occur most often during the summer months, the majority of fires that occurred during the dormant season (53%) were set by humans. These data are essential in understanding oak dynamics and in developing management programs for restoration and preservation of remnant areas of oak savanna.

Publication The American Midland Naturalist
Volume 152
Issue 2
Pages 201-213
Date October 2004
Journal Abbr Am. Midl. Nat.
DOI 10.1674/0003-0031(2004)152[0201:AYFHIA]2.0.CO;2
ISSN 1938-4238
URL http://www.bioone.org/doi/abs/10.1674/0003-0031(2004)152%5B0201:AYFHIA%5D2.0.CO%3B2
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:26:48 2011

A 400-year history of fire and oak recruitment in an old-growth oak forest in western Maryland, USA

Type Journal Article
Author Durland L. Shumway
Author Marc D. Abrams
Author Charles M. Ruffner
Abstract We document the fire history and associated ecological changes of an old-growth forest stand in western Maryland, U.S.A. The study area is located on the side slopes of a ridge system (Savage Mountain). Twenty basal cross sections were obtained from old trees cut in 1986, which provided evidence of 42 fires from 1615 to 1958. Nine fires were recorded in the sample trees in the 17th century, 13 in the 18th century, 12 in the 19th century, and eight in the early to mid-20th century. However, there were no major fire years after 1930. The Weibull modal fire interval was 7.6 years. Oaks recruited consistently from the early 1600s to the early 1900s, but there was increased Acer rubrum L. and Betula lenta L. recruitment with fire suppression after 1930. Species recruitment patterns and long-term fire history reported in this study offer important direct support for the hypothesis that periodic fire played an important role in the historical development and perpetuation of oak forests of the mid-Atlantic region before and after European settlement.
Publication Canadian Journal of Forest Research
Volume 31
Issue 8
Pages 1437–1443
Date August 2001
Journal Abbr Can. J. For. Res.
DOI 10.1139/x01-079
ISSN 0045-5067
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x01-079
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:14 2011

A 400-year history of fires on lake islands in south-east Sweden

Type Journal Article
Author Mats Niklasson
Author Igor Drobyshev
Author Tomasz Zielonka
Abstract Island-lake ecosystems are suitable for testing scale dependence in forests disturbance theories thanks to differences in the potential for fire spread on islands and the mainland. We investigated past fire regime on the mainland and on islands in a large lake in south-east Sweden. We used dendrochronological methods to reconstruct fire disturbances on 18 small islands (0.04–24.1 ha) and in 43 sites in the surrounding 75-km2 landscape over the last 400 years. In the past, fires were frequent on both islands and mainland but not synchronised on an annual scale. Significant temporal changes occurred around the middle of the 18th century. Before 1750, fires were less frequent on islands than on the mainland (median fire return interval 58 v. 25 years respectively). However, an inversion of this pattern was observed during 1750–1860: islands showed even shorter fire intervals than mainland locations, suggesting additional and likely human-related source of ignitions (median fire return interval 15 v. 29 years respectively). A substantial decrease in fire activity in both islands and mainland was apparent in 1860–1890. We suggest that the present fire regime (the last 100 years) on the small islands is largely natural as fire suppression is not present there. The dynamic nature of the fire regime on islands still requires further studies: islands may, at times, attract lightning, humans with fire, or both.
Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 1050–1058
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09117
ISSN 1448-5516
URL http://www.publish.csiro.au/?paper=WF09117
Extra Keywords: dendrochronology; disturbance regime; disturbance theory; Fennoscandia; forest fire; land-use history; lightning ignition; Scots pine.
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 23:42:35 2011

A 500 hPa synoptic wildland fire climatology for large Canadian forest fires, 1959-1996

Type Journal Article
Author Walter R. Skinner
Author Michael D. Flannigan
Author Brian J. Stocks
Author David L. Martell
Author B. Mike Wotton
Author J. Bernie Todd
Author John A. Mason
Author Kimberley A. Logan
Author Erin M. Bosch
Abstract In Canada, the average annual area of burned forest has increased from around 1 million ha in the 1970's to over 2.5 million ha in the 1990's. A previous study has identified the link between anomalous mid-tropospheric circulation at 500 hPa over northern North America and wildland fire severity activity in various large regions of Canada over the entire May to August fire season. In this study, a northern North American study region of

the hemispheric gridded 5° latitude by 10° longitude 500 hPa dataset is identified and analysed from 1959 to 1996 for a sequence of six monthly periods through the fire season, beginning in April and ending in September. Synoptic types, or modes of upper air behavior, are determined objectively by the eigenvector method employing K-means cluster analysis. Monthly burned areas from the Canadian Large Fire Database (LFDB) for the same period, 1959 to 1996, are analysed in conjunction with the classified monthly 500 hPa synoptic types. Relationships between common monthly patterns of anomalous upper flow and spatial patterns of large fire occurrence are examined at the ecozone level. Average occurrence of a monthly synoptic type associated with very large area burned is approximately 18% of the years from 1959 to 1996. The largest areas burned during the main fire (May to August) season occur in the western Boreal and Taiga ecozones – the Taiga Plains, Taiga Shield, Boreal West Shield and Boreal Plains. Monthly burned areas are also analysed temporally in conjunction with a calculated monthly zonal index (Zim) for two separate areas defined to cover western and eastern Canada. In both western and eastern Canada, high area burned is associated with synoptic types with mid-tropospheric ridging in the proximity of the affected region and low Zim with weak westerlies and strong meridional flow over western Canada.

Publication Theoretical and Applied Climatology
Volume 71
Issue 3-4
Pages 157-169
Date February 2002
Journal Abbr Theor. Appl. Climatol.
DOI 10.1007/s007040200002
ISSN 0177-798X
URL http://www.springerlink.com/openurl.asp?genre=article&…
Extra Keywords: burned areas; Canada; Canadian Large Fire Database (CLFD); fire climatology.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:39 2011

A 560-year record of Santa Ana fires reconstructed from charcoal deposited in the Santa Barbara Basin, California

Type Journal Article

Author Scott A. Mensing
Author Joel Michaelsen
Author Roger Byrne

Abstract Microscopic charcoal from varved Santa Barbara Basin sediments was used to reconstruct a 560-yr record (A.D. 1425 to 1985) of Santa Ana fires. Comparison of large (>3750 μm^2) charcoal with documented fire records in the Santa Barbara Ranger District shows that high accumulations correspond to large fires (>20,000 ha) that occurred during Santa Ana conditions. The charcoal record reconstructed a minimum of 20 large fires in the Santa Barbara region during the study period. The average time between fires shows no distinct change across three different land use periods: the Chumash period, apparently characterized by frequent burning, the Spanish/Early American period with nominal fire control, and the 20th century with active fire suppression. Pollen data support the conclusion that the fire regime has not dramatically changed during the last 500 yr. Comparison of large charcoal particle accumulation rates and precipitation reconstructed from tree rings show a strong relationship between climate and fire history, with large fires consistently occurring at the end of wet periods and the beginning of droughts.

Publication Quaternary Research
Volume 51
Issue 3
Pages 295–305
Date May 1999
Journal Abbr Quaternary Res.
DOI 10.1006/qres.1999.2035

ISSN 0033-5894
URL http://www.sciencedirect.com/science/article/pii/S0033589499920355
Extra Keywords: Santa Ana; fire history; microscopic charcoal; Santa Barbara Basin; varved sediments.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:22:40 2011

A 9000-year fire history from the Oregon Coast Range, based on a high-resolution charcoal study

Type Journal Article
Author Colin J. Long
Author Cathy Whitlock
Author Patrick J. Bartlein
Author Sarah H. Millspaugh
Abstract High-resolution analysis of macroscopic charcoal in sediment cores from Little Lake was used to reconstruct the fire history of the last 9000 years. Variations in sediment magnetism were examined to detect changes in allochthonous sedimentation associated with past fire occurrence. Fire intervals from ca. 9000 to 6850 calendar years BP averaged 110 ± 20 years, when the climate was warmer and drier than today and xerophytic vegetation dominated. From ca. 6850 to 2750 calendar years BP the mean fire interval lengthened to 160 ± 20 years in conjunction with the onset of cool humid conditions. Fire-sensitive species, such as Thuja plicata Donn ex D. Don, Tsuga heterophylla (Raf.) Sarg., and Picea sitchensis (Bong.) Carr., increased in abundance. At ca. 4000 calendar years BP, increases in allochthonous sedimentation increased the delivery of secondary charcoal to the site. From ca. 2750 calendar years BP to present, the mean fire interval increased to 230 ± 30 years as cool humid conditions and mesophytic taxa prevailed. The Little Lake record suggests that fire frequency has varied continuously on millennial time scales as a result of climate change and the present-day fire regime has been present for no more than 1000 years.
Publication Canadian Journal of Forest Research
Volume 28
Issue 5
Pages 774–787
Date May 1998
Journal Abbr Can. J. For. Res.
DOI 10.1139/cjfr-28-5-774
ISSN 0045-5067
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x98-051
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:48 2011

A brief history of atmospheric general circulation modeling (Chapter 2)

Type Book Section
Author Paul N. Edwards
Abstract This article covers the history of atmospheric general circulation modeling from its prehistory through about 1985. The backgrounds, chief models, and influences of the major GCM modeling groups established in the 1960s (GFDL, UCLA, and NCAR) are discussed. The author solicits comments and criticism for a Web site and future book on this largely unexplored topic.
Book Title General Circulation Model Development: Past, Present, and Future
Series International Geophysics
Volume 70
Place New York, NY
Publisher Academic Press

Date 2001
Pages 67-90
ISBN 0-12-578010-9, 978-0-12-578010-0
URL http://www.sciencedirect.com/science?_ob=ArticleURL&…
Library Catalog Elsevier Science Publishers
Extra doi:10.1016/S0074-6142(00)80050-9
Date Added Sun Aug 28 05:42:07 2011
Modified Sun Aug 28 05:44:34 2011

Notes:

Citation:

Paul N. Edwards, "A Brief History of Atmospheric General Circulation Modeling" in David A. Randall, ed., General Circulation Model Development, Past Present and Future: The Proceedings of a Symposium in Honor of Akio Arakawa (New York: Academic Press, 2000), 67-90

A burning story: The role of fire in the history of life

Type Journal Article
Author Juli G. Pausas
Author Jon E. Keeley
Abstract Ecologists, biogeographers, and paleobotanists have long thought that climate and soils controlled the distribution of ecosystems, with the role of fire getting only limited appreciation. Here we review evidence from different disciplines demonstrating that wildfire appeared concomitant with the origin of terrestrial plants and played an important role throughout the history of life. The importance of fire has waxed and waned in association with changes in climate and paleoatmospheric conditions. Well before the emergence of humans on Earth, fire played a key role in the origins of plant adaptations as well as in the distribution of ecosystems. Humans initiated a new stage in ecosystem fire, using it to make the Earth more suited to their lifestyle. However, as human populations have expanded their use of fire, their actions have come to dominate some ecosystems and change natural processes in ways that threaten the sustainability of some landscapes.
Publication BioScience
Volume 59
Issue 7
Pages 593–601
Date July-August 2009
Journal Abbr BioScience
DOI 10.1525/bio.2009.59.7.10
ISSN 0006-3568
Short Title A burning story
URL http://www.bioone.org/doi/abs/10.1525/bio.2009.59.7.10
Extra Keywords: fire regime; fire history; fire ecology; plant evolution; human evolution.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:29:53 2011

A classification of landscape fire succession models: spatial simulations of fire and vegetation dynamics

Type Journal Article

Author R.E. Keane
Author G.J. Cary
Author I.D. Davies
Author M.D. Flannigan
Author R.H. Gardner
Author S. Lavorel
Author J.M. Lenihan
Author C. Li
Author T.S. Rupp
Abstract A classification of spatial simulation models of fire and vegetation dynamics (landscape fire succession models or LFSMs) is presented. The classificationwas developed to provide a foundation for comparing models and to help identify the appropriate fire and vegetation processes and their simulation to include in coarse scale dynamic global vegetation models. Other uses include a decision tool for research and management applications and a vehicle to interpret differences between LFSMs. The classification is based on the four primary processes that influence fire and vegetation dynamics: fire ignition, fire spread, fire effects, and vegetation succession. Forty-four LFSMs that explicitly simulated the four processes were rated by the authors and the modelers on a scale from 0 to 10 for their inherent degree of stochasticity, complexity, and mechanism for each of the four processes. These ratings were then used to group LFSMs into similar classes using common ordination and clustering techniques. Another database was created to describe each LFSM using selected keywords for over 20 explanatory categories. This database and the ordination and clustering results were then used to create the final LFSM classification that contains 12 classes and a corresponding key. The database and analysis results were used to construct a second classification key so managers can pick the most appropriate model for their application based on computer resources, available modeling expertise, and management objective. Published by Elsevier B.V. Keywords: Spatial simulation models; Fire regime; Model evaluation; Ordination; Model selection
Publication Ecological Modelling
Volume 179
Pages 3–27
Date 2004
Short Title A classification of landscape fire succession models
Library Catalog Google Scholar
Call Number 0080
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

A classification of the forest types of North America

Type Journal Article
Author John L. Vankat
Abstract Previous classifications at continental to state/provincial scales were surveyed in order to produce a new classification of North American forests. This classification is of present-day forests and includes both seral and old-growth forest types. The classification is hierarchical, as physiognomically-based formation types are defined on the basis of growth form of dominant trees and subdivided into forest types according to the species of these dominants. The classification includes a total of 68 forest types and 1 complex of forest types. These are presented by formation type (9) and by forest region (11). The number of formation types is largest in forest regions where major climate types intergrade, i.e., in the United States Coastal Plain and Piedmont Lowland (6 types) and the Central American Montane (5). The number of forest types is largest in the Eastern United States Lowland (12) and the Rocky Moutain—Sierra Madre Oriental—Sierra Madre Occidental Montane (11).
Publication Vegetatio
Volume 88
Issue 1
Pages 53-66
Date July 1990

Journal Abbr Vegetatio
DOI 10.1007/BF00032602
ISSN 0042-3106
URL http://www.jstor.org/stable/20038636
Extra Keywords: Canada; Central America; forest type; formation type; Mexico; vegetation; USA.
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:53:47 2011

A comparison of stand structure and fire history in two black oak woodlands in northwestern Indiana

Type Journal Article
Author Norman R. Henderson
Author James N. Long
Abstract The composition and structure of two black oak woodlands in northwestern Indiana are examined. Current conditions are compared with those existing in the early 1800s, based on public land survey records of the two areas. Fire histories during the past 50 yr are reconstructed from fire scars, age-class distributions, and fire-control records. On the basis of this information, we concluded that frequency and intensity of fire strongly influence stand structure and succession in these black oak woodlands.
Publication Botanical Gazette
Volume 145
Issue 2
Pages 222–228
Date June 1984
Journal Abbr Bot. Gaz.
ISSN 0006-8071
URL http://www.jstor.org/stable/2474343
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:40 2011

A continuous climate-vegetation classification for use in climate-biosphere studies

Type Journal Article
Author Victor Brovkin
Author Andrei Ganopolski
Author Yuri Svirezhev
Abstract An interactive coupling of global climate models with models for the terrestrial vegetation requires a reduction of the number of vegetation classes in comparison with traditional bioclimatic classification. We suggest a continuous vegetation classification based on two main plant functional types: trees and grass. Correspondence between climate and these vegetation types on a global scale was analysed on the basis of state-of-the-art global climate and vegetation datasets. An empirical formula describing a fraction of trees as a function of climate (mean annual temperature and precipitation) was obtained.
Publication Ecological Modelling
Volume 101
Issue 2-3
Pages 251–261
Date 15 August 1997
Journal Abbr Ecol. Model
DOI 10.1016/S0304-3800(97)00049-5
ISSN 0304-3800

URL http://www.sciencedirect.com/science/article/pii/S0304380097000495
Extra Ketwords: vegetation classification; plant functional types; trees; grass.
Date Added Wed Aug 24 05:09:30 2011
Modified Fri Aug 26 20:34:22 2011

A determination of the cloud feedback from climate variations over the past decade

Type Journal Article
Author Andrew E. Dessler
Abstract Estimates of Earth's climate sensitivity are uncertain, largely because of uncertainty in the long-term cloud feedback. I estimated the magnitude of the cloud feedback in response to short-term climate variations by analyzing the top-of-atmosphere radiation budget from March 2000 to February 2010. Over this period, the short-term cloud feedback had a magnitude of 0.54 ± 0.74 (2σ) watts per square meter per kelvin, meaning that it is likely positive. A small negative feedback is possible, but one large enough to cancel the climate's positive feedbacks is not supported by these observations. Both long- and short-wave components of short-term cloud feedback are also likely positive. Calculations of short-term cloud feedback in climate models yield a similar feedback. I find no correlation in the models between the short- and long-term cloud feedbacks.
Publication Science
Volume 330
Issue 6010
Pages 1523-1527
Date 10 December 2010
Journal Abbr Science
DOI 10.1126/science.1192546
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1192546
Date Added Tue Aug 30 04:16:19 2011
Modified Tue Aug 30 04:16:19 2011

A fire history from tree rings in a high-elevation forest of Rocky Mountain National Park

Type Journal Article
Author A. Buechling
Author W.L. Baker
Abstract Historical fire patterns in a subalpine forest of Rocky Mountain National Park were quantified from an analysis of forest stand ages and fire-scarred trees. A comparatively detailed sample of 3461 tree cores and 212 fire scars was collected from a 9200-ha study area north of Estes Park, Colorado. A total of 41 fire events were identified in the record. Annually precise fire dates, beginning in 1533, include 22 high-severity crown fires, 7 low-severity surface fires, and 8 mixed-severity events with both surface and crown fire components. Fire rotation was estimated for both surface fires (7587 years) and crown fires (346 years). Fire rotation did not appear to vary with fuel characteristics associated with topographical differences in the study area. Fires larger than 300 ha were few, but they determined a large proportion of the area burned since 1700 and were significantly correlated with a reconstructed index of summer drought. Low fire activity in the 20th century was associated with decreased severity and frequency of drought episodes. Long fire rotations preclude definitive conclusions regarding the effects of fire suppression in the 20th century, but relationships between high-severity fires, fuels, and drought suggest that climatic variability remains the primary influence on fire cycles in high-elevation ecosystems of the southern Rocky Mountains.
Publication Can. J. For. Res
Volume 34
Date 2004
Library Catalog Google Scholar

Call Number 0035
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

A fire history from tree rings in a high-elevation forest of Rocky Mountain National Park

Type Journal Article
Author Arne Buechling
Author William L. Baker
Abstract Historical fire patterns in a subalpine forest of Rocky Mountain National Park were quantified from an analysis of forest stand ages and fire-scarred trees. A comparatively detailed sample of 3461 tree cores and 212 fire scars was collected from a 9200-ha study area north of Estes Park, Colorado. A total of 41 fire events were identified in the record. Annually precise fire dates, beginning in 1533, include 22 high-severity crown fires, 7 low-severity surface fires, and 8 mixed-severity events with both surface and crown fire components. Fire rotation was estimated for both surface fires (7587 years) and crown fires (346 years). Fire rotation did not appear to vary with fuel characteristics associated with topographical differences in the study area. Fires larger than 300 ha were few, but they determined a large proportion of the area burned since 1700 and were significantly correlated with a reconstructed index of summer drought. Low fire activity in the 20th century was associated with decreased severity and frequency of drought episodes. Long fire rotations preclude definitive conclusions regarding the effects of fire suppression in the 20th century, but relationships between high-severity fires, fuels, and drought suggest that climatic variability remains the primary influence on fire cycles in high-elevation ecosystems of the southern Rocky Mountains.
Publication Canadian Journal of Forest Research
Volume 34
Issue 6
Pages 1259-1273
Date June 2004
Journal Abbr Can. J. For. Res.
DOI 10.1139/x04-012
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x04-012
Date Added Thu Aug 25 10:47:25 2011
Modified Wed Aug 31 00:33:54 2011

A fire history of a subalpine forest in south-eastern Wyoming, USA

Type Journal Article
Author K.F. Kipfmueller
Author W.L. Baker
Abstract Fire history was determined for part of the Routt-Medicine Bow National Forest in south-eastern Wyoming using fire-scar and age-class analysis. A composite chronology of fire events was used to determine mean fire intervals (MFI) for pre-EuroAmerican settlement, EuroAmerican settlement (before 1868 ad), EuroAmerican settlement and modern (after 1912) periods, for all fires and stand-replacing fires. Point-scale MFI was also determined using grand means from individual trees. Stand-replacing fires were reconstructed to determine fire rotation. MFI for the entire time period is 5.5–8.4 years. MFI decreased from 9.3 to 15.7–1.9–2.9 years from the preto post-EuroAmerican settlement periods, and increased during the modern period. Point-scale MFIs are longer than MFI of the study area. Fire rotation is 182 years for the total period of record, but increased from 127 years during the pre-EuroAmerican settlement period to 170 years during the EuroAmerican settlement period. Fire rotation during the modern period dramatically increased to 27,035 years. Results suggest fire suppression may have influenced the fire regime. Comparison of regional fire events with fire events from this study indicate regional weather has an important influence on Rocky Mountain fire regimes. Keywords Fire history, Subalpine forests, Lodgepole pine, Fire-scars, Rocky Mountains, Wyoming.

Publication Journal of Biogeography
Volume 27
Pages 71–85
Date 2000
Library Catalog Google Scholar
Call Number 0070
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

A fire history of a subalpine forest in south-eastern Wyoming, USA

Type Journal Article
Author Kurt F. Kipfmueller
Author William L. Baker
Abstract Fire history was determined for part of the Routt-Medicine Bow National Forest in south-eastern Wyoming using fire-scar and age-class analysis. A composite chronology of fire events was used to determine mean fire intervals (MFI) for pre-EuroAmerican settlement, EuroAmerican settlement (before 1868 ad), EuroAmerican settlement and modern (after 1912) periods, for all fires and stand-replacing fires. Point-scale MFI was also determined using grand means from individual trees. Stand-replacing fires were reconstructed to determine fire rotation. MFI for the entire time period is 5.5–8.4 years. MFI decreased from 9.3 to 15.7–1.9–2.9 years from the preto post-EuroAmerican settlement periods, and increased during the modern period. Point-scale MFIs are longer than MFI of the study area. Fire rotation is 182 years for the total period of record, but increased from 127 years during the pre-EuroAmerican settlement period to 170 years during the EuroAmerican settlement period. Fire rotation during the modern period dramatically increased to 27,035 years. Results suggest fire suppression may have influenced the fire regime. Comparison of regional fire events with fire events from this study indicate regional weather has an important influence on Rocky Mountain fire regimes.
Publication Journal of Biogeography
Volume 27
Issue 1
Pages 71–85
Date January 2000
Journal Abbr J. Biogeogr.
DOI 10.1046/j.1365-2699.2000.00364.x
ISSN 1365-2699
URL http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2699.2000.00364.x/full
Extra Keywords: fire history; subalpine forests; lodgepole pine; fire-scars; Rocky Mountains; Wyoming.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:15:56 2011

A fire history of the high Chisos, Big Bend National Park, Texas

Type Journal Article
Author W. H Moir
Abstract Fire history was studied in cypress forests and pinyon-juniper savannas. Fire dates were determined by tree ring counts from scars on Pinus cembroides. At least 10 fires occurred in the vicinity of Boot Canyon and at least eight on the Rim between 1770 and 1940. Episodic ground fires seem an important mortality factor of established pinyon and cypress saplings, but as trees grow to larger sizes, fire mortality is reduced. Longer fire intervals probably are filters that permit trees to survive into larger, fire-impervious sizes. Surface fires about every 50 years are one way to maintain the vegetation in some semblance of a natural, fire-regulated condition.
Publication The Southwestern Naturalist

Volume 27
Issue 1
Pages 87–98
Date February 19, 1982
Journal Abbr Southwest. Nat.
ISSN 0038-4909
URL http://www.jstor.org/stable/3671411
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:16 2011

A framework to diagnose barriers to climate change adaptation

Type Journal Article
Author Susanne C. Moser
Author Julia A. Ekstrom
Abstract This article presents a systematic framework to identify barriers that may impede the process of adaptation to climate change. The framework targets the process of planned adaptation and focuses on potentially challenging but malleable barriers. Three key sets of components create the architecture for the framework. First, a staged depiction of an idealized, rational approach to adaptation decision-making makes up the process component. Second, a set of interconnected structural elements includes the actors, the larger context in which they function (e.g., governance), and the object on which they act (the system of concern that is exposed to climate change). At each of these stages, we ask (i) what could impede the adaptation process and (ii) how do the actors, context, and system of concern contribute to the barrier. To facilitate the identification of barriers, we provide a series of diagnostic questions. Third, the framework is completed by a simple matrix to help locate points of intervention to overcome a given barrier. It provides a systematic starting point for answering critical questions about how to support climate change adaptation at all levels of decision-making.
Publication Proceedings of the National Academy of Sciences
Volume 107
Issue 51
Pages 22026-22031
Date December 21, 2010
Journal Abbr PNAS
DOI 10.1073/pnas.1007887107
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1007887107
Extra Keywords: adapting; social-ecological system; decision process.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:35:38 2011

A half century of change in alpine treeline patterns at Glacier National Park, Montana, U.S.A.

Type Journal Article
Author Frederick L. Klasner
Author Daniel B. Fagre
Abstract Using sequential aerial photography, we identified changes in the spatial distribution of subalpine fir (Abies lasiocarpa) habitat at the alpine treeline ecotone. Six 40-ha study sites in the McDonald Creek drainage of Glacier National Park contained subalpine fir forests that graded into alpine tundra. Over a 46-yr period, altitudinal changes in the location of alpine treeline ecotone were not observed. However, over this 46-yr period the area of krummholz, patch-forest, and continuous canopy forest increased by 3.4%, and tree density increased within existing patches of krummholz and patch-forest. Change in subalpine fir vegetation patterns

within 100 m of trails was also compared to areas without trails. Within 100 m of trails, the number of small, discrete krummholz stands increased compared to areas without trails, but there was no significant change in total krummholz area. We used historical terrestrial photography to expand the period (to 70 yr) considered. This photography supported the conclusions that a more abrupt ecotone transition developed from forest to tundra at alpine treeline, that tree density within forested areas increased, and that krummholz became fragmented along trails. This local assessment of fine-grained change in the alpine treeline ecotone provides a comparative base for looking at ecotone change in other mountain regions throughout the world.

Publication Arctic, Antarctic, and Alpine Research

Volume 34

Issue 1

Pages 49-56

Date February 2002

Journal Abbr Arctic Antarct Alpine Res.

DOI 10.2307/1552508

ISSN 1523-0430

URL http://www.jstor.org/stable/1552508

Call Number 0072

Date Added Sun Sep 4 03:49:37 2011

Modified Mon Sep 5 10:11:18 2011

A hierarchical fire frequency model to simulate temporal patterns of fire regimes in LANDIS

Type Journal Article

Author Jian Yang

Author Hong S. He

Author Eric J. Gustafson

Abstract Fire disturbance has important ecological effects in many forest landscapes. Existing statistically based approaches can be used to examine the effects of a fire regime on forest landscape dynamics. Most examples of statistically based fire models divide a fire occurrence into two stages—fire ignition and fire initiation. However, the exponential and Weibull fire-interval distributions, which model a fire occurrence as a single event, are often inappropriately applied to these two-stage models. We propose a hierarchical fire frequency model in which the joint distribution of fire frequency is factorized into a series of conditional distributions. The model is consistent with the framework of statistically based approaches because it accounts for the separation of fire ignition from fire occurrence. The exponential andWeibull models are actually special cases of our hierarchical model. In addition, more complicated non-stationary temporal patterns of fire occurrence also can be simulated with the same approach. We implemented this approach as an improved fire module in LANDIS and conducted experiments within forest landscapes of northern Wisconsin and southern Missouri. The results of our experiments demonstrate this new fire module can simulate a wide range of fire regimes across heterogeneous landscapes with a few parameters and a moderate amount of input data. The model possesses great flexibility for simulating temporal variations in fire frequency for various forest ecosystems and can serve as a theoretical framework for future statistical modeling of fire regimes.

Publication Ecological Modelling

Volume 180

Issue 1

Pages 119–133

Date 10 December 2004

Journal Abbr Ecol. Model

DOI 10.1016/j.ecolmodel.2004.03.017

ISSN 0304-3800

URL http://www.sciencedirect.com/science/article/pii/S0304380004003783

Extra Keywords: fire frequency model; fire regime; hierarchical modeling; LANDIS.

Date Added Tue Aug 16 01:32:35 2011

Modified Tue Aug 16 01:32:47 2011

A historical perspective on pitch pine-scrub oak communities in the Connecticut Valley of Massachusetts

Type Journal Article

Author Glenn Motzkin
Author William A. Patterson III
Author David R. Foster

Abstract We present a regional–historical approach to the interpretation, conservation, and management of pitch pine–scrub oak (PPSO) communities in the Connecticut Valley of Massachusetts. Historical studies, aerial photographs, GIS analyses, and extensive field sampling are used to (a) document changes in the historical distribution, composition, and dynamics of these communities, and (b) evaluate the importance of regional–historical approaches to understanding, conserving, and managing uncommon communities. At the time of European settlement, pine plains dominated by both pitch and white pine were widespread, occurring on 9000 ha or more of the extensive (approximately 32,000 ha) xeric outwash deposits in the Connecticut Valley. Pine plains were harvested for diverse forest products from the 17th to the early 19th centuries. After 1830, most sites were cleared and plowed for agriculture and then abandoned in the late 19th and early 20th centuries, resulting in widespread natural reforestation. Modern PPSO communities differ from historical communities with respect to landscape distribution, composition, and structure. Nearly all modern pitch pine stands in the Connecticut Valley became established on former agricultural fields. Current vegetation on these former fields differs substantially from those few sites that were never plowed. In particular, several species (for example, Gaultheria procumbens, Gaylussacia baccata, Quercus ilicifolia, and Q. prinoides) that are characteristic of unplowed sites have not successfully colonized former fields in the 50 to more than 100 years since agricultural abandonment. Urban, commercial, and residential development have been widespread in the 20th century. By 1985, only 38.6% of the outwash deposits remained forested, and only 1094 ha of pitch pine stands and 74 ha of scrub oak stands occurred, primarily in numerous small patches. Several stands have been destroyed since 1985, and development threatens all remaining sites. The trend towards rapid urban development in the 20th century makes it increasingly urgent that the few, relatively large, undeveloped sites be protected. Our results suggest that (a) land protection efforts should prioritize large, undeveloped sand plains, areas that were not plowed historically, and reestablishment of contiguity between isolated sites to facilitate colonization of former agricultural lands by sand plain species; (b) management of PPSO communities should not be restricted to maintenance of open barrens; "old-growth" pitch and white pine stands occurred historically, and some PPSO communities should be allowed to mature without frequent disturbance; (c) the exclusive use of prescribed fires during the spring months is unlikely to maintain communities similar to modern ones or to restore communities similar to historical ones. Establishment or maintenance of open barrens species and communities may require more varied disturbance regimes, perhaps including mechanical treatment in combination with prescribed fire to simulate severe summer fires; (d) regional–historical perspectives are critical for understanding modern community dynamics and for evaluating conservation objectives and management strategies for uncommon plant communities.

Publication Ecosystems
Volume 2
Issue 3
Pages 255–273
Date May-June 1999
Journal Abbr Ecosystems
DOI 10.1007/s100219900073
ISSN 1432-9840
URL http://www.springerlink.com/content/3djya1u7xejrynpn/
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:47:51 2011

A history of fire and vegetation in northeastern Minnesota as recorded in lake sediments

Type Journal Article
Author Albert M. Swain
Abstract The record of charcoal in lake sediments indicates that fire has always been an important ecological factor in the forest history of northeastern Minnesota. The annually laminated sediments of Lake of the Clouds permit precise dating of the charcoal peaks and record the changes in the influx of various pollen types. A detailed record of the past 1000 yr shows that the average frequency of fire is approximately 60–70 yr, with a range of about 20–100 yr. The amount of charcoal in sediments dating between 1000-500 y.a. is consistently higher than that for the last 500 yr, although the fire frequency for the two periods was not appreciably different. Pollen analysis shows no change or only short-term changes in the percentages of major pollen types following charcoal peaks.
Publication Quaternary Research
Volume 3
Issue 3
Pages 383–390
Date October 1973
Journal Abbr Quaternary Res.
DOI 10.1016/0033-5894(73)90004-5
ISSN 0033-5894
URL http://www.sciencedirect.com/science/article/pii/0033589473900045
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:26 2011

A history of forest policy in the United States

Type Journal Article
Author James L Huffman
Abstract no abstract
Publication Environmental Law
Volume 8
Pages 239-280
Date 1977-1978
Journal Abbr Envtl. L.
ISSN 0046-2276
URL http://heinonline.org/HOL/LandingPage?collection=journals&…
Loc. in Archive Environmental law / Northwestern School of Law of Lewis and Clark College
Call Number 0000
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:30:58 2011

A large and persistent carbon sink in the world's forests

Type Journal Article
Author Yude Pan
Author Richard A. Birdsey
Author Jingyun Fang
Author Richard Houghton

Author Pekka E. Kauppi
Author Werner A. Kurz
Author Oliver L. Phillips
Author Anatoly Z. Shvidenko
Author Simon L. Lewis
Author Josep G. Canadell
Author Philippe Ciais
Author Robert B. Jackson
Author Stephen Pacala
Author A. David McGuire
Author Shilong Piao
Author Aapo Rautiainen
Author Stephen Sitch
Author Daniel Hayes
Abstract The terrestrial carbon sink has been large in recent decades, but its size and location remain uncertain. Using forest inventory data and long-term ecosystem carbon studies, we estimate a total forest sink of 2.4 ± 0.4 petagrams of carbon per year (Pg C year^{-1}) globally for 1990 to 2007. We also estimate a source of 1.3 ± 0.7 Pg C year^{-1} from tropical land-use change, consisting of a gross tropical deforestation emission of 2.9 ± 0.5 Pg C year^{-1} partially compensated by a carbon sink in tropical forest regrowth of 1.6 ± 0.5 Pg C year^{-1}. Together, the fluxes comprise a net global forest sink of 1.1 ± 0.8 Pg C year^{-1}, with tropical estimates having the largest uncertainties. Our total forest sink estimate is equivalent in magnitude to the terrestrial sink deduced from fossil fuel emissions and land-use change sources minus ocean and atmospheric sinks.
Publication Science
Volume 333
Issue 6045
Pages 988-993
Date 19 August 2011
Journal Abbr Science
DOI 10.1126/science.1201609
ISSN 0036-8075
URL http://www.sciencemag.org/content/333/6045/988.full
Call Number 0000
Date Added Mon Aug 29 22:29:37 2011
Modified Wed Aug 31 00:24:34 2011

A mathematical model for predicting fire spread in wildland fuels

Type Report
Author Richard C. Rothermel
Abstract A mathematical fire model for predicting rate of spread and intensity that is applicable to a wide range of wildland fuels and environment is presented. Methods of incorporating mixtures of fuel sizes are introduced by weighting input parameters by surface area. The input parameters do not require a prior knowledge of the burning characteristics of the fuel.
Report Number INT-RP-115
Report Type Research Paper
Place Ogden, UT
Institution U.S. Department of Agriculture, Intermountain Forest and Range Experiment Station
Date January 1972
Pages 40 p.
URL http://www.treesearch.fs.fed.us/pubs/32533

Extra Keywords: fire spread; intensity; wildland fuels; fire model.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:27 2011

Notes:

Citation:

Rothermel, Richard C. 1972. A mathematical model for predicting fire spread in wildland fuels. Res. Pap. INT-115. Ogden, UT: U.S. Department of Agriculture, Intermountain Forest and Range Experiment Station. 40 p.

A model for predicting synoptic weather types based on model output statistics

Type Journal Article
Author Morris H. McCutchan
Abstract An objective classification model was developed that can automatically predict synoptic weather types in southern California. Stepwise discriminant analysis was used to match the National Meteorological Center's Limited-area Fine Mesh (LFM) Model Output Statistics to subjectively classified weather types or patterns. The five classified weather types range from hot, dry, windy Santa Ana days to cool, rainy, cloudy days caused by a synoptic low. Discriminant function equations were developed for predicting each weather type 12 and 24 h in advance by screening 80 potential predictors consisting of forecasts at 500, 700 and 850 mb from the LFM model. Model output at nine grid points was used because that information adequately describes the meteorological patterns over southern California. Using independent LFM model forecasts valid 12 and 24 h in advance, the objective classification model predicted the probability of the days being in each of the five weather types, then the type with the highest probability was selected. Eighty-eight of 107 24 h periods (days) centered 12 h in advance (81%) were correctly predicted. Of 99 independent days centered 24 h in advance, 71 (72%) were correctly predicted. Hourly means and standard deviations of surface temperature and dew points at eight research sites in the San Bernardino Mountains computed by month for the five weather types had distinct diurnal variations corresponding with weather types. Summarizing hourly temperatures in August at the eight sites by weather type reduced their standard deviation by almost one-half. Measurements of mean daily maximum ozone at a San Bernardino Mountain crest site, where chronic ozone injury to ponderosa pine has occurred, showed significant differences between the weather types. The mean surface wind, temperature and dew-point patterns at 2100 GMT over southern California for type 1 (Santa Ana) days show strong offshore winds, high temperatures and very low dew points, whereas type 5 (synoptic low) days show strong onshore winds, low temperatures and high dew points.
Publication Journal of Applied Meteorology
Volume 17
Issue 10
Pages 1466-1475
Date October 1978
Journal Abbr J. Appl. Meteorol.
DOI 10.1175/1520-0450(1978)017<1466:AMFPSW>2.0.CO;2
ISSN 0021-8952
URL http://dx.doi.org/10.1175%2F1520-0450%281978%29017%3C1466%3AAMFPSW%3E2.0.CO%3B2
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:45:17 2011

A modified Köppen classification applied to model simulations of glacial and interglacial climates

Type Journal Article
Author Peter J. Guetter
Author John E. Kutzbach

Abstract A series of experiments was done using an atmospheric general circulation model to simulate climates from full glacial time at 18 ka (thousands of years before the present) to the present at 3000 year intervals, and at 126 ka, the previous interglacial period. A modified Köppen climate classification was developed to aid in the interpretation of the results of the circulation model experiments. The climate classification scheme permits the characterization of eleven distinct seasonal temperature and precipitation regimes. For the modern climate, the modified classification agrees well with a classification of natural vegetation zones, and provides an easily-assimilated depiction of climate changes resulting from the varying boundary conditions in the past. At 18 ka, the time of glacial maximum, 45% of the land surface had climate classifications different from the present. At 126 ka, a time when northern hemisphere summer radiation was much greater than at present owing to changes in the date of perihelion and tilt of the earth's axis, the corresponding difference was 32%. For all experiments - 3 to 18 ka and 126 ka - only 30% of the land surface showed no change in climate classification from the present. Core areas showing no change included the Amazon basin, the northern Sahara and Australia.

Publication Climatic Change
Volume 16
Issue 2
Pages 193–215
Date April 1990
Journal Abbr Climatic Change
DOI 10.1007/BF00134657
ISSN 0165-0009
URL http://www.springerlink.com/content/th2705356518105x/
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:10 2011

A national cohesive wildland fire management strategy

Type Report
Author Danny C. Lee
Author Alan A. Ager
Author Dave E. Calkin
Author Mark A. Finney
Author Matthew P. Thompson
Author Thomas M. Quigley
Author Charles W. McHugh
Abstract no abstract
Report Type Cohesive Strategy Reports
Place Washington, D.C.
Institution Wildland Fire Leadership Council (WFLC)
Date March 2011
Pages 40 p.
URL http://www.forestsandrangelands.gov/strategy/
Loc. in Archive Forests and Rangelands
Call Number 0000
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:03 2011

A national ecological network for research and education

Type Journal Article
Author Margaret Lowman

Author Charlene D'Avanzo
Author Carol Brewer
Abstract no abstract
Publication Science
Volume 323
Issue 5918
Pages 1172-1173
Date 27 February 2009
Journal Abbr Science
DOI 10.1126/science.1166945
ISSN 0036-8075
Short Title Ecology
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1166945
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:37:58 2011

A new look at atmospheric carbon dioxide

Type Journal Article
Author David J. Hofmann
Author James H. Butler
Author Pieter P. Tans
Abstract Carbon dioxide is increasing in the atmosphere and is of considerable concern in global climate change because of its greenhouse gas warming potential. The rate of increase has accelerated since measurements began at Mauna Loa Observatory in 1958 where carbon dioxide increased from less than 1 part per million per year (ppm yr^{-1}) prior to 1970 to more than 2 ppm yr^{-1} in recent years. Here we show that the anthropogenic component (atmospheric value reduced by the pre-industrial value of 280 ppm) of atmospheric carbon dioxide has been increasing exponentially with a doubling time of about 30 years since the beginning of the industrial revolution (not, vert, similar1800). Even during the 1970s, when fossil fuel emissions dropped sharply in response to the “oil crisis” of 1973, the anthropogenic atmospheric carbon dioxide level continued increasing exponentially at Mauna Loa Observatory. Since the growth rate (time derivative) of an exponential has the same characteristic lifetime as the function itself, the carbon dioxide growth rate is also doubling at the same rate. This explains the observation that the linear growth rate of carbon dioxide has more than doubled in the past 40 years. The accelerating growth rate is simply the outcome of exponential growth in carbon dioxide with a nearly constant doubling time of about 30 years (about 2%/yr) and appears to have tracked human population since the pre-industrial era.
Publication Atmospheric Environment
Volume 43
Issue 12
Pages 2084-2086
Date April 2009
Journal Abbr Atmo. Environ.
DOI 10.1016/j.atmosenv.2008.12.028
ISSN 1352-2310
URL http://linkinghub.elsevier.com/retrieve/pii/S1352231008011540
Extra Keywords: climate change; carbon dioxide.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:02 2011

A new look at global forest histories of land clearing

Type Journal Article
Author Michael Williams
Abstract Uncertainty about historical evidence of forest clearing is highlighted; nevertheless, its longevity and basic importance for survival make an understanding of the process important. First, archaeological and paleobotanical evidence for clearing during late Mesolithic and Neolithic Europe is examined. A similar examination of the Americas during past millennia emphasizes the myth of a pristine precontact forest. Post-1950s deforestation is beset with similar problems of forest extent and loss, pathways and processes of change, and the rate of change. Recent literature also reflects concerns about past and present motives in clearing and management, emphasizing conflicts between traditional users and modern producers, North/South inequalities of consumption/production, and social confrontation. The cultural meaning of the forest is another current theme, developed through dominant “discourses.” Finally, I argue that humans and the organic world are intimately entwined, and our expectations and ideas of the natural world actually mold the way we use and manipulate it.
Publication Annual Review of Environment and Resources
Volume 33
Issue 1
Pages 345–367
Date November 2008
Journal Abbr Annu. Rev. Environ. Resour.
DOI 10.1146/annurev.environ.33.040307.093859
ISSN 1543-5938
URL http://www.annualreviews.org/doi/full/10.1146/annurev.environ.33.040307.093859
Extra Keywords: contemporary deforestation; ethics of clearing; historical uncertainty; prehistoric cleaning.
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:26:54 2011

A new method for determining the reliability of dynamical ENSO predictions

Type Journal Article
Author Richard Kleeman
Author Andrew M. Moore
Abstract Determination of the reliability of particular ENSO forecasts is of particular importance to end users. Theoretical arguments are developed that indicate that the amplitudes of slowly decaying (or growing) normal modes of the coupled system provide a useful measure of forecast reliability. Historical forecasts from a skillful prediction model together with a series of ensemble predictions from a “perfect model” experiment are used to demonstrate that these arguments carry over to the practical prediction situation. In such a setting it is found that the amplitude of the dominant normal mode, which strongly resembles the observed ENSO cycle, is a potentially useful index of reliability. The fact that this index was generally lower in the 1970s than the 1980s provides an explanation for why many coupled models performed better in the latter decade. It does not, however, explain the low skill of some coupled models in the early 1990s as the index defined here was then moderate.
Publication Monthly Weather Review
Volume 127
Issue 5
Pages 694-705
Date May 1999
Journal Abbr Mon. Wea. Rev.
DOI 10.1175/1520-0493(1999)127<0694:ANMFDT>2.0.CO;2
ISSN 0027-0644

URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0493%281999%29127%3C0694%3AANMFDT%3E2.0.CO%3B2
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:15:37 2011

A new model for atmospheric oxygen over Phanerozoic time

Type Journal Article
Author Robert A. Berner
Author Donald E. Canfield
Abstract A mathematical model has been constructed that enables calculation of the level of atmospheric O_2 over the past 570 my from rates of burial and weathering of organic carbon (C) and pyrite sulfur (S). Burial rates as a function of time are calculated from an assumed constant worldwide clastic sedimentation rate and the relative abundance, and C and S contents, of the three rock types: marine sandstones and shales, coal basin sediments, and other non-marine clastics (red beds, arkoses). By our model, values of O_2 versus time, using a constant total sedimentation rate, agree with those for variable sedimentation derived from present-day rock abundances and estimates of erosional losses since deposition. This agreement is the result of our reliance on the idea that any increase in total worldwide sediment burial, with consequently faster burial of C and S and greater O_2 production, must be accompanied by a corresponding increase in erosion and increased exposure of C and S on the continents to O_2 consumption via weathering. It is the redistribution of sediment between the three different rock types, and not total sedimentation rate, that is important in O_2 control. To add stability to the system, negative feedback against excessive O_2 fluctuation was provided in the modeling by the geologically reasonable assignment of higher weathering rates to younger rocks, resulting in rapid recycling of C and S. We did not use direct O_2 negative feedback on either weathering of C and S or burial of C because weathering rates are assumed to be limited by uplift and erosion, and the burial rate of C limited by the rate of sediment deposition. The latter assumption is the result of modern sediment studies which show that marine organic matter burial occurs mainly in oxygenated shallow water and is limited by the rate of supply of nutrients to the oceans by rivers. Results of the modeling indicate that atmospheric O_2 probably has varied appreciably over Phanerozoic time. During the Late Carboniferous and Permian periods O_2 was higher than previously because of the rise of vascular land plants and the widespread burial of organic matter in vast coal swamps. A large decrease in O_2 during the Late Permian was due probably to the drying-up of the coal swamps and deposition of a large proportion of total sediment in C and S-free continental red beds. Sensitivity study shows that major parameters affecting results are the mean C concentration in coal basins and the relative sizes of the reservoirs of young (rapidly recycled) versus old rocks. Less sensitivity was found for changes over time in total land area undergoing weathering and the use of direct O_2 negative feedback on marine carbon burial. Good agreement for rates of C burial calculated via our model and via independent models, which are based on the use of stable carbon isotopes, indicates that the dominant factor that has brought about changes in atmospheric O_2 level (and the isotopic composition of dissolved inorganic carbon in seawater) over Phanerozoic time is sedimentation and not weathering or higher temperature phenomena such as basalt-seawater reaction.
Publication American Journal of Science
Volume 289
Issue 4
Pages 333-361
Date April 1989
Journal Abbr Am. J. Sci.
DOI 10.2475/ajs.289.4.333
ISSN 0002-9599
URL http://www.ncbi.nlm.nih.gov/pubmed/11539776
Date Added Tue Aug 23 02:17:40 2011
Modified Wed Aug 24 04:40:26 2011

A new, lower value of total solar irradiance: Evidence and climate significance

Type Journal Article
Author Greg Kopp
Author Judith L. Lean
Abstract The most accurate value of total solar irradiance during the 2008 solar minimum period is 1360.8 ± 0.5 Wm^{-2} according to measurements from the Total Irradiance Monitor (TIM) on NASA's Solar Radiation and Climate Experiment (SORCE) and a series of new radiometric laboratory tests. This value is significantly lower than the canonical value of 1365.4 ± 1.3 Wm^{-2} established in the 1990s, which energy balance calculations and climate models currently use. Scattered light is a primary cause of the higher irradiance values measured by the earlier generation of solar radiometers in which the precision aperture defining the measured solar beam is located behind a larger, view-limiting aperture. In the TIM, the opposite order of these apertures precludes this spurious signal by limiting the light entering the instrument. We assess the accuracy and stability of irradiance measurements made since 1978 and the implications of instrument uncertainties and instabilities for climate research in comparison with the new TIM data. TIM's lower solar irradiance value is not a change in the Sun's output, whose variations it detects with stability comparable or superior to prior measurements; instead, its significance is in advancing the capability of monitoring solar irradiance variations on climate-relevant time scales and in improving estimates of Earth energy balance, which the Sun initiates.
Publication Geophysical Research Letters
Volume 38
Issue 1
Pages L01706 (7 p.)
Date January 2011
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2010GL045777
ISSN 0094-8276
URL http://www.agu.org/pubs/crossref/2011/2010GL045777.shtml
Call Number 0000
Extra Keywords: solar irradiance; solar variability; climate variability; global climate models.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:17:02 2011

A numerical analysis of Holocene forest and prairie vegetation in central Minnesota

Type Journal Article
Author George L. Jacobson
Author Eric C. Grimm
Abstract Fossil-pollen samples from Billy's Lake in central Minnesota are compared with 105 presettlement pollen samples from Minnesota and adjacent states by ordinating both sets of data with detrended correspondence analysis. The pollen record from Billy's Lake reveals that the vegetation changed from pine forest (10000-8020 BP), to prairie (8020-3400 BP), to deciduous forest (3400-1000 BP), and finally back to pine forest (1000 BP-present). The numerical comparison indicates that most of the fossil samples have analogs in the presettlement pollen assemblages from Minnesota. Fossil samples from the early Holocene pine forest/prairie transition have no analogs because a belt of deciduous forest presently occurs between pine forests and prairie. The early prairie also has no analogs in Minnesota because of abundant Artemisia, which today is characteristic of prairie farther west. This Artemisia-rich prairie may indicate that the climatic gradient across the region was steeper in the early Holocene than at present. The rate of polynological change is assessed by smoothing the Billy's Lake pollen curve through the ordination. Change is continual throughout the last 10000 yr, but is most rapid in the early and late Holocene and least rapid 7000-6000 BP, when prairie occurred in the region. Inasmuch as pollen-assemblage change reveals vegetational change, these results show that, in central Minnesota, vegetational constancy has been low for at least 9000 of the past 10 000 yr.
Publication Ecology
Volume 67
Issue 4
Pages 958-966

Date August 1986
Journal Abbr Ecology
DOI 10.2307/1939818
ISSN 0012-9658
URL http://www.jstor.org/stable/1939818
Call Number 0068
Extra Keywords: constancy; DECORANA; forest; Holocene; Minnesota; ordination; paleoecology; palynology; prairie; vegetation.
Date Added Sun Sep 4 03:28:26 2011
Modified Mon Sep 5 10:11:31 2011

A polycentric approach for coping with climate change

Type Report
Author Elinor Ostrom
Abstract This paper proposes an alternative approach to addressing the complex problems of climate change caused by greenhouse gas emissions. The author, who won the 2009 Nobel Prize in Economic Sciences, argues that single policies adopted only at a global scale are unlikely to generate sufficient trust among citizens and firms so that collective action can take place in a comprehensive and transparent manner that will effectively reduce global warming. Furthermore, simply recommending a single governmental unit to solve global collective action problems is inherently weak because of freerider problems. For example, the Carbon Development Mechanism (CDM) can be 'gamed' in ways that hike up prices of natural resources and in some cases can lead to further natural resource exploitation. Some flaws are also noticeable in the Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) program. Both the CDM and REDD are vulnerable to the free-rider problem. As an alternative, the paper proposes a polycentric approach at various levels with active oversight of local, regional, and national stakeholders. Efforts to reduce global greenhouse gas emissions are a classic collective action problem that is best addressed at multiple scales and levels. Given the slowness and conflict involved in achieving a global solution to climate change, recognizing the potential for building a more effective way of reducing green house gas emissions at multiple levels is an important step forward. A polycentric approach has the main advantage of encouraging experimental efforts at multiple levels, leading to the development of methods for assessing the benefits and costs of particular strategies adopted in one type of ecosystem and compared to results obtained in other ecosystems. Building a strong commitment to find ways of reducing individual emissions is an important element for coping with this problem, and having others also take responsibility can be more effectively undertaken in small- to medium-scale governance units that are linked together through information networks and monitoring at all levels. This paper was prepared as a background paper for the 2010 World Development Report on Climate Change.
Report Number WPS5095
Report Type Policy Research Working Paper
Series Title The Policy Research Working Paper Series
Place Workshop in Political Theory and Policy Analysis, Indiana University
Institution World Bank
Date October 2009
Pages 56 p.
URL http://wdronline.worldbank.org/worldbank/a/nonwdrdetail/162
Extra This paper—prepared as a background paper to the World Bank's World Development Report 2010: Development in a Changing Climate—is a product of the Development Economics Vice Presidency.
Date Added Sat Aug 27 18:47:28 2011
Modified Sat Aug 27 18:48:54 2011

A postglacial palaeoecological record from the San Juan Mountains of Colorado USA: Fire, climate and vegetation history

Type Journal Article
Author Jaime L. Toney
Author R. Scott Anderson
Abstract Continuous sediment, charcoal and pollen records were developed from a-4.5 m sediment core from Little Molas Lake (LML), 3370 m elevation, San Juan County, CO. LML formed by 11 200 cal. BP subsequent to glacial retreat. Turbated clay and gyttja was derived from in-lake productivity and outwash sediments from the drainage basin from 1 1 200 cal. BP until-10 200 cal. BP. Cessation of glacial input and replacement of tundra with Picea forest correlates with the termination of the Younger Dryas and indicates warming. An increase in diploxylon pollen (cf. P ponderosa), probably from lower elevations, reflects the influence of the southwestern monsoon c. 10 160 cal. BP. Pollen ratios indicate that Picea and other conifers persisted near the lake for the remainer of the Holocene. The driest Holocene period occurs c. 6200 to 5900 cal. BP, when lake levels were the lowest as indicated by all the proxy records. Wetter conditions during the last c. 2600 cal. BP favoured the expansion of P edulis and P ponderosa. Lateglacial fire events occurred on average every 65 years with a doubling of the fire return interval in the early Holocene. The former may reflect an increase in biomass for burning during a period of rapid vegetation turnover. The lowest fire event frequency occurs during the Neoglacial (after c. 4100), during a period of moister and cooler climate. The most recent pronounced peak in charcoal coincides with the historically documented AD 1879 Lime Creek Burn.
Publication The Holocene
Volume 16
Issue 4
Pages 505 -517
Date May 2006
Journal Abbr Holocene
DOI 10.1191/0959683606hl946rp
ISSN 1477-0911
Short Title A postglacial palaeoecological record from the San Juan Mountains of Colorado USA
URL http://hol.sagepub.com/content/16/4/505.abstract
Extra Keywords: palaeoecology; vegetation history; Southern Rocky Mountains; pollen analysis; charcoal analysis; Holocene; fire history.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:00 2011

A pragmatic approach to functional ecology

Type Journal Article
Author Paul A. Keddy
Abstract no abstract
Publication Functional Ecology
Volume 6
Issue 6
Pages 621–626
Date 1992
Journal Abbr Funct. Ecol.
DOI 10.2307/2389954
ISSN 1365-2435
URL http://www.jstor.org/stable/2389954
Call Number 0118
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 07:18:14 2011

A project for monitoring trends in burn severity

Type Journal Article
Author Jeff Eidenshink
Author Brian Schwind
Author Ken Brewer
Author Zhi-Liang Zhu
Author Brad Quayle
Author Stephen Howard
Abstract Elected officials and leaders of environmental agencies need information about the effects of large wildfires in order to set policy and make management decisions. Recently, the Wildland Fire Leadership Council (WFLC), which implements and coordinates the National Fire Plan (NFP) and Federal Wildland Fire Management Policies (National Fire Plan 2004), adopted a strategy to monitor the effectiveness of the National Fire Plan and the Healthy Forests Restoration Act (HFRA). One component of this strategy is to assess the environmental impacts of large wildland fires and identify the trends of burn severity on all lands across the United States. To that end, WFLC has sponsored a six-year project, Monitoring Trends in Burn Severity (MTBS), which requires the U.S. Department of Agriculture Forest Service (USDA-FS) and the U.S. Geological Survey (USGS) to map and assess the burn severity for all large current and historical fires. Using Landsat data and the differenced Normalized Burn Ratio (dNBR) algorithm, the USGS Center for Earth Resources Observation and Science (EROS) and USDA-FS Remote Sensing Applications Center will map burn severity of all fires since 1984 greater than 202 ha (500ac) in the east, and 404 ha (1,000 ac) in the west. The number of historical fires from this period combined with current fires occurring during the course of the project will exceed 9,000. The MTBS project will generate burn severity data, maps, and reports, which will be available for use at local, state, and national levels to evaluate trends in burn severity and help develop and assess the effectiveness of land management decisions. Additionally, the information developed will provide a baseline from which to monitor the recovery and health of fire-affected landscapes over time. Spatial and tabular data quantifying burn severity will augment existing information used to estimate risk associated with a range of current and future resource threats. The annual report of 2004 fires has been completed. All data and results will be distributed to the public on a Web site.
Publication Fire Ecology
Volume 3
Issue 1
Pages 3-21
Date November 2007
Journal Abbr Fire Ecol.
DOI 10.4996/fireecology.0301003
ISSN 1933-9747
URL http://fireecology.net/index.php?option=com_journal&…
Extra Keywords: burn severity; fire atlas; monitoring; normalized burn ratio; remote sensing.
Date Added Sun Aug 28 05:42:07 2011
Modified Sun Aug 28 05:42:07 2011

A quantitative approach to developing regional ecosystem classifications

Type Journal Article
Author George E. Host
Author Philip L. Polzer
Author David J. Mladenoff
Author Mark A. White
Author Thomas R. Crow

Abstract Ecological land classification systems have recently been developed at continental, regional, state, and landscape scales. In most cases, the map units of these systems result from subjectively drawn boundaries, often derived by consensus and with unclear choice and weighting of input data. Such classifications are of variable accuracy and are not reliably repeatable. We combined geographic information systems (GIS) with multivariate statistical analyses to integrate climatic, physiographic, and edaphic databases and produce a classification of regional landscape ecosystems on a 29 340-km² quadrangle of northwestern Wisconsin. Climatic regions were identified from a high-resolution climatic database consisting of 30-yr mean monthly temperature and precipitation values interpolated over a 1-km² grid across the study area. Principal component analysis (PCA) coupled with an isodata clustering algorithm was used to identify regions of similar seasonal climatic trends. Maps of Pleistocene geology and major soil morphosequences were used to identify the major physiographic and soil regions within the landscape. Climatic and physiographic coverages were integrated to identify regional landscape ecosystems, which potentially differ in characteristic forest composition, successional dynamics, potential productivity, and other ecosystem-level processes. Validation analysis indicated strong correspondence between forest cover classes from an independently derived Landsat Thematic Mapper classification and ecological region. The development of more standardized data sets and analytical methods for ecoregional classification provides a basis for sound interpretations of forest management at multiple spatial scales.

Publication Ecological Applications
Volume 6
Issue 2
Pages 608–618
Date May 1996
Journal Abbr Ecol. Appl.
DOI 10.2307/2269395
ISSN 1051-0761
URL http://www.jstor.org/stable/2269395
Extra Keywords: climate; ecological land classification; geographic information systems; landscape ecosystem; physiography; Wisconsin.
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:35:01 2011

A review of uncertainties in global temperature projections over the twenty-first century

Type Journal Article
Author Reto Knutti
Author Myles R. Allen
Author Pierre Friedlingstein
Author Jonathan M. Gregory
Author Gabriele C. Hegerl
Author Gerald A. Meehl
Author Malte Meinshausen
Author James M. Murphy
Author Gian-Kasper Plattner
Author Sarah C. B. Raper
Author Thomas F. Stocker
Author Peter A. Stott
Author Haiyan Teng
Author Tom M. L. Wigley
Abstract Quantification of the uncertainties in future climate projections is crucial for the implementation of climate policies. Here a review of projections of global temperature change over the twenty-first century is provided for the six illustrative emission scenarios from the Special Report on Emissions Scenarios (SRES) that assume no policy intervention, based on the latest generation of coupled general circulation models, climate models of

intermediate complexity, and simple models, and uncertainty ranges and probabilistic projections from various published methods and models are assessed. Despite substantial improvements in climate models, projections for given scenarios on average have not changed much in recent years. Recent progress has, however, increased the confidence in uncertainty estimates and now allows a better separation of the uncertainties introduced by scenarios, physical feedbacks, carbon cycle, and structural uncertainty. Projection uncertainties are now constrained by observations and therefore consistent with past observed trends and patterns. Future trends in global temperature resulting from anthropogenic forcing over the next few decades are found to be comparably well constrained. Uncertainties for projections on the century time scale, when accounting for structural and feedback uncertainties, are larger than captured in single models or methods. This is due to differences in the models, the sources of uncertainty taken into account, the type of observational constraints used, and the statistical assumptions made. It is shown that as an approximation, the relative uncertainty range for projected warming in 2100 is the same for all scenarios. Inclusion of uncertainties in carbon cycle–climate feedbacks extends the upper bound of the uncertainty range by more than the lower bound.

Publication Journal of Climate
Volume 21
Issue 11
Pages 2651-2663
Date June 2008
Journal Abbr J. Climate
DOI 10.1175/2007JCLI2119.1
ISSN 0894-8755
URL http://journals.ametsoc.org/doi/abs/10.1175/2007JCLI2119.1
Call Number 0000
Extra Keywords: temperature; anthropogenic effects; climate predictions; climate models; greenhouse gases.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:16:38 2011

A simple type of wood in two early Devonian plants

Type Journal Article

Author Philippe Gerrienne
Author Patricia G. Gensel
Author Christine Strullu-Derrien
Author Hubert Lardeux
Author Philippe Steemans
Author Cyrille Prestianni

Abstract The advent of wood (secondary xylem) is a major event of the Paleozoic Era, facilitating the evolution of large perennial plants. The first steps of wood evolution are unknown. We describe two small Early Devonian (407 to 397 million years ago) plants with secondary xylem including simple rays. Their wood currently represents the earliest evidence of secondary growth in plants. The small size of the plants and the presence of thick-walled cortical cells confirm that wood early evolution was driven by hydraulic constraints rather than by the necessity of mechanical support for increasing height. The plants described here are most probably precursors of lignophytes.

Publication Science
Volume 333
Issue 6044
Pages 837-837
Date 12 August 2011
Journal Abbr Science
DOI 10.1126/science.1208882
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1208882

Date Added Mon Aug 29 06:17:09 2011
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A spatially-explicit reconstruction of historical fire occurrence in the ponderosa pine zone of the Colorado Front Range

Type Journal Article
Author Rosemary L. Sherriff
Author Thomas T. Veblen
Abstract A key issue in ecosystem management in the western U.S. is the determination of the historic range of variability of fire and its ecological significance prior to major land-use changes associated with Euro-American settlement. The present study relates spatial variation in historical fire occurrence to variation in abiotic and biotic predictors of fire frequency and severity across the elevational range of ponderosa pine in northern Colorado. Logistic regression was used to relate fire frequency to environmental predictors and to derive a probability surface for mapping purposes. These results indicate that less than 20% of the ponderosa pine zone had an historic fire regime (pre-1915) of relatively frequent fires (mean fire intervals, MFI, <30 years). More than 80% is reconstructed to have had a lower frequency (MFI ≥ 30 years), more variable severity fire regime. High fire frequency is clearly associated with low elevations. Lower and more variable fire frequencies, associated with high and moderate severities, occur across a broad range of elevation and are related to variations in other environmental variables. Only a small part of the ponderosa pine zone fits the widespread view that the historic fire regime was characterized mainly by frequent, low-severity that maintained open conditions. Management attempts to restore historic forest structures and/or fire conditions must recognize that infrequent severe fires were an important component of the historic fire regime in this cover type in northern Colorado.
Publication Ecosystems
Volume 10
Issue 2
Pages 311-323
Date March 2007
Journal Abbr Ecosystems
DOI 10.1007/s10021-007-9022-2
ISSN 1432-9840
URL http://www.springerlink.com/content/n84105g7m62128g1/
Extra Keywords: fire history; ponderosa pine; Pinus ponderosa; geographic information system; Colorado Front Range; fire regime.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:29:52 2011

A statistical-topographic model for mapping climatological precipitation over mountainous terrain

Type Journal Article
Author Christopher Daly
Author Ronald P. Neilson
Author Donald L. Phillips
Abstract The demand for climatological precipitation fields on a regular grid is growing dramatically as ecological and hydrological models become increasingly linked to geographic information systems that spatially represent and manipulate model output. This paper presents an analytical model that distributes point measurements of monthly and annual precipitation to regularly spaced grid cells in midlatitude regions. PRISM (Precipitation-elevation Regressions on Independent Slopes Model) brings a combination of climatological and statistical concepts to the analysis of orographic precipitation. Specifically, PRISM 1) uses a digital elevation model (DEM) 10 estimate the “orographic” elevations of precipitation stations; 2) uses the DEM and a windowing

technique to group stations onto individual topographic facets; 3) estimates precipitation at a DEM grid cell through a regression of precipitation versus DEM elevation developed from stations on the cell's topographic facet; and 4) when possible, calculates a prediction interval for the estimate, which is an approximation of the uncertainty involved. PRISM exhibited the lowest cross-validation bias and absolute error when compared to kriging, detrended kriging, and cokriging in the Willamette River basin, Oregon. PRISM was also applied to northern Oregon and to the entire western United States; detrended kriging and cokriging could not be used, because there was no overall relationship between elevation and precipitation. Cross-validation errors in these applications were confined to relatively low levels because PRISM continually adjusts its frame of reference by using localized precipitation-DEM elevation relationships.

Publication Journal of Applied Meteorology
Volume 33
Issue 2
Pages 140-158
Date February 1994
Journal Abbr J. Appl. Meteorol.
DOI 10.1175/1520-0450(1994)033<0140:ASTMFM>2.0.CO;2
ISSN 0894-8763
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0450%281994%29033%3C0140%3AASTMFM%3E2.0.CO%3B2
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 01:02:53 2011

A strategy for climate change stabilization experiments

Type Journal Article

Author Kathy A. Hibbard
Author Gerald A. Meehl
Author Peter M. Cox
Author Pierre Friedlingstein

Abstract Climate models used for climate change projections are on the threshold of including much greater biological and chemical detail than previous models. Today, standard climate models (referred to generically as atmosphere-ocean general circulation models, or AOGCMs) include components that simulate the coupled atmosphere, ocean, land, and sea ice. Some modeling centers are now incorporating carbon cycle models into AOGCMs in a move toward an Earth system model (ESM) capability. Additional candidate components to include in ESMs are aerosols, chemistry, ice sheets, and dynamic vegetation.

Publication EOS Transactions American Geophysical Union
Volume 88
Issue 20
Pages 217, 219, 221
Date 15 May 2007
Journal Abbr EOS Trans. AGU
DOI doi:10.1029/2007EO200002
ISSN 0096-3941
URL http://www.agu.org/pubs/crossref/2007/2007EO200002.shtml
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:34:35 2011

A synoptic climatology for forest-fires in the NE US and future implications from GCM simulations

Type Journal Article

Author Eugene S. Takle
Author Daniel J. Bramer
Author Warren E. Heilman
Author Metinka R. Thompson
Abstract We studied surface-pressure patterns corresponding to reduced precipitation, high evaporation potential, and enhanced forest-fire danger for West Virginia, which experienced extensive forest-fire damage in November 1987. From five years of daily weather maps we identified eight weather patterns that describe distinctive flow situations throughout the year. Map patterns labeled extended-high, back-of-high, and pre-high were the most frequently occurring patterns that accompany forest fires in West Virginia and the nearby four-stare region. Of these, back-of-high accounted for a disproportionately large amount of fire-related damage. Examination of evaporation acid precipitation data showed that these three patterns and high-to-the-south patterns ail led to drying conditions and all other patterns led to moistening conditions. Surface-pressure fields generated by the Canadian Climate Centre global circulation model for simulations of the present ($1xCO_2$) climate and $2xCO_2$ climate were studied to determine whether forest-fire potential would change under increased atmospheric CO_2. The analysis showed a tendency for increased frequency of drying in the NE US, but the results were not statistically significant.
Publication International Journal of Wildland Fire
Volume 4
Issue 4
Pages 217-224
Date January 1994
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF9940217
ISSN 1049-8001
URL http://www.publish.csiro.au/paper/WF9940217
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:05 2011

A synthesis of plant invasion effects on biodiversity across spatial scales

Type Journal Article
Author Kristin I. Powell
Author Jonathan M. Chase
Author Tiffany M. Knight
Abstract • Premise of the study: Invasive plant species are typically thought to pose a large threat to native biodiversity, and local-scale studies typically confirm this view. However, plant invaders rarely cause regional extirpations or global extinctions, causing some to suggest that invasive species' influence on native biodiversity may not be so dire. We aim to synthesize the seemingly conflicting literature in plant invasion biology by evaluating the effects of invasive plant species across spatial scales. • Methods: We first conducted a meta-analysis on the effects of invasive plants on the species richness of invaded communities across a range of spatial extents. We then discuss studies that consider the role of invasive plants on regional spatial scales for which such meta-analyses are not possible. Finally, we develop a conceptual framework to synthesize the influence of invasive species across spatial scales by explicitly recognizing how invasive species alter species-occupancy distributions. • Key results: We found a negative relationship between the spatial extent of the study and the effect size of invasive plants on species richness. Our simulation models suggest that this result can occur if invaders, either proportionately or disproportionately, reduce the occupancy of common species to a greater degree than rare species. • Conclusions: Future studies should consider the influence of invaders on the abundance and occupancy-level changes in native species to inform how invasive plants will influence native species richness relationships across spatial scales. This approach will allow greater predictive ability for forecasting changes in biodiversity in the face of anthropogenic biological invasions and will inform invasive species management and restoration.
Publication American Journal of Botany
Volume 98

Issue 3
Pages 539-548
Date March 2011
Journal Abbr Am. J. Bot.
DOI 10.3732/ajb.1000402
ISSN 0002-9122
URL http://www.amjbot.org/cgi/doi/10.3732/ajb.1000402
Extra Keywords: biodiversity; biological invasions; common; effect size; invasive plants; meta-analysis; occupancy; rare; spatial scale; species richness.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:27:26 2011

A unified modeling approach to climate system prediction

Type Journal Article
Author James Hurrell
Author Gerald A. Meehl
Author David Bader
Author Thomas L. Delworth
Author Ben Kirtman
Author Bruce Wielicki
Abstract There is a new perspective of a continuum of prediction problems, with a blurring of the distinction between short-term predictions and long-term climate projections. At the heart of this new perspective is the realization that all climate system predictions, regardless of time scale, share common processes and mechanisms; moreover, interactions across time and space scales are fundamental to the climate system itself. Further, just as seasonal-to-interannual predictions start from an estimate of the state of the climate system, there is a growing realization that decadal and longer-term climate predictions could be initialized with estimates of the current observed state of the atmosphere, oceans, cryosphere, and land surface. Even though the prediction problem itself is seamless, the best practical approach to it may be described as unified: models aimed at different time scales and phenomena may have large commonality but place emphasis on different aspects of the system. The potential benefits of this commonality are significant and include improved predictions on all time scales and stronger collaboration and shared knowledge, infrastructure, and technical capabilities among those in the weather and climate prediction communities.
Publication Bulletin of the American Meteorological Society
Volume 90
Issue 12
Pages 1819-1832
Date December 2009
Journal Abbr BAMS
DOI 10.1175/2009BAMS2752.1
ISSN 0003-0007
URL http://journals.ametsoc.org/doi/abs/10.1175/2009BAMS2752.1
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:30:44 2011

A very inconvenient truth

Type Journal Article
Author Charles H. Greene
Author D. James Baker

Author Daniel H. Miller

Abstract Studies conducted after those that contributed to the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (FAR) suggest that human society may be facing a very inconvenient truth—that emission reduction efforts alone are unlikely to stabilize greenhouse gas concentrations at levels low enough to prevent dangerous anthropogenic interference with the climate system. Here, we discuss reasons why the IPCC process is prone to underestimating the threats of global climate change. We then review some of the critical policy-relevant scientific findings that have emerged since the release of the IPCC FAR. Finally, we discuss how these new findings fundamentally transform the debate on efforts needed to prevent dangerous changes to our climate system. It now appears that to avoid such changes, society will likely need to adopt a mixed strategy of reducing greenhouse gas emissions and employing geoengineering approaches that extract carbon dioxide from the atmosphere and/or reduce the level of incoming solar radiation reaching Earth's surface.

Publication Oceanography

Volume 23

Issue 1

Pages 214–218

Date March 2010

Journal Abbr Oceanography

ISSN 1042-8275

URL http://www.doaj.org/doaj?func=abstract&…

Extra Keywords: climate change; geoengineering; anthropogenic interference; carbon dioxide; global warming; greenhouse gases.

Date Added Mon Aug 29 06:17:09 2011

Modified Mon Aug 29 15:58:11 2011

A world ecoregions map for resource reporting

Type Journal Article

Author Robert G. Bailey

Author Howard C. Hogg

Abstract An international project is proposed to create a map showing the world subdivided into macroecosystem regions within each of which ecological conditions are relatively uniform but which show certain natural potentials and limitations. The map should tend to supplement the Dasmann-Udvardy system of biogeographical provinces, being of higher resolution and greater ecological relevance. The primary purpose of the map will be to serve as a reporting structure for information about global resources and environment, though it will be based largely on published information. Maps based on classification of climatic types, vegetation formations, and soil groups, will be synthesized and generalized to delineate the areas to be shown on the ecoregion map. Its delineations will be refined through consultations with local experts, and through the interpretation of low-resolution remote-sensing imagery. The usefulness of the map is considered favourably in relation to national-level policy analysis, environmental monitoring, transfer of agricultural technology, compatibility with remote-sensing systems for monitoring environmental conditions, and agricultural activities, biomass estimation, macroreserve selection, and land management.

Publication Environmental Conservation

Volume 13

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Date Autumn 1986

Journal Abbr Envir. Conserv.

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ISSN 0376-8929

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Date Added Tue Aug 16 11:29:48 2011

Modified Tue Aug 16 11:31:25 2011

Aboriginal man and white men as historical causes of fires in the boreal forest, with particular reference to Alaska

Type Report
Author Harold J. Lutz
Abstract The boreal forest of North America is especially liable to destruction by fires. It is a region in which forest fires have been extremely common and wide spreading. Lightning is certainly one of the causes of fires but man, both aboriginal and white, has been an even more prolific source. The general attitude of aboriginal man toward fire was that of carelessness. Campfires were in general use and the evidence is that they were not carefully extinguished but frequently started forest fires. Use of fire in signaling was widespread and must have been a major source of forest fires. Wherever the birch bark canoe was used, frequent gumming of sewn seams was necessary along with repairs of cracks or tears in the bark. This necessitated making a fire for heating and applying the gum; the evidence is that this use of fire at least occasionally lead to fires in the forest. Fires were at times used in hunting but this practice probably was not an important source of forest burning. On some occasions, at least, aboriginal man seems to have employed fire in warfare but evidence on this use is scanty. In his efforts to combat mosquitoes and gnats, aboriginal man generally employed fire and smoke and this led to frequent forest fires. Of the miscellaneous uses of fire by aboriginal man that occasionally must have led to forest burning the following seem most worthy oi mention: clearing away of forest growth, cutting down trees, cutting up of trunks of fallen, or felled trees and killing trees for a supply of dry fuel. It seems certain that even prior to contact with white man, aboriginal man was responsible for frequent and widespread fires in the boreal forest. White man was, without doubt, the cause of even more fires in the boreal forest than was aboriginal man. He was generally careless and possessed easier means of striking fire. Campfires left without being extinguished resulted in a tremendous amount of forest burning. The frequent practice of setting fires to provide a supply of dry fuelwood likewise led to much forest destruction. Fires set to combat the mosquito pest were so frequently a cause of forest burning that it was commonly said that "mosquitoes cause more fires than any other one thing." Use of fire in signaling was not confined to the natives; the practice was also employed by white man and is known to have resulted in extensive forest fires. White man also adopted, at least occasionally, the practice of using fire in hunting. He burned off the forest to promote the growth of grass for his livestock, and he employed fire in clearing land. Prospectors were known to burn the forest to remove the vegetation mantle and expose the surface rock. Incredible as it may be, white man is also known to have set the forest afire just to see it burn or "for fun." In the boreal forest there were many fires whose causes are unknown. Some of these must have resulted from lightning but it is likely that most of them were caused by man, either aboriginal or white. It is probable that there have been fires in the northern forests ever since there were forests to burn. Destruction of timber and other values has been enormous but the boreal forest has generally shown a remarkable capacity to recover, to rise again, phoenix-like, from its own ashes.
Report Number 65
Report Type Yale School of Forestry Bulletin
Place New Haven, CT
Institution Yale University
Date 1959
Pages 49 p.
URL http://ir.library.oregonstate.edu/xmlui/handle/1957/11281
Library Catalog Oregon State University
Call Number 0037
Date Added Sun Sep 4 05:42:53 2011
Modified Mon Sep 5 10:11:04 2011

Aboriginal use of fire: Are there any “natural” plant communities?

Type Book Section
Author Gerald W. Williams

Abstract	no abstract
Book Title	Wilderness and Political Ecology: Aboriginal Influences and the Original State of Nature
Place	Salt Lake City, UT
Publisher	University of Utah Press
Date	September 2002
Pages	179-214
ISBN	0874807190, 9780874807196
Short Title	Aboriginal use of fire
URL	http://westinstenv.org/histwl/2010/03/04/aboriginal-use-of-fire-are-there-any-%E2%80%9Cnatural%E2%80%9D-plant-communities/
Date Added	Sat Aug 27 00:55:16 2011
Modified	Wed Aug 31 00:26:58 2011

Notes:

Book - Table of Contents:

Citation:

The following essay is a slight revision of a chapter to be printed in a volume edited by Charles E. Kay and Randy T. Simmons (eds.) Wilderness and Political Ecology: Aboriginal Land Management–Myths and Reality. Logan, UT: University of Utah Press. 2002.

Gerald W. Williams. 2002. Aboriginal Use of Fire: Are There Any “Natural” Plant Communities? IN Wilderness and Political Ecology: Aboriginal Influences and the Original State of Nature, Charles E. Kay and Randy T. Simmons (eds.) University of Utah Press.

Accurate radiometry from space: An essential tool for climate studies

Type Journal Article
Author Nigel Fox
Author Andrea Kaiser-Weiss
Author Werner Schmutz
Author Kurtis Thome
Author Dave Young
Author Bruce Wielicki
Author Rainer Winkler
Author Emma Woolliams
Abstract The Earth's climate is undoubtedly changing; however, the time scale, consequences and causal attribution remain the subject of significant debate and uncertainty. Detection of subtle indicators from a background of natural variability requires measurements over a time base of decades. This places severe demands on the instrumentation used, requiring measurements of sufficient accuracy and sensitivity that can allow reliable judgements to be made decades apart. The International System of Units (SI) and the network of National Metrology Institutes were developed to address such requirements. However, ensuring and maintaining SI traceability of sufficient accuracy in instruments orbiting the Earth presents a significant new challenge to the metrology community. This paper highlights some key measurands and applications driving the uncertainty demand of the climate community in the solar reflective domain, e.g. solar irradiances and reflectances/radiances of the Earth. It discusses how meeting these uncertainties facilitate significant improvement in the forecasting abilities of climate models. After discussing the current state of the art, it describes a new satellite mission, called TRUTHS, which enables, for the first time, high-accuracy SI traceability to be established in orbit. The direct use of a ‘primary standard’ and replication of the terrestrial traceability chain extends the SI into space, in effect realizing a ‘metrology laboratory in space’.
Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences
Volume 369
Issue 1953
Pages 4028-4063
Date 28 October 2011
Journal Abbr Phil. Trans. R. Soc. A
DOI 10.1098/rsta.2011.0246
ISSN 1364-503X, 1471-2962
Short Title Accurate radiometry from space
URL http://rsta.royalsocietypublishing.org/lookup/doi/10.1098/rsta.2011.0246
Call Number 0000
Extra Keywords: climate change; Earth observation; satellites; radiometry; solar irradiance.
Date Added Thu Sep 22 03:09:07 2011
Modified Wed Sep 28 17:53:55 2011

Adapting to the impacts of climate change - America’s climate choices: Panel on adapting to the impacts of climate change

Type Book
Author National Research Council
Abstract Much of the nation's experience to date in managing and protecting its people, resources, and infrastructure is based on the historic record of climate variability during a period of relatively stable climate. This report from the America's Climate Choices suite of studies concludes that adaptation to climate change calls for a new paradigm--one that considers a range of possible future climate conditions and associated impacts, some well outside the realm of past experience. Adaptation is a process that requires actions from many decision-makers in federal, state, tribal, and local governments, the private sector, non-governmental organizations, and community groups. However, current adaptation efforts are hampered by a lack of solid information about the benefits, costs, and effectiveness of various adaptation options, by uncertainty about future climate impacts at a scale necessary for decision-making, and by a lack of coordination. The report calls for a national adaptation

strategy to support and coordinate decentralized efforts. As part of this strategy, the federal government should provide technical and scientific resources that are currently lacking at the local or regional scale, incentives for local and state authorities to begin adaptation planning, guidance across jurisdictions, shared lessons learned, and support of scientific research to expand knowledge of impacts and adaptation.

Place	Washington, D.C.
Publisher	National Academies Press
Date	2010
# of Pages	325 p.
ISBN	0-309-14592-9
URL	http://americasclimatechoices.org/paneladaptation.shtml
Date Added	Sat Aug 27 22:34:48 2011
Modified	Sat Aug 27 22:37:49 2011

Addressing climate change in the forest vegetation simulator to assess impacts on landscape forest dynamics

Type	Journal Article
Author	Nicholas. L Crookston
Author	Rehfeldt, Gerald E.
Author	Dixon, Gary E.
Author	Weiskittel, Aaron R.
Abstract	To simulate stand-level impacts of climate change, predictors in the widely used Forest Vegetation Simulator (FVS) were adjusted to account for expected climate effects. This was accomplished by: (1) adding functions that link mortality and regeneration of species to climate variables expressing climatic suitability, (2) constructing a function linking site index to climate and using it to modify growth rates, and (3) adding functions accounting for changing growth rates due to climate-induced genetic responses. For three climatically diverse landscapes, simulations were used to explore the change in species composition and tree growth that should accompany climate change during the 21st century. The simulations illustrated the changes in forest composition that could accompany climate change. Projections were the most sensitive to mortality, as the loss of trees of a dominant species heavily influenced stand dynamics. While additional work is needed on fundamental plant–climate relationships, this work incorporates climatic effects into FVS to produce a new model called Climate–FVS. This model provides for managers a tool that allows climate change impacts to be incorporated in forest plans.
Publication	Forest Ecology and Management
Volume	260
Issue	7
Pages	1198-1211
Date	31 August 2010
Journal Abbr	Forest Ecol. Manag.
DOI	10.1016/j.foreco.2010.07.013
ISSN	0378-1127
URL	http://www.sciencedirect.com/science/article/pii/S0378112710003853
Archive	http://www.treesearch.fs.fed.us/pubs/35984
Call Number	0004
Extra	Keywords: species–climate relationships; stand dynamics; species composition; genetic adaptation; general circulation model; climate change; carbon loads; site index; growth and yield.
Date Added	Sun Sep 4 02:40:26 2011
Modified	Mon Sep 5 10:11:09 2011

Advancing the science of climate change : America's Climate Choices

Type Book
Author National Research Council
Abstract "Climate change is occurring, is caused largely by human activities, and poses significant risks for--and in many cases is already affecting--a broad range of human and natural systems. The compelling case for these conclusions is provided in Advancing the Science of Climate Change, part of a congressionally requested suite of studies known as America's Climate Choices. While noting that there is always more to learn and that the scientific process is never closed, the book shows that hypotheses about climate change are supported by multiple lines of evidence and have stood firm in the face of serious debate and careful evaluation of alternative explanations. As decision makers respond to these risks, the nation's scientific enterprise can contribute through research that improves understanding of the causes and consequences of climate change and also is useful to decision makers at the local, regional, national, and international levels. The book identifies decisions being made in 12 sectors, ranging from agriculture to transportation, to identify decisions being made in response to climate change. Advancing the Science of Climate Change calls for a single federal entity or program to coordinate a national, multidisciplinary research effort aimed at improving both understanding and responses to climate change. Seven cross-cutting research themes are identified to support this scientific enterprise. In addition, leaders of federal climate research should redouble efforts to deploy a comprehensive climate observing system, improve climate models and other analytical tools, invest in human capital, and improve linkages between research and decisions by forming partnerships with action-oriented programs"--Publisher's description.
Edition 1st edition
Place Washington D.C.
Publisher National Academies Press
Date 2010
# of Pages 528 p.
ISBN 9780309145886, 0309145880
URL http://americasclimatechoices.org/panelscience.shtml
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

After the Ice Age: The return of life to glaciated North America

Type Book
Author Evelyn Christine Pielou
Abstract Description: The fascinating story of how a harsh terrain that resembled modern Antarctica has been transformed gradually into the forests, grasslands, and wetlands we know today. "One of the best scientific books published in the last ten years."--Ottowa Journal "A valuable new synthesis of facts and ideas about climate, geography, and life during the past 20,000 years. More important, the book conveys an intimate appreciation of the rich variety of nature through time."--S. David Webb, Science
Edition reprint, illustrated
Place Chicago, IL
Publisher University of Chicago Press
Date December 1992
# of Pages 376 p.
ISBN 0226668126, 9780226668123
Short Title After the ice age
URL http://www.press.uchicago.edu/ucp/books/book/chicago/A/bo3697245.html
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:27:26 2011

Notes:

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Agricultural origins and dispersals

Type	Book
Author	Carl O. Sauer
Abstract	no abstract
Series	Bowman Memorial Lectures. Ser. 2.
Place	New York, NY
Publisher	The American Geographical Society, George Grady Press
Date	1952
# of Pages	110 p.
URL	http://www.archive.org/details/agriculturalorig033518mbp
Loc. in Archive	Osmania University
Date Added	Sun Aug 28 17:22:41 2011
Modified	Wed Aug 31 00:25:55 2011

Aids to determining fuel models for estimating fire behavior

Type Report
Author Hal E. Anderson
Abstract Research Summary: This report presents photographic examples, tabulations, and a similarity chart to assist fire behavior officers, fuel management specialists, and other field personnel in selecting a fuel model appropriate for a specific field situation. Proper selection of a fuel model is a critical step in the mathematical modeling of fire behavior and fire danger rating. This guide will facilitate the selection of the proper fire behavior fuel model and will allow comparison with fire danger rating fuel models. The 13 fire behavior fuel models are presented in 4 fuel groups: grasslands, shrublands, timber, and slash. Each group comprises three or more fuel models; two or more photographs illustrate field situations relevant to each fuel model. The 13 fire behavior fuel models are crossreferenced to the 20 fuel models of the National Fire Danger Rating System by means of a similarity chart. Fire behavior fuel models and fire danger rating fuel models, along with the fire-carrying features of the model and its physical characteristics, are described in detail.
Report Number GTR-INT-122
Report Type General Technical Report
Place Ogden, UT
Institution U.S.Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station
Date April 1982
Pages 22 p.
URL http://www.treesearch.fs.fed.us/pubs/6447
Extra Keywords: forest fuels; modeling; fire behavior.
Date Added Mon Aug 15 23:21:26 2011
Modified Thu Sep 1 05:19:54 2011

Notes:

Citation:

Anderson, Hal E. 1982. Aids to determining fuel models for estimating fire behavior. Gen. Tech. Rep. INT-122. Ogden, Utah: U.S.Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 22p.

Alaska’s changing fire regime - implications for the vulnerability of its boreal forests

Type Journal Article
Author Eric S. Kasischke
Author David L. Verbyla
Author T. Scott Rupp
Author A. David McGuire
Author Karen A. Murphy
Author Randi Jandt
Author Jennifer L. Barnes
Author Elizabeth E. Hoy
Author Paul A. Duffy
Author Monika Calef
Author Merritt R. Turetsky
Abstract A synthesis was carried out to examine Alaska’s boreal forest fire regime. During the 2000s, an average of 767 000 ha·year–1 burned, 50% higher than in any previous decade since the 1940s. Over the past 60 years, there was a decrease in the number of lightning-ignited fires, an increase in extreme lightning-ignited fire events, an increase in human-ignited fires, and a decrease in the number of extreme human-ignited fire events. The fraction of area burned from human-ignited fires fell from 26% for the 1950s and 1960s to 5% for the 1990s

and 2000s, a result from the change in fire policy that gave the highest suppression priorities to fire events that occurred near human settlements. The amount of area burned during late-season fires increased over the past two decades. Deeper burning of surface organic layers in black spruce (Picea mariana (Mill.) BSP) forests occurred during late-growing-season fires and on more well-drained sites. These trends all point to black spruce forests becoming increasingly vulnerable to the combined changes of key characteristics of Alaska's fire regime, except on poorly drained sites, which are resistant to deep burning. The implications of these fire regime changes to the vulnerability and resilience of Alaska's boreal forests and land and fire management are discussed.

Publication Canadian Journal of Forest Research
Volume 40
Issue 7
Pages 1313-1324
Date July 2010
Journal Abbr Can. J. For. Res.
DOI 10.1139/X10-098
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/X10-098
Extra This article is one of a selection of papers from The Dynamics of Change in Alaska's Boreal Forests: Resilience and Vulnerability in Response to Climate Warming.
Date Added Tue Aug 30 14:37:15 2011
Modified Sun Sep 4 03:00:48 2011

Amazon drought and its implications for forest flammability and tree growth: A basin-wide analysis

Type Journal Article

Author Daniel Nepstad
Author Paul Lefebvre
Author Urbano Lopes da Silva
Author Javier Tomasella
Author Peter Schlesinger
Author Luiz Solorzano
Author Paulo Moutinho
Author David Ray
Author Jose Guerreira Benito

Abstract Severe drought in moist tropical forests provokes large carbon emissions by increasing forest flammability and tree mortality, and by suppressing tree growth. The frequency and severity of drought in the tropics may increase through stronger El Niño Southern Oscillation (ENSO) episodes, global warming, and rainfall inhibition by land use change. However, little is known about the spatial and temporal patterns of drought in moist tropical forests, and the complex relationships between patterns of drought and forest fire regimes, tree mortality, and productivity. We present a simple geographic information system soil water balance model, called RisQue (Risco de Queimada – Fire Risk) for the Amazon basin that we use to conduct an analysis of these patterns for 1996–2001. RisQue features a map of maximum plant-available soil water (PAWmax) developed using 1565 soil texture profiles and empirical relationships between soil texture and critical soil water parameters. PAW is depleted by monthly evapotranspiration (ET) fields estimated using the Penman–Monteith equation and satellite-derived radiation inputs and recharged by monthly rain fields estimated from 266 meteorological stations. Modeled PAW to 10 m depth (PAW10 m) was similar to field measurements made in two Amazon forests. During the severe drought of 2001, PAW10 m fell to below 25% of PAWmax in 31% of the region's forests and fell below 50% PAWmax in half of the forests. Field measurements and experimental forest fires indicate that soil moisture depletion below 25% PAWmax corresponds to a reduction in leaf area index of approximately 25%, increasing forest flammability. Hence, approximately one-third of Amazon forests became susceptible to fire during the 2001 ENSO period. Field measurements also suggest that the ENSO drought of 2001 reduced carbon storage by approximately 0.2 Pg relative to years without severe soil moisture deficits. RisQue is sensitive to spin-up time, rooting depth, and errors in ET estimates. Improvements in our ability to accurately model soil moisture content of Amazon forests will depend upon better understanding of forest rooting depths, which can extend to beyond 15 m. RisQue provides a tool for early detection of forest fire risk.

Publication Global Change Biology
Volume 10
Issue 5
Pages 704-717
Date May 2004
Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1529-8817.2003.00772.x
ISSN 1354-1013
Short Title Amazon drought and its implications for forest flammability and tree growth
URL http://www.blackwell-synergy.com/links/doi/10.1111%2Fj.1529-8817.2003.00772.x
Extra Keywords: evapotranspiration; fire; hydrology; NPP; rainforest; soil moisture; tropical; water balance.
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:37:30 2011

America's ancient forests: From the ice age to the age of discovery

Type Book
Author Thomas M. Bonnicksen
Abstract no abstract
Edition 1st edition
Place New York, Chichester, Brisbane, Toronto, Singapore, Weinheim
Publisher John Wiley and Sons
Date January 2000
# of Pages 608 p.
ISBN 0471136220, 9780471136224
Short Title America's ancient forests
URL http://www.wiley.com/WileyCDA/WileyTitle/productCd-0471136220.html
Date Added Tue Aug 23 03:38:26 2011
Modified Wed Aug 24 04:39:41 2011

Notes:

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- Spruce Migration.
- Trees Abandon the Great Plains.
- Trees Advance in the Midwest and East.
- Trees Advance in the West.
- The Great Drought.
- The Next Ice Age.

4. Ancient People in a New World.
    - First Footprint.
    - Passage South.
    - Setting the West.
    - The Way East.
    - Trail to Florida.
    - Journey to Another Continent.
5. Taming a Wilderness.
    - Mammoth Hunters.
    - Ice Age Extinctions.
    - The Holocene.
    - Bison Hunters.
    - Hunter-Gatherers.
    - Decline and Return of the Bison.
    - Settlement and the Seasonal Round.
    - Harvesting the Forest. (Nourishment and Healing. Temporary and Portable Shelter. Plank Houses and Canoes.)
6. Enhancing Nature's Bounty.
    - Wild Gardens.
    - Agriculture and Forests in the Southwest. (The Hohokam. The Anasazis.)
    - Agriculture and Forests in the East. (Early Mound Builders. The Adena. The Hopewell. The Mississippians.)
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    - Historical Times.
7. Fire Masters.
    - A World of Fire. (Hissing, Roaring Flames. Fire People. Country Very Smoky.)
    - Their Fires are Left Burning.
    - The Ominous Smoke Signal.
    - Firing the Forests of Their Enemies.
    - Fire Hunters. (Circles of Fire. Their Wings are Scorched. That Necessity May Drive Them. Green and Fair Pasturage. To Render Hunting Easier.)
    - Just Set Your Teepee Up There.
    - They Knew Where to Burn. (Little Hair (Pelillo). To Dry and Cook. Straight and Slender.)
    - Burned Places in the Forest (Go-ley-day). (Keeping the Country Open. A Pleasant Meadow. Prairies and Open Grounds along the Coast. Little Knots of Deer. To Prepare the Ground.)
    - They Cleared the Way with Fire.
    - Because the Woods Were Not Burnt.

PART TWO: FORESTS AT DISCOVERY.

1. Timeless Qualities of Ancient Forests.
    - Patches.
    - Succession.
    - Shifting Mosaics.
    - Mutual Dependence.
2. The Spanish Explorer's Forests.
    - Southern Pine Forests.
    - Piñon-Juniper and Juniper Woodlands.
    - Pacific Oak Woodlands.
    - Valley Woodlands.
    - Foothill Woodlands.
    - Coastal Woodlands.
    - Northern Woodlands.
    - Coast Redwood Forest.
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    - Eastern White Pine Forest.

- Beech-Maple Forest.
- Red Spruce--Fir and Balsam Fir Forests.
- Southern Red Spruce--Fir Forest.
- Northern Red Spruce--Fir Forest.
- High Mountain Balsam Fir Forest.

4. Forests of the Fathers.
    - White Spruce Forest.
    - Great Lakes Pine Forests.
    - Jack Pine Forest.
    - Red and White Pine Forests.
    - Oak-Hickory Forest.
    - Oak Savannas.
    - Bottomland and Protected Forests.
    - Oak Woodlands.
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    - Lodgepole Pine Forest.
    - Pacific Douglas-fir (*Pseudotsuga menziesii*) Forest.
    - Giant Sequoia Forest.

American forests : A history of resiliency and recovery

Type Book
Author Douglas W. MacCleery
Abstract no abstract
Series Forest History Society’s Issues Series
Edition 1st edition
Place Durham N.C.
Publisher U.S. Dept. of Agriculture Forest Service in cooperation with Forest History Society
Date October 1992
# of Pages 58 p.
ISBN 9780890300480
Short Title American forests
URL http://www.foresthistory.org/publications/Issues/amforests.html
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:21:08 2011

Amount and timing of permafrost carbon release in response to climate warming

Type Journal Article
Author Kevin Schaefer
Author Tingjun Zhang
Author Lori Bruhwiler
Author Andrew P. Barrett
Abstract The thaw and release of carbon currently frozen in permafrost will increase atmospheric CO_2 concentrations and amplify surface warming to initiate a positive permafrost carbon feedback (PCF) on climate. We use surface weather from three global climate models based on the moderate warming, A1B Intergovernmental Panel on Climate Change emissions scenario and the SiBCASA land surface model to estimate the strength and timing of the PCF and associated uncertainty. By 2200, we predict a 29–59% decrease in permafrost area and a 53–97 cm increase in active layer thickness. By 2200, the PCF strength in terms of cumulative permafrost carbon flux to the atmosphere is 190 ± 64 Gt C. This estimate may be low because it does not account for amplified surface warming due to the PCF itself and excludes some discontinuous permafrost regions where

SiBCASA did not simulate permafrost. We predict that the PCF will change the arctic from a carbon sink to a source after the mid-2020s and is strong enough to cancel 42–88% of the total global land sink. The thaw and decay of permafrost carbon is irreversible and accounting for the PCF will require larger reductions in fossil fuel emissions to reach a target atmospheric CO_2 concentration.

Publication Tellus B
Volume 63
Issue 2
Pages 165–180
Date April 2011
Journal Abbr Tellus B
DOI 10.1111/j.1600-0889.2011.00527.x
ISSN 02806509
URL http://doi.wiley.com/10.1111/j.1600-0889.2011.00527.x
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:26:00 2011

Amplification and dampening of soil respiration by changes in temperature variability

Type Journal Article
Author Carlos A. Sierra
Author Mark E. Harmon
Author Enrique Thomann
Author Steven S. Perakis
Author Hank W. Loescher
Abstract Accelerated release of carbon from soils is one of the most important feedbacks related to anthropogenically induced climate change. Studies addressing the mechanisms for soil carbon release through organic matter decomposition have focused on the effect of changes in the average temperature, with little attention to changes in temperature variability. Anthropogenic activities are likely to modify both the average state and the variability of the climatic system; therefore, the effects of future warming on decomposition should not only focus on trends in the average temperature, but also variability expressed as a change of the probability distribution of temperature. Using analytical and numerical analyses we tested common relationships between temperature and respiration and found that the variability of temperature plays an important role determining respiration rates of soil organic matter. Changes in temperature variability, without changes in the average temperature, can affect the amount of carbon released through respiration over the long-term. Furthermore, simultaneous changes in the average and variance of temperature can either amplify or dampen the release of carbon through soil respiration as climate regimes change. These effects depend on the degree of convexity of the relationship between temperature and respiration and the magnitude of the change in temperature variance. A potential consequence of this effect of variability would be higher respiration in regions where both the mean and variance of temperature are expected to increase, such as in some low latitude regions; and lower amounts of respiration where the average temperature is expected to increase and the variance to decrease, such as in northern high latitudes.
Publication Biogeosciences Discussions
Volume 7
Issue 6
Pages 8979-9008
Date December 2010
Journal Abbr Biogeosciences Discuss.
DOI 10.5194/bgd-7-8979-2010
ISSN 1810-6285
URL http://www.biogeosciences-discuss.net/7/8979/2010/
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:29:56 2011

AMS Glossary of Meteorology

Type Book
Author Todd S. Glickman
Abstract Description: Forty-one years ago, the AMS published the Glossary of Meteorology. Containing 7900 terms, more than 10,000 copies have been sold over four decades through five printings. It is a tribute to the editors of the first edition that it has withstood the test of time and continued to be among the leading reference sources in meteorology and related sciences. This is the electronic version of the second edition of the Glossary with more than 12,000 terms. Along with the print version it should be the authoritative source for definitions of meteorological terms for many years to come.
Edition 2nd edition
Place Boston, MA
Publisher American Meteorological Society
Date January 2000
# of Pages 850 p.
ISBN 9781878220349
URL http://amsglossary.allenpress.com/glossary
Extra Book: http://www.press.uchicago.edu/ucp/books/book/distributed/G/bo8670114.html
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:17:09 2011

An adaptive approach to planning and decision-making

Type Journal Article
Author Gene Lessard
Abstract A formal process of adaptive management will be required to maximize the benefits of any option for land and natural resource management and to achieve long-term objectives through implementation of ecosystem management. The process itself is straightforward and simple: new information is identified, evaluated, and a determination is made whether to adjust strategy or goals. While relatively straightforward, applying the concept of adaptive management to complex management strategies requires answers to several critical questions. What new information should compel an adjustment to the management strategy? What threshold should trigger this adjustment? Who decides when and how to make adjustments? What are the definitions and thresholds of acceptable results? Adaptive ecosystem management depends on a continually evolving understanding of cause-and-effect relationships in both biological and social systems. Planning for and adapting to surprise will provide an actionary rather than a reactionary basis for more informed decisions.
Publication Landscape and Urban Planning
Volume 40
Issue 1-3
Pages 81-87
Date March 1998
Journal Abbr Landscape Urban Plan
DOI 10.1016/S0169-2046(97)00100-X
ISSN 0169-2046
URL http://linkinghub.elsevier.com/retrieve/pii/S016920469700100X
Extra Keywords: adaptive management; decision-making; assessment; scenario planning.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:24 2011

An approach toward a rational classification of climate

Type Journal Article
Author C. Warren Thornthwaite
Abstract no abstract
Publication Geographical review
Volume 38
Issue 1
Pages 55–94
Date January 1948
Journal Abbr Geogr. Rev.
ISSN 0016-7428
URL http://www.jstor.org/stable/210739
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:48 2011

An assessment of potential change in wildfire activity in the Russian boreal forest zone induced by climate warming during the twenty-first century

Type Journal Article
Author Sergey Petrovich Malevsky-Malevich
Author Elena K. Molkentin
Author Ekaterina D. Nadyozhina
Author Oksana B. Shklyarevich
Abstract The problem of forest fires is very important for Russia. In this paper we consider this problem in the connection with the projection of significant climate change. An approach to determine the magnitude of change in wildfire risk in Russia under the influence of climate warming is discussed. Observations for the European part of Russia and for Siberia have been used in this analysis. A statistical correlation between drought indices calculated by use of monthly sums of temperature and precipitation and the frequency of fire danger was obtained for the forest zone of Russia. The change in fire danger potential was evaluated using temperature and precipitation monthly means at the nodes of a regular spatial grid. Climate change scenarios were obtained from Global Climate Models (GCM) ensemble projections. The maximum increases (about 12–30%) of the number of days with fire danger conditions during the twenty-first century fire season were obtained for the southern forest zone boundary in both the European region of Russia and in Siberia. In the Baikal and Primoriye Regions, fire danger distributions in the twenty-first century are not projected to change significantly.
Publication Climatic Change
Volume 86
Issue 3-4
Pages 463-474
Date February 2008
Journal Abbr Climatic Change
DOI 10.1007/s10584-007-9295-7
ISSN 0165-0009
URL http://www.springerlink.com/index/10.1007/s10584-007-9295-7
Call Number 0020
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 07:18:16 2011

An early Cenozoic perspective on greenhouse warming and carbon-cycle dynamics

Type Journal Article
Author James C. Zachos
Author Gerald R. Dickens
Author Richard E. Zeebe
Abstract Past episodes of greenhouse warming provide insight into the coupling of climate and the carbon cycle and thus may help to predict the consequences of unabated carbon emissions in the future.
Publication Nature
Volume 451
Issue 7176
Pages 279–283
Date 17 January 2008
Journal Abbr Nature
DOI 10.1038/nature06588
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature06588
Date Added Tue Aug 16 01:13:27 2011
Modified Tue Aug 16 01:13:27 2011

An ecological history of the Great Lakes forest of Michigan

Type Journal Article
Author Gordon G. Whitney
Abstract Summary: (1) The historical development, i.e. changing species composition and the areal extent, of the vegetation of the High Plains region of Michigan is traced with the use of printed and manuscript materials and contemporary forest survey records. (2) The classic pre-settlement Great Lakes pine forest occupied the rolling upland areas and was conditioned to fires at 130-260 year intervals. Fires were much more frequent on the drier outwash sands of the jack pine plains and openings and almost non-existent on the moist hemlock-white pine-northern hardwoods forests of the uplands and the swamp conifer forests of the lowlands. (3) Selective logging of the white pine and later the hemlock and the better hardwoods converted the hemlock-white pine-northern hardwoods type to sugar maple. Waves of fires, following the logging in rapid succession, upset the natural equilibrium of the Great Lakes forest. The ignition of the remaining debris or the slash destroyed the remaining seed trees and the seedling pine in the mixed pine type. The result was a poorly stocked forest of oak sprouts and aspen suckers. Oak and aspen had formerly played a relatively subordinate role in the pre-settlement forest. (4) The cessation of fires in 1920-40 allowed the maturation of the oak, the aspen, and the jack pine and set the stage for the new pulp-oriented industrial forest of the 1950s.
Publication The Journal of Ecology
Volume 75
Issue 3
Pages 667–684
Date September 1987
Journal Abbr J. Ecol.
ISSN 0022-0477
URL http://www.jstor.org/stable/2260198
Date Added Wed Aug 24 02:09:29 2011
Modified Sat Aug 27 01:01:42 2011

An environmental narrative of inland northwest United States forests, 1800–2000

Type Journal Article
Author Paul F. Hessburg

Author James K. Agee

Abstract Fire was arguably the most important forest and rangeland disturbance process in the Inland Northwest United States for millennia. Prior to the Lewis and Clark expedition, fire regimes ranged from high severity with return intervals of one to five centuries, to low severity with fire-free periods lasting three decades or less. Indoamerican burning contributed to the fire ecology of grasslands and lower and mid-montane dry forests, especially where ponderosa pine was the dominant overstory species, but the extent of this contribution is difficult to quantify. Two centuries of settlement, exploitation, management, and climate variation have transformed the fire regimes, vegetation and fuel patterns, and overall functionality of these forests. We present a narrative that portrays conditions beginning at the first contact of Euro-American settlers with Indoamericans of the region and extending to the present. Due in part to its geographic isolation, the Inland Northwest was among the last regions to be discovered by Euro-Americans. In 200 years the region has undergone fur trapping and trading, sheep, cattle, and horse grazing, timber harvesting, mining, road construction, native grassland conversion to agricultural production, urban and rural area development, fire prevention, and fire suppression. We highlight key changes to forest landscape patterns and processes that occurred under these combined influences, discuss implications of the changes, and progress towards restoring sustainability. An adaptive ecosystem management model has been adopted by public land management agencies to remedy current conditions. Ecosystem management is a relatively new concept that emphasizes the integrity and sustainability of land systems rather than outputs from the land. Adaptive management emphasizes the twin notions that incomplete knowledge and high degrees of risk and uncertainty about earth and climate systems will always limit land and resource planning and management decisions, and that management is chiefly a learning and adapting process. We discuss current issues and future options associated with ecosystem management, including the low likelihood of social consensus concerning desired outcomes, the lack of integrated planning, analysis, and decision support tools, and mismatches between existing land management planning processes, Congressional appropriations, and complex management and restoration problems.

Publication Forest Ecology and Management
Volume 178
Issue 1-2
Pages 23–59
Date 3 June 2003
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/S0378-1127(03)00052-5
ISSN 0378-1127
URL http://www.cfr.washington.edu/classes.esc.401/InlandPNWForestHistory.pdf
Archive http://www.sciencedirect.com/science/article/pii/S0378112703000525
Extra Keywords: landscape change; human settlement; management history; environmental narrative; inland northwest; fire regimes; vegetation patterns; adaptive ecosystem management.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 01:41:05 2011

An evaluation of spatial and temporal patterns of lightning-and human-caused forest fires in Alberta, Canada, 1980–2007

Type Journal Article
Author Yonghe Wang
Author Kerry R. Anderson

Abstract We used the K-function and kernel estimation methods to evaluate the spatial and temporal patterns of ignition locations of lightning- and human-caused forest fires in Alberta, Canada. Although both of these fire types have spatial patterns of cluster distribution, quantitative measures for evaluating the patterns in the province are lacking. Our results revealed annual differences in the spatial patterns between the two fire types, whereby fires caused by humans tended to be more clustered and had more complex spatial patterns than those caused by lightning. Spatial interactions of cluster and inhibition existed between the two fire types. Human-caused fires in the period 2003–07 were highly concentrated in the southern parts of the province, indicating the existence of an interaction between space and time. Kernel analysis confirmed the observation that in northern Alberta, lightning-caused fires were more likely to occur than human-caused fires; the opposite was true in southern

Alberta. This study provided useful spatial information that is not obvious or cannot be inferred from visual examination of raw data. Such quantitative knowledge could lead to the development of fire-response and fire-suppression strategies appropriate to specific regions within the province.

Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 1059–1072
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09085
ISSN 1448-5516
URL http://www.publish.csiro.au/?paper=WF09085
Extra Keywords: Alberta Wildfire Management Areas; K-function; kernel estimation; spatial intensity; spatial point patterns.
Date Added Tue Aug 16 02:02:13 2011
Modified Tue Aug 16 02:02:19 2011

An overview of the Fuel Characteristic Classification System - Quantifying, classifying, and creating fuelbeds for resource planning

Type Journal Article
Author Roger D. Ottmar
Author David V. Sandberg
Author Cynthia L. Riccardi
Author Susan J. Prichard
Abstract We present an overview of the Fuel Characteristic Classification System (FCCS), a tool that enables land managers, regulators, and scientists to create and catalogue fuelbeds and to classify those fuelbeds for their capacity to support fire and consume fuels. The fuelbed characteristics and fire classification from this tool will provide inputs for current and future sophisticated models for the quantification of fire behavior, fire effects, and carbon accounting and enable assessment of fuel treatment effectiveness. The system was designed from requirements of land managers, scientists and policy makers gathered through six regional workshops. The FCCS contains a set of fuelbeds representing the United States that were compiled from scientific literature, fuels photo series, fuels data sets, and expert opinion. The system enables modification and enhancement of these fuelbeds to represent a particular scale of interest. The FCCS then reports assigned and calculated fuel characteristics for each existing fuelbed stratum including the canopy, shrubs, nonwoody, woody, litter/lichen /moss, and duff. Finally, the system classifies each fuelbed by calculating fire potentials that provide an index of the intrinsic capacity of each fuelbed to support surface fire behavior, support crown fire, and provide fuels for flaming, smoldering, and residual consumption. The FCCS outputs are being used in a national wildland fire emissions inventory and in the development of fuelbed, fire hazard, and treatment effectiveness maps on several national forests. Although the FCCS was built for the United States, the conceptual framework is applicable worldwide.
Publication Canadian Journal of Forest Research
Volume 37
Issue 12
Pages 2383–2393
Date December 2007
Journal Abbr Can. J. For. Res.
DOI 10.1139/X07-077
ISSN 0045-5067
URL http://www.nrcresearchpress.com/doi/full/10.1139/X07-077
Date Added Sat Aug 27 18:47:28 2011

Modified Sat Aug 27 18:47:28 2011

An unusual oak savanna in northeastern Wisconsin: The effect of Indian-caused fire

Type Journal Article

Author Cheryl H. Dorney

Author John R. Dorney

Abstract Evaluation of the impact of native Americans on vegetation has largely relied on historical accounts of fire use. Remnant vegetation communities may also provide evidence. A large (49 km²), disjunct oak savanna in northeastern Wisconsin was recorded by the original public land survey in 1834. Surrounding vegetation was mixed conifer-hardwood forest typical of northern Wisconsin. The oak savanna was not associated with unusual soil, topographic or climatic conditions of the area but instead was associated with Potawatomi and Winnebago Indian agricultural villages. A remnant woodlot (89 ha) is still dominated by Quercus alba but the canopy has closed and the stand has apparently been invaded by Carya ovata. This pre-European settlement oak savanna is strong evidence that native Americans influenced vegetation through fire in this region.

Publication American Midland Naturalist

Volume 122

Issue 1

Pages 103-113

Date July 1989

Journal Abbr Am. Midl. Nat.

DOI 10.2307/2425687

ISSN 1938-4238

Short Title An Unusual Oak Savanna in Northeastern Wisconsin

URL http://www.jstor.org/stable/2425687

Date Added Tue Aug 30 04:16:19 2011

Modified Wed Aug 31 00:40:02 2011

Analgzing long-term changes in vegetation with geographic information system and remotely sensed data

Type Journal Article

Author Louis R. Iverson

Author Paul G. Risser

Abstract Geographic information systems and remote sensing techniques are powerful tools in the analysis of long-term changes in vegetation and land use, especially because spatial information from two or more time intervals can be compared more readily than by manual methods. A primary restriction is the paucity of data that has been digitized from earlier periods. The Illinois State Geographic Information System has a number of automated data sets containing land-use information, including original land survey plat maps that show the boundaries of forests, prairies, and wetlands as they existed prior to European colonization in the early 1800s. More recent data include the United States Forest Service inventories of 1948, 1962, and 1985; the United States Geological Survey Land Use Data Analysis; National High Altitude Program photographs of vegetation; and Landsat MSS and TM information. These data can be used to compare vegetation patterns and changes in land use over time and to suggest factors that may have caused or influenced these variations. Profound changes have occurred in the Illinois landscape since European settlement, primarily because of conversion to agricultural use; in certain parts of the state, however, urbanization has been the major factor contributing to changes.

Publication Advances in Space Research

Volume 7

Issue 11

Pages 183–194

Date 1987

Journal Abbr Adv. Space Res.
DOI 10.1016/0273-1177(87)90311-5
ISSN 0273-1177
URL http://www.sciencedirect.com/science/article/pii/0273117787903115
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:11:51 2011

Analysis of the patterns of large fires in the boreal forest region of Alaska

Type Journal Article
Author Eric S. Kasischke
Author David Williams
Author Donald Barry
Abstract Analyses of the patterns of fire in Alaska were carried out using three different data sets, including a large-fire database dating back to 1950. Analyses of annual area burned statistics illustrate the episodic nature of fire in Alaska, with most of the area burning during a limited number of high fire years. Over the past 50 years, high fire years occurred once every 4 years. Seasonal fire statistics indicated that high fire years consist of larger fire events that occur later in the growing season. On a decadal basis, average annual area burned has varied little between the 1960s and 1990s. Using a geographic information system (GIS), the spatial distribution of fires (aggregated by ecoregions) was compared with topographic, vegetation cover, and climate features of Alaska. The use of topographic data allows for a more realistic determination of fire cycle by eliminating areas where fires do not occur due to lack of vegetation above the treeline. Geographic analyses show that growing season temperature, precipitation, lightning strike frequency, elevation, aspect, and the level of forest cover interact in a complex fashion to control fire frequency.
Publication International Journal of Wildland Fire
Volume 11
Issue 2
Pages 131-144
Date January 2002
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF02023
ISSN 1448-5516
URL http://www.publish.csiro.au/paper/WF02023
Extra Keywords: fire map; fire history; spatial analysis.
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:39:22 2011

Analyzing extreme disturbance events: Fire in Los Padres National Forest

Type Journal Article
Author Max A. Moritz
Abstract Extreme disturbance events may strongly influence the structure and functioning of many ecosystems, particularly those in which large, infrequent events are the defining forces within the region. This paper introduces the extremal fire regime (i.e., the time series of the largest fire per year) and the assumptions implicit in its analysis. I describe the statistics of extremes and demonstrate their application to the fire regime of Los Padres National Forest, California, to compare two regions (i.e., Main and Monterey divisions), to test for a shift in fire regime due to fire suppression, and to examine climatic events as a forcing mechanism for large fires. Despite their similarity and proximity, the Main Division exhibited a much higher frequency of large fires (and shorter return time) compared to the Monterey Division. Comparison of time periods 1911–1950 and 1951–1991 indicated that fire suppression had no effect on the distribution of very large fires in the Main Division, although the frequency of fires smaller than ~4000 ha declined. Comparing distributions of an index

for severity of Santa Ana conditions (i.e., characterized by hot, dry winds) and extreme fire events in the Main Division indicated a convergence of distributions with increasing event size. The distribution of fire events larger than ~4000 ha appears to be coupled with that of severe Santa Ana conditions, suggesting a strong climatic forcing for extreme fires and a threshold for the transition from small- to large-fire dynamics. Results indicate the usefulness of extremal fire regime analysis for comparisons over space and time and for examining a potential forcing mechanism. This approach can be applied to any disturbance regime in which large events play an important role, providing ecologists and land managers with a useful tool for understanding and predicting dynamics of extreme disturbance events.

Publication Ecological Applications
Volume 7
Issue 4
Pages 1252–1262
Date November 1997
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(1997)007[1252:AEDEFI]2.0.CO;2
ISSN 1051-0761
Short Title Analyzing extreme disturbance events
URL http://www.jstor.org/stable/2641212
Extra Keywords: climate; disturbance; extremal fire regime; fire size; landscape ecology; Los Padres National Forest; statistics of extremes.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:42 2011

Annual and decadal climate forcing of historical fire regimes in the interior Pacific Northwest, USA

Type Journal Article
Author Emily K. Heyerdahl
Author Linda B. Brubaker
Author James K. Agee
Abstract Anticipating the consequences of climatic change for fire requires understanding of the causes of variation in historical fire regimes. We assessed the influence of annual and decadal variation in climate on fire regimes of ponderosa pine-dominated forests in eastern Oregon and Washington using existing, annually dated tree-ring reconstructions (1687–1994). In four watersheds, we compared the extent of low-severity fires (total area burned each year) to precipitation and the Southern Oscillation Index, a measure of variation in El Niño-Southern Oscillation (ENSO), which affects weather in this region. At the annual scale, large fires burned during dry years and El Niño years (low SOI) in all watersheds while small fires burned regardless of variation in these climate parameters. Large fires also burned during relatively wet years and La Niña years (high SOI) in one watershed, indicating that local factors can override regional climate controls in some locations. Climate from previous years did not influence current year's fire extent. The influence of ENSO on fire regimes in this region has not previously been demonstrated at these multicentury, regional scales. At the decadal scale, fire extent varied with precipitation, perhaps in response to variation in such climate features as the Pacific Decadal Oscillation. Several decades of low fire extent in the watersheds during the early 1800s was synchronous with a lack of fire at other sites in North and South America, probably in response to a change in the global climate that included a lessening in the frequency and/or intensity of ENSO events.
Publication The Holocene
Volume 12
Issue 5
Pages 597-604
Date July 2002
Journal Abbr Holocene
DOI 10.1191/0959683602hl570rp
ISSN 1477-0911

URL http://hol.sagepub.com/cgi/content/abstract/12/5/597
Extra Keywords: fire history; dendrochronology; climate; fire scars; El Niño-Southern Oscillation; Pacific Northwest USA.
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:34:29 2011

Anomalous atmospheric events leading to the summer 2010 floods in Pakistan

Type Journal Article
Author Robert A. Houze Jr
Author Kristen L. Rasmussen
Author Socorro Medina
Author Stacy R. Brodzik
Author Ulrike Romatschke
Abstract no abstract
Publication Bulletin of the American Meteorological Society
Volume 92
Issue 3
Pages 291–298
Date March 2011
Journal Abbr BAMS
DOI 10.1175/2010BAMS3173.1
ISSN 1520-0477
URL http://journals.ametsoc.org/doi/abs/10.1175/2010BAMS3173.1
Call Number 0000
Date Added Sun Sep 4 03:21:38 2011
Modified Mon Sep 5 10:11:20 2011

Anthropogenic reduction of Santa Ana winds

Type Conference Paper
Author Mimi Hughes
Author Alex Hall
Author Jinwon Kim
Abstract The frequency of Santa Ana wind events is investigated within a high-resolution downscaling of the European Centre for Medium-Range Weather Forecasts ERA-40 reanalysis data to 6-kilometer resolution over Southern California. In this climate reconstruction, the number of Santa Ana days per winter season declines significantly over the 44-year reanalysis period, resulting in over 30 percent fewer events per year over the final decade of the reconstruction (1991–2001) compared to the first decade (1959–1969). This study investigates this signal further in late-twentieth and mid-twenty-first century realizations of the National Center for Atmospheric Research Community Climate System Model, version 3.0, global climate change scenario run downscaled to a 12-kilometer resolution over California. The reduction in events per year in the mid-twenty-first century compared with the late-twentieth century is similar to that seen in the ERA-40 downscaling, suggesting the cause of the decrease is a change in the climate due to anthropogenic forcing. A regression model is used to reproduce the Santa Ana time series based on two previously documented forcing mechanisms: synoptically-forced strong offshore winds at the mountain tops (which transport offshore momentum to the surface), and a local desert-ocean temperature gradient causing katabatic-like winds as the cold desert air pours down the coastal topography. Both past and future climate simulations show a large reduction in the contribution of the local thermodynamic forcing. This reduction is due to the differential warming that occurs during transient climate change conditions, with more warming in the desert interior than over the ocean. Thus the mechanism responsible for the decrease in Santa Ana frequency originates from a

well-known aspect of the climate response to increasing greenhouse gases, but cannot be understood or simulated without mesoscale atmospheric dynamics.

Date	August 2009
Proceedings Title	Proceedings of the American Geophysical Union 2008 Fall Meeting
Conference Name	American Geophysical Union Fall Meeting, San Francisco, CA, 15-19 December 2008
Place	Los Angeles, CA
Publisher	California Energy Commission, California Climate Change Center
Pages	29 p.
URL	http://adsabs.harvard.edu/abs/2008AGUFMGC22A..05H
Archive	http://www.energy.ca.gov/2009publications/CEC-500-2009-015/CEC-500-2009-015-F.PDF
Extra	Keywords: regional climate; climate change; Santa Ana winds; fire weather; Southern California.
Date Added	Mon Aug 29 17:30:07 2011
Modified	Mon Aug 29 17:30:07 2011

Application of economic techniques to fire management - A status review and evaluation

Type	Report
Author	Julie K. Gorte
Author	Ross W. Gorte
Abstract	no abstract
Report Number	GTR lNT-53
Report Type	General Technical Report
Place	Ogden, UT
Institution	U.S. Department of Agriculture, Forest Service, Intermountain Research Station
Date	1979
Pages	26 p.
URL	http://www.treesearch.fs.fed.us/pubs/34302
Extra	Keywords: economics; fire management; benefit/cost analysis; damage appraisal.
Date Added	Mon Aug 29 06:17:09 2011
Modified	Mon Aug 29 06:17:09 2011

Notes:

Citation:

Gorte, Julie K.; Gorte, Ross W. 1979. Application of economic techniques to fire management - A status review and evaluation. Gen. Tech. Rep. INT-GTR-53. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 26 p.

Applied historical ecology: Using the past to manage for the future

Type	Journal Article
Author	Thomas W. Swetnam
Author	Craig D. Allen
Author	Julio L. Betancourt
Abstract	Applied historical ecology is the use of historical knowledge in the man- agement of ecosystems. Historical perspectives increase our understanding of the dynamic nature of landscapes and provide a frame of reference for assessing modern patterns and processes. Historical records, however, are often too brief or fragmentary to be useful, or they are not obtainable for the process or structure of interest. Even where long historical time series can be assembled, selection of appropriate reference conditions may be com- plicated by the past influence of humans and the many potential reference conditions encompassed by nonequilibrium dynamics.

These complications, however, do not lessen the value of history; rather they underscore the need for multiple, comparative histories from many locations for evaluating both cultural and natural causes of variability, as well as for characterizing the overall dynamical properties of ecosystems. Historical knowledge may not simplify the task of setting management goals and making decisions, but 20th century trends, such as increasingly severe wildfires, suggest that disregarding history can be perilous. We describe examples from our research in the southwestern United States to illustrate some of the values and limitations of applied historical ecology. Paleoecological data from packrat middens and other natural archives have been useful for defining baseline conditions of vegetation communities, determining histories and rates of species range expansions and contractions, and discriminating between natural and cultural causes of environmental change. We describe a montane grassland restoration project in northern New Mexico that was justified and guided by an historical sequence of aerial photographs showing progressive tree invasion during the 20th century. Likewise, fire scar chronologies have been widely used to justify and guide fuel reduction and natural fire reintroduction in forests. A south- western network of fire histories illustrates the power of aggregating historical time series across spatial scales. Regional fire patterns evident in these aggregations point to the key role of interannual lags in responses of fuels and fire regimes to the El Ninio-Southern Oscillation (wet/dry cycles), with important implications for long-range fire hazard fore- casting. These examples of applied historical ecology emphasize that detection and expla- nation of historical trends and variability are essential to informed management.

Publication Ecological Applications
Volume 9
Issue 4
Pages 1189–1206
Date November 1999
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(1999)009[1189:AHEUTP]2.0.CO;2
ISSN 1051-0761
Short Title Applied historical ecology
URL http://www.jstor.org/stable/2641390
Extra Keywords: climate change; disturbance; fire history; historical ecology; packrat middens; pa- leoecology; range of natural variation; repeat photography; restoration; southwestern United States; tree rings; vegetation change.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:11 2011

Arctic climate impact assessment: Scientific report

Type Book
Author Arctic Climate Impact Assessment ACIA
Abstract The Arctic is now experiencing some of the most rapid and severe climate change on earth. Over the next 100 years, climate change is expected to accelerate, contributing to major physical, ecological, social, and economic changes, many of which have already begun. Changes in arctic climate will also affect the rest of the world through increased global warming and rising sea levels. Arctic Climate Impact Assessment was prepared by an international team of over 300 scientists, experts, and knowledgeable members of indigenous communities. The report has been thoroughly researched, is fully referenced, and provides the first comprehensive evaluation of arctic climate change, changes in ultraviolet radiation and their impacts for the region and for the world. It is illustrated in full color throughout. The results provided the scientific foundations for the ACIA synthesis report - Impacts of a Warming Arctic - published by Cambridge University Press in 2004.
Place Cambridge, United Kingdom
Publisher Cambridge University Press
Date 2005
# of Pages 1042 p.
ISBN 0521865093, 9780521865098
URL http://amap.no/acia/
Extra http://www.acia.uaf.edu/
Date Added Mon Aug 15 22:29:35 2011

Modified Mon Aug 15 22:30:06 2011

Arctic ecology: Tundra's burning

Type Journal Article
Author Jane Qiu
Abstract no abstract
Publication Nature
Volume 461
Issue 7260
Pages 34-36
Date 3 September 2009
Journal Abbr Nature
DOI 10.1038/461034a
ISSN 1476-4687
Short Title Arctic ecology
URL http://www.nature.com/doifinder/10.1038/461034a
Date Added Sat Aug 27 05:27:39 2011
Modified Wed Aug 31 00:24:41 2011

Are we successfully adapting science to climate change?

Type Journal Article
Author Kristen Averyt
Abstract no abstract
Publication Bulletin of the American Meteorological Society
Volume 91
Issue 6
Pages 723-726
Date June 2010
Journal Abbr BAMS
DOI 10.1175/2010BAMS2906.1
ISSN 0003-0007
URL http://journals.ametsoc.org/doi/abs/10.1175/2010BAMS2906.1
Date Added Tue Aug 16 01:01:06 2011
Modified Tue Aug 16 01:01:17 2011

Asian monsoon failure and megadrought during the last millennium

Type Journal Article
Author Edward R. Cook
Author Kevin J. Anchukaitis
Author Brendan M. Buckley
Author Rosanne D. D'Arrigo
Author Gordon C. Jacoby
Author William E. Wright

Abstract The Asian monsoon system affects more than half of humanity worldwide, yet the dynamical processes that govern its complex spatiotemporal variability are not sufficiently understood to model and predict its behavior, due in part to inadequate long-term climate observations. Here we present the Monsoon Asia Drought Atlas (MADA), a seasonally resolved gridded spatial reconstruction of Asian monsoon drought and pluvials over the past millennium, derived from a network of tree-ring chronologies. MADA provides the spatiotemporal details of known historic monsoon failures and reveals the occurrence, severity, and fingerprint of previously unknown monsoon megadroughts and their close linkages to large-scale patterns of tropical Indo-Pacific sea surface temperatures. MADA thus provides a long-term context for recent monsoon variability that is critically needed for climate modeling, prediction, and attribution.

Publication Science
Volume 328
Issue 5977
Pages 486-489
Date 23 April 2010
Journal Abbr Science
DOI 10.1126/science.1185188
ISSN 0036-8075
URL http://www.sciencemag.org/content/328/5977/486.full
Call Number 0028
Date Added Wed Sep 21 23:40:32 2011
Modified Wed Sep 28 17:53:46 2011

Assessing the response of area burned to changing climate in western boreal North America using a Multivariate Adaptive Regression Splines (MARS) approach

Type Journal Article
Author Michael S. Balshi
Author A. David McGuire
Author Paul Duffy
Author Mike Flannigan
Author John Walsh
Author Jerry Melillo

Abstract Fire is a common disturbance in the North American boreal forest that influences ecosystem structure and function. The temporal and spatial dynamics of fire are likely to be altered as climate continues to change. In this study, we ask the question: how will area burned in boreal North America by wildfire respond to future changes in climate? To evaluate this question, we developed temporally and spatially explicit relationships between air temperature and fuel moisture codes derived from the Canadian Fire Weather Index System to estimate annual area burned at 2.5° (latitude x longitude) resolution using a Multivariate Adaptive Regression Spline (MARS) approach across Alaska and Canada. Burned area was substantially more predictable in the western portion of boreal North America than in eastern Canada. Burned area was also not very predictable in areas of substantial topographic relief and in areas along the transition between boreal forest and tundra. At the scale of Alaska and western Canada, the empirical fire models explain on the order of 82% of the variation in annual area burned for the period 1960–2002. July temperature was the most frequently occurring predictor across all models, but the fuel moisture codes for the months June through August (as a group) entered the models as the most important predictors of annual area burned. To predict changes in the temporal and spatial dynamics of fire under future climate, the empirical fire models used output from the Canadian Climate Center CGCM2 global climate model to predict annual area burned through the year 2100 across Alaska and western Canada. Relative to 1991–2000, the results suggest that average area burned per decade will double by 2041–2050 and will increase on the order of 3.5–5.5 times by the last decade of the 21st century. To improve the ability to better predict wildfire across Alaska and Canada, future research should focus on incorporating additional effects of long-term and successional vegetation changes on area burned to account more fully for interactions among fire, climate, and vegetation dynamics.

Publication Global Change Biology

Volume 15
Issue 3
Pages 578-600
Date March 2009
Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1365-2486.2008.01679.x
ISSN 1365-2486
URL http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2008.01679.x/full
Extra Keywords: boreal forest; climate change; fire; future area burned; Multivariate Adaptive Regression Splines.
Date Added Tue Aug 23 01:51:45 2011
Modified Wed Aug 24 04:42:36 2011

Assessing the response of terrestrial ecosystems to potential changes in precipitation

Type Journal Article
Author Jake F. Weltzin
Author Michael E. Loik
Author Susanne Schwinning
Author David G. Williams
Author Philip A. Fay
Author Brent M. Haddad
Author John Harte
Author Travis E. Huxman
Author Alan K. Knapp
Author Guanghui Lin
Author William T. Pockman
Author M. Rebecca Shaw
Author Eric E. Small
Author Melinda D. Smith
Author Stanley D. Smith
Author David T. Tissue
Author John C. Zak
Abstract Changes in Earth's surface temperatures caused by anthropogenic emissions of greenhouse gases are expected to affect global and regional precipitation regimes. Interactions between changing precipitation regimes and other aspects of global change are likely to affect natural and managed terrestrial ecosystems as well as human society. Although much recent research has focused on assessing the responses of terrestrial ecosystems to rising carbon dioxide or temperature, relatively little research has focused on understanding how ecosystems respond to changes in precipitation regimes. Here we review predicted changes in global and regional precipitation regimes, outline the consequences of precipitation change for natural ecosystems and human activities, and discuss approaches to improving understanding of ecosystem responses to changing precipitation. Further, we introduce the Precipitation and Ecosystem Change Research Network (PrecipNet), a new interdisciplinary research network assembled to encourage and foster communication and collaboration across research groups with common interests in the impacts of global change on precipitation regimes, ecosystem structure and function, and the human enterprise.
Publication BioScience
Volume 53
Issue 10
Pages 941–952
Date October 2003
Journal Abbr BioScience
DOI 10.1641/0006-3568(2003)053[0941:ATROTE]2.0.CO;2

ISSN 0006-3568
URL http://www.bioone.org/doi/full/10.1641/0006-3568%282003%29053%5B0941%3AATROTE%5D2.0.CO%3B2
Extra Keywords: global change; community; ecosystem; precipitation; soil moisture.
Date Added Tue Aug 16 02:13:42 2011
Modified Tue Aug 16 22:57:42 2011

Assessment of intraseasonal to interannual climate prediction and predictability

Type Book
Author National Academy of Sciences
Abstract More accurate forecasts of climate conditions over time periods of weeks to a few years could help people plan agricultural activities, mitigate drought, and manage energy resources, amongst other activities; however, current forecast systems have limited ability on these time- scales. Models for such climate forecasts must take into account complex interactions among the ocean, atmosphere, and land surface. Such processes can be difficult to represent realistically. To improve the quality of forecasts, this book makes recommendations about the development of the tools used in forecasting and about specific research goals for improving understanding of sources of predictability. To improve the accessibility of these forecasts to decision-makers and researchers, this book also suggests best practices to improve how forecasts are made and disseminated.
Place Washington, D.C.
Publisher The National Academies Press
Date 2010
# of Pages 192 p.
ISBN 0309151848
URL http://www.nap.edu/catalog/12878.html
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

Asymmetric vegetation responses to mid-Holocene aridity at the prairie–forest ecotone in south-central Minnesota

Type Journal Article
Author Charles E. Umbanhowar Jr.
Author Philip Camill
Author Christoph E. Geiss
Author Rebecca Teed
Abstract The mid-Holocene (ca. 8000–4000 cal yr BP) was a time of marked aridity throughout much of Minnesota, and the changes due to mid-Holocene aridity are seen as an analog for future responses to global warming. In this study, we compare the transition into (ca. 9000–7000 yr ago) and out of (ca. 5000–2500 yr ago) the mid-Holocene (MH) period at Kimble Pond and Sharkey Lake, located along the prairie forest ecotone in south-central Minnesota, using high resolution (~ 5–36 yr) sampling of pollen, charcoal, sediment magnetic and loss-on-ignition properties. Changes in vegetation were asymmetrical with increasing aridity being marked by a pronounced shift from woodland/forest-dominated landscape to a more open mix of grassland and woodland/savanna. In contrast, at the end of the MH, grassland remained an important component of the landscape despite increasing effective moisture, and high charcoal influxes (median 2.7–4.0 vs. 0.6–1.7 mm^2 cm^{-2} yr^{-1} at start of MH) suggest the role of fire in limiting woodland expansion. Asymmetric vegetation responses, variation among and within proxies, and the near-absence of fire today suggest caution in using changes associated with mid-Holocene aridity at the prairie forest boundary as an analog for future responses to global warming.
Publication Quaternary Research
Volume 66

Issue 1
Pages 53–66
Date July 2006
Journal Abbr Quaternary Res.
DOI 10.1016/j.yqres.2006.03.005
ISSN 0033-5894
URL http://www.sciencedirect.com/science/article/pii/S0033589406000470
Call Number 0013
Extra Keywords: climate; ecotone; fire; mid-Holocene aridity; prairie forest border; Big Woods.
Date Added Mon Sep 5 02:24:40 2011
Modified Mon Sep 5 10:11:33 2011

Atlas of climatic controls of wildfire in the western United States

Type Report
Author Steven W. Hostetler
Author Patrick J. Bartlein
Author Justin O. Holman
Abstract Wildfire behavior depends on several factors including ecologic characteristics, near-term and antecedent climatic conditions,fuel availability and moisture level, weather, and sources of ignition (lightning or human). The variability and interplay of these factors over many spatial and temporal scales present an ongoing challenge to our ability to forecast a given wildfire season. Here we focus on one aspect of wildfire in the western US through a retrospective analysis of wildfire (starts and area burned) and climate over monthly time scales. We consider prefire conditions up to a year preceding fire outbreaks. For our analysis, we used daily and monthly wildfire records and a combination of observed and model-simulated atmospheric and surface climate data. The focus of this report is on monthly wildfire and climate for the period 1980-2000. Although a longer fire record is desirable, the 21-year record is the longest currently available and it is sufficient for the purpose of a first-order regional analysis. We present the main results in the form of a wildfire-climate atlas for 8 subregions of the West that can be used by resource managers to assess current wildfire conditions relative to high, normal, and low fire years in the historical record. Our results clearly demonstrate the link between wildfire conditions and a small set of climatic variables, and our methodology is a framework for providing near-real-time assessments of current wildfire conditions in the West.
Report Number SIR2006-5139
Report Type Scientific Investigations Report
Series Title US Geological Survey Scientific Investigations Report
Place Reston, Virginia
Institution U.S. Department of the Interior, U.S. Geological Survey
Date 2006
Pages 74 p.
URL http://pubs.usgs.gov/sir/2006/5139/
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:30:07 2011

Atmospheric budget of primary biological aerosol particles from fungal spores

Type Journal Article
Author Colette L. Heald
Author Dominick V. Spracklen
Abstract The contribution of primary biological aerosol particles (PBAP) to the global budget of organic aerosol is poorly understood. Concentrations of mannitol, a biotracer for fungal spores, are used here to constrain the first

global model (GEOS-Chem) simulation of PBAP from fungi. Emissions are driven by leaf area index and atmospheric water vapor concentrations and are empirically optimized based on the geographical and seasonal variability of observed mannitol concentrations. Optimized global emissions total 28 Tg yr^{-1}, with 25% of that total emitted as fine mode ($PM_{2.5}$) aerosol. Fungal spores contribute 23% of total primary emissions of organic aerosol, or 7% of the fine-mode source. Annual mean simulated surface concentrations of PBAP over vegetated regions range from 0.1–0.7 μgm^{-3} ($PM_{2.5}$) and 0.4–3.0 μgm^{-3} (PM_{10}), with the highest concentrations in the tropics, where PBAP may be the dominant source of organic aerosol. Further validation is required to reduce the substantial uncertainties on this budget.

Publication Geophysical Research Letters
Volume 36
Issue 9
Pages L09806 (5 p.)
Date May 2009
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2009GL037493
ISSN 0094–8276
URL http://europa.agu.org/?uri=/journals/gl/gl0909/2009GL037493/2009GL037493.xml&…
Extra Keywords: PBAP; fungal spores; mannitol.
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:33:38 2011

Atmospheric carbon dioxide record from Mauna Loa

Type Web Page
Author R. F. Keeling
Author S. C. Piper
Author A. F. Bollenbacher
Author J. S. Walker
Abstract no abstract
Website Title CDIAC: Trends - CO_2 - SIO Air Sampling Network
Date 2010
URL http://cdiac.ornl.gov/trends/co2/sio-mlo.html
Rights Carbon Dioxide Information Analysis Center
Extra DOI: 10.3334/CDIAC/atg.035
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:37:15 2011

Notes:

Citation:

Keeling, R.F., S.C. Piper, A.F. Bollenbacher and J.S. Walker. 2009. Atmospheric CO_2 records from sites in the SIO air sampling network. In Trends: A Compendium of Data on Global Change. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi: 10.3334/CDIAC/atg.035

Atmospheric carbon dioxide variations at Mauna Loa Observatory, Hawaii

Type Journal Article
Author Charles D. Keeling

Author Robert B. Bacastow
Author Arnold E. Bainbridge
Author Carl A. Ekdahl
Author Peter R. Guenther
Author Lee S. Waterman
Author John F. S. Chin
Abstract The concentration of atmospheric carbon dioxide at Mauna Loa Observatory, Hawaii is reported for eight years (1964-1971) of a long term program to document the effects of the combustion of coal, petroleum, and natural gas on the distribution of CO_2, in the atmosphere. The new data, when combined with earlier data, indicate that the annual average CO_2, concentration rose 3.4 % between 1959 and 1971. The rate of rise, however, has not been steady. In the mid-1960's it declined. Recently it has accelerated. Similar changes in rate have been observed at the South Pole and are evidently a global phenomenon.
Publication Tellus
Volume 28
Issue 6
Pages 538-551
Date December 1976
Journal Abbr Tellus
DOI 10.1111/j.2153-3490.1976.tb00701.x
ISSN 0040-2826
URL http://doi.wiley.com/10.1111/j.2153-3490.1976.tb00701.x
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:18:37 2011

Atmospheric CO_2: Principal control knob governing Earth's temperature

Type Journal Article
Author Andrew A. Lacis
Author Gavin A. Schmidt
Author David Rind
Author Reto A. Ruedy
Abstract Ample physical evidence shows that carbon dioxide (CO_2) is the single most important climate-relevant greenhouse gas in Earth's atmosphere. This is because CO_2, like ozone, N_2O, CH_4 and chlorofluorocarbons, does not condense and precipitate from the atmosphere at current climate temperatures, whereas water vapor can and does. Noncondensing greenhouse gases, which account for 25% of the total terrestrial greenhouse effect, thus serve to provide the stable temperature structure that sustains the current levels of atmospheric water vapor and clouds via feedback processes that account for the remaining 75% of the greenhouse effect. Without the radiative forcing supplied by CO_2 and the other noncondensing greenhouse gases, the terrestrial greenhouse would collapse, plunging the global climate into an icebound Earth state.
Publication Science
Volume 330
Issue 6002
Pages 356-359
Date 15 October 2010
DOI 10.1126/science.1190653
ISSN 0036-8075 (print), 1095-9203 (online)
Short Title Atmospheric CO2
URL http://www.sciencemag.org/content/330/6002/356.full
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:17:34 2011

Atmospheric predictability as revealed by naturally occurring analogues

Type Journal Article
Author Edward N. Lorenz
Abstract Two states of the atmosphere which are observed to resemble one another are termed analogues. Either state of a pair of analogues may be regarded as equal to the other state plus a small superpose “error”. From the behavior of the atmosphere following each state, the growth rate of the error may be determined. Five years of twice-daily height values of the 200-, 500-, and 850-mb surfaces at a grid of 1003 points over the Northern Hemisphere are procured. A weighted root-mean-square height difference is used to measure the difference between two states, or the error. For each pair of states occurring within one month of the same time of yeas, the error is computed. There are numerous mediocre analogues but no truly good ones. The smallest errors have an average doubling time of about 8 days. Larger errors grow less rapidly. Extrapolation with the aid of a quadratic hypothesis indicates that truly small errors would double in 2.5 days. These rates may be compared with a 5-days doubling time previously deduced from dynamical considerations. The possibility that the computed growth rate is spurious and results only from having superposed small errors on these particular states where erros grow most rapidly, is considered and rejected. The likelihood of encountering any truly good analogues by processing all existing upper-level data appears to be small.
Publication Journal of the Atmospheric Sciences
Volume 26
Issue 4
Pages 636-646
Date July 1969
Journal Abbr J. Atmos. Sci.
DOI 10.1175/1520-0469(1969)26<636:APARBN>2.0.CO;2
ISSN 0022-4928, 1520-0469
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0469%281969%2926%3C636%3AAPARBN%3E2.0.CO%3B2
Call Number 0348
Date Added Thu Sep 22 04:27:50 2011
Modified Wed Sep 28 17:53:56 2011

Atmospheric science: Enigma of the recent methane budget

Type Journal Article
Author Martin Heimann
Abstract The previously increasing atmospheric methane concentration has inexplicably stalled over the past three decades. This may be due to a fall in fossil-fuel emissions or to farming practices that are curtailing microbial sources.
Publication Nature
Volume 476
Issue 7359
Pages 157-158
Date 11 August 2011
Journal Abbr Nature
DOI 10.1038/476157a
ISSN 0028-0836
Short Title Atmospheric science
URL http://www.nature.com/doifinder/10.1038/476157a
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:33:54 2011

Atmospheric, climatic, and ecological controls on extreme wildfire years in the northwestern United States

Type Journal Article

Author Ze'ev Gedalof
Author David L. Peterson
Author Nathan J. Mantua

Abstract Wildland fire is an important disturbance agent in forests of the American Northwest. Historical fire suppression efforts have contributed to an accumulation of fuels in many Northwestern forests and may result in more frequent and/or more severe wildfire events. Here we investigate the extent to which atmospheric and climatic variability may contribute to variability in annual area burned on 20 National Forests in Washington, Oregon, and Idaho. Empirical orthogonal function (EOF) analysis was used to identify coherent patterns in area burned by wildfire in the Pacific Northwest. Anomaly fields of 500-hPa height were regressed onto the resulting principal-component time series to identify the patterns in atmospheric circulation that are associated with variability in area burned by wildfire. Additionally, cross-correlation functions were calculated for the Palmer drought severity index (PDSI) over the year preceding the wildfire season. Parallel analyses based on superposed epoch analysis focused only on the extreme fire years (both large and small) to discriminate the controls on extreme years from the linear responses identified in the regression analyses. Four distinct patterns in area burned were identified, each associated with distinct climatic processes. Extreme wildfire years are forced at least in part by an- tecedent drought and summertime blocking in the 500-hPa height field. However the response to these forcings is modulated by the ecology of the dominant forest. In more mesic forest types antecedent drought is a necessary precondition for forests to burn, but it is not a good predictor of area burned due to the rarity of subsequent ignition. At especially dry locations, summertime blocking events can lead to increases in area burned even in the absence of antecedent drought. At particularly xeric locations summertime cyclones can also lead to increased area burned, probably due to dry lightning storms that bring ignition and strong winds but little precipitation. These results suggest that fuels treatments alone may not be effective at reducing area burned under extreme climatic conditions and furthermore that anthropogenic climate change may have important implications for forest management.

Publication Ecological Applications
Volume 15
Issue 1
Pages 154–174
Date February 2005
Journal Abbr Ecol. Appl.
DOI 10.1890/03-5116
ISSN 1051-0761
URL http://www.jstor.org/stable/4543343
Extra Keywords: climatic variability empirical; function analysis; Pacific Decadal Oscillation; Pacific Northwest; top-down controls; wildfire.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:29 2011

Attribution of the present-day total greenhouse effect

Type Journal Article

Author Gavin A. Schmidt
Author Reto A. Ruedy
Author Ron L. Miller
Author Andy A. Lacis

Abstract The relative contributions of atmospheric long-wave absorbers to the present-day global greenhouse effect are among the most misquoted statistics in public discussions of climate change. Much of the interest in these values is however due to an implicit assumption that these contributions are directly relevant for the question of climate sensitivity. Motivated by the need for a clear reference for this issue, we review the existing literature and use the Goddard Institute for Space Studies ModelE radiation module to provide an overview of the role of each absorber at the present-day and under doubled CO_2 . With a straightforward scheme for allocating overlaps, we find that water vapor is the dominant contributor (~50% of the effect), followed by clouds (~25%) and then CO_2 with ~20%. All other absorbers play only minor roles. In a doubled CO_2 scenario, this allocation is essentially unchanged, even though the magnitude of the total greenhouse effect is significantly larger than the initial radiative forcing, underscoring the importance of feedbacks from water vapor and clouds to climate sensitivity.

Publication Journal of Geophysical Research
Volume 115
Issue 20
Pages D20106 (6 p.)
Date October 2010
Journal Abbr J. Geophys. Res.
DOI 10.1029/2010JD014287
ISSN 0148-0227
URL http://www.agu.org/pubs/crossref/2010/2010JD014287.shtml
Extra Keywords: greenhouse effect; carbon dioxide; water vapor.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:26:05 2011

Background paper: Historical overview of the southern forest landscape and associated resources (Chapter 24)

Type Report
Author Wayne D. Carroll
Author Peter R. Kapeluck
Author Richard A. Harper
Author David H. Van Lear
Abstract no abstract
Report Number SRS-53
Report Type General Technical Report
Series Title Southern forest resource assessment
Place Asheville, NC
Institution U.S. Department of Agriculture, Forest Service, Southern Research Station
Date 2002
Pages 583–605
Short Title Background history
URL http://www.srs.fs.usda.gov/sustain/report/histry/histry.htm
Archive http://www.srs.fs.usda.gov/sustain/report/index.htm
Extra Keywords: conservation; forest sustainability; integrated assessment.
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:03:25 2011

Notes:

Citation:

In: Wear, David N.; Greis, John G., eds. 2002. Southern forest resource assessment. Gen. Tech. Rep. SRS-53. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 635 p.

Barotropic instability of Rossby wave motion

Type Journal Article
Author Edward N. Lorenz
Abstract Zonal flow resembling zonally averaged tropospheric motion in middle latitudes is usually barotropically stable, but zonal flow together with superposed neutral Rossby waves may be unstable with respect to further perturbations. Rossby's original solution of the barotropic vorticity equation is tested for stability, using beta-plane geometry. When the waves are sufficiently strong or the wavenumber is sufficiently high, the flow is found to be unstable, but if the flow is weak or the wavenumber is low, the beta effect may render the flow stable. The amplification rate of growing perturbations is comparable to the growth rate of errors deduced from large numerical models of the atmosphere. The Rossby wave motion together with amplifying perturbations possesses jet-like features not found in Rossby wave motion alone. It is suggested that barotropic instability is largely responsible for the unpredictability of the real atmosphere.
Publication Journal of Atmospheric Sciences
Volume 29
Issue 2
Pages 258–265
Date March 1972
Journal Abbr J. Atmos. Sci.
DOI 10.1175/1520-0469(1972)029<0258:BIORWM>2.0.CO;2
ISSN 1520-0469
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0469%281972%29029%3C0258%3ABIORWM%3E2.0.CO%3B2
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:42:53 2011

Basic principles of forest fuel reduction treatments

Type Journal Article
Author James K. Agee
Author Carl N. Skinner
Abstract Successful fire exclusion in the 20th century has created severe fire problems across the West. Not every forest is at risk of uncharacteristically severe wildfire, but drier forests are in need of active management to mitigate fire hazard. We summarize a set of simple principles important to address in fuel reduction treatments: reduction of surface fuels, increasing the height to live crown, decreasing crown density, and retaining large trees of fire-resistant species. Thinning and prescribed fire can be useful tools to achieve these objectives. Low thinning will be more effective than crown or selection thinning, and management of surface fuels will increase the likelihood that the stand will survive a wildfire. Five empirical examples of such treatment are discussed: Hayfork fires, California, 1987; Tyee fire,Washington, 1994; Megram fire, California, 1999; Hayman fire, Colorado,2002; and the Cone fire, California, 2002. Applying treatments at an appropriate landscape scale will be critical to the success of fuel reduction treatments in reducing wildfire losses in Western forests.
Publication Forest Ecology and Management
Volume 211
Issue 1-2
Pages 83–96
Date 6 June 2005
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/j.foreco.2005.01.034
ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/pii/S0378112705000411
Extra Keywords: fire ecology; fuel treatment; prescribed fire; thinning; western United States.

Date Added Mon Aug 15 22:54:09 2011
Modified Wed Aug 31 01:40:48 2011

Beyond wildfire: Perspectives of climate, managed fire and policy in the USA

Type Journal Article
Author Crystal A. Kolden
Author Timothy J. Brown
Abstract Climate–wildfire relationships have been widely addressed by the scientific community over the last two decades; however, the role of climate in managed fire in the US (i.e. prescribed fire and wildland fire use) has not yet been addressed. We hypothesised that if climate is an important component of managed fire, the fire community would already be aware of this and using climate information in order to mitigate risks associated with managed fires. We conducted 223 surveys with fire managers to ascertain how climate information is utilised in managed-fire decision-making. We found that wildland fire use managers consider climate to be an important aspect of managed fire and use various types of climate information, but prescribed-fire managers do not generally consider climate or use climate information in their planning activities. Survey responses also indicate a lack of agency training on climate information and decision-support tools. This is partly attributed to obstacles in US fire policy that inhibit widespread utilisation of climate information. We suggest these results are indicative of a broader conflict in US wildfire policy, which does not directly address climate despite two decades of scientific research showing climate plays a key role in wildfire regimes.
Publication International Journal of Wildland Fire
Volume 19
Issue 3
Pages 364-373
Date May 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF08111
Short Title Beyond wildfire
URL http://dx.doi.org/10.1071/WF08111
Extra Keywords: fire risk; prescribed fire; wildland fire use.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:16:54 2011

Biodiversity: Climate change and the ecologist

Type Journal Article
Author Wilfried Thuiller
Abstract The evidence for rapid climate change now seems overwhelming. Global temperatures are predicted to rise by up to 4 °C by 2100, with associated alterations in precipitation patterns. Assessing the consequences for biodiversity, and how they might be mitigated, is a Grand Challenge in ecology.
Publication Nature
Volume 448
Issue 7153
Pages 550–552
Date 2 August 2007
Journal Abbr Nature
DOI 10.1038/448550a
ISSN 0028-0836
URL http://www.nature.com/nature/journal/v448/n7153/full/448550a.html
Date Added Sat Aug 27 06:05:17 2011

Modified Sat Aug 27 15:51:51 2011

Biogeography

Type Journal Article
Author John M. Crowley
Abstract no abstract
Publication The Canadian Geographer/Le Géographe Canadien
Volume 11
Issue 4
Pages 312-326
Date December 1967
Journal Abbr Can. Geogr.
DOI 10.1111/j.1541-0064.1967.tb00474.x
ISSN 0008-3658
URL http://doi.wiley.com/10.1111/j.1541-0064.1967.tb00474.x
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:46 2011

Biological invasions by exotic grasses, the grass/fire cycle, and global change

Type Journal Article
Author Carla M. D'Antonio
Author Peter M. Vitousek
Abstract CONCLUSIONS The effects of alien grasses on ecosystem function (fire, nutrient loss, altered local microclimate, prevention of succession) are significant on the local scale and are becoming increasingly important on regional and global scales. Moreover, the interaction of competition with alien grasses, fire, and the prevention of succession now represents a substantial global threat to biological diversity on the genetic, population, and species levels. However, the number of cases in which ecosystem effects of grass invasions have been intensively studied (as opposed to described or speculated about) is small. A thorough understanding of additional cases, leading to a better overall understanding of the process, would be useful to the development of basic ecological principles as well as to the management of these invasions
Publication Annual Review of Ecology and Systematics
Volume 23
Pages 63–87
Date November 1992
Journal Abbr Annu. Rev. Ecol. Syst.
DOI 10.1146/annurev.es.23.110192.000431
ISSN 0066-4162
URL http://www.jstor.org/stable/2097282
Extra Keywords: alien species; land-use change; competitive effects; ecosystem processes; grass- fueled fires.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:38:41 2011

BIOME 6000: Reconstructing global mid-Holocene vegetation patterns from palaeoecological records

Type Journal Article
Author I. Colin Prentice

Author Thompson Webb III

Abstract Global change research needs data sets describing past states of the Earth system. Vegetation distributions for specified 'time slices' (with known forcings, such as changes in insolation patterns due to the Earth's orbital variations, changes in the extent of ice-sheets, and changes in atmospheric trace-gas composition) should provide a benchmark for coupled climate-biosphere models. Pollen and macrofossil records from dated sediments give spatially extensive coverage of data on vegetation distribution changes. Applications of such data have been delayed by the lack of a global synthesis. The BIOME 6000 project of IGBP aims at a synthesis for 6000 years bp. Success depends on community-wide participation for data compilation and quality assurance, and on a robust methodology for assigning palaeorecords to biomes. In the method summarized here, taxa are assigned to one or more plant functional types (PFTs) and biomes reconstructed using PFT-based definitions. By involving regional experts in PFT assignments, one can combine data from different floras without compromising global consistency in biome assignments. This article introduces a series of articles that substantially extend the BIOME 6000 data set. The list of PFTs and the reconstruction procedure itself are evolving. Some compromises (for example, restricted taxon lists in some regions) limit the precision of biome assignments and will become obsolete as primary data are put into community data bases. This trend will facilitate biome mapping for other time slices. Co-evolution of climate-biosphere modelling and palaeodata synthesis and analysis will continue.

Publication Journal of Biogeography
Volume 25
Issue 6
Pages 997–1005
Date November 1998
Journal Abbr J. Biogeogr.
DOI 10.1046/j.1365-2699.1998.00235.x
ISSN 1365-2699
Short Title BIOME 6000
URL http://www.jstor.org/stable/2846196
Extra Keywords: biomes; pollen; vegetation; plant functional type; palaeoecology; climate change.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:31:24 2011

Black carbon and the carbon cycle

Type Journal Article
Author Thomas A. J. Kuhlbusch

Abstract When vegetation and fossil fuels burn, the combustion creates "black carbon" that becomes distributed throughout the environment. Determining how it is created and where it goes is important for studying the past history of fire and for understanding global carbon and oxygen budgets. In his Research Commentary, Kuhlbusch discusses results reported in the same issue by Masiello and Druffel in which carbon mass and isotope measurements were used to study the age of black carbon in ocean sediment. They find that the black carbon is 2400 to 13,900 years older than the concurrently deposited sediment, suggesting that the black carbon must have been stored in some as-yet unknown intermediate pool.

Publication Science
Volume 280
Issue 5371
Pages 1903-1904
Date 19 June 1998
Journal Abbr Science
DOI 10.1126/science.280.5371.1903
ISSN 0036-8075 (print), 1095-9203 (online)
Short Title Ocean Chemistry
URL http://www.sciencemag.org/content/280/5371/1903.full

Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:37:15 2011

Bringing climate change into natural resource management

Type Conference Paper
Author Linda Joyce
Author Richard Haynes
Author Rachel White
Author R. James Barbour
Abstract These are the proceedings of the 2005 workshop titled implications of bringing climate into natural resource management in the Western United States. This workshop was an attempt to further the dialogue among scientists, land managers, landowners, interested stakeholders and the public about how individuals are addressing climate change in natural resource management. Discussions illustrated the complexity of global climate change and the need for managers to consider how the impacts of climate change will unfold across regional and local landscapes. The workshop offered examples of how managers are already responding to those aspects of the global climate change that they can see or perceive. While no comprehensive solutions emerged, there was an appreciation that policy complexity may exceed the science complexity but that eventually the accumulation of local actions will shape the future.
Date March 2007
Proceedings Title Bringing Climate Change into Natural Resource Management: Proceedings
Conference Name Bringing Climate Change into Natural Resource Management Proceedings of a 2005 Workshop, June 28-30, 2005, Portland, Oregon
Place Portland, OR
Publisher U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station
Pages 150 p.
Series General Technical Report, PNW-GTR-706
URL http://www.treesearch.fs.fed.us/pubs/27014
Extra Keywords: climate change; forest and range management.
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:05:14 2011

Notes:

Citation:

Joyce, L.; Haynes, R.; White, R.; Barbour, R.J., tech. coords. 2007. Bringing climate change into natural resource management: proceedings.. Gen. Tech. Rep. PNW-GTR-706. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 150 p.

Bringing fire back: The changing regimes of the Appalachian mixed-oak forests

Type Journal Article
Author Patrick H. Brose
Author Thomas M. Schuler
Author David H. Van Lear
Author John Berst
Abstract Since vegetative associations stabilized about 4,000 years ago, the Appalachian mixed-oak forests have experienced three profoundly different fire regimes. Periodic, low-intensity surface fires lit by American Indians characterized the first regime, and this regime helped perpetuate oak as one of the dominant species groups. The Industrial Revolution led to high-intensity, stand-replacing fires, causing extensive damage to the

forests. Modern fire protection created a “no-fire” regime that permitted the forests to recover but allowed mesophytic species to begin replacing the oaks. Today, research is under way to identify how to reintroduce fire to solve this oak replacement problem.

Publication Journal of Forestry
Volume 99
Issue 11
Pages 30–35
Date November 2001
Journal Abbr J. Forest
ISSN 0022-1201
Short Title Bringing fire back
URL http://www.treesearch.fs.fed.us/pubs/35686
Extra Keywords: oak regeneration; pre-European settlement; wildfire.
Date Added Wed Aug 24 12:16:24 2011
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Broad-scale concepts for interactions of climate, topography, and biota at biome transitions

Type Journal Article
Author James R. Gosz
Author Peter J. H. Sharpe
Abstract no abstract
Publication Landscape Ecology
Volume 3
Issue 3-4
Pages 229-243
Date December 1989
Journal Abbr Landscape Ecol.
DOI 10.1007/BF00131541
ISSN 0921-2973
URL http://www.springerlink.com/index/10.1007/BF00131541
Extra Keywords: landscape ecology; scale; ecotone; biome.
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:20:23 2011

Browsing interacts with climate to determine tree-ring increment

Type Journal Article
Author James D. M. Speed
Author Gunnar Austrheim
Author Alison J. Hester
Author Atle Mysterud
Abstract Summary: 1. A warming climate has been linked to shifts in plant distribution and growth. The relationship between climate and growth is used to infer past climate conditions within dendrochronological studies. However, browsing may interact with climate to determine growth, yet the impact of large herbivores on tree-ring growth series is largely unknown. 2. Here, we disentangle the interactions between climate and herbivory in determining plant growth at the upper distribution limit of mountain birch (Betula pubescens ssp. czerepanovii). 3. Stem discs of 206 birch were sampled within an altitudinal tree line ecotone in southern Norway, after 9 years of experimental browsing at three sheep densities (unbrowsed, low and high with 0, 25

and 80 sheep km⁻²). Annual radial growth was measured using digital microscopy and related to summer temperatures, altitude and sheep density. 4. Radial growth was negatively related to altitude and related to summer temperature in a nonlinear fashion, increasing from low temperatures and saturating and decreasing at high temperatures. However, the variation between browsing treatments overrode the influence of interannual temperature in determining growth. Increasing sheep densities limited radial growth and interacted with both temperature and altitude. The temperature of peak radial growth increased at higher densities of sheep, and growth was less limited by altitude at low sheep density. 5. This demonstrates that browsing interacts with temperature to determine the growth of mountain birch at the upper distribution limit and that the variation in growth linked to sheep density was greater than that linked to the 50-year range of interannual temperatures. The ability of browsing to affect radial growth has important implications for the use of dendrochronology to infer past climatic conditions, where samples are taken from regions that have undergone past land-use change.

Publication	Functional Ecology
Volume	Article first published online
Pages	6 p.
Date	July 2011
Journal Abbr	Funct. Ecol.
DOI	10.1111/j.1365-2435.2011.01877.x
ISSN	0269-8463
URL	http://doi.wiley.com/10.1111/j.1365-2435.2011.01877.x
Call Number	0000
Extra	Keywords: birch; dendrochronology; herbivory; land use; sheep; treeline.
Date Added	Sun Aug 28 17:26:59 2011
Modified	Wed Aug 31 00:29:17 2011

Burned area emergency watershed rehabilitation: Program goals, techniques, effectiveness, and future directions in the 21st century

Type	Conference Paper
Author	Daniel G. Neary
Author	Peter R. Robichaud
Author	Jan L. Beyers
Abstract	Following wildfires, burned areas are assessed by special teams to determine whether emergency watershed rehabilitation measures are required to restore watershed function and minimize damage to soil resources. The objective of burned area emergency rehabilitation (BAER) treatments is to restore watershed condition and reduce erosional losses on hillslopes, in channels, and on road surfaces and peripheral areas such as ditches. In the Western United States, a project is currently in progress to determine the costs and effectiveness of BAER projects in restoring watershed function. Results of this project will help establish the future directions of the BAER program into the 21st century.
Date	March 2000
Proceedings Title	US Department of Agriculture Forest Service, Proceedings RMRS–P-13
Conference Name	Land stewardship in the 21st Century: The contributions of watershed management; 2000 March 13-16; Tucson, AZ
Place	Fort Collins, CO
Publisher	U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station
Volume	13
Pages	375-378
Short Title	Burned Area Emergency Watershed Rehabilitation
URL	http://forest.moscowfsl.wsu.edu/cgi-bin/engr/library/searchpub.pl?pub=2000q
Archive	http://www.fs.fed.us/rm/pubs/rmrs_p013.html
Date Added	Sat Aug 27 22:34:48 2011
Modified	Sat Aug 27 22:34:48 2011

Notes:

Citation:

Neary, D.G.; Robichaud, P.R.; Beyers, J.L. 2000. *Burned Area Emergency Watershed Rehabilitation: Program Goals, Techniques, Effectiveness, and Future Directions in the 21st Century.* In: Ffolliott, Peter F.; Baker Jr., Malchus B.; Edminster, Carleton B.; Dillon, Madelyn C.; Mora, Karen L., technical coordinators. 2000. Land stewardship in the 21st century: the contributions of watershed management: poster papers. USDA Forest Service proceedings RMRS-P-13. 375-378.

C_4 grasses prosper as carbon dioxide eliminates desiccation in warmed semi-arid grassland

Type Journal Article
Author Jack A. Morgan
Author Daniel R. LeCain
Author Elise Pendall
Author Dana M. Blumenthal
Author Bruce A. Kimball
Author Yolima Carrillo
Author David G. Williams
Author Jana Heisler-White
Author Feike A. Dijkstra
Author Mark West
Abstract Global warming is predicted to induce desiccation in many world regions through increases in evaporative demand. Rising CO_2 may counter that trend by improving plant water-use efficiency. However, it is not clear how important this CO_2-enhanced water use efficiency might be in offsetting warming-induced desiccation because higher CO_2 also leads to higher plant biomass, and therefore greater transpirational surface. Furthermore, although warming is predicted to favour warm-season, C_4 grasses, rising CO_2 should favour C_3, or cool-season plants. Here we show in a semi-arid grassland that elevated CO_2 can completely reverse the desiccating effects of moderate warming. Although enrichment of air to 600 p.p.m.v. CO_2 increased soil water content (SWC), 1.5/3.0 °C day/night warming resulted in desiccation, such that combined CO_2 enrichment and warming had no effect on SWC relative to control plots. As predicted, elevated CO_2 favoured C_3 grasses and enhanced stand productivity, whereas warming favoured C_4 grasses. Combined warming and CO_2 enrichment stimulated above-ground growth of C4 grasses in 2 of 3 years when soil moisture most limited plant productivity. The results indicate that in a warmer, CO_2-enriched world, both SWC and productivity in semi-arid grasslands may be higher than previously expected.
Publication Nature
Volume 476
Issue 7359
Pages 202–205
Date 11 August 2011
Journal Abbr Nature
DOI 10.1038/nature10274
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature10274
Call Number 0000
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:32 2011

Can forest management be used to sustain water-based ecosystem services in the face of climate

change?

Type Journal Article
Author Chelcy R. Ford
Author Stephanie H. Laseter
Author Wayne T. Swank
Author James M. Vose

Abstract Forested watersheds, an important provider of ecosystems services related to water supply, can have their structure, function, and resulting streamflow substantially altered by land use and land cover. Using a retrospective analysis and synthesis of long-term climate and streamflow data (75 years) from six watersheds differing in management histories we explored whether streamflow responded differently to variation in annual temperature and extreme precipitation than unmanaged watersheds. We show significant increases in temperature and the frequency of extreme wet and dry years since the 1980s. Response models explained almost all streamflow variability (adjusted $R2 > 0.99$). In all cases, changing land use altered streamflow. Observed watershed responses differed significantly in wet and dry extreme years in all but a stand managed as a coppice forest. Converting deciduous stands to pine altered the streamflow response to extreme annual precipitation the most; the apparent frequency of observed extreme wet years decreased on average by sevenfold. This increased soil water storage may reduce flood risk in wet years, but create conditions that could exacerbate drought. Forest management can potentially mitigate extreme annual precipitation associated with climate change; however, offsetting effects suggest the need for spatially explicit analyses of risk and vulnerability. Key words: climate, Coweeta basin, southern Appalachians, USA, drought risk, forest management, land use, paired watershed, precipitation, streamflow, warming, water supply

Publication Ecological Applications
Volume 21
Pages 2049-2067
Date 09/2011
DOI 10.1890/10-2246.1
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/10-2246.1
Accessed Thu Sep 29 09:49:44 2011
Library Catalog CrossRef
Call Number 0000
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Modified Thu Oct 6 11:52:17 2011

Can natural or anthropogenic explanations of late-Holocene CO_2 and CH_4 increases be falsified?

Type Journal Article
Author William F. Ruddiman
Author John E. Kutzbach
Author Stephen J. Vavrus

Abstract Concentrations of CO_2 and CH_4 in the atmosphere rose slowly during the millennia prior to the industrial era. Opposing explanations for these increases have invoked natural and anthropogenic sources. Here we revisit this argument using new evidence to see whether either explanation can be falsified (disproven, in the sense proposed by German philosopher Karl Popper). Two lines of evidence suggest that natural explanations for the CH_4 increase are falsified: (1) the absence of any sustained methane increase early in seven interglaciations prior to the Holocene; and (2) weakening emissions during the last 5000 years from the two largest global sources of CH_4 – north tropical and boreal wetlands. Consistent with this interpretation, a new synthesis of archeological data from southern Asia reported in this issue indicates an exponential increase in CH_4 emissions from expanding rice irrigation during the last 5000 years. Neither the anthropogenic nor the natural explanations for the CO_2 increase can at this point be falsified. Previous studies that rejected the early anthropogenic hypothesis based on the small size of early farming populations ignored a rich array of archeological and historical evidence showing that early farmers used much more land per capita than those in the centuries just before the industrial era. Previous interpretations of very small terrestrial (anthropogenic and other) carbon emissions during the last 7000 years based on the $\delta^{13}CO_2$ record failed to incorporate credible estimates of very large carbon burial in boreal peat lands during the late Holocene. Allowance for larger burial in peat deposits requires much greater emissions of anthropogenic carbon to balance the $\delta^{13}CO_2$ budget. The prevalence of downward CO_2 trends during equivalent intervals early in previous interglaciations poses a major problem for natural explanations of the late-Holocene CO_2 increase.

Publication The Holocene
Volume 21
Issue 5
Pages 865-879
Date August 2011
Journal Abbr Holocene
DOI 10.1177/0959683610387172
ISSN 0959-6836
URL http://hol.sagepub.com/cgi/doi/10.1177/0959683610387172
Call Number 0000
Extra Keywords: agriculture; anthropogenic; carbon isotopes; land use; late Holocene; models.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:36 2011

Canadian boreal forest ecosystem structure and function in a changing climate: Impact on fire regimes

Type Journal Article
Author Michael G. Weber
Author Michael D. Flannigan
Abstract Boreal forest fire regime, which encompasses fire intensity, frequency, seasonality, size, type (crown versus surface), and severity (depth of burn), is an organizing factor of boreal forest landscapes and highly dependant on climate. This review combines what is known about boreal forest dynamics from paleological studies, with the information derived from state-of-the-art climate and vegetation modeling, to present possible scenarios of the impact of anticipated climate change on boreal forest ecosystem structure and function, particularly in relation to fire regimes. Anticipated climatic/atmospheric impact on plant physiological, communal, ecosystem, and finally landscape-level interactions with fire are reviewed. All indications from the modeling sector point towards unprecedented increased regional or seasonal temperatures, with projected changes most pronounced at high latitudes and there greatest in winter. Anticipated climate change scenarios are expected to alter dramatically the boreal forest ecosystems and fire regimes with which they are currently in equilibrium. Changed fire regimes could be represented by increased annual area burned because of an extended fire season, increased fire frequency, and severity. Simulation studies show the potential for greatly reduced boreal forest area and increased fragmentation due to climate change. Fire regime as an ecosystem process is highly sensitive to climate change because fire behaviour responds immediately to fuel moisture, which is affected by precipitation, relative humidity, air temperature, and wind speed. This interaction between climate change and fire regime has the potential to overshadow the importance of the direct effects of global warming on species distribution, migration, substitution, and extinction. Such a scenario suggests that rate and magnitude of fire-regime-induced changes to the boreal forest landscape could greatly exceed anything expected due to atmospheric warming alone. Socioeconomic implications of altered fire regimes in a changing climate are discussed in terms of adaptive fire management strategies, age class distribution, and such global stewardship issues as biodiversity, carbon cycling, and sequestration.
Publication Environmental Reviews
Volume 5
Issue 3-4
Pages 145–166
Date December 1997
Journal Abbr Environ. Rev.
DOI 10.1139/a97-008
ISSN 1208-6053

Short Title Canadian boreal forest ecosystem structure and function in a changing climate
URL http://www.nrcresearchpress.com/doi/abs/10.1139/a97-008
Extra Keywords: climate change; fire regime; boreal forests; ecosystem structure and function; ecosystem processes.
Date Added Tue Aug 16 02:09:19 2011
Modified Tue Aug 16 02:09:19 2011

Carbon dioxide and people

Type Journal Article
Author Norman D. Newell
Author Leslie Marcus
Abstract For at least a quarter of a century the steady increase of carbon dioxide in the atmosphere has closely paralleled the growth of world human population with an amazing correlation of .9985. This nearly perfect correlation can hardly be fortuitous. It suggests that the rate of increase of CO_2 is almost wholly dependent on human activities with only very minor contributions from natural causes such as volcanoes, the melting of glaciers, and changes in oceanic circulation. It is generally agreed by ecologists that rates of human activities, such as the consumption of fossil fuels and the destruction of forests, are also increasing. No matter how complex the relationship may be, the fact remains that CO_2 and the population explosion are almost precisely correlated. We suggest that mean values of atmospheric CO_2 taken at frequent intervals should usefully supplement, or even replace, inaccurate census compilations for estimating the global growth of human population and some of its consequences: increasing industrialization, burning of fuels, urbanization, changes in land management, etc. It appears that population growth has now exceeded the capacity of the earth to provide a reasonable quality existence for every individual. Our statistical result appears to be new. People looking at population changes should find the study of these data useful.
Publication PALAIOS
Volume 2
Issue 1
Pages 101-103
Date 1987
Journal Abbr PALAIOS
ISSN 0883-1351
URL http://www.jstor.org/stable/3514578
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:37:16 2011

Carbon dioxide and world climate

Type Journal Article
Author Roger Revelle
Abstract The article discusses several questions related to carbon dioxide. The first and the foremost question is that how much carbon dioxide will be added to the atmosphere in the future. The amount of atmospheric carbon dioxide has already increased by 15% due to human activities. The second question is whether the increase in carbon dioxide can affect temperature and climate of various regions. The third question asks the consequences of the increased carbon dioxide on human societies.
Publication Scientific American
Volume 247
Issue 2
Pages 35-43
Date August 1982
Journal Abbr Sci. Am.

ISSN 0036-8733
URL http://www.osti.gov/energycitations/product.biblio.jsp?osti_id=6174749
Archive http://books.google.com/books?hl=en&lr=&
Extra Keywords: carbon dioxide; atmosphere; atmospheric carbon dioxide; global temperature changes; climatology; weather.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:02 2011

Carbon loss from an unprecedented Arctic tundra wildfire

Type Journal Article
Author Michelle C. Mack
Author M. Syndonia Bret-Harte
Author Teresa N. Hollingsworth
Author Randi R. Jandt
Author Edward A. G. Schuur
Author Gaius R. Shaver
Author David L. Verbyla
Abstract Arctic tundra soils store large amounts of carbon (C) in organic soil layers hundreds to thousands of years old that insulate, and in some cases maintain, permafrost soils. Fire has been largely absent from most of this biome since the early Holocene epoch, but its frequency and extent are increasing, probably in response to climate warming. The effect of fires on the C balance of tundra landscapes, however, remains largely unknown. The Anaktuvuk River fire in 2007 burned 1,039 square kilometres of Alaska's Arctic slope, making it the largest fire on record for the tundra biome and doubling the cumulative area burned since 1950. Here we report that tundra ecosystems lost $2,016 \pm 435$ g C m^{-2} in the fire, an amount two orders of magnitude larger than annual net C exchange in undisturbed tundra. Sixty per cent of this C loss was from soil organic matter, and radiocarbon dating of residual soil layers revealed that the maximum age of soil C lost was 50 years. Scaled to the entire burned area, the fire released approximately 2.1 teragrams of C to the atmosphere, an amount similar in magnitude to the annual net C sink for the entire Arctic tundra biome averaged over the last quarter of the twentieth century. The magnitude of ecosystem C lost by fire, relative to both ecosystem and biome-scale fluxes, demonstrates that a climate-driven increase in tundra fire disturbance may represent a positive feedback, potentially offsetting Arctic greening and influencing the net C balance of the tundra biome. Editor's Summary: In 2007, an area of more than 1,000 square kilometres of Alaskan tundra was destroyed by a single fire, more than doubling the cumulative area burnt in this region since 1950. Michelle Mack and colleagues now show that, in the process, teragrams of carbon was released and about one-third of soil organic matter burned away, thereby potentially exposing permafrost soils to thaw. The amount of carbon released from the entire burn was comparable to the annual net carbon sink of the entire Arctic tundra biome during the past 25 years of the twentieth century. As tundra fires are expected to increase as the climate warms, combustion of 'old growth' tundra soil could constitute a positive climate feedback, by transferring surface soil carbon to the atmosphere and accelerating the thaw and decomposition of deeper permafrost carbon.
Publication Nature
Volume 475
Issue 7357
Pages 489-492
Date 28 July 2011
Journal Abbr Nature
DOI 10.1038/nature10283
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature10283
Call Number 0000
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:21:19 2011

Carbon protection and fire risk reduction: Toward a full accounting of forest carbon offsets

Type Journal Article
Author Matthew D. Hurteau
Author George W. Koch
Author Bruce A. Hungate
Abstract Management of forests for carbon uptake is an important tool in the effort to slow the increase in atmospheric CO_2 and global warming. However, some current policies governing forest carbon credits actually promote avoidable CO_2 release and punish actions that would increase long-term carbon storage. In fire-prone forests, management that reduces the risk of catastrophic carbon release resulting from stand-replacing wild-fire is considered to be a CO_2 source, according to current accounting practices, even though such management may actually increase long-term carbon storage. Examining four of the largest wildfires in the US in 2002, we found that, for forest land that experienced catastrophic stand-replacing fire, prior thinning would have reduced CO_2 release from live tree biomass by as much as 98%. Altering carbon accounting practices for forests that have historically experienced frequent, low-severity fire could provide an incentive for forest managers to reduce the risk of catastrophic fire and associated large carbon release events.
Publication Frontiers in Ecology and the Environment
Volume 6
Issue 9
Pages 493–498
Date November 2008
Journal Abbr Front. Ecol. Environ.
DOI 10.1890/070187
ISSN 1540-9295
Short Title Carbon protection and fire risk reduction
URL http://www.esajournals.org/doi/full/10.1890/070187
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:35:59 2011

Catastrophic dispersion of coal fly ash into oceans during the latest Permian extinction

Type Journal Article
Author Stephen E. Grasby
Author Hamed Sanei
Author Benoit Beauchamp
Abstract During the latest Permian extinction about 250 Myr ago, more than 90% of marine species went extinct, and biogeochemical cycles were disrupted globally. The cause of the disruption is unclear, but a link between the eruption of the Siberian Trap flood basalts and the extinction has been suggested on the basis of the rough coincidence of the two events. The flood basalt volcanism released CO_2. In addition, related thermal metamorphism of Siberian coal measures and organic-rich shales led to the emission of methane, which would have affected global climate and carbon cycling, according to model simulations. This scenario is supported by evidence for volcanic eruptions and gas release in the Siberian Tunguska Basin6, but direct indicators of coal combustion have not been detected. Here we present analyses of terrestrial carbon in marine sediments that suggest a substantial amount of char was deposited in Permian aged rocks from the Canadian High Arctic immediately before the mass extinction. Based on the geochemistry and petrology of the char, we propose that the char was derived from the combustion of Siberian coal and organic-rich sediments by flood basalts, which was then dispersed globally. The char is remarkably similar to modern coal fly ash, which can create toxic aquatic conditions when released as slurries. We therefore speculate that the global distribution of ash could have created toxic marine conditions.
Publication Nature Geoscience
Volume 4
Issue 2

Pages 104–107
Date February 2011
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo1069
ISSN 1752-0894
URL http://www.nature.com/doifinder/10.1038/ngeo1069
Call Number 0000
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:44 2011

Causes of decadal climate variability over the North Pacific and North America

Type Journal Article
Author Mojib Latif
Author Timothy P. Barnett
Abstract The cause of decadal climate variability over the North Pacific Ocean and North America is investigated by the analysis of data from a multidecadal integration with a state-of-the-art coupled ocean-atmosphere model and observations. About one-third of the low-frequency climate variability in the region of interest can be attributed to a cycle involving unstable air-sea interactions between the subtropical gyre circulation in the North Pacific and the Aleutian low-pressure system. The existence of this cycle provides a basis for long-range climate forecasting over the western United States at decadal time scales.
Publication Science
Volume 266
Issue 5185
Pages 634-637
Date 28 October 1994
Journal Abbr Science
DOI 10.1126/science.266.5185.634
ISSN 0036-8075 (print), 1095-9203 (online)
URL http://www.sciencemag.org/cgi/content/abstract/266/5185/634
Extra Keywords: climates; north america; pacific ocean; mathematical models; air-water interactions; atmospheric circulation; forecasting.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:19:48 2011

Causes of juniper invasion in southwestern Idaho

Type Journal Article
Author J. Wayne Burkhardt
Author Edwin W. Tisdale
Abstract Invasion of western juniper into vegetation dominated by mountain big sagebrush and perennial bunchgrass on the Owyhee Plateau of southwest Idaho appears to be directly related to cessation of periodic fires. Evidence from adjacent climax juniper stands indicates that fires were frequent for at least several hundred years preceding white settlement. Fires have been much less frequent during the past century due to active fire control, development of roads and other fire barriers, and reduced fuel because of heavy grazing and a shift towards decreased precipitation. Physical and biotic factors affecting the establishment of juniper, seed dispersal mechanisms, and the fire history of the study area were investigated. Results indicated that range condition as such had a negligible effect on juniper establishment. Juniper seedlings became established most readily on areas supporting well-developed herbaceous and shrubby vegetation. Seed dispersal was primarily localized, and accomplished by gravity and disturbance by animal trampling. Abundant evidence of fire in the

form of charred stumps and fire scars on living trees was found throughout the study area. Old juniper stands are confined to rocky ridges where understory vegetation is sparse and fires less intense. Juniper was apparently kept out of the denser vegetation of deeper soils by more intense fires. Most herbaceous and shrubby species survived this treatment due to greater tolerance to fire, or rapid reproduction from seed.

Publication Ecology
Volume 57
Issue 3
Pages 472-484
Date May 1976
Journal Abbr Ecology
DOI 10.2307/1936432
ISSN 0012-9658
URL http://www.jstor.org/stable/1936432
Extra Keywords: fires; grazing; Idaho; Juniperus occidentalis, sagebrush; succession.
Date Added Thu Aug 25 10:47:25 2011
Modified Wed Aug 31 00:33:59 2011

Central Pacific El Niño and decadal climate change in the North Pacific Ocean

Type Journal Article

Author Emanuele Di Lorenzo
Author Kim M. Cobb
Author Jason C. Furtado
Author Niklas Schneider
Author Bruce T. Anderson
Author Annalisa Bracco
Author Michael A. Alexander
Author Daniel J. Vimont

Abstract Decadal fluctuations of the ocean and atmosphere over the North Pacific Ocean significantly affect the weather and climate of North America and Eurasia. They also cause transitions between different states of marine ecosystems across the Pacific Ocean. An important fraction of North Pacific low-frequency variability is linked to the North Pacific Gyre Oscillation, a climate pattern associated with decadal fluctuations of the ocean circulation. Decadal variations in the North Pacific Gyre Oscillation are characterized by a pattern of sea surface temperature anomalies that resemble the central Pacific El Niño, a dominant mode of interannual variability with far-reaching effects on global climate patterns. Here we use an ensemble of simulations with a coupled ocean–atmosphere model to show that the sea surface temperature anomalies associated with central Pacific El Niño force changes in the extra-tropical atmospheric circulation. These changes in turn drive the decadal fluctuations of the North Pacific Gyre Oscillation. Given that central Pacific El Niño events could become more frequent with increasing levels of greenhouse gases in the atmosphere, we infer that the North Pacific Gyre Oscillation may play an increasingly important role in shaping Pacific climate and marine ecosystems in the twenty-first century.

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Volume 3
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Pages 762-765
Date November 2010
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo984
ISSN 1752-0908
URL http://www.nature.com/doifinder/10.1038/ngeo984
Date Added Tue Aug 30 04:16:19 2011

Modified Tue Aug 30 04:25:30 2011

Century scale climate forcing of fire regimes in the American Southwest

Type Journal Article

Author Henri D. Grissino Mayer

Author Thomas W. Swetnam

Abstract Interannual time-scale associations between fire occurrence anddrought indices, the Southern Oscillation, and other synopticpatterns demonstrate that large-scale, long term atmospheric featuresare precursors to regional fire activity. However, our knowledge offire-climate relations over longer (century) timescales is fragmentary because of the rarity of comparable climate and fire time-series with sufficient resolution, length and regional extent. In this study, we develop reconstructions of wildfire occurrence from tree-ring data collected from northwestern New Mexico to compare with a millennium-length dendroclimatic reconstruction of precipitation. Reconstructions of both wildfires and climate show simultaneous changes since AD 1700 that indicate climate forcing of wildfire regimes on interannual to century timescales. Following a centuries-long dry period with high fire frequency (c. AD 1400-1790), annual precipitation increased, fire frequency decreased, and the season of fire shifted from predominantly midsummer to late spring. We hypothesize that these shifts in fire regimes reflect long-term changes in rainfall patternsassociated with changes in synoptic-scale atmospheric circulation patterns and the Southern Oscillation. Our evidence supports century-scale climate forcing of fire regimes in the American Southwest, providing a useful analogue of future wildfire regimes expected uinder changing global climate conditions.

Publication The Holocene

Volume 10

Issue 2

Pages 213-220

Date February 2000

Journal Abbr Holocene

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ISSN 0959-6836 (Print) 1477-0911 (Online)

URL http://hol.sagepub.com/cgi/content/abstract/10/2/213

Extra Keywords: dendrochronology; tree-rings; fire history; climatic change; El Malpais National Monument; southwestern USA.

Date Added Mon Aug 29 06:17:09 2011

Modified Wed Aug 31 00:32:34 2011

Change and variability in Plio-Pleistocene climates: modelling the hominin response

Type Journal Article

Author Matt Grove

Abstract Research into the links between climatic change and hominin evolution has generated numerous hypotheses. In recent years, methodological refinement of, and increased research effort directed towards, reliable proxies for palaeoclimatic change have provided a growing body of data with which to test such hypotheses. Whilst many archaeologists are aware of these data, few are cognizant of the wealth of techniques developed by theoretical biologists over the last half-century to explicitly address the evolutionary consequences of adaptation to temporally heterogeneous environments. The current paper expands and adapts one such technique for use with empirical data, and applies it to a global palaeoclimatic record spanning the last five million years, in order to discern the potential impact of environmental heterogeneity on hominin evolution during this period. Of particular interest are the contributions of climatic change, associated with directional selection, and climatic variability, associated with selection for phenotypic plasticity. At this macro-scale, results suggest an early peak in selection for plasticity at approximately 2–2.7 mya, combined with three major shifts in directional selection at approximately 3.3–3.4, 1.4–1.5, and 0.5–0.6 mya. These results are employed to relate the fossil and archaeological records to a number of environmental hypotheses of human evolution. In particular, it is argued

that the origins of the genus Homo and the spread of Oldowan technology are associated not with a major turnover pulse, but with a period of selection for phenotypic plasticity.

Publication Journal of Archaeological Science
Volume 38
Pages 3038-3047
Date 11/2011
DOI 10.1016/j.jas.2011.07.002
ISSN 03054403
Short Title Change and variability in Plio-Pleistocene climates
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Accessed Thu Sep 29 09:55:24 2011
Library Catalog CrossRef
Call Number 0000
Date Added Thu Oct 6 11:53:05 2011
Modified Thu Oct 6 11:53:05 2011

Change of fire frequency in the eastern Canadian boreal forests during the Holocene: Does vegetation composition or climate trigger the fire regime?

Type Journal Article
Author Christopher Carcaillet
Author Yves Bergeron
Author Pierre J. H. Richard
Author Bianca Fréchette
Author Sylvie Gauthier
Author Yves T. Prairie
Abstract Summary: 1. Studies on the variability of natural fire regimes are needed to understand plant responses in a changing environment. Since vegetation changes might follow or trigger changes in fire frequency, climate models suggest that changes in water balance will accompany current global warming, and the response of fire regimes to Holocene hydro-climate changes and vegetation switches may thus serve as a useful analogue for current change. 2. We present high-resolution charcoal records from laminated cores from three small kettle lakes located in mixed-boreal and coniferous-boreal forest. Comparison with some pollen diagrams from the lakes is used to evaluate the role of the local vegetation in the fire history. Fire frequency was reconstructed by measuring the separation of peaks after detrending the charcoal accumulation rate from any background. 3. Several distinct periods of fire regime were detected with fire intervals. Between c. 7000-3000 cal. year BP, fire intervals were double those in the last 2000 years. Fire frequency changed 1000 years earlier in the coniferous-boreal forest than in the mixed-boreal forest to the south. The absence of changes in combustibility species in the pollen data that could explain the fire frequency transition suggests that the vegetation does not control the long-term fire regime in the boreal forest. 4. Climate appears to be the main process triggering fire. The increased frequency may be the result of more frequent drought due to the increasing influence of cool dry westerly Pacific air-masses from mid to late Holocene, and thus of conditions conducive to ignition and fire spread. In east Canada, this change matches other long-term climate proxies and suggests that a switch in atmospheric circulation 2-3000 years ago triggered a less stable climate with more dry summers. Future warming is moreover likely to reduce fire frequency.
Publication Journal of Ecology
Volume 89
Issue 6
Pages 930–946
Date December 2001
Journal Abbr J. Ecol.
DOI 10.1111/j.1365-2745.2001.00614.x
ISSN 0022-0477

Short Title Change of fire frequency in the eastern Canadian boreal forests during the Holocene
URL http://www.jstor.org/stable/3072171
Extra Keywords: boreal forest; climate; charcoal; fire frequency; Holocene; laminated sediments; pollen; Quebec.
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:07:53 2011

Changes and projections in Australian winter rainfall and circulation: Anthropogenic forcing and internal variability

Type Journal Article
Author Carsten Segerlund Frederiksen
Author Jorgen Segerlund Frederiksen
Author Janice Maria Sisson
Author Stacey Lee Osbrough
Abstract Large and continuing reductions in southern Australian winter rainfall are shown to be associated with major shifts in the Southern Hemisphere circulation since the mid-1970s. In particular, these changes have been linked to a reduction in winter storm formation with the growth rate of the leading storm track modes affecting southern Australia being more than 30% lower during the last three decades compared to the period between 1949 and 1968. These effects have become more pronounced with time. In this paper, we focus on the changes in southern Australian winter rainfall and relate them to circulation changes that are directly associated with storm formation. We employ a useful diagnostic of storm development which is the vertical shear in the atmospheric winds, commonly known as baroclinic instability, and is encapsulated in the Phillips (1954) criterion. The relationship between changes in the Phillips criterion and changes in rainfall during the twentieth century is discussed. We also consider projected changes and trends in rainfall and baroclinic instability in SRES scenarios using results from CMIP3 models. We elucidate the roles of anthropogenic forcing and internal variability. Our results show that the impact of further increases in anthropogenic CO_2 concentrations can lead to further large reductions in baroclinic instability, with model trends during the 21st century similar to those simulated during the second half of the 20th century. Associated reductions in modelled southern Australian rainfall can be as much as twice those seen at the end of the 20th century.
Publication International Journal of Climate Change: Impacts and Responses
Volume 2
Issue 3
Pages 143-162
Date 2011
Journal Abbr Int. J. Clim. Change Impacts Responses
ISSN 1835-7156
URL http://ijc.cgpublisher.com/product/pub.185/prod.104
Call Number 0000
Extra Keywords: Australian rainfall; atmospheric circulation; climate change; climate projections; storm formation; anthropogenic forcing; internal variability.
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:14 2011

Changes in climatic water balance drive downhill shifts in plant species' optimum elevations

Type Journal Article
Author Shawn M. Crimmins
Author Solomon Z. Dobrowski
Author Jonathan A. Greenberg
Author John T. Abatzoglou

Author Alison R. Mynsberge

Abstract Uphill shifts of species' distributions in response to historical warming are well documented, which leads to widespread expectations of continued uphill shifts under future warming. Conversely, downhill shifts are often considered anomalous and unrelated to climate change. By comparing the altitudinal distributions of 64 plant species between the 1930s and the present day within California, we show that climate changes have resulted in a significant downward shift in species' optimum elevations. This downhill shift is counter to what would be expected given 20th-century warming but is readily explained by species' niche tracking of regional changes in climatic water balance rather than temperature. Similar downhill shifts can be expected to occur where future climate change scenarios project increases in water availability that outpace evaporative demand.

Publication Science

Volume 331

Issue 6015

Pages 324-327

Date 21 January 2011

Journal Abbr Science

DOI 10.1126/science.1199040

ISSN 0036-8075

URL http://www.sciencemag.org/content/331/6015/324.full

Date Added Tue Aug 30 02:03:25 2011

Modified Wed Aug 31 00:35:35 2011

Changes in fire regime break the legacy lock on successional trajectories in Alaskan boreal forest

Type Journal Article

Author Jill F. Johnstone

Author Teresa N. Hollingsworth

Author F. Stuart Chapin

Author Michelle C. Mack

Abstract Predicting plant community responses to changing environmental conditions is a key element of forecasting and mitigating the effects of global change. Disturbance can play an important role in these dynamics, by initiating cycles of secondary succession and generating opportunities for communities of long-lived organisms to reorganize in alternative configurations. This study used landscape-scale variations in environmental conditions, stand structure, and disturbance from an extreme fire year in Alaska to examine how these factors affected successional trajectories in boreal forests dominated by black spruce. Because fire intervals in interior Alaska are typically too short to allow relay succession, the initial cohorts of seedlings that recruit after fire largely determine future canopy composition. Consequently, in a dynamically stable landscape, postfire tree seedling composition should resemble that of the prefire forest stands, with little net change in tree composition after fire. Seedling recruitment data from 90 burned stands indicated that postfire establishment of black spruce was strongly linked to environmental conditions and was highest at sites that were moist and had high densities of prefire spruce. Although deciduous broadleaf trees were absent from most prefire stands, deciduous trees recruited from seed at many sites and were most abundant at sites where the fires burned severely, consuming much of the surface organic layer. Comparison of pre- and postfire tree composition in the burned stands indicated that the expected trajectory of black spruce self-replacement was typical only at moist sites that burned with low fire severity. At severely burned sites, deciduous trees dominated the postfire tree seedling community, suggesting these sites will follow alternative, deciduous-dominated trajectories of succession. Increases in the severity of boreal fires with climate warming may catalyze shifts to an increasingly deciduous-dominated landscape, substantially altering landscape dynamics and ecosystem services in this part of the boreal forest.

Publication Global Change Biology

Volume 16

Issue 4

Pages 1281-1295

Date April 2010

Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1365-2486.2009.02051.x
ISSN 1354-1013
URL http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2009.02051.x/full
Extra Keywords: Betula neoalaskana; boosted regression trees; composite burn index; fire severity; Picea mariana; Populus tremuloides; postfire succession; seedling recruitment; topography.
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:12:15 2011

Changes in fire regimes since the Last Glacial Maximum: An assessment based on a global synthesis and analysis of charcoal data

Type Journal Article

Author Mitchell J. Power
Author Jennifer Marlon
Author Natalie Ortiz
Author Patrick J. Bartlein
Author Sandy P. Harrison
Author Francis E. Mayle
Author Aziz Ballouche
Author Richard H. W. Bradshaw
Author Christopher Carcaillet
Author Carlos Cordova
Author Scott Mooney
Author Patricio I. Moreno
Author I. Colin Prentice
Author Kirsten Thonicke
Author Willy Tinner
Author Cathy Whitlock
Author Yun Zhang
Author Yan Zhao
Author Adam A. Ali
Author R. Scott Anderson
Author Ruth Beer
Author Hermann Behling
Author Christy Briles
Author Kendrick J. Brown
Author Andrea Brunelle
Author Mark Bush
Author Phil Camill
Author Guo Qiang Chu
Author James Clark
Author Daniele Colombaroli
Author Simon Connor
Author Anne-Laure Daniau
Author Mark Daniels
Author John Dodson
Author Elaine Doughty
Author Mary E. Edwards

Author Walter Finsinger
Author David Foster
Author Jedediah Frechette
Author Marie-Jose Gaillard
Author Daniel G. Gavin
Author Erika Gobet
Author Simon Haberle
Author Douglas J. Hallett
Author Philip Higuera
Author Geoffrey Hope
Author Sally Horn
Author Jun Inoue
Author Petra Kaltenrieder
Author Lisa Kennedy
Author Zhao Chen Kong
Author Chris Larsen
Author Colin J. Long
Author Jason Lynch
Author Elizabeth A. Lynch
Author Matt McGlone
Author Scott Meeks
Author Scott Mensing
Author Grant Meyer
Author Thomas Minckley
Author Jerry Mohr
Author David M. Nelson
Author Jennifer New
Author Rewi Newnham
Author Roland Noti
Author Wyatt Oswald
Author Jennifer Pierce
Author Pierre J. H. Richard
Author Cassandra Rowe
Author Maria Fernanda Sanchez Goñi
Author Bryan N. Shuman
Author Hikaru Takahara
Author Jaime Toney
Author Chris Turney
Author Dunia H. Urrego-Sanchez
Author Charles E. Umbanhowar Jr.
Author Marcus Vandergoes
Author Boris Vanniere
Author Elisa Vescovi
Author Megan Walsh
Author Xu Wang
Author Nicola Williams
Author Janet Wilmshurst
Author Jia Hua Zhang

Abstract Fire activity has varied globally and continuously since the last glacial maximum (LGM) in response to long-term changes in global climate and shorter-term regional changes in climate, vegetation, and human land use. We have synthesized sedimentary charcoal records of biomass burning since the LGM and present global maps showing changes in fire activity for time slices during the past 21,000 years (as differences in charcoal accumulation values compared to pre-industrial). There is strong broad-scale coherence in fire activity after the LGM, but spatial heterogeneity in the signals increases thereafter. In North America, Europe and southern South America, charcoal records indicate less-than-present fire activity during the deglacial period, from 21,000 to ~11,000 cal yr BP. In contrast, the tropical latitudes of South America and Africa show greater-than-present fire activity from ~19,000 to ~17,000 cal yr BP and most sites from Indochina and Australia show greater-than-present fire activity from 16,000 to ~13,000 cal yr BP. Many sites indicate greater-than-present or near-present activity during the Holocene with the exception of eastern North America and eastern Asia from 8,000 to ~3,000 cal yr BP, Indonesia and Australia from 11,000 to 4,000 cal yr BP, and southern South America from 6,000 to 3,000 cal yr BP where fire activity was less than present. Regional coherence in the patterns of change in fire activity was evident throughout the post-glacial period. These complex patterns can largely be explained in terms of large-scale climate controls modulated by local changes in vegetation and fuel load.

Publication Climate Dynamics

Volume 30

Issue 7-8

Pages 887-907

Date June 2008

Journal Abbr Clim. Dyn.

DOI 10.1007/s00382-007-0334-x

ISSN 0930-7575

URL http://www.springerlink.com/content/p7w37nk82236gh84/

Extra Keywords: palaeoenvironmental reconstruction; biomass burning; palaeofire regimes; charcoal; data-model comparisons.

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Modified Sun Aug 28 00:31:16 2011

Changes in the phase of the annual cycle of surface temperature

Type Journal Article

Author Alexander R. Stine

Author Peter Huybers

Author Inez Y. Fung

Abstract The annual cycle in the Earth's surface temperature is extremely large—comparable in magnitude to the glacial–interglacial cycles over most of the planet. Trends in the phase and the amplitude of the annual cycle have been observed, but the causes and significance of these changes remain poorly understood—in part because we lack an understanding of the natural variability. Here we show that the phase of the annual cycle of surface temperature over extratropical land shifted towards earlier seasons by 1.7 days between 1954 and 2007; this change is highly anomalous with respect to earlier variations, which we interpret as being indicative of the natural range. Significant changes in the amplitude of the annual cycle are also observed between 1954 and 2007. These shifts in the annual cycles appear to be related, in part, to changes in the northern annular mode of climate variability, although the land phase shift is significantly larger than that predicted by trends in the northern annular mode alone. Few of the climate models presented by the Intergovernmental Panel on Climate Change reproduce the observed decrease in amplitude and none reproduce the shift towards earlier seasons.

Publication Nature

Volume 457

Issue 7228

Pages 435-440

Date 22 January 2009

Journal Abbr Nature

DOI 10.1038/nature07675

ISSN 0028-0836 (print), 1476-4687(online)
URL http://www.nature.com/doifinder/10.1038/nature07675
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:22 2011

Changes in the timing of snowmelt and streamflow in Colorado: A response to recent warming

Type Journal Article
Author David W. Clow
Abstract Trends in the timing of snowmelt and associated runoff in Colorado were evaluated for the 1978–2007 water years using the regional Kendall test (RKT) on daily snow-water equivalent (SWE) data from snowpack telemetry (SNOTEL) sites and daily streamflow data from headwater streams. The RKT is a robust, nonparametric test that provides an increased power of trend detection by grouping data from multiple sites within a given geographic region. The RKT analyses indicated strong, pervasive trends in snowmelt and streamflow timing, which have shifted toward earlier in the year by a median of 2–3 weeks over the 29-yr study period. In contrast, relatively few statistically significant trends were detected using simple linear regression. RKT analyses also indicated that November–May air temperatures increased by a median of 0.9°C decade−1, while 1 April SWE and maximum SWE declined by a median of 4.1 and 3.6 cm decade−1, respectively. Multiple linear regression models were created, using monthly air temperatures, snowfall, latitude, and elevation as explanatory variables to identify major controlling factors on snowmelt timing. The models accounted for 45% of the variance in snowmelt onset, and 78% of the variance in the snowmelt center of mass (when half the snowpack had melted). Variations in springtime air temperature and SWE explained most of the interannual variability in snowmelt timing. Regression coefficients for air temperature were negative, indicating that warm temperatures promote early melt. Regression coefficients for SWE, latitude, and elevation were positive, indicating that abundant snowfall tends to delay snowmelt, and snowmelt tends to occur later at northern latitudes and high elevations. Results from this study indicate that even the mountains of Colorado, with their high elevations and cold snowpacks, are experiencing substantial shifts in the timing of snowmelt and snowmelt runoff toward earlier in the year. Keywords: Streamflow, Snowmelt/icemelt, Interannual variability, North America
Publication Journal of Climate
Volume 23
Issue 9
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Date May 2010
Journal Abbr J. Climate
DOI 10.1175/2009JCLI2951.1
ISSN 0894-8755
Short Title Changes in the Timing of Snowmelt and Streamflow in Colorado
URL http://journals.ametsoc.org/doi/abs/10.1175/2009JCLI2951.1
Extra Keywords: streamflow; snowmelt/icemelt; interannual variability; North America.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:02 2011

Changes in vegetation, structure, and growth of southwestern pine forests since white settlement

Type Journal Article
Author Charles F. Cooper
Abstract no abstract
Publication Ecological Monographs
Volume 30
Issue 2

Pages 129–164
Date April 1960
Journal Abbr Ecol. Monogr.
DOI 10.2307/1948549
ISSN 0012-9615
URL http://www.jstor.org/stable/1948549
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:09:38 2011

Changes on the range: Exploring climate change with range managers

Type Journal Article
Author Michael A. Crimmons
Author George Zaimes
Author Niina Haas
Author Christopher K. Jones
Author Gregg Garfin
Author Theresa M. Crimmins
Abstract In the southwestern United States, climate variability strongly influences range conditions and thus is an important factor in range managers' land management decisions. Access to cutting-edge climate and range science information is vital for managers to make better short and long-term decisions. To engage land management practitioners and scientists in communicating about climate change and range science concepts, an experiential learning exercise was implemented at a recent meeting of land managers and scientists. Within a state and transition model framework, participants explored potential trajectories for rangeland management units under a changing climate. Small groups collectively managed a 400-hectare (1000-acre) parcel of land given financial constraints and environmental disturbances determined by chance for six decision periods, representing 60 years. In each round, groups discussed potential changes to and transitions of their parcel based on the interaction between initial state, disturbances, and the decade-by-decade climate time series data provided. The groups enacted management strategies based on trying to keep the parcel in the current state or trying to move the parcel to a more favored state. Evaluation results indicate that the exercise was useful in facilitating small group discussions between scientists and managers on the complex interactions between short-term climate variability, longer-term changes, and management decisions at all time-scales. Additionally, participants' knowledge and comfort levels with state and transition models significantly increased following the exercise. With minor adaptations, the exercise could be implemented in any part of the country and for use by college courses studying land management issues.
Publication Journal of Natural Resources and Life Sciences Education
Volume 36
Pages 76-86
Date 2007
Journal Abbr J. Nat. Resour. Life Sci. Educ.
ISSN 1539-1582
Short Title Changes on the Range
URL https://www.jnrlse.org/issues/
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:28 2011

Changes to the North Atlantic subtropical high and its role in the intensification of summer rainfall variability in the southeastern United States

Type Journal Article

Author Wenhong Li
Author Laifang Li
Author Rong Fu
Author Yi Deng
Author Hui Wang

Abstract We have investigated the changes of the North Atlantic Subtropical High (NASH) and its impact on summer precipitation over the Southeast United States (SE US) using the 850hPa geopotential height field in the NCEP, ERA-40 reanalysis, long-term rainfall data and IPCC AR4 model simulations during the past six decades (1948–2007). Our results show that the NASH in the last 30 years has become more intense and its western ridge has displaced westward with an enhanced meridional movement compared to the previous 30 years. When the NASH moved closer to the continental US in the most recent 3 decades, the effect of the NASH on the interannual variation of SE US precipitation is enhanced through the ridge's north-south movement. Our attribution analysis suggested that the changes of the NASH are mainly due to anthropogenic warming. In the 21st century with an increase of the atmospheric CO_2 concentration, the center of the NASH would be intensified and the western ridge of the NASH would shift westward further. These changes would increase the likelihood of both strong anomalously wet and dry summers over the SE US in future as suggested by the IPCC AR4 models.

Publication Journal of Climate
Volume 24
Issue 5
Pages 1499–1506
Date March 2011
Journal Abbr J. Climate
DOI 10.1175/2010JCLI3829.1
ISSN 0894-8755
URL http://journals.ametsoc.org/doi/abs/10.1175/2010JCLI3829.1
Extra Keywords: North Atlantic Ocean; rainfall; anticyclones; summer/warm season; subtropics.
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:42:35 2011

Changing climates, Earth systems and society

Type Book
Editor John Dodson

Abstract The book covers state-of-the-art considerations on how climate change has and will deliver impacts on major globalised biophysical and societal themes that will affect the way the world functions. Human activity has resulted in changes to atmospheric chemistry and land cover, and caused serious decline in biodiversity. Modifying biogeochemical cycles leads to complex feedbacks. The future climate will have impact on food security and agriculture, water supply and quality, storm and cyclone frequency, shoreline stability, biodiversity and the future of biological resources. Earth scientists might be asked to forecast any potential abrupt or environmental surprises. A sound knowledge of the Earth System will improve the chances of achieving this, by developing climate models that will reduce the degree of uncertainty in regional climate prediction. This volume sets out a framework of research issues that show how the Earth sciences contribute to a better understanding of climate change and suggests where future research will best contribute to the wellbeing of society. The key topics discussed are: - climate change patterns over the last four glacial cycles; - the variability in climate over the last 1000 years; - impact that past climate change has had on societies; - the role of human activities in climate forcing; - the role of models in predicting future climate and how we can assess their merit; - the future and likely future climate trajectories.

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Publisher Springer
Date 2010

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ISBN 978-90-481-8715-7
URL http://www.springer.com/environment/global+change+-+climate+change/book/978-90-481-8715-7
Extra Keywords: climate change; climate and Earth systems; climate and society; environmental change; IYPE.
Date Added Tue Aug 30 04:16:19 2011
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Notes:

Table of contents:

Chaos rules: Edward Lorenz capped a century of progress in forecasting by explaining unpredictability

Type Journal Article
Author Stanley David Gedzelman
Abstract no abstract
Publication Weatherwise
Volume 47
Issue 4
Pages 21-26
Date August/September 1994
Journal Abbr Weatherwise
DOI 10.1080/00431672.1994.9925328
ISSN 0043-1672
URL http://dx.doi.org/10.1080/00431672.1994.9925328
Call Number 0000
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:23 2011

Characterizing global climate change by means of Köppen Climate Classification

Type Journal Article
Author Christoph Beck
Author Jürgen Grieser
Author Markus Kottek
Author Franz Rubel
Author Bruno Rudolf
Abstract Introduction: Global climate classifications were originally constructed in order to designate the manifold existing local climates to an adequate number of climate types and to determine the spatial distribution of these types on the basis of climatic data for a reference period. Thus, climate classifications are introduced in order to reflect the mean spatial climate characteristics. However, the underlying climate variables are subject to temporal variations and so are the results of climate classifications. Therefore climate classifications may not only be used to determine the mean state of the climate. They can also be utilized to analyse global and regional scale climate variations by applying them

to varying time periods. Spatio-temporal variations of climate types resulting from effective climate classifications do not only reflect modifications of climatic parameters. By definition they are closely linked to different environmental conditions (e.g. vegetation) and therefore they may moreover be used for investigating the potential impact of past, present and projected future climate change on environmental systems. Varying aspects of global and regional climate change have been investigated on the basis of the well-known climate classification according to Köppen (e.g. Köppen 1936, Geiger 1961) by several authors. Fraedrich et al. (2001) analysed the shifts of modified Köppen climate types on a global and continental scale during the 20th century, Grieser et al. (2006) compared the results of a Köppen classification applied to gridded data from the periods 1951 – 1975 and 1976 - 2000. Focusing on a more regional perspective Suckling and Mitchell (2000) investigated variations of the boundary between the Köppen C and D climates in the Central United States and Wang and Overland (2004) analysed arctic climate change during the 20th century on the basis of a modified Köppen classification. Triantafyllou and Tsonis (1994) assessed the sensitivity of the Köppen classes to long-term climate change on the basis of long station time series. By applying the Köppen classification to the output of general circulation models (hereafter GCM) Guetter and Kutzbach (1990) estimated the main characteristics of glacial and interglacial climates, Kalvova et al. (2003) compared the results of Köppen classifications applied to several 20th century observational data sets and varying GCM outputs and Lohmann et al. (1993) used the Köppen classification to validate GCM control runs and as well to analyse scenario runs concerning spatio-tem-poral variations of climate types. In this contribution the spatio-temporal climate variations during the second half of the 20th century are investigated on global and continental scale by applying the Köppen climate classification to monthly precipitation and temperature data available from two most recently constructed globally gridded data sets (Mitchell and Jones 2005, Beck et al. 2005).

Publication Deutscher Wetterdienst(DWD), Klimastatusbericht
Issue Klimastatusbericht 2005
Pages 139-149
Date 2005
ISSN 1437-7691
URL http://www.dwd.de/sid_M283MtlKvy3JTG6TTn0SXrhphnptj3Ld9W1QyhrSdGbzRNDyvTkG!293021733!-400704827!1282270634576/bvbw/appmanager/bvbw/dwdwwwDesktop?_nfpb=true&_pageLabel=_dwdwww_klima_umwelt_hydro&…
Call Number 0000
Date Added Tue Aug 23 02:07:43 2011
Modified Sun Aug 28 04:17:44 2011

Characterizing interannual variations in global fire calendar using data from Earth observing satellites

Type Journal Article

Author Cesar Carmona-Moreno
Author Alan Belward
Author Jean-Paul Malingreau
Author Andrew Hartley
Author Maria Garcia-Alegre
Author Mikhail Antonovskiy
Author Victor Buchshtaber
Author Victor Pivovarov

Abstract Daily global observations from the Advanced Very High-Resolution Radiometers on the series of meteorological satellites operated by the National Oceanic and Atmospheric Administration between 1982 and 1999 were used to generate a new weekly global burnt surface product at a resolution of 8 km. Comparison with independently available information on fire locations and timing suggest that while the time-series cannot yet be used to make accurate and quantitative estimates of global burnt area it does provide a reliable estimate of changes in location and season of burning on the global scale. This time-series was used to characterize fire activity in both northern and southern hemispheres on the basis of average seasonal cycle and interannual variability. Fire seasonality and fire distribution data sets have been combined to provide gridded maps at 0.5° resolution documenting the probability of fire occurring in any given season for any location. A multiannual variogram constructed from 17 years of observations shows good agreement between the spatial–temporal

behavior in fire activity and the ‘El Niño’ Southern Oscillation events, showing highly likely connections between both phenomena.

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Date September 2005
Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1365-2486.2005.01003.x
ISSN 1354-1013
URL http://doi.wiley.com/10.1111/j.1365-2486.2005.01003.x
Extra Keywords: El Niño Southern Oscillation (ENSO); fire activity seasonal cycle; global burnt surfaces time series; global fire dynamics.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:16 2011

Characterizing wildfire regimes in the United States

Type Journal Article
Author Bruce D. Malamud
Author James D. A. Millington
Author George L. W. Perry
Abstract Wildfires statistics for the conterminous United States (U.S.) are examined in a spatially and temporally explicit manner. We use a high-resolution data set consisting of 88,916 U.S. Department of Agriculture Forest Service wildfires over the time period 1970-2000 and consider wildfire occurrence as a function of ecoregion (land units classified by climate, vegetation, and topography), ignition source (anthropogenic vs. lightning), and decade. For the conterminous U.S., we (i) find that wildfires exhibit robust frequency-area power-law behavior in 18 different ecoregions; (ii) use normalized power-law exponents to compare the scaling of wildfire-burned areas between ecoregions, finding a systematic change from east to west; (iii) find that wildfires in the eastern third of the U.S. have higher power-law exponents for anthropogenic vs. lightning ignition sources; and (iv) calculate recurrence intervals for wildfires of a given burned area or larger for each ecoregion, allowing for the classification of wildfire regimes for probabilistic hazard estimation in the same vein as is now used for earthquakes.
Publication Proceedings of the National Academy of Sciences
Volume 102
Issue 13
Pages 4694-4699
Date March 29, 2005
Journal Abbr PNAS
DOI 10.1073/pnas.0500880102
ISSN 1091-6490
URL http://www.pnas.org/content/102/13/4694.full
Extra Keywords: frequency-area statistics; power-law distribution; Bailey ecoregion divisions; U.S. Department of Agriculture Forest Service; probabilistic hazard.
Date Added Tue Aug 30 14:35:38 2011
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Charcoal as a fire proxy (Chapter 5)

Type Book Section

Author Cathy Whitlock
Author Chris Larsen

Abstract Charcoal particles preserved in lake sediments provide a means of reconstructing fire history beyond documentary and dendrochronological records. Recent refinements in charcoal analysis and interpretation have greatly improved our ability to use charcoal records as proxy of past fire events and to calculate long-term variations in fire frequency. Standardization has also facilitated synthesis of different researchers' data. Interpretating charcoal records in terms of the fire location, size, and intensity requires an understanding of the processes that influence charcoal production, transport, and deposition. Studies of charcoal deposition following modern fires, as well as theoretical models of charcoal particle transport, suggest that macroscopic particles (>100 microns in size) are not transported far from source before settling. They become entrapped in lake sediments within a few years of the fire event through airborne fall-out and secondary reworking. Microscopic charcoal particles (<100 microns in size), in contrast, are able to be carried aloft during a fire and can travel long distances before settling. A record of these small particles provides a reconstruction of regional or extralocal fires. Macroscopic charcoal is tallied or measured in petrographic thin sections or in sieved residues and used to calculate charcoal accumulation rates. Microscopic charcoal is usually counted as a part of routine pollen analysis and its abundance is often presented as a ratio of the pollen sum. The choice of particle size dictates whether regional or local fire events are reconstructed, and whether calculation of fire frequency is possible. Interpretation of the charcoal record requires a well-constrained chronology, in order to analyse charcoal samples taken at a finer time interval than the mean fire return interval inferred from ecological data. In most cases, it is necessary to distinguish between background charcoal in the stratigraphic record, which may be introduced through secondary processes like erosion, and the primary charcoal signal of peaks that represents fire events. Calibration of the charcoal record in terms of background and peaks is also provided by comparing the uppermost stratigraphy with known fire events, inferred from documentary or dendrochronological evidence. Current efforts to be rigorous in methodology and explicit in assumption promise to produce a network of high-resolution charcoal records that can be more easily compared and interpreted.

Book Title Tracking environmental change using lake sediments. Volume 3: Terrestrial, algal, and siliceous indicators
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Volume 3
Edition 1st edition
Place New York, NY
Publisher Springer
Date 2001
Pages 75–97
ISBN 1-4020-0681-0
URL http://www.springer.com/earth+sciences+and+geography/hydrogeology/book/978-1-4020-0681-4
Call Number 0000
Extra Keywords: charcoal analysis; fire history; lake-sediment records.
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Notes:

Citation:

Whitlock, C., and Larson, C. 2001. Charcoal as a Fire Proxy. In Tracking Environmental Change Using Lake Sediments. Volume 3: Terrestrial, Algal, and Siliceous Indicators. J. P. Smol, H. J. B. Birks & W. M. Last (eds.).

J. P. Smol, H. J. B. Birks & W. M. Last (eds.), 2001. Tracking Environmental Change Using Lake Sediments. Volume 3:Terrestrial, Algal, and Siliceous Indicators. KluwerAcademic Publishers, Dordrecht, The Netherlands.

Chinese stalagmite δ18O controlled by changes in the Indian monsoon during a simulated Heinrich event

Type Journal Article
Author Francesco S. R. Pausata
Author David S. Battisti
Author Kerim H. Nisancioglu
Author Cecilia M. Bitz
Abstract Carbonate cave deposits in India and China are assumed to record the intensity of monsoon precipitation, because the δ18O of the carbonate tracks the isotopic signature of precipitation. These records show spatially coherent variability throughout the last ice age and suggest that monsoon strength was altered during the millennial-scale climate variations known as Dansgaard–Oeschger events and during the Heinrich cooling events. Here we use a numerical climate model with an embedded oxygen-isotope model to assess what caused the shifts in the oxygen-isotope signature of precipitation during a climate perturbation designed to mimic a Heinrich event. Our simulations show that a sudden increase in North Atlantic sea-ice extent during the last glacial period leads to cooling in the Northern Hemisphere, reduced precipitation over the Indian basin and weakening of the Indian monsoon. The precipitation is isotopically heavier over India and the water vapour exported to China is isotopically enriched. Our model broadly reproduces the enrichment of δ18O over Northern India and East Asia evident in speleothem records during Heinrich events. We therefore conclude that changes in the δ18O of cave carbonates associated with Heinrich events reflect changes in the intensity of Indian rather than East Asian monsoon precipitation.
Publication Nature Geoscience
Volume 4
Issue 7
Pages 474–480
Date July 2011
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo1169
ISSN 1752-0894
URL http://www.nature.com/doifinder/10.1038/ngeo1169
Date Added Sun Aug 28 00:27:26 2011
Modified Wed Aug 31 22:12:30 2011

Classification of meteorological patterns in southern California by discriminant analysis

Type Journal Article
Author Morris H. McCutchan
Author Mark J. Schroeder
Abstract Stepwise discriminant analysis of eight meteorological variables was used to classify the days from May through September, 1970, on the southern slopes of the San Bernardino Mountains and over the adjacent basin of southern California. The five classes were: 1) hot, dry continental air throughout the day (Santa Ana); 2) relatively dry forenoon, modified marine air in afternoon, very hot (heat wave); 3) moist, modified marine air, hot in afternoon; 4) moist, modified marine air, warm in afternoon; and 5) cool, moist, deep marine air throughout day. Observations of surface temperature, humidity, wind speed and direction, and total oxidant were recorded continuously along the southern slope and crest of the San Bernardino Mountains, and rawinsonde observations were recorded at the base. Vertical profiles of temperature, humidity, and wind measured by rawinsonde document the five classes. Significant differences in fire weather and oxidant air pollution exposure were found on the slope and crest during the five meteorological conditions. Oxidant concentrations are highest on days in classes 2, 3 and 4, when transported up the slope with the marine air during the day.
Publication Journal of Applied Meteorology
Volume 12

Issue 4
Pages 571-577
Date June 1973
Journal Abbr J. Appl. Meteorol.
ISSN 0021-8952
URL http://dx.doi.org/10.1175%2F1520-0450%281973%29012%3C0571%3ACOMPIS%3E2.0.CO%3B2
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:45:19 2011

Climate Action Tracker

Type Web Page
Author ECOFYS
Author Climate Analytics
Abstract Detailed information on individual country pledges for greenhouse gas emission reductions developed by Ecofys and Climate Analytics/supported by the European Climate Foundation
Website Title No major changes in ambition: High chance to exceed 3°C
Website Type independent science-based assessment (Green House Gas Emission)
URL http://www.climateactiontracker.org/

Date Added Sun Aug 28 05:42:07 2011
Modified Sun Aug 28 05:42:07 2011

Climate and atmospheric history of the past 420,000 years from the Vostok ice core, Antarctica

Type Journal Article
Author Jean-Robert Petit
Author J. Jouzel
Author Dominique Raynaud
Author Narcisse I. Barkov
Author Jean-Marc Barnola
Author Isabelle Basile
Author Michael Bender
Author J. Chappellaz
Author M. Davis
Author Gilles Delaygue
Author Marc Delmotte
Author Vladimir M. Kotlyakov
Author Michel Legrand
Author Volodia Y. Lipenkov
Author Claude Lorius
Author Laurence Pépin
Author Catherine Ritz
Author Eric Saltzman
Author Michel Stievenard
Abstract The recent completion of drilling at Vostok station in East Antarctica has allowed the extension of the ice record of atmospheric composition and climate to the past four glacial–interglacial cycles. The succession of changes through each climate cycle and termination was similar, and atmospheric and climate properties

oscillated between stable bounds. Interglacial periods differed in temporal evolution and duration. Atmospheric concentrations of carbon dioxide and methane correlate well with Antarctic air-temperature throughout the record. Present-day atmospheric burdens of these two important greenhouse gases seem to have been unprecedented during the past 420,000 years.

Publication	Nature
Volume	399
Issue	6735
Pages	429–436
Date	June 03, 1999
Journal Abbr	Nature
DOI	10.1038/20859
ISSN	0028-0836
URL	http://dx.doi.org/10.1038/20859
Date Added	Sun Aug 28 00:27:26 2011
Modified	Sun Aug 28 00:30:17 2011

Climate and disturbance forcing of episodic tree recruitment in a southwestern ponderosa pine landscape

Type	Journal Article
Author	Peter M. Brown
Author	Rosalind Wu
Abstract	Strong but relatively short (annual to decadal length) climate change can have broad-scale and long-lasting effects on forest communities. Climate impacts forests through direct effects on tree demography (mortality and overstory recruitment) and indirect effects on disturbance regimes. Here, we compare multicentury chronologies of tree recruitment from a 307-ha ponderosa pine forest in southwestern Colorado to reconstructions of fire years, hydroclimate, and the El Niño-Southern Oscillation (ENSO). Few trees predate a regional multiyear megadrought centered in the 1580s. A prolonged pluvial in the early1600s resulted in a pulse of tree recruitment that corresponds to recruitment seen over much of the Southwest. Other cohorts in the early 1700s and mid-1800s established during multidecadal fire-quiescent periods. These periods correspond to shifts in ENSO that apparently resulted in dampening of interannual wet/dry oscillations responsible for fuel buildup and drying. Fires, mediated by stochastic climate variation, acted as a densityindependent regulation on tree populations since establishment was not limited by overstory tree density, but rather by fire-caused mortality of seedlings and saplings during periods of more frequent fires. Even-aged cohorts in ponderosa pine forests likely have little if anything to do with episodic mortality caused by more severe fires, but rather relate mainly to episodic recruitment opportunities. Fire cessation after Euro-American settlement in the late 1800s resulted in an increase in tree density and changes in forest composition, which are major factors that have contributed to recent severe wildfires in other Southwestern forests. Our results document clear linkages between synoptic climate forcing, fires, and recruitment episodes, and highlight the importance of regional historical processes on contemporary forest composition and structure.
Publication	Ecology
Volume	86
Issue	11
Pages	3030–3038
Date	November 2005
Journal Abbr	Ecology
DOI	10.1890/05-0034
ISSN	0012-9658
URL	http://www.esajournals.org/doi/full/10.1890/05-0034
Extra	Keywords: dendroecology; density-independent population dynamics; drought; El Niño-Southern Oscillation; fire regimes; tree demography; tree recruitment.
Date Added	Wed Aug 24 12:35:15 2011

Modified Fri Aug 26 20:34:44 2011

Climate and forest fires in Montana and Northern Idaho, 1909 to 1919

Type Journal Article
Author Julius A. Larsen
Author C. C. Delavan
Abstract no abstract
Publication Monthly Weather Review
Volume 50
Issue 2
Pages 55-68
Date February 1922
Journal Abbr Mon. Wea. Rev.
DOI 10.1175/1520-0493(1922)50<55:CAFFIM>2.0.CO;2
ISSN 1520-0493
URL http://dx.doi.org/10.1175%2F1520-0493%281922%2950%3C55%3ACAFFIM%3E2.0.CO%3B2
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:41:29 2011

Climate and human influences on global biomass burning over the past two millennia

Type Journal Article
Author Jennifer R. Marlon
Author Patrick J. Bartlein
Author Christopher Carcaillet
Author Daniel G. Gavin
Author Sandy P. Harrison
Author Philip E. Higuera
Author Fortunat Joos
Author Mitchell J. Power
Author I. Colin Prentice
Abstract Large, well-documented wildfires have recently generated worldwide attention, and raised concerns about the impacts of humans and climate change on wildfire regimes. However, comparatively little is known about the patterns and driving forces of global fire activity before the twentieth century. Here we compile sedimentary charcoal records spanning six continents to document trends in both natural and anthropogenic biomass burning for the past two millennia. We find that global biomass burning declined from AD 1 to approx1750, before rising sharply between 1750 and 1870. Global burning then declined abruptly after 1870. The early decline in biomass burning occurred in concert with a global cooling trend and despite a rise in the human population. We suggest the subsequent rise was linked to increasing human influences, such as population growth and land-use changes. Our compilation suggests that the final decline occurred despite increasing air temperatures and population. We attribute this reduction in the amount of biomass burned over the past 150 years to the global expansion of intensive grazing, agriculture and fire management.
Publication Nature Geoscience
Volume 1
Issue 10
Pages 697-702
Date October 2008
Journal Abbr Nature Geosci.

DOI 10.1038/ngeo313
ISSN 1752-0894
URL http://www.nature.com/doifinder/10.1038/ngeo313
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:44:55 2011

Notes:

error:

* In the version of this Article originally published, the y axis label of Fig. 4d was incorrect. This error has been corrected in the HTML and PDF versions.

Climate and plant distribution at global and local scales

Type Journal Article
Author F. Ian Woodward
Author B. G. Williams
Abstract This paper investigates, with predictive models, the utility of ecophysiological responses to climate as predictors of plant distribution. At the global scale responses to extreme minimum temperatures and to the hydrological budget effectively predict the distribution limits of the major vegetation types of the World. A minimum temperature of -15°C, for example, appears critical in controlling the poleward spread of vegetation that is dominated by evergreen broadleaved species; however, the presence or absence of more frost resistant species, such as those that are deciduous broadleaved, is not obviously explained in terms of extremes of climate. In such cases, predicting the competitive relationships between species is necessary and dependent on the climatic sensitivity of population dynamics.
Publication Vegetatio
Volume 69
Issue 1-3
Pages 189–197
Date April 30, 1987
Journal Abbr Vegetatio
DOI 10.1007/BF00038700
ISSN 0042-3106
URL http://www.jstor.org/stable/20038116
Extra Keywords: climate; drought; frost resistance; gap; life-cycle; plant distribution; population dynamics; temperature.
Date Added Tue Aug 30 23:28:52 2011
Modified Wed Aug 31 00:44:04 2011

Climate and spatial patterns of wildfire in North America (Chapter 4)

Type Book Section
Author Ze'ev Gedalof
Abstract Climate interacts with wildfire at a range of spatial and temporal scales. In this chapter I describe a conceptual model that describes how climate (a top-down control) interacts with processes of vegetation development and topography (bottom-up controls) to give rise to characteristic disturbance regimes and observed patterns of wildfire throughout North America. At the shortest timescales (synoptic to seasonal), climate influences fine fuel moisture, ignition frequency, and rates of wildfire spread. At intermediate timescales (annual to interannual), climate affects the relative abundance and continuity of fine fuels, as well as the abundance and moisture content of coarser fuels. At longer timescales (decadal to centennial) climate determines the

assemblage of species that can survive at a particular location. Interactions between these species' characteristics and the influence of climatic processes on wildfire activity give rise to the characteristic disturbance regime and vegetation structure at a given location.

Book Title The Landscape Ecology of Fire
Series Ecological Studies
Volume 213
Edition 1st edition
Place New York, NY
Publisher Springer Verlag
Date 2011
Pages 89–115
ISBN 978-94-007-0300-1
URL http://www.springerlink.com/content/l522l0p176n57617/
Call Number 0000
Extra DOI: 10.1007/978-94-007-0301-8_4
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:33 2011

Climate and wildfire area burned in Western U.S. ecoprovinces, 1916-2003

Type Journal Article
Author Jeremy S. Littell
Author Donald McKenzie
Author David L. Peterson
Author Anthony L. Westerling
Abstract The purpose of this paper is to quantify climatic controls on the area burned by fire in different vegetation types in the western United States. We demonstrate that wildfire area burned (WFAB) in the American West was controlled by climate during the 20th century (1916–2003). Persistent ecosystem-specific correlations between climate and WFAB are grouped by vegetation type (ecoprovinces). Most mountainous ecoprovinces exhibit strong year-of-fire relationships with low precipitation, low Palmer drought severity index (PDSI), and high temperature. Grass- and shrub-dominated ecoprovinces had positive relationships with antecedent precipitation or PDSI. For 1977–2003, a few climate variables explain 33–87% (mean = 64%) of WFAB, indicating strong linkages between climate and area burned. For 1916–2003, the relationships are weaker, but climate explained 25–57% (mean = 39%) of the variability. The variance in WFAB is proportional to the mean squared for different data sets at different spatial scales. The importance of antecedent climate (summer drought in forested ecosystems and antecedent winter precipitation in shrub and grassland ecosystems) indicates that the mechanism behind the observed fire–climate relationships is climatic preconditioning of large areas of low fuel moisture via drying of existing fuels or fuel production and drying. The impacts of climate change on fire regimes will therefore vary with the relative energy or water limitations of ecosystems. Ecoprovinces proved a useful compromise between ecologically imprecise state-level and localized gridded fire data. The differences in climate–fire relationships among the ecoprovinces underscore the need to consider ecological context (vegetation, fuels, and seasonal climate) to identify specific climate drivers of WFAB. Despite the possible influence of fire suppression, exclusion, and fuel treatment, WFAB is still substantially controlled by climate. The implications for planning and management are that future WFAB and adaptation to climate change will likely depend on ecosystem-specific, seasonal variation in climate. In fuel-limited ecosystems, fuel treatments can probably mitigate fire vulnerability and increase resilience more readily than in climate-limited ecosystems, in which large severe fires under extreme weather conditions will continue to account for most area burned.
Publication Ecological Applications
Volume 19
Issue 4
Pages 1003–1021
Date June 2009
Journal Abbr Ecol. Appl.

DOI 10.1890/07-1183.1
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/07-1183.1
Extra Keywords: adaptation; antecedent climate; climate; climate change; drought; ecoprovinces; ecosystem management; fire; forest; fuels; gamma distribution; resilience.
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:42:39 2011

Climate and wildfire in the western United States

Type Journal Article
Author Anthony L. Westerling
Author Alexander Gershunov
Author Timothy J. Brown
Author Daniel R. Cayan
Author Michael D. Dettinger
Abstract A 21-yr gridded monthly fire-starts and acres-burned dataset from U.S. Forest Service, Bureau of Land Management, National Park Service, and Bureau of Indian Affairs fire reports recreates the seasonality and interannual variability of wildfire in the western United States. Despite pervasive human influence in western fire regimes, it is striking how strongly these data reveal a fire season responding to variations in climate. Correlating anomalous wildfire frequency and extent with the Palmer Drought Severity Index illustrates the importance of prior and accumulated precipitation anomalies for future wildfire season severity. This link to antecedent seasons' moisture conditions varies widely with differences in predominant fuel type. Furthermore, these data demonstrate that the relationship between wildfire season severity and observed moisture anomalies from antecedent seasons is strong enough to forecast fire season severity at lead times of one season to a year in advance.
Publication Bulletin of the American Meteorological Society
Volume 84
Issue 5
Pages 595–604
Date May 2003
Journal Abbr BAMS
DOI 10.1175/BAMS-84-5-595
ISSN Bulletin of the American Meteorological Society
URL http://journals.ametsoc.org/doi/abs/10.1175/BAMS-84-5-595
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:50 2011

Climate and wildfires in the North American boreal forest

Type Journal Article
Author Marc Macias Fauria
Author Edward A. Johnson
Abstract The area burned in the North American boreal forest is controlled by the frequency of mid-tropospheric blocking highs that cause rapid fuel drying. Climate controls the area burned through changing the dynamics of large-scale teleconnection patterns (Pacific Decadal Oscillation/El Niño Southern Oscillation and Arctic Oscillation, PDO/ENSO and AO) that control the frequency of blocking highs over the continent at different time scales. Changes in these teleconnections may be caused by the current global warming. Thus, an increase in temperature alone need not be associated with an increase in area burned in the North American boreal forest. Since the end of the Little Ice Age, the climate has been unusually moist and variable: large fire years have occurred in unusual years, fire frequency has decreased and fire–climate relationships have occurred at

interannual to decadal time scales. Prolonged and severe droughts were common in the past and were partly associated with changes in the PDO/ENSO system. Under these conditions, large fire years become common, fire frequency increases and fire–climate relationships occur at decadal to centennial time scales. A suggested return to the drier climate regimes of the past would imply major changes in the temporal dynamics of fire–climate relationships and in area burned, a reduction in the mean age of the forest, and changes in species composition of the North American boreal forest.

Publication Philosophical Transactions of the Royal Society B
Volume 363
Issue 1501
Pages 2315-2327
Date 12 July 2008
Journal Abbr Phil. Trans. R. Soc. B
DOI 10.1098/rstb.2007.2202
ISSN 0962-8436
URL http://rstb.royalsocietypublishing.org/cgi/doi/10.1098/rstb.2007.2202
Extra Keywords: Alaska; area burned by wildfire; Canada; climate change; Pacific Decadal Oscillation; Arctic Oscillation.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:43:17 2011

Climate Change - Improvements needed to clarify national priorities and better align them with federal funding decisions

Type Report
Author US Government Accountability Office
Abstract Background: In August 2005, we issued a report on federal climate change funding for 1993 through 2004, as reported by OMB.8 Specifically, we reported on how (1) total funding and funding by category changed and whether funding data were comparable over time and (2) funding by agency changed and whether funding data were comparable over time. We found, among other things, that it was unclear whether funding changed as much as OMB reported because modifications in the format and content of OMB reports limited the comparability of funding data over time. For example, OMB reported that it expanded the definitions of some accounts to include more activities, but did not specify how it changed the definitions. We were also unable to compare climate-related tax expenditures over time because OMB reported data on proposed, but not on existing tax expenditures. Based on these findings, we recommended that OMB (1) use the same format for presenting data from year-to-year, to the extent that it could do so and remain in compliance with reporting requirements; (2) explain changes in report content or format when they are introduced; (3) include information on existing climate-related tax expenditures in its reports; and (4) use the same criteria for determining which tax expenditures to include as it uses for determining which accounts to include. Presenting tax expenditures alongside the related spending programs is a first step in providing a useful and accurate picture of the extent of federal support for climate change. In its April 2006 Federal Climate Change Expenditures Report to Congress—the first following our August 2005 report—OMB responded to our recommendations about report consistency and tax expenditures. The report stated that “to address GAO’s recommendations, reporting changes have been noted in table footnotes throughout this report and a summary table of climate funding from 2003 through 2007 has been provided.” The report also included existing tax expenditures that could contribute to reducing greenhouse gas emissions. OMB’s most recent reports generally have kept the same structures, categories, definitions, and format as in past years and more clearly label funding data.
Report Number GAO-11-317
Place Washington, D.C.
Institution U.S. Government Accountability Office (GAO)
Date May 2011
Pages 89 p.
URL http://www.gao.gov/new.items/d11317.pdf
Loc. in Archive http://www.gao.gov/products/GAO-11-317

Call Number 0000
Date Added Sat Aug 27 04:08:03 2011
Modified Sat Aug 27 15:53:23 2011

Climate Change 1992: The supplementary report to the IPCC scientific assessment

Type Book
Editor John T. Houghton
Editor Bruce A. Callander
Editor Shelagh K. Varney
Abstract no abstract
Edition 1st edition
Place Cambridge, New York, and Victoria
Publisher Cambridge University Press
Date 1992
# of Pages 218 p.
ISBN 0521438292, 9780521438292
Short Title Climate Change 1992
URL http://www.ipcc.ch/publications_and_data/publications_ipcc_supplementary_report_1992_wg1.shtml
Loc. in Archive IPCC
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:04 2011

Climate Change 2001: The scientific basis: Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change

Type Book
Author IPCC WG I
Editor John T. Houghton
Editor Yihui Ding
Editor David J. Griggs
Editor Maria Noguer
Editor Paul J. van der Linden
Editor Xiaosu Dai
Editor Kathy Maskell
Editor Cathy A. Johnson
Abstract no abstract
Series Climate Change
Place Cambridge, United Kingdom: New York, NY, USA
Publisher Cambridge University Press
Date 2001
# of Pages 881 p.
ISBN 0521807670, 0521014956
Short Title IPCC, 2001
URL http://www.grida.no/publications/other/ipcc_tar/?src=/climate/ipcc_tar/wg1/index.htm
Archive UNEP/GRID-Arendal
Loc. in Archive http://www.grida.no/publications/other/ipcc_tar/

Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:05:14 2011

Notes:

Climate change and Variability

Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.
Note that the Framework Convention on Climate Change (UNFCCC), in its Article 1, defines "climate change" as: "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods". The UNFCCC thus makes a distinction between "climate change" attributable to human activities altering the atmospheric composition, and "climate variability" attributable to natural causes.

See also: Climate variability.

Climate variability
Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability). See also: Climate change.

Citation:

IPCC, 2001: Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Houghton, J.T.,Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 881 pp.

Climate Change 2007: Impacts, adaptation and vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

Type Book
Author IPCC WG II
Editor Martin L. Parry
Editor Osvaldo F. Canziani
Editor Jean P. Palutikof
Editor Paul J. van der Linden
Editor Clair E. Hanson
Abstract no abstract
Series Climate Change
Place Cambridge, United Kingdom
Publisher Cambridge University Press
Date 2007
# of Pages 976 p.
ISBN 978052188010-7, 978052170597-4
Short Title Climate change 2007
URL http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm
Loc. in Archive IPCC

Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:05:14 2011

Notes:

Citation:

IPCC, 2007: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 976 pp.

Climate Change 2007: Mitigation of climate change: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

Type Book
Author IPCC WG III
Editor Bert Metz
Editor Ogunlade R. Davidson
Editor Peter R. Bosch
Editor Rutu Dave
Editor Leo A. Meyer
Abstract no abstract
Series Climate Change
Publisher Cambridge University Press
Date 2007
# of Pages 862 p.
ISBN 978052188011-4, 978052170598-1
Short Title Climate change 2007
URL http://www.ipcc.ch/publications_and_data/ar4/wg3/en/contents.html
Archive http://www.ipcc.ch/ipccreports/ar4-wg3.htm
Loc. in Archive IPCC
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:05:14 2011

Notes:

Citation:

IPCC, 2007: Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA., 862 pp.

Climate Change 2007: Synthesis report: Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

Type Book
Author IPCC
Editor The Core Writing Team
Editor Rajendra K. Pachauri

Editor Andy Reisinger
Abstract no abstract
Series Climate Change
Place Geneva, Switzerland
Publisher IPCC Secretariat
Date 2007
# of Pages 104 p.
Short Title Climate Change 2007
URL http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm
Loc. in Archive IPCC
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:05:14 2011

Notes:

Citation:

IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

Climate Change 2007: The physical science basis: Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

Type Book
Author IPCC WG I
Editor Susan Solomon
Editor Dahe Qin
Editor Martin Manning
Editor Zhenlin Chen
Editor Melinda Marquis
Editor Kristen B. Averyt
Editor Melinda M.B. Tignor
Editor Henry LeRoy Miller, Jr.
Abstract no abstract
Series Climate Change
Place Cambridge, United Kingdom: New York, NY, USA
Publisher Cambridge University Press
Date 2007
# of Pages 996 p.
ISBN 978052188009-1, 978052170596-7
Short Title Climate change 2007
URL http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm
Loc. in Archive IPCC
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:05:14 2011

Notes:

Citation:

IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp.

Climate change adaptation policy options

Type	Journal Article
Author	Joel B. Smith
Author	Stephanie S. Lenhart
Abstract	Africa is one of the regions of the world potentially most vulnerable to climate change. Warming of the globe due to increased atmospheric concentrations of greenhouse gases appears to be inevitable. Therefore, it is imperative that policy makers in regions such as Africa begin to consider what measures they should take to adapt to the potential conseqences of climate change. A number of adaptation policies are suggested here. The policies address general adaptation measures as well as specific measures in water resources, coastal resources (adapting to sea-level nse), forests, ecosystems, and agriculture. These measures would enhance the flexibhty of resources to adapt to climate change and would have net benefits greater than costs. In some cases, the measures make sense without considering climate change because they help address current climate variability. In other cases, the measures must be implemented in anticipation of climate change because they would be ineffective if implemented as a reaction to climate change.
Publication	Climate Research
Volume	6
Issue	2
Pages	193–201
Date	February 1996
Journal Abbr	Clim. Res.
DOI	10.3354/cr0006193
ISSN	1616-1572
URL	http://www.int-res.com/abstracts/cr/v06/n2/p193-201/
Extra	Keywords: climate change; adaptation; policy.
Date Added	Thu Sep 15 18:03:29 2011
Modified	Thu Sep 15 18:03:55 2011

Climate change and forest disturbances

Type	Journal Article
Author	Virginia H. Dale
Author	Linda A. Joyce
Author	Steve McNULTY
Author	Ronald P. Neilson
Author	Matthew P. Ayres
Author	Michael D. Flannigan
Author	Paul J. Hanson
Author	Lloyd C. Irland
Author	Ariel E. Lugo
Author	Chris J. Peterson
Author	Daniel Simberloff
Author	Frederick J. Swanson

Author Brian J. Stocks
Author B. Michael Wotton
Abstract Climate change can affect forests by altering the frequency, intensity, duration, and timing of fire, drought, introduced species, insect and pathogen outbreaks, hurricanes, windstorms, ice storms, or landslides.
Publication BioScience
Volume 51
Issue 9
Pages 723–734
Date September 2001
Journal Abbr BioScience
DOI 10.1641/0006-3568(2001)051[0723:CCAFD]2.0.CO;2
ISSN 0006-3568
URL http://www.bioone.org/doi/full/10.1641/0006-3568%282001%29051%5B0723%3ACCAFD%5D2.0.CO %3B2
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:36:21 2011

Climate change and forest fires

Type Journal Article
Author Michael D. Flannigan
Author Brian J. Stocks
Author B. Mike Wotton
Abstract This paper addresses the impacts of climate change on forest fires and describes how this, in turn, will impact on the forests of the United States. In addition to reviewing existing studies on climate change and forest fires we have used two transient general circulation models (GCMs), namely the Hadley Centre and the Canadian GCMs, to estimate fire season severity in the middle of the next century. Ratios of $2xCO_2$ seasonal severity rating (SSR). over present day SSR were calculated for the means and maximums for North America. The results suggest that the SSR will increase by 10-50% over most of North America; although, there are regions of little change or where the SSR may decrease by the middle of the next century. Increased SSRs should translate into increased forest fire activity. Thus, forest fires could be viewed as an agent of change for US forests as the fire regime will respond rapidly to climate warming. This change in the fire regime has the potential to overshadow the direct effects of climate change on species distribution and migration.
Publication The Science of the Total Environment
Volume 262
Issue 3
Pages 221-229
Date 15 November 2000
Journal Abbr Sci. Total Environ.
DOI 10.1016/S0048-9697(00)00524-6
ISSN 0048-9697
URL http://linkinghub.elsevier.com/retrieve/pii/S0048969700005246
Extra Keywords: climate change; forest fires; forests; general circulation models.
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:24 2011

Climate change and forests of the future: Managing in the face of uncertainty

Type Journal Article
Author Constance I. Millar

Author Nathan L. Stephenson

Author Scott L. Stephens

Abstract We offer a conceptual framework for managing forested ecosystems under an assumption that future environments will be different from present but that we cannot be certain about the specifics of change. We encourage flexible approaches that promote reversible and incremental steps, and that favor ongoing learning and capacity to modify direction as situations change. We suggest that no single solution fits all future challenges, especially in the context of changing climates, and that the best strategy is to mix different approaches for different situations. Resources managers will be challenged to integrate adaptation strategies (actions that help ecosystems accommodate changes adaptively) and mitigation strategies (actions that enable ecosystems to reduce anthropogenic influences on global climate) into overall plans. Adaptive strategies include resistance options (forestall impacts and protect highly valued resources), resilience options (improve the capacity of ecosystems to return to desired conditions after disturbance), and response options (facilitate transition of ecosystems from current to new conditions). Mitigation strategies include options to sequester carbon and reduce overall greenhouse gas emissions. Priority-setting approaches (e.g., triage), appropriate for rapidly changing conditions and for situations where needs are greater than available capacity to respond, will become increasingly important in the future.

Publication Ecological Applications

Volume 17

Issue 8

Pages 2145-2151

Date December 2007

Journal Abbr Ecol. Appl.

DOI 10.1890/06-1715.1

ISSN 1051-0761

Short Title Climate change and forests of the future

URL http://www.esajournals.org/doi/abs/10.1890/06-1715.1

Extra Keywords: carbon sequestration; climate change; desired conditions; ecosystem management; facilitated conservation; forest management; historical variability; resilience; resistance; wildfire.

Date Added Tue Aug 30 14:35:38 2011

Modified Tue Aug 30 14:46:21 2011

Climate change and the invasion of California by grasses

Type Journal Article

Author Brody Sandel

Author Emily M. Dangremond

Abstract Over the next century, changes in the global climate are expected to have major consequences for plant communities, possibly including the exacerbation of species invasions. We evaluated this possibility in the grass flora of California, which is economically and ecologically important and heavily invaded. We used a novel, trait-based approach involving two components: identifying differences in trait composition between native and exotic components of the grass flora and evaluating contemporary trait–climate relationships across the state. The combination of trait–climate relationships and trait differences between groups allows us to predict changes in the exotic-native balance under climate change scenarios. Exotic species are more likely to be annual, taller, with larger leaves, larger seeds, higher specific leaf area, and higher leaf N percentage than native species. Across the state, all these traits are associated with regions with higher temperature. Therefore, we predict that increasing temperatures will favor trait states that tend to be possessed by exotic species, increasing the dominance of exotic species. This prediction is corroborated by the current distribution of exotic species richness relative to native richness in California; warmer areas contain higher proportions of exotic species. This pattern was very well captured by a simple model that predicts invasion severity given only the trait–climate relationship for native species and trait differences between native and exotic species. This study provides some of the first evidence for an important interaction between climate change and species invasions across very broad geographic and taxonomic scales.

Publication Global Change Biology

Volume Published online

Pages 13 p.
Date July 2011
Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1365-2486.2011.02480.x
ISSN 1354-1013
URL http://doi.wiley.com/10.1111/j.1365-2486.2011.02480.x
Extra Keywords: California; climate change; exotic species; functional traits; grass; grassland; height; invasive species; leaf nitrogen; seed mass.
Date Added Sun Aug 28 17:22:27 2011
Modified Sun Aug 28 17:28:54 2011

Climate change and wildfire in California

Type Journal Article
Author Anthony L. Westerling
Author Benjamin P. Bryant
Abstract Wildfire risks for California under four climatic change scenarios were statistically modeled as functions of climate, hydrology, and topography. Wildfire risks for the GFDL and PCM global climate models and the A2 and B1 emissions scenarios were compared for 2005–2034, 2035–2064, and 2070–2099 against a modeled 1961–1990 reference period in California and neighboring states. Outcomes for the GFDL model runs, which exhibit higher temperatures than the PCM model runs, diverged sharply for different kinds of fire regimes, with increased temperatures promoting greater large fire frequency in wetter, forested areas, via the effects of warmer temperatures on fuel flammability. At the same time, reduced moisture availability due to lower precipitation and higher temperatures led to reduced fire risks in some locations where fuel flammability may be less important than the availability of fine fuels. Property damages due to wildfires were also modeled using the 2000 U.S. Census to describe the location and density of residential structures. In this analysis the largest changes in property damages under the climate change scenarios occurred in wildland/urban interfaces proximate to major metropolitan areas in coastal southern California, the Bay Area, and in the Sierra foothills northeast of Sacramento.
Publication Climatic Change
Volume 87
Issue S1
Pages 231-249
Date March 2008
Journal Abbr Climatic Change
DOI 10.1007/s10584-007-9363-z
ISSN 0165-0009
URL http://www.springerlink.com/index/10.1007/s10584-007-9363-z
Date Added Tue Aug 16 23:28:30 2011
Modified Tue Aug 16 23:28:30 2011

Climate change effects on vegetation distribution, carbon, and fire in California

Type Journal Article
Author James M. Lenihan
Author Raymond Drapek
Author Dominique Bachelet
Author Ronald P. Neilson
Abstract The objective of this study was to dynamically simulate the response of vegetation distribution, carbon, and fire to the historical climate and to two contrasting scenarios of climate change in California. The results of the

simulations for the historical climate compared favorably to independent estimates and observations, but validation of the results was complicated by the lack of land use effects in the model. The response to increasing temperatures under both scenarios was characterized by a shift in dominance from needle-leaved to broad-leaved life-forms and by increases in vegetation productivity, especially in the relatively cool and mesic regions of the state. The simulated response to changes in precipitation were complex, involving not only the effect of changes in soil moisture on vegetation productivity, but also changes in tree–grass competition mediated by fire. Summer months were warmer and persistently dry under both scenarios, so the trends in simulated fire area under both scenarios were primarily a response to changes in vegetation biomass. Total ecosystem carbon increased under both climate scenarios, but the proportions allocated to the wood and grass carbon pools differed. The results of the simulations underscore the potentially large impact of climate change on California ecosystems, and the need for further use and development of dynamic vegetation models using various ensembles of climate change scenarios.

Publication Ecological Applications
Volume 13
Issue 6
Pages 1667–1681
Date December 2003
Journal Abbr Ecol. Appl.
DOI 10.1890/025295
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/025295
Extra Keywords: California, USA; carbon; climate change; dynamic vegetation model; fire; vegetation distribution.
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:42:02 2011

Climate change projected fire weather sensitivity: California Santa Ana wind occurrence

Type Journal Article

Author Norman L. Miller
Author Nicole J. Schlegel

Abstract A new method based on global climate model pressure gradients was developed for identifying coastal high-wind fire weather conditions, such as the Santa Ana Occurrence (SAO). Application of this method for determining southern California Santa Ana wind occurrence resulted in a good correlation between derived large-scale SAOs and observed offshore winds during periods of low humidity. The projected change in the number of SAOs was analyzed using two global climate models, one a low temperature sensitivity and the other a middle-temperature sensitivity, both forced with low and high emission scenarios, for three future time periods. This initial analysis shows consistent shifts in SAO events from earlier (September–October) to later (November–December) in the season, suggesting that SAOs may significantly increase the extent of California coastal areas burned by wildfires, loss of life, and property.

Publication Geophysical Research Letters
Volume 33
Issue 15
Pages L15711 (5 p.)
Date August 2006
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2006GL025808
Short Title Climate change projected fire weather sensitivity
URL http://www.agu.org/pubs/crossref/2006/2006GL025808.shtml
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:22:58 2011

Climate change vulnerability of forest biodiversity: Climate and competition tracking of demographic rates

Type Journal Article
Author James S. Clark
Author David M. Bell
Author Michelle H. Hersh
Author Lauren Nichols
Abstract Forest responses to climate change will depend on demographic impacts in the context of competition. Current models used to predict species responses, termed climate envelope models (CEMs), are controversial, because (i) calibration and prediction are based on correlations in space (CIS) between species abundance and climate, rather than responses to climate change over time (COT), and (ii) they omit competition. To determine the relative importance of COT, CIS, and competition for light, we applied a longitudinal analysis of 27 000 individual trees over 6–18 years subjected to experimental and natural variation in risk factors. Sensitivities and climate and resource tracking identify which species are vulnerable to these risk factors and in what ways. Results show that responses to COT differ from those predicted based on CIS. The most important impact is the effect of spring temperature on fecundity, rather than any input variable on growth or survival. Of secondary importance is growing season moisture. Species in the genera Pinus, Ulmus, Magnolia, and Fagus are particularly vulnerable to climate variation. However, the effect of competition on growth and mortality risk exceeds the effects of climate variation in space or time for most species. Because sensitivities to COT and competition are larger than CIS, current models miss the most important effects. By directly comparing sensitivity to climate in time and space, together with competition, the approach identifies which species are sensitive to climate change and why, including the heretofore overlooked impact on fecundity.
Publication Global Change Biology
Volume 17
Issue 5
Pages 1834-1849
Date May 2011
Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1365-2486.2010.02380.x
ISSN 1354-1013
Short Title Climate change vulnerability of forest biodiversity
URL http://doi.wiley.com/10.1111/j.1365-2486.2010.02380.x
Call Number 0000
Extra Keywords: bayesian analysis; climate change; climate tracking; competition; drought; resource tracking; tree demography.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:43 2011

Climate change-integrated conservation strategies

Type Journal Article
Author Lee Hannah
Author Guy F. Midgley
Author D. Millar
Abstract • Aim: Conservation strategies currently include little consideration of climate change. Insights about the biotic impacts of climate change from biogeography and palaeoecology, therefore, have the potential to provide significant improvements in the effectiveness of conservation planning. We suggest a collaboration involving biogeography, ecology and applied conservation. The resulting Climate Change-integrated Conservation Strategies (CCS) apply available tools to respond to the conservation challenges posed by climate change. • Location: The focus of this analysis is global, with special reference to high biodiversity areas vulnerable to climate change, particularly tropical montane settings. • Methods: Current tools from climatology,

biogeography and ecology applicable to conservation planning in response to climate change are reviewed. Conservation challenges posed by climate change are summarized. CCS elements are elaborated that use available tools to respond to these challenges. • Results: Five elements of CCS are described: regional modelling; expanding protected areas; management of the matrix; regional coordination; and transfer of resources. Regional modelling uses regional climate models, biotic response models and sensitivity analysis to identify climate change impacts on biodiversity at a regional scale appropriate for conservation planning. Expansion of protected areas management and systems within the planning region are based on modelling results. Management of the matrix between protected areas provides continuity for processes and species range shifts outside of parks. Regional coordination of park and off-park efforts allows harmonization of conservation goals across provincial and national boundaries. Finally, implementation of these CCS elements in the most biodiverse regions of the world will require technical and financial transfer of resources on a global scale. • Main conclusions: Collaboration across disciplines is necessary to plan conservation responses to climate change adequately. Biogeography and ecology provide insights into the effects of climate change on biodiversity that have not yet been fully integrated into conservation biology and applied conservation management. CCS provide a framework in which biogeographers, ecologists and conservation managers can collaborate to address this need. These planning exercises take place on a regional level, driven by regional climate models as well as general circulation models (GCMs), to ensure that regional climate drivers such as land use change and mesoscale topography are adequately represented. Sensitivity analysis can help address the substantial uncertainty inherent in projecting future climates and biodiversity response.

Publication	Global Ecology and Biogeography
Volume	11
Issue	6
Pages	485–495
Date	November 2002
Journal Abbr	Global Ecol. Biogeogr.
DOI	10.1046/j.1466-822X.2002.00306.x
ISSN	1466-8238
URL	http://onlinelibrary.wiley.com/doi/10.1046/j.1466-822X.2002.00306.x/abstract
Extra	Keywords: biodiversity; climate change; conservation; matrix management; modelling; protected areas; range shifts.
Date Added	Mon Aug 29 17:30:07 2011
Modified	Mon Aug 29 17:33:13 2011

Climate change, forest disturbance and carbon retention

Type	Conference Paper
Author	William T. Sommers
Abstract	Carbon retention is an important aspect of sustainable forest management and mitigating future climate change. Forest ecosystems contain 1146 Pg C. Various large scale naturally occurring disturbances can have large impacts on forest ecosystems and their carbon cycles. Fire results in global CO_2 emissions of 2 to 4 Pg C y-1. As forest ecosystems respond to climate change, changes in disturbance regimes are likely to impact carbon management in a non-linear manner. Failure to include analytical approaches for quantifying and forecasting the impact of disturbances, such as fire, in planning for sustainable forest carbon management will significantly lessen the utility of that planning. Remote Sensing (RS) technologies are a critical component of the needed analytical approaches, since climate change impacts and seasonal through inter-annual variability of disturbance regimes should be monitored on a global basis. Additionally, Geographic Information System (GIS) technologies that focus on tracking forest carbon cycles and carbon projects will be central to successful monitoring and cataloging changes in forest carbon stocks.
Date	18 – 23 October 2009
Conference Name	XIII World Forestry Congress 2009
Place	Buenos Aires, Argentina
Pages	10 p.
URL	http://www.fao.org/forestry/wfc/xiii/en/
Extra	Keywords: climate; forests; carbon; disturbance; response.

Date Added Sun Aug 28 17:26:59 2011
Modified Sun Aug 28 22:45:58 2011

Climate change: Agencies should develop guidance for addressing the effects on federal land and water resources

Type Report
Author US Government Accountability Office
Abstract Summary: Climate change has implications for the vast land and water resources managed by the Bureau of Land Management (BLM), Forest Service (FS), U.S. Fish and Wildlife Service (FWS), National Oceanic and Atmospheric Administration (NOAA), and National Park Service (NPS). These resources generally occur within four ecosystem types: coasts and oceans, forests, fresh waters, and grasslands and shrublands. GAO obtained experts' views on (1) the effects of climate change on federal resources and (2) the challenges managers face in addressing climate change effects on these resources. GAO held a workshop with the National Academies in which 54 scientists, economists, and federal resource managers participated, and conducted 4 case studies.....
Report Number GAO-07-863
Report Type Report to Congressional Requesters
Place Washington, D.C.
Institution U.S. Government Accountability Office (GAO)
Date August 2007
Pages 184 p.
Short Title Climate Change on Federal Lands
URL http://www.gao.gov/products/GAO-07-863
Call Number 0000
Date Added Sat Aug 27 04:08:03 2011
Modified Sat Aug 27 15:53:22 2011

Notes:

Summary:

Climate change has implications for the vast land and water resources managed by the Bureau of Land Management (BLM), Forest Service (FS), U.S. Fish and Wildlife Service (FWS), National Oceanic and Atmospheric Administration (NOAA), and National Park Service (NPS). These resources generally occur within four ecosystem types: coasts and oceans, forests, fresh waters, and grasslands and shrublands. GAO obtained experts' views on (1) the effects of climate change on federal resources and (2) the challenges managers face in addressing climate change effects on these resources. GAO held a workshop with the National Academies in which 54 scientists, economists, and federal resource managers participated, and conducted 4 case studies.

According to experts at the GAO workshop, federal land and water resources are vulnerable to a wide range of effects from climate change, some of which are already occurring. These effects include, among others, (1) physical effects, such as droughts, floods, glacial melting, and sea level rise; (2) biological effects, such as increases in insect and disease infestations, shifts in species distribution, and changes in the timing of natural events; and (3) economic and social effects, such as adverse impacts on tourism, infrastructure, fishing, and other resource uses. Experts at the GAO workshop also identified several challenges that resource managers face in addressing the observed and potential effects of climate change in their management and planning efforts. In particular, BLM, FS, FWS, NOAA, and NPS have not made climate change a priority, and the agencies' strategic plans do not specifically address climate change. Resource managers focus first on near-term, required activities, leaving less time for addressing longer-term issues such as climate change. In addition, resource managers have limited guidance about whether or how to address climate change and, therefore, are uncertain about what actions, if any, they should take. In general, resource managers lack specific guidance for incorporating climate change into their management actions and planning efforts. Without such guidance, their ability to address climate change and effectively manage resources is constrained. While a broad order developed in January 2001 directed BLM, FWS, and NPS to consider and analyze potential climate change effects in their management plans and activities, the agencies have not yet provided specific direction to managers on how they are to implement the order. A BLM official stated at an April 2007 hearing that BLM is establishing policy and technical committees to address necessary actions and develop guidance to address climate change in agency management practices. FWS and NPS officials said that their agencies have not developed specific guidance but believe that they are operating in a manner consistent with the 2001 order. While NOAA and FS have not provided specific guidance to their resource managers, NOAA officials said that the agency is establishing a working group to determine what actions to take to address climate change effects. FS officials said that FS planning processes are designed to identify and respond to emerging issues such as climate change. Finally, resource managers do not have sufficient site-specific information to plan for and manage the effects of climate change on the federal resources they manage. In particular, the managers lack computational models for local projections of expected changes and detailed inventories and monitoring systems for an adequate baseline understanding of existing local species. Without such information, managers are limited to reacting to already-observed climate change effects on their units, which makes it difficult to plan for future changes.

Climate change: Helping nature survive the human response

Type	Journal Article
Author	Will R. Turner
Author	Bethany A. Bradley
Author	Lyndon D. Estes
Author	David G. Hole
Author	Michael Oppenheimer
Author	David S. Wilcove
Abstract	Climate change poses profound, direct, and well-documented threats to biodiversity. A significant fraction of Earth’s species is at risk of extinction due to changing precipitation and temperature regimes, rising and acidifying oceans, and other factors. There is also growing awareness of the diversity and magnitude of responses, both proactive and reactive, that people will undertake as lives and livelihoods are affected by climate change. Yet to date few studies have examined the relationship between these two powerful forces. The natural systems upon which people depend, already under direct assault from climate change, are further threatened by how we respond to climate change. Human history and recent studies suggest that our actions to cope with climate change (adaptation) or lessen its rate and magnitude (mitigation) could have impacts that match—and even exceed—the direct effects of climate change on ecosystems. If we are to successfully conserve biodiversity and maintain ecosystem services in a warming world, considerable effort is needed to predict and reduce the indirect risks created by climate change.
Publication	Conservation Letters
Volume	3
Issue	5
Pages	304–312
Date	September 2010
Journal Abbr	Conserv. Lett.
DOI	10.1111/j.1755-263X.2010.00128.x
ISSN	1755-263X
Short Title	Climate change
URL	http://doi.wiley.com/10.1111/j.1755-263X.2010.00128.x
Extra	Keywords: indirect impacts; adaptation; mitigation; climate change; biodiversity; second-order impacts.
Date Added	Sat Aug 27 06:05:17 2011
Modified	Sat Aug 27 17:31:52 2011

Climate change: Is global warming causing more, larger wildfires?

Type	Journal Article
Author	Steven W. Running
Abstract	Higher spring and summer temperatures and earlier snowmelt are extending the wildfire season and increasing the intensity of wildfires in the western United States.
Publication	Science
Volume	313

Issue 5789
Pages 927-928
Date 18 August 2006
Journal Abbr Science
DOI 10.1126/science.1130370
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1130370
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:42 2011

Climate change: The El Niño with a difference

Type Journal Article
Author Karumuri Ashok
Author Toshio Yamagata
Abstract Patterns of sea-surface warming and cooling in the tropical Pacific seem to be changing, as do the associated atmospheric effects. Increased global warming is implicated in these shifts in El Niño phenomena.
Publication Nature
Volume 461
Issue 7263
Pages 481-484
Date 24 September 2009
Journal Abbr Nature
DOI 10.1038/461481a
ISSN 0028-0836
Short Title Climate change
URL http://www.nature.com/doifinder/10.1038/461481a
Date Added Tue Aug 16 01:00:00 2011
Modified Tue Aug 16 01:00:00 2011

Climate commitment in an uncertain world

Type Journal Article
Author Kyle C. Armour
Author Gerard H. Roe
Abstract Climate commitment—the warming that would still occur given no further human influence—is a fundamental metric for both science and policy. It informs us of the minimum climate change we face and, moreover, depends only on our knowledge of the natural climate system. Studies of the climate commitment due to CO_2 find that global temperature would remain near current levels, or even decrease slightly, in the millennium following the cessation of emissions. However, this result overlooks the important role of the non-CO_2 greenhouse gases and aerosols. This paper shows that global energetics require an immediate and significant warming following the cessation of emissions as aerosols are quickly washed from the atmosphere, and the large uncertainty in current aerosol radiative forcing implies a large uncertainty in the climate commitment. Fundamental constraints preclude Earth returning to pre-industrial temperatures for the indefinite future. These same constraints mean that observations are currently unable to eliminate the possibility that we are already beyond the point where the ultimate warming will exceed dangerous levels. Models produce a narrower range of climate commitment, but undersample observed forcing constraints.
Publication Geophysical Research Letters
Volume 38
Issue 1

Pages L01707 (5 p.)
Date January 2011
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2010GL045850
ISSN 0094-8276
URL http://www.agu.org/pubs/crossref/2011/2010GL045850.shtml
Extra Keywords: climate commitment; committed warming.
Date Added Mon Aug 15 23:52:31 2011
Modified Tue Aug 16 01:37:06 2011

Climate data challenges in the 21st century

Type Journal Article
Author Jonathan T. Overpeck
Author Gerald A. Meehl
Author Sandrine Bony
Author David R. Easterling
Abstract Climate data are dramatically increasing in volume and complexity, just as the users of these data in the scientific community and the public are rapidly increasing in number. A new paradigm of more open, user-friendly data access is needed to ensure that society can reduce vulnerability to climate variability and change, while at the same time exploiting opportunities that will occur.
Publication Science
Volume 331
Issue 6018
Pages 700-702
Date 11 February 2011
Journal Abbr Science
DOI 10.1126/science.1197869
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1197869
Date Added Sat Aug 27 18:47:36 2011
Modified Sat Aug 27 18:48:32 2011

Climate drivers of regionally synchronous fires in the inland Northwest (1651–1900)

Type Journal Article
Author Emily K. Heyerdahl
Author Donald McKenzie
Author Lori D. Daniels
Author Amy E. Hessl
Author Jeremy S. Littell
Author Nathan J. Mantua
Abstract We inferred climate drivers of regionally synchronous surface fires from 1651 to 1900 at 15 sites with existing annually accurate fire-scar chronologies from forests dominated by ponderosa pine or Douglas-fir in the inland Northwest (interior Oregon, Washington and southern British Columbia). Years with widespread fires (35 years with fire at 7 to 11 sites) had warm spring–summers and warm-dry summers, whereas years with no fires at any site (18 years) had the opposite conditions. Spring climate likely affected the length of the fire season via the effects of snowmelt on soil and fuel moisture, whereas summer climate influenced fuel moisture during the fire season. Climate in prior years was not a significant driver of regionally synchronous surface fires, likely

because fuels were generally sufficient for the ignition and spread of such fires in these forests. Fires occurred significantly more often than expected by chance when the El Niño–Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO) were both warm phase and less often when they were both cool phase. Interactions between large-scale climate patterns influenced fire synchrony in the inland Northwest because phases of ENSO and PDO were associated with changes in the frequency of warm-dry v. cool-wet spring–summer climate.

Publication International Journal of Wildland Fire
Volume 17
Issue 1
Pages 40
Date February 2008
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07024
ISSN 1049-8001
URL http://dx.doi.org/10.1071/WF07024
Extra Keywords: British Columbia; El Niño–Southern Oscillation; fire scars; Oregon; Pacific Decadal Oscillation; Palmer Drought Severity Index; temperature; Washington.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:12 2011

Climate effects on historical fires (1630–1900) in Utah

Type Journal Article
Author Peter M. Brown
Author Emily K. Heyerdahl
Author Stanley G. Kitchen
Author Marc H. Weber
Abstract We inferred climate effects on fire occurrence from 1630 to 1900 for a new set of crossdated fire-scar chronologies from 18 forested sites in Utah and one site in eastern Nevada. Years with regionally synchronous fires (31 years with fire at ≥20% of sites) occurred during drier than average summers and years with no fires at any site (100 years) were wetter than average. Antecedent wet summers were associated with regional-fire years in mixed-conifer and ponderosa pine forest types, possibly by affecting fine fuel amount and continuity. NINO3 (an index of the El Niño–Southern Oscillation, ENSO) was significantly low during regional-fire years (La Niñas) and significantly high during non-fire years (El Niños). NINO3 also was high during years before regional-fire years. Although regional fire years occurred nearly twice as often as expected when NINO3 and the Pacific Decadal Oscillation were both in their cool (negative) phases, this pattern was not statistically significant. Palmer Drought Severity Index was important for fire occurrence in ponderosa pine and mixed-conifer forests across the study area but ENSO forcing was seen only in south-eastern sites. Results support findings from previous fire and climate studies, including a possible geographic pivot point in Pacific basin teleconnections at ~40°N.
Publication International Journal of Wildland Fire
Volume 17
Issue 1
Pages 28-39
Date February 2008
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07023
ISSN 1049-8001
URL http://dx.doi.org/10.1071/WF07023
Extra Keywords: crossdating; El Niño–Southern Oscillation; fire scars; Palmer Drought Severity Index; temperature.
Date Added Wed Aug 24 12:34:39 2011
Modified Fri Aug 26 20:34:42 2011

Climate forcing due to optimization of maximal leaf conductance in subtropical vegetation under rising CO_2

Type Journal Article
Author Hugo Jan de Boer
Author Emmy I. Lammertsma
Author Friederike Wagner-Cremer
Author David L. Dilcher
Author Martin J. Wassen
Author Stefan C. Dekker
Abstract Plant physiological adaptation to the global rise in atmospheric CO_2 concentration (CO_2) is identified as a crucial climatic forcing. To optimize functioning under rising CO_2, plants reduce the diffusive stomatal conductance of their leaves (gs) dynamically by closing stomata and structurally by growing leaves with altered stomatal densities and pore sizes. The structural adaptations reduce maximal stomatal conductance (gsmax) and constrain the dynamic responses of gs. Here, we develop and validate models that simulate structural stomatal adaptations based on diffusion of CO_2 and water vapor through stomata, photosynthesis, and optimization of carbon gain under the constraint of a plant physiological cost of water loss. We propose that the ongoing optimization of gsmax is eventually limited by species-specific limits to phenotypic plasticity. Our model reproduces observed structural stomatal adaptations and predicts that adaptation will continue beyond double CO_2. Owing to their distinct stomatal dimensions, angiosperms reach their phenotypic response limits on average at 740 ppm and conifers on average at 1,250 ppm CO_2. Further, our simulations predict that doubling today's CO_2 will decrease the annual transpiration flux of subtropical vegetation in Florida by ≈ 60 Wm^{-2}. We conclude that plant adaptation to rising CO_2 is altering the freshwater cycle and climate and will continue to do so throughout this century.
Publication Proceedings of the National Academy of Sciences
Volume 108
Issue 10
Pages 4041-4046
Date March 8, 2011
Journal Abbr PNAS
DOI 10.1073/pnas.1100555108
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1100555108
Extra Keywords: climate change; physiological forcing; plant evolution.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:26 2011

Climate impact of increasing atmospheric carbon dioxide

Type Journal Article
Author James Hansen
Author D. Johnson
Author A. Lacis
Author Sergej Lebedeff
Author P. Lee
Author D. Rind
Author Gary Russell
Abstract The global temperature rose by 0.2°C between the middle 1960's and 1980, yielding a warming of 0.4°C in the past century. This temperature increase is consistent with the calculated greenhouse effect due to measured increases of atmospheric carbon dioxide. Variations of volcanic aerosols and possibly solar luminosity appear to be primary causes of observed fluctuations about the mean trend of increasing temperature. It is shown that

the anthropogenic carbon dioxide warming should emerge from the noise level of natural climate variability by the end of the century, and there is a high probability of warming in the 1980's. Potential effects on climate in the 21st century include the creation of drought-prone regions in North America and central Asia as part of a shifting of climatic zones, erosion of the West Antarctic ice sheet with a consequent worldwide rise in sea level, and opening of the fabled Northwest Passage.

Publication	Science
Volume	213
Issue	4511
Pages	957-966
Date	28 August 1981
Journal Abbr	Science
DOI	10.1126/science.213.4511.957
ISSN	0036-8075
URL	http://www.sciencemag.org/cgi/doi/10.1126/science.213.4511.957
Date Added	Mon Aug 29 17:30:07 2011
Modified	Mon Aug 29 17:30:07 2011

Climate in the context of wildland fire use: Windows of opportunity

Type	Conference Paper
Author	Crystal A. Kolden
Author	Timothy J. Brown
Abstract	Wildland Fire Use (WFU) is a tool utilized by fire managers to promote resource benefits from naturally occurring lightning-ignited wildfires. While WFU has been in use for nearly 40 years, only recently has it expanded beyond a few select national parks and wilderness areas. With an expanded area approved for WFU, the question begs: How does climate impact usage of the WFU tool? A dual approach was taken to answer this question. Since WFU is a management decision not to suppress a fire, we surveyed 31 WFU managers in the U.S.A. to determine how climate information is utilized in their decision-making process for a WFU incident. Additionally, we assessed drought and teleconnections indices for correlations to historic WFU occurrence to determine how climate has impacted WFU in the past. We found that fire managers are utilizing climate information extensively in their WFU decision-making, and would like to have more climate information available for their specific needs. This supports our findings that historic WFU is well-correlated to climate trends.
Date	2007
Conference Name	Seventh Symposium on Fire and Forest Meteorology. October 23–25, 2007, Bar Harbor, Maine
Place	Washington, D.C.
Publisher	The American Meteorological Society and organized by the AMS Committee on Agricultural and Forest Meteorology
Short Title	Climate in the context of Wildland Fire Use
URL	http://www.ametsoc.org/meet/fainst/20077firenortheast.html
Call Number	0000
Extra	Poster
Date Added	Tue Aug 30 14:37:15 2011
Modified	Wed Aug 31 00:16:48 2011

Climate over past millennia

Type	Journal Article
Author	Phil D. Jones
Author	Michael E. Mann

Abstract We review evidence for climate change over the past several millennia from instrumental and high-resolution climate "proxy" data sources and climate modeling studies. We focus on changes over the past 1 to 2 millennia. We assess reconstructions and modeling studies analyzing a number of different climate fields, including atmospheric circulation diagnostics, precipitation, and drought. We devote particular attention to proxy-based reconstructions of temperature patterns in past centuries, which place recent large-scale warming in an appropriate longer-term context. Our assessment affirms the conclusion that late 20th century warmth is unprecedented at hemispheric and, likely, global scales. There is more tentative evidence that particular modes of climate variability, such as the El Niño/Southern Oscillation and the North Atlantic Oscillation, may have exhibited late 20th century behavior that is anomalous in a long-term context. Regional conclusions, particularly for the Southern Hemisphere and parts of the tropics where high-resolution proxy data are sparse, are more circumspect. The dramatic differences between regional and hemispheric/global past trends, and the distinction between changes in surface temperature and precipitation/drought fields, underscore the limited utility in the use of terms such as the "Little Ice Age" and "Medieval Warm Period" for describing past climate epochs during the last millennium. Comparison of empirical evidence with proxy-based reconstructions demonstrates that natural factors appear to explain relatively well the major surface temperature changes of the past millennium through the 19th century (including hemispheric means and some spatial patterns). Only anthropogenic forcing of climate, however, can explain the recent anomalous warming in the late 20th century.

Publication Reviews of Geophysics
Volume 42
Issue 2
Pages RG2002 (42 p.)
Date May 2004
Journal Abbr Rev. Geophys.
DOI 10.1029/2003RG000143
ISSN 8755–1209
URL http://www.agu.org/pubs/crossref/2004/2003RG000143.shtml
Extra Keywords: climate.
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:12:18 2011

Climate over the past two millennia

Type Journal Article
Author Michael E. Mann
Abstract To assess the significance of modern climate change, it is essential to place recent observed changes in a longer-term context. This review assesses the evidence from both "proxy" climate data and theoretical climate model simulations with regard to the nature and causes of climate variability over a time interval spanning roughly the past two millennia. Evidence is reviewed for changes in temperature, drought, and atmospheric circulation over this timescale. Methods for reconstructing past climate from proxy data are reviewed and comparisons with the results of climate modeling studies are provided. The assessment provided affirms the role of natural (solar and volcanic) radiative forcing in past changes in large-scale mean temperature changes and in dynamical modes of climate variability such as the North Atlantic Oscillation (NAO) and El Niño/Southern Oscillation (ENSO) influencing large-scale climate. At hemispheric scales, late twentieth century warmth appears unprecedented in the context of at least the past 2000 years. This anomalous warmth can only be explained by modern anthropogenic forcing.
Publication Annual Review of Earth and Planetary Sciences
Volume 35
Pages 111-136
Date May 2007
Journal Abbr Annu. Rev. Earth Planet. Sci.
DOI 10.1146/annurev.earth.35.031306.140042
ISSN 0084-6597
URL http://www.annualreviews.org/eprint/VsUsrxAi8GrtDrvWGT5p/full/10.1146/annurev.earth.35.031306.140042

Extra Keywords: climate change; radiative forcing; volcanic forcing; solar forcing; anthropogenic forcing; greenhouse gas forcing; NAO; ENSO; climate reconstruction; paleoclimate modeling.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:43:37 2011

Climate regulation of fire emissions and deforestation in equatorial Asia

Type Journal Article
Author Guido R. van der Werf
Author Jan Dempewolf
Author Simon N. Trigg
Author James T. Randerson
Author Prasad S. Kasibhatla
Author Louis Giglio
Author Daniel Murdiyarso
Author Wouter Peters
Author Douglas C. Morton
Author G. James Collatz
Author A. Johannes Dolman
Author Ruth S. DeFries
Abstract Drainage of peatlands and deforestation have led to large-scale fires in equatorial Asia, affecting regional air quality and global concentrations of greenhouse gases. Here we used several sources of satellite data with biogeochemical and atmospheric modeling to better understand and constrain fire emissions from Indonesia, Malaysia, and Papua New Guinea during 2000–2006. We found that average fire emissions from this region [128 ± 51 (1σ) Tg carbon (C) year^{-1}, T = 10^{12}] were comparable to fossil fuel emissions. In Borneo, carbon emissions from fires were highly variable, fluxes during the moderate 2006 El Niño more than 30 times greater than those during the 2000 La Niña (and with a 2000–2006 mean of 74 ± 33 Tg C yr^{-1}). Higher rates of forest loss and larger areas of peatland becoming vulnerable to fire in drought years caused a strong nonlinear relation between drought and fire emissions in southern Borneo. Fire emissions from Sumatra showed a positive linear trend, increasing at a rate of 8 Tg C year^{-2} (approximately doubling during 2000–2006). These results highlight the importance of including deforestation in future climate agreements. They also imply that land manager responses to expected shifts in tropical precipitation may critically determine the strength of climate–carbon cycle feedbacks during the 21st century.
Publication Proceedings of the National Academy of Sciences
Volume 105
Issue 51
Pages 20350-20355
Date December 23, 2008
Journal Abbr PNAS
DOI 10.1073/pnas.0803375105
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.0803375105
Extra Keywords: climate change; feedbacks; biomass burning; Indonesia; global carbon cycle.
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:53:31 2011

Climate shifts during the last century

Type Journal Article
Author Klaus Fraedrich

Author Friedrich-Wilhelm Gerstengarbe
Author Peter C. Werner
Abstract Fluctuations of the land surface areas covered by Koeppen climates are analysed for the 1901 to 1995 period using trends and outliers as indicators of climate shift. Only the extreme climate zones of the global Tropics and of the Tundra (with the highly correlated northern hemisphere temperature) realise statistically significant shifts and outliers. There are no significant trends and outliers in the fluctuating ocean-atmosphere patterns (Pacific Decadal and North Atlantic Oscillations) and the highly correlated intermediate climate zones (dry, subtropical and boreal) of the surrounding continents.
Publication Climatic Change
Volume 50
Issue 4
Pages 405–417
Date September 2001
Journal Abbr Climatic Change
DOI 10.1023/A:1010699428863
ISSN 0165-0009 (Print) 1573-1480 (Online)
URL http://www.springerlink.com/content/v6801111n616w200/
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:46 2011

Climate versus human-driven fire regimes in Mediterranean landscapes: The Holocene record of Lago dell'Accesa (Tuscany, Italy)

Type Journal Article
Author Boris Vannière
Author Daniele Colombaroli
Author Emmanuel Chapron
Author Aurélie Leroux
Author Willy Tinner
Author Michel Magny
Abstract A high-resolution sedimentary charcoal record from Lago dell'Accesa in southern Tuscany reveals numerous changes in fire regime over the last 11.6 kyr cal. BP and provides one of the longest gap-free series from Italy and the Mediterranean region. Charcoal analyses are coupled with gamma density measurements, organic-content analyses, and pollen counts to provide data about sedimentation and vegetation history. A comparison between fire frequency and lake-level reconstructions from the same site is used to address the centennial variability of fire regimes and its linkage to hydrological processes. Our data reveal strong relationships among climate, fire, vegetation, and land-use and attest to the paramount importance of fire in Mediterranean ecosystems. The mean fire interval (MFI) for the entire Holocene was estimated to be 150 yr, with a minimum around 80 yr and a maximum around 450 yr. Between 11.6 and 3.6 kyr cal. BP, up to eight high-frequency fire phases lasting 300-500 yr generally occurred during shifts towards low lake-level stands (ca 11,300, 10,700, 9500, 8700, 7600, 6200, 5300, 3400, 1800 and 1350 cal. yr BP). Therefore, we assume that most of these shifts were triggered by drier climatic conditions and especially a dry summer season that promoted ignition and biomass burning. At the beginning of the Holocene, high climate seasonality favoured fire expansion in this region, as in many other ecosystems of the northern and southern hemispheres. Human impact affected fire regimes and especially fire frequencies since the Neolithic (ca 8000-4000 cal. yr BP). Burning as a consequence of anthropogenic activities became more frequent after the onset of the Bronze Age (ca 3800-3600 cal. yr BP) and appear to be synchronous with the development of settlements in the region, slash-and-burn agriculture, animal husbandry, and mineral exploitation. The anthropogenic phases with maximum fire activity corresponded to greater sensitivity of the vegetation and triggered significant changes in vegetational communities (e.g. temporal declines of Quercus ilex forests and expansion of shrublands and macchia). The link between fire and climate persisted during the mid- and late Holocene, when human impact on vegetation and the fire regime was high. This finding suggests that climatic conditions were important for fire occurrence even under strongly humanised ecosystem conditions.

Publication Quaternary Science Reviews
Volume 27
Issue 11-12
Pages 1181-1196
Date June 2008
Journal Abbr Quaternary Sci. Rev.
DOI 10.1016/j.quascirev.2008.02.011
ISSN 0277-3791
Short Title Climate versus human-driven fire regimes in Mediterranean landscapes
URL http://www.sciencedirect.com/science/article/B6VBC-4S8TW95-1/2/f59508669cdae29ef0f4415f92e2879f
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:53:49 2011

Climate-induced boreal forest change: Predictions versus current observations

Type Journal Article
Author Amber J. Soja
Author Nadezda M. Tchebakova
Author Nancy H.F. French
Author Michael D. Flannigan
Author Herman H. Shugart
Author Brian J. Stocks
Author Anatoly I. Sukhinin
Author E. I. Parfenova
Author F. Stuart Chapin III
Author Paul W. Stackhouse, Jr.
Abstract For about three decades, there have been many predictions of the potential ecological response in boreal regions to the currently warmer conditions. In essence, a widespread, naturally occurring experiment has been conducted over time. In this paper, we describe previously modeled predictions of ecological change in boreal Alaska, Canada and Russia, and then we investigate potential evidence of current climate-induced change. For instance, ecological models have suggested that warming will induce the northern and upslope migration of the treeline and an alteration in the current mosaic structure of boreal forests. We present evidence of the migration of keystone ecosystems in the upland and lowland treeline of mountainous regions across southern Siberia. Ecological models have also predicted a moisture-stress-related dieback in white spruce trees in Alaska, and current investigations show that as temperatures increase, white spruce tree growth is declining. Additionally, it was suggested that increases in infestation and wildfire disturbance would be catalysts that precipitate the alteration of the current mosaic forest composition. In Siberia, 7 of the last 9 yr have resulted in extreme fire seasons, and extreme fire years have also been more frequent in both Alaska and Canada. In addition, Alaska has experienced extreme and geographically expansive multi-year outbreaks of the spruce beetle, which had been previously limited by the cold, moist environment. We suggest that there is substantial evidence throughout the circumboreal region to conclude that the biosphere within the boreal terrestrial environment has already responded to the transient effects of climate change. Additionally, temperature increases and warming-induced change are progressing faster than had been predicted in some regions, suggesting a potential non-linear rapid response to changes in climate, as opposed to the predicted slow linear response to climate change.
Publication Global and Planetary Change
Volume 56
Issue 3-4
Pages 274–296
Date April 2007
Journal Abbr Global Planet Change
DOI 10.1016/j.gloplacha.2006.07.028

ISSN 0921-8181
Short Title Climate-induced boreal forest change
URL http://www.sciencedirect.com/science/article/pii/S0921818106001883
Call Number 0000
Extra Keywords: climate change evidence; fire; infestation disturbance; treeline progression; boreal; montane.
Date Added Sun Aug 28 17:26:59 2011
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Climate–carbon cycle feedback analysis: Results from the C4MIP model intercomparison

Type Journal Article

Author Pierre Friedlingstein
Author Peter Cox
Author Richard Betts
Author Laurent Bopp
Author Werner von Bloh
Author Victor Brovkin
Author Patricia Cadule
Author Scott Doney
Author Michael Eby
Author Inez Fung
Author Govindswamy Bala
Author Jasmin John
Author Chris Jones
Author Fortunat Joos
Author Tomomichi Kato
Author Michio Kawamiya
Author Wolfgang Knorr
Author Keith Lindsay
Author H. Damon Matthews
Author Thomas Raddatz
Author Peter Rayner
Author Christian Reick
Author Erich Roeckner
Author Karl-Georg Schnitzler
Author Reiner Schnur
Author Kuno Strassmann
Author Andrew J. Weaver
Author Chisato Yoshikawa
Author Ning Zeng

Abstract Eleven coupled climate–carbon cycle models used a common protocol to study the coupling between climate change and the carbon cycle. The models were forced by historical emissions and the Intergovernmental Panel on Climate Change (IPCC) Special Report on Emissions Scenarios (SRES) A2 anthropogenic emissions of CO_2 for the 1850–2100 time period. For each model, two simulations were performed in order to isolate the impact of climate change on the land and ocean carbon cycle, and therefore the climate feedback on the atmospheric CO_2 concentration growth rate. There was unanimous agreement among the models that future climate change will reduce the efficiency of the earth system to absorb the anthropogenic carbon perturbation. A larger fraction of anthropogenic CO_2 will stay airborne if climate change is accounted for. By the end of the twenty-first century, this additional CO_2 varied between 20 and 200 ppm for the two extreme models, the majority of the models lying between 50 and 100 ppm. The higher CO_2 levels led to an additional climate warming ranging between 0.1° and 1.5°C. All models simulated a negative sensitivity for both the land and the ocean carbon cycle to future climate. However, there was still a large uncertainty on the magnitude of these sensitivities. Eight models attributed most of the changes to the land, while three attributed it to the ocean. Also, a majority of the models located the reduction of land carbon uptake in the Tropics. However, the attribution of the land sensitivity to changes in net primary productivity versus changes in respiration is still subject to debate; no consensus emerged among the models.

Publication Journal of Climate
Volume 19
Issue 14
Pages 3337–3353
Date July 2006
Journal Abbr J. Climate
DOI 10.1175/JCLI3800.1
ISSN 1520-0442
Short Title Climate–carbon cycle feedback analysis
URL http://journals.ametsoc.org/doi/full/10.1175/JCLI3800.1
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:37 2011

Climate, fire and carbon: Tipping points and landscape vulnerability in the Greater Yellowstone Ecosystem

Type Report
Author Erica A. H. Smithwick
Author Anthony L. Westerling
Author Monica G. Turner
Author William H. Romme
Author Michael G. Ryan
Abstract More frequent fires under climate warming are likely to alter terrestrial carbon (C) stocks by reducing the amount of C stored in biomass and soil. However, the thresholds of fire frequency that could shift landscapes from C sinks to C sources under future climates and whether these are likely to be exceeded during the coming century are not known. We used the Greater Yellowstone Ecosystem (GYE) as a case study to explore the conditions under which future climate and fire regimes would result in tipping points of C source/sink dynamics. We asked: (1) How great a change in climate and fire regime would be required to shift each of the dominant vegetation communities in the GYE from a net C sink to a net C source? (2) Do current projections indicate that changes of this magnitude are likely to occur in the next century, and if so, where in the GYE do they occur? and (3) What are the integrated effects of changing climate, vegetation, and fire on spatial patterns of C flux across the GYE landscape as a whole? To answer these questions, we developed downscaled climate projections for the GYE for three general circulation models and used these projections in dynamic and statistical modeling approaches. Using the CENTURY ecosystem model, we simulated C storage for individual forest stands under three fire-event pathways (fires at 90, 60 or every 30 years) to year 2100 compared to a reference simulation (no fire, representing the historical fire interval) under both future and current climate scenarios. Our results show that fire intervals would need to be less than 90 years for lodgepole pine (Pinus contorta var. latifolia) forest stands to shift from a net C sink to a net C source because the time between fires would be less than the time required to recover 85% of the C lost to fire (Question 1). We also developed new statistical models to relate monthly climate data to the occurrence of large fires (> 200 ha) and area burned, evaluated these for the 1972-1999 time period, and then used these relationships to predict fire occurrence and area burned in the GYE through 2100 given the downscaled climate projections. Results showed that anticipated climate changes are likely to increase fire frequency and annual area burned over the next century compared to the observational record. However, the timing of these changes and the probability of future largescale 1988-type fires depended on the type of climate-fire model that was used, the accuracy of the simulated future climates, and to a small degree, the specific climate simulation. The climatefire frequency and climate-fire size models are extremely sensitive to temperature differences between the projected future climate and the 1961-1990 base period because the two large fire years that occurred in the 1972-1999 climate-fire

model calibration period had relatively small temperature anomalies (0.5 to 1 °C) and the small sample size of the large fire years in the time series makes model building a challenge. Between now and 2050, where we have the most confidence in the model, all climate scenarios and both fire-climate model formulations projected at least two 1988 sized fires (range 2-6, fires projected to be > 300,000 ha). After 2050, climatic conditions are sufficiently outside the historic range of variability used to estimate statistical fire models that those models cannot be used to characterize the magnitude of extreme fire years. However, extreme fire years from 2050-2100 will almost certainly become more common then projected for 2010-2050, because temperature is projected to continue to increase while precipitation is projected to remain at historical levels. We note, however, that projected changes in temperature by the climate scenarios only reach the historical differences in temperature between a subalpine forest (with an historical fire return interval of > 100 years) and a montane forest (with an historical fire return interval of < 30 years) by the end of this century (5-6 °C). In the northern Rocky Mountains, large fire years have been driven historically by extreme climate conditions. Our results imply that fuel availability would become increasingly important for fire as weather conditions conducive to large fires become common. The capacity for fast post-fire regeneration of lodgepole pine from an aerial seedbank (serotinous cones) and the projected increase in lodgepole pine productivity under warmer climate conditions are unlikely to counter the anticipated reductions in fire-return interval. In all future climate scenarios, decreases in fire-return interval are likely to reduce the potential of the GYE landscape to store C (Question 3). The magnitude of this shift will depend on the future distribution of forest and nonforest ecosystems across the landscape, other constraints on fire patterns not considered here (fuels, ignition factors, and landscape management), and the accuracy of the fire-climate model as future climate diverges increasingly from the past. If past climate-fire relationships can predict the future, soon after 2050 climate conditions projected by all three general circulation models would likely result in more fire than the current conifer forest ecosystem in the GYE could sustain. Forest managers should be considering the potential for qualitative shifts in forest distribution and regional C storage to occur before 2100.

Report Number 09-3-01-47
Report Type JFSP(Joint Fire Science Program) Project: Fire Effects and Fire Ecology
Place University Park, PA
Institution Pennsylvania State University (Sierra Nevada Research Institute and UC-Merced, University of Wisconsin, Colorado State University, USDA Forest Service RMRS)
Date July 2009 ~ January 2011
Pages 39 p.
Short Title Climate, Fire and Carbon
URL http://www.firescience.gov/JFSP_Search_Results_Detail.cfm?jdbid=%24%26Z%2B%3BV%40%20%20%0A
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:43 2011

Climate, lightning ignitions, and fire severity in Yosemite National Park, California, USA

Type Journal Article
Author James A. Lutz
Author Jan W. van Wagtendonk
Author Andrea E. Thode
Author Jay D. Miller
Author Jerry F. Franklin
Abstract Continental-scale studies of western North America have attributed recent increases in annual area burned and fire size to a warming climate, but these studies have focussed on large fires and have left the issues of fire severity and ignition frequency unaddressed. Lightning ignitions, any of which could burn a large area given appropriate conditions for fire spread, could be the first indication of more frequent fire. We examined the relationship between snowpack and the ignition and size of fires that occurred in Yosemite National Park, California (area 3027 km²), between 1984 and 2005. During this period, 1870 fires burned 77 718 ha. Decreased spring snowpack exponentially increased the number of lightning-ignited fires. Snowpack mediated lightning-ignited fires by decreasing the proportion of lightning strikes that caused lightning-ignited fires and through fewer lightning strikes in years with deep snowpack. We also quantified fire severity for the 103 fires

>40 ha with satellite fire-severity indices using 23 years of Landsat Thematic Mapper data. The proportion of the landscape that burned at higher severities and the complexity of higher-severity burn patches increased with the log10 of annual area burned. Using one snowpack forecast, we project that the number of lightning-ignited fires will increase 19.1% by 2020 to 2049 and the annual area burned at high severity will increase 21.9%. Climate-induced decreases in snowpack and the concomitant increase in fire severity suggest that existing assumptions may be understated – fires may become more frequent and more severe.

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Volume 18
Issue 7
Pages 765–774
Date October 2009
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF08117
ISSN 1049-8001
URL http://www.publish.csiro.au/paper/WF08117.htm
Extra Keywords: burn severity; climate change; climate variability; fire regime attributes; landscape flammability; normalized burn ratio; patch complexity; RdNBR; Sierra Nevada; snowpack; snow water equivalent.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:21:02 2011

Climate, Santa Ana winds and autumn wildfires in Southern California

Type Journal Article
Author Anthony L. Westerling
Author Daniel R. Cayan
Author Timothy J. Brown
Author Beth L. Hall
Author Laurence G. Riddle
Abstract Wildfires periodically burn large areas of chaparral and adjacent woodlands in autumn and winter in southern California. These fires often occur in conjunction with Santa Ana weather events, which combine high winds and low humidity, and tend to follow a wet winter rainy season. Because conditions fostering large fall and winter wildfires in California are the result of large-scale patterns in atmospheric circulation, the same dangerous conditions are likely to occur over a wide area at the same time. Furthermore, over a century of watershed reserve management and fire suppression have promoted fuel accumulations, helping to shape one of the most conflagration-prone environments in the world. Combined with a complex topography and a large human population, southern Californian ecology and climate pose a considerable physical and societal challenge to fire management.
Publication EOS, Transactions American Geophysical Union
Volume 85
Issue 31
Pages 289, 296
Date 3 August 2004
Journal Abbr EOS Trans. AGU
DOI doi:10.1029/2004EO310001
ISSN 0096-3941
URL http://www.agu.org/pubs/crossref/2004/2004EO310001.shtml
Date Added Tue Aug 16 23:39:27 2011
Modified Wed Aug 31 00:56:28 2011

Climatic and human influences on fire history in Pike National Forest, central Colorado

Type Journal Article
Author Joseph A Donnegan
Author Thomas T Veblen
Author Jason S Sibold
Abstract We investigated interannual and multidecadal variability in fire regimes, as related to climate and human landuse in Pike National Forest, central Colorado. Short and long-term trends in fire-scar records were related to tree-ring proxy records of moisture availability and to variability in El Niño – Southern Oscillation (ENSO). Fire occurrence is strongly tied to interannual drought conditions and is associated with cycles of ENSO. Fire events tend to occur in years of reduced moisture availability (La Niña years) and are often preceded by 2–4 years of increased moisture availability (El Niño years). A period of reduced variability in the tree-ring record from 1760 to 1820 AD, roughly corresponds to a period of reduced fire occurrence from approximately 1792 to 1842. Coincident with increased fire occurrence, variability in the climate proxies was high in the middle to late 1800s until the early 1900s. Multidecadal impacts through land use are also evident in the fire record with sharp increases during Euro-American settlement in ca. 1850 and abrupt declines with the start of active fire suppression after ca. 1920. Both humans and climatic variation appear to have interacted synergistically to create long-term trends in fire occurrence over the past two centuries.
Publication Canadian Journal of Forest Research
Volume 31
Pages 1526-1539
Date 09/2001
DOI 10.1139/x01-093
ISSN 0045-5067, 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x01-093
Accessed Fri Oct 7 10:19:21 2011
Library Catalog CrossRef
Call Number 0065
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

Climatic and human influences on fire history in Pike National Forest, central Colorado

Type Journal Article
Author Joseph A. Donnegan
Author Thomas T. Veblen
Author Jason S. Sibold
Abstract We investigated interannual and multidecadal variability in fire regimes, as related to climate and human land-use in Pike National Forest, central Colorado. Short and long-term trends in fire-scar records were related to tree-ring proxy records of moisture availability and to variability in El Niño-Southern Oscillation (ENSO). Fire occurrence is strongly tied to interannual drought conditions and is associated with cycles of ENSO. Fire events tend to occur in years of reduced moisture availability (La Niña years) and are often preceded by 2-4 years of increased moisture availability (El Niño years). A period of reduced variability in the tree-ring record from 1760 to 1820 AD, roughly corresponds to a period of reduced fire occurrence from approximately 1792 to 1842. Coincident with increased fire occurrence, variability in the climate proxies was high in the middle to late 1800s until the early 1900s. Multidecadal impacts through land use are also evident in the fire record with sharp increases during Euro-American settlement in ca. 1850 and abrupt declines with the start of active fire suppression after ca. 1920. Both humans and climatic variation appear to have interacted synergistically to create long-term trends in fire occurrence over the past two centuries.
Publication Canadian Journal of Forest Research
Volume 31
Issue 9
Pages 1526–1539
Date September 2001

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DOI 10.1139/x01-093
ISSN 1208-6037
URL http://www.nrcresearchpress/doi/abs/10.1139/x01-093
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:40:04 2011

Climatic and human influences on fire regimes in ponderosa pine forests in the Colorado Front Range

Type Journal Article
Author Thomas T. Veblen
Author Thomas Kitzberger
Author Joseph Donnegan
Abstract In the northern Colorado Front Range, fire suppression during the 20th century is believed to have created a high hazard of catastrophic fire in ponderosa pine (Pinus ponderosa) forests. Since the early 1990s, resource managers have increased the use of prescribed fires to re-create fire regimes and forest structures similar to those of the pre-Euro-American settlement period in order both to reduce fire hazard and to improve forest health. To improve understanding of historical fire regimes, we conducted a study of fire history along an elevational gradient from 1830 to 2800 m in ponderosa pine forests in the northern Front Range. Fire-scar dates were determined from 525 partial cross sections from living and dead trees at 41 sample sites. Fire frequencies and fire intervals were analyzed in relation to changes in human activities and interannual climatic variability as recorded in instrumental climatic records and tree-ring proxy records. Prior to modern fire suppression, the low elevation, open ponderosa pine forests of the northern Front Range were characterized by frequent surface fires, similar in frequency to many other ponderosa pine ecosystems in the West. In contrast, in higher elevation forests (above 2400 m) where ponderosa pine is mixed with Douglas-fir (Pseudotsuga menziesii) and lodgepole pine (Pinus contorta), the fire regime was characterized by a much lower fire frequency and included extensive stand-replacing fires as well as surface fires. In the mid-1800s there was a marked increase in fire occurrence that can be related both to Euro-American settlement and increased climatic variability. This episode of increased fire left a legacy of dense, even-aged stands in higher elevation ponderosa pine forests, whereas increased stand densities in low elevation forests are attributed mainly to fire exclusion during the 20th century. Warmer and drier spring–summers, indicated in instrumental climatic records (1873–1995) and in tree-ring proxy records of climate (1600–1983), are strongly associated with years of widespread fire. Years of widespread fire also tend to be preceded two to four years by wetter than average springs that increase the production of fine fuels. Alternation of wet and dry periods over time periods of 2–5 years is conducive to fire spread and is strongly linked to El Niño–Southern Oscillation (ENSO) events. The warm (El Niño) phase of ENSO is associated with greater moisture availability during spring that results in a peak of fire occurrence several years following El Niño events. Conversely, dry springs associated with La Niña events were followed by more widespread fire during the same year. The 1600–1920 fire-scar record indicates that individual years during which high percentages of the 41 sample sites synchronously recorded fire have occurred at least several times per century. The association of these years of widespread fire with very strong ENSO events demonstrates the importance of ENSO-related climatic variabililty in creating extreme fire hazard at a landscape scale.
Publication Ecological Applications
Volume 10
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Pages 1178–1195
Date August 2000
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(2000)010[1178:CAHIOF]2.0.CO;2
ISSN 1051-0761
URL http://www.jstor.org/stable/2641025
Extra Keywords: climatic variation; Colorado; El Niño–Southern Oscillation; fire regime; forest dynamics; forest health; Pinus ponderosa.
Date Added Sat Aug 27 02:07:29 2011

Modified Sat Aug 27 15:53:54 2011

Climatic and Human Influences on Fire Regimes in Ponderosa Pine Forests in the Colorado Front Range

Type Journal Article
Author T.T. Veblen
Author T. Kitzberger
Author J. Donnegan
Abstract In the northern Colorado Front Range, fire suppression during the 20th century is believed to have created a high hazard of catastrophic fire in ponderosa pine (Pinus ponderosa) forests. Since the early 1990s, resource managers have increased the use of prescribed fires to re-create fire regimes and forest structures similar to those of the pre-Euro-American settlement period in order both to reduce fire hazard and to improve forest health. To improve understanding of historical fire regimes, we conducted a study of fire history along an elevational gradient from 1830 to 2800 m in ponderosa pine forests in the northern Front Range. Fire-scar dates were determined from 525 partial cross sections from living and dead trees at 41 sample sites. Fire frequencies and fire intervals were analyzed in relation to changes in human activities and interannual climatic variability as recorded in instrumental climatic records and tree-ring proxy records. Prior to modern fire suppression, the low elevation, open ponderosa pine forests of the northern Front Range were characterized by frequent surface fires, similar in frequency to many other ponderosa pine ecosystems in the West. In contrast, in higher elevation forests (above 2400 m) where ponderosa pine is mixed with Douglas-fir (Pseudotsuga menziesii) and lodgepole pine (Pinus contorta), the fire regime was characterized by a much lower fire frequency and included extensive stand-replacing fires as well as surface fires. In the mid-1800s there was a marked increase in fire occurrence that can be related both to Euro-American settlement and increased climatic variability. This episode of increased fire left a legacy of dense, even-aged stands in higher elevation ponderosa pine forests, whereas increased stand densities in low elevation forests are attributed mainly to fire exclusion during the 20th century. Warmer and drier spring–summers, indicated in instrumental climatic records (1873–1995) and in tree-ring proxy records of climate (1600–1983), are strongly associated with years of widespread fire. Years of widespread fire also tend to be preceded two to four years by wetter than average springs that increase the production of fine fuels. Alternation of wet and dry periods over time periods of 2–5 years is conducive to fire spread and is strongly linked to El Niño–Southern Oscillation (ENSO) events. The warm (El Niño) phase of ENSO is associated with greater moisture availability during spring that results in a peak of fire occurrence several years following El Niño events. Conversely, dry springs associated with La Niña events were followed by more widespread fire during the same year. The 1600–1920 fire-scar record indicates that individual years during which high percentages of the 41 sample sites synchronously recorded fire have occurred at least several times per century. The association of these years of widespread fire with very strong ENSO events demonstrates the importance of ENSO-related climatic variabililty in creating extreme fire hazard at a landscape scale. Keywords: climatic variation, Colorado, El Niño–Southern Oscillation, fire regime, forest dynamics, forest health, Pinus ponderosa
Publication Ecological Applications
Volume 10
Issue 4
Pages 1178–1195
Date 2000
Library Catalog Google Scholar
Call Number 0260
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

Climatic and human influences on fire regimes of the southern San Juan Mountains, Colorado, USA

Type Journal Article
Author Henri D. Grissino-Mayer

Author William H. Romme
Author M. Lisa Floyd
Author David D. Hanna
Abstract Fire severity, frequency, and extent are expected to change dramatically in coming decades in response to changing climatic conditions, superimposed on the adverse cumulative effects of various human-related disturbances on ecosystems during the past 100 years or more. To better gauge these expected changes, knowledge of climatic and human influences on past fire regimes is essential. We characterized the temporal and spatial properties of fire regimes in ponderosa pine forests of the southern San Juan Mountains of southwestern Colorado by collecting 175 fire-scarred tree samples from nine sites across a wide range of topographic settings. All tree rings and fire scars were dated using standard dendrochronological techniques. Fire-free intervals were statistically modeled using the Weibull distribution to provide quantitative measures that characterized the historical range of variation in pre-EuroAmerican fire regimes. Fires during our reference period were more frequent in the low elevation ponderosa pine forests (6-10 yr) than in the high elevation, mixed conifer forests (18-28 yr). Fires at lower elevations were predominantly low-severity, isolated fires. Fires during some years (e.g., 1748) were spatially extensive throughout the entire mountain range. Intervals that delimited significantly long fire-free periods ranged from 10-19 yr (low elevation) to 27-50 yr (high elevation). Fire histories were similar between the eastern and western portions of the mountain range, although we found significant evidence of topographic isolation on fire regimes at one site. Pre-1880 fires primarily occurred in the dormant season, and we found no temporal changes in past fire seasonality. We found no compelling evidence that Native Americans influenced fire regimes in our study sites. We found a hiatus in fire occurrence between 1750 and 1770 that we believe was likely related to weakened El Niño-Southern Oscillation activity, an extended series of cool-phase Pacific Decadal Oscillation events, and weakened monsoonal moisture, all possibly entrained in an invasive air mass typical of locations that are more northerly. In addition, pre-1880 fires occurred during years of severe drought, conditioned by above average moisture conditions in preceding years. The 20th century is characterized by a near complete absence of fires (fire-free interval of >100 yr), suggesting future wildfires may be more widespread and ecologically severe compared to pre-1880 fires.
Publication Ecology
Volume 85
Issue 6
Pages 1708–1724
Date June 2004
Journal Abbr Ecology
DOI 10.1890/02-0425
ISSN 0012-9658
URL http://www.jstor.org/stable/3450595
Extra Keywords: climate–fire interactions; dendrochronology; disturbances, human; fire history; fire regimes; mixed conifer; ponderosa pine; San Juan Mountains, Colorado, USA.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:42 2011

Climatic and landscape controls of the boreal forest fire regime: Holocene records from Alaska

Type Journal Article
Author Jason A. Lynch
Author Jeremy L. Hollis
Author Feng Sheng Hu
Abstract Summary: 1. The response of ecosystems to past and future climatic change is difficult to understand due to the uncertainties in the direction and magnitude of changes and the relative importance of interactions between climate and local factors. In boreal ecosystems such interactions may dictate the response to climatic change, but the interaction of climate, vegetation composition and the fire regime remains poorly understood. 2. Sediment cores from lakes in south-central Alaska were analysed for lithology, macrofossils, pollen and charcoal to investigate the relationships between moisture availability, species composition and mean fire return intervals (MFI). 3. Macrofossil and lithological evidence suggests that variations in effective moisture occurred over the past 7000 years and that the regional climate has been wetter during the past c. 3800 years

than before. 4. Boreal forests existed in the region throughout the past 7000 years. Picea glauca and Picea mariana were the prevalent forest species around Chokasna Lake, whereas P. glauca and hardwood species (e.g. Betula) co-dominated the landscape around Moose Lake. Picea mariana replaced P. glauca as the dominant Picea species around Chokasna Lake at c. 2000 BP. 5. MFI was > 500 years before 3800 BP, except from 5800 to 5000 BP at Moose Lake and 5400 to 4550 BP at Chokasna Lake, when values were c. 200 years. MFI decreased to c. 200 years during the late-Holocene at both sites and to c. 150 years after 2000 BP at Chokasna Lake. 6. At both sites, fires occurred more frequently under wetter climatic conditions. Our results therefore support other recent studies demonstrating that warmer/drier climatic conditions do not necessarily induce greater fire importance. A combination of increased ignition by lightning strikes and seasonal-moisture variability probably resulted in more frequent fires under wetter conditions.

Publication Journal of Ecology
Volume 92
Issue 3
Pages 477–489
Date June 2004
Journal Abbr J. Ecol.
DOI 10.1111/j.0022-0477.2004.00879.x
ISSN 0022-0477
Short Title Climatic and landscape controls of the boreal forest fire regime
URL http://onlinelibrary.wiley.com/doi/10.1111/j.0022-0477.2004.00879.x/abstract
Extra Keywords: boreal ecosystem; charcoal analysis; climate change; fire frequency; forest dynamics.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 14:23:10 2011

Climatic and topographic controls on patterns of fire in the southern and central Appalachian Mountains, USA

Type Journal Article
Author William T. Flatley
Author Charles W. Lafon
Author Henri D. Grissino-Mayer
Abstract Climate and topography are two important controls on spatial patterns of fire disturbance in forests globally, via their influence on fuel moisture and fuel production. To assess the influences of climate and topography on fire disturbance patterns in a temperate forest region, we analyzed the mapped perimeters of fires that burned during 1930–2003 in two national parks in the eastern United States. These were Great Smoky Mountains National Park (GSMNP) in the southern Appalachian Mountains and Shenandoah National Park (SNP) in the central Appalachian Mountains. We conducted GIS analyses to assess trends in area burned under differing climatic conditions and across topographic gradients (elevation, slope position, and aspect). We developed a Classification and Regression Tree model in order to further explore the interactions between topography, climate, and fire. The results demonstrate that climate is a strong driver of both spatial and temporal patterns of wildfire. Fire was most prevalent in the drier SNP than the wetter GSMNP, and during drought years in both parks. Topography also influenced fire occurrence, with relatively dry south-facing aspects, ridges, and lower elevations burning most frequently. However, the strength of topographic trends varied according to the climatic context. Weaker topographic trends emerged in the drier SNP than GSMNP, and during low-PDSI (dry) years than high-PDSI (wet) years in both parks. The apparent influence of climate on the spatial patterning of fire suggests a more general concept, that disturbance-prone landscapes exhibit weaker fine-scale spatial patterning of disturbance than do less disturbance-prone landscapes.
Publication Landscape Ecology
Volume 26
Issue 2
Pages 195-209
Date February 2011
Journal Abbr Landscape Ecol.

DOI 10.1007/s10980-010-9553-3
ISSN 0921-2973
URL http://www.springerlink.com/content/g73v586520234526/
Call Number 0000
Extra Keywords; fire ecology; forest disturbance; climate; topography; fire perimeters; spatial pattern; Great Smoky Mountains National Park; Shenandoah National Park; classification and regression tree model.
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:29 2011

Climatic and weather factors affecting fire occurrence and behavior (Chapter 2)

Type Book Section
Author Randall P. Benson
Author John O. Roads
Author David R. Weise
Abstract Weather and climate have a profound influence on wildland fire ignition potential, fire behavior, and fire severity. Local weather and climate are affected by large-scale patterns of winds over the hemispheres that predispose wildland fules to firre. The characteristics of wildland fuels, especially the moisture content, ultimately determine fire behavior and the impact of fire on the landscape. The physical processes related to combustion, fire and plume behavior are largely affected by both daily weather and long-term climate.
Book Title Developments in Environmental Science: Wildland Fires and Air Pollution
Series Developments in Environmental Science
Volume 8
Edition 1st edition
Place Amsterdam
Publisher Elsevier
Date October 2008
Pages 37-59
ISBN 9780080556093 (DOI:10.1016/S1474-8177(08)00002-8, ISSN:1474-8177)
URL http://linkinghub.elsevier.com/retrieve/pii/S1474817708000028
Call Number 0000
Date Added Tue Aug 23 02:11:57 2011
Modified Wed Aug 24 04:41:23 2011

Notes:

Citation:

Benson, Randall P.; Roads , John O.; Weise, David R. 2009. Climatic and weather factors affecting fire occurrence and behavior. In: Bytnerowicz, Andrzej; Arbaugh, Michael; Andersen, Christian; Riebau, Allen. 2009. Wildland Fires and Air Pollution. Developments in Environmental Science 8. Amsterdam, The Netherlands: Elsevier. pp. 37-59.

Climatic change and agronomic performance of hard red spring wheat from 1950 to 2007

Type Journal Article
Author Susan P. Lanning
Author Kenneth Kephart
Author Gregg R. Carlson
Author Joyce E. Eckhoff
Author Robert N. Stougaard

Author David M. Wichman
Author John M. Martin
Author Luther E. Talbert

Abstract Increasing temperatures are a threat to hard red spring wheat (Triticum aestivum L.) production in the northern Great Plains and may impact objectives for breeding programs. Weather data and agronomic performance of experimental lines and a check cultivar 'Thatcher' were compiled for six sites in Montana for 1950 to 2007. Mean annual temperature increased significantly at five sites. March temperature increased significantly at all sites, and planting date has become significantly earlier at a rate of 0.24 d yr^{-1} Grain yield of Thatcher increased significantly at a rate of 23.5 kg ha^{-1} yr^{-1} July temperatures increased significantly at two sites. July temperatures showed a significant negative correlation with grain yield at three sites and with grain volume weight at three sites. Nursery means over years as adjusted for Thatcher was used as a measure of genetic change and showed significantly increased grain yield and significantly earlier heading date. Our results suggest that earlier planting due to warmer spring temperatures has helped to alleviate negative effects of high temperatures during grain filling periods. Genetic changes in breeding materials have also contributed to increased yield potential, partially due to earlier heading and avoidance of July heat. Projection of increasing temperatures suggests the need for management and breeding strategies to insure productivity of hard red spring wheat in the northern Great Plains.

Publication Crop Science
Volume 50
Issue 3
Pages 835-841
Date May/June 2010
Journal Abbr Crop Sci.
DOI 10.2135/cropsci2009.06.0314
ISSN 1435-0653
URL https://www.crops.org/publications/cs/abstracts/50/3/835
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:17:43 2011

Climatic change and the broad-scale distribution of terrestrial ecosystem complexes

Type Journal Article

Author William R. Emanuel
Author Herman H. Shugart
Author Mary P. Stevenson

Abstract The broad-scale distribution of terrestrial ecosystem complexes is determined in large part by climate and can be altered by climatic change due to natural causes or due to human activities such as those leading to increasing atmospheric CO_2 concentration. Classifications that recognize the dependence of natural vegetation on climate provide one means of constructing maps to display the impact of climatic change on the geography of major vegetation zones. A world map of the Holdridge Life-Zone Classification, developed from approximately 8,000 meteorological records, is compared with a Holdridge Map with average temperature increments simulated by a. model of climate under elevated atmospheric CO_2 concentration. The largest changes are indicated at high latitudes, where the simulated temperature increase is largest and the temperature intervals defining life zones are smallest. Boreal Forest Zones are replaced by either Cool Temperate Forest or Cool Temperate Steppe, depending on average precipitation. Changes in the tropics are smaller; however, in some regions, Subtropical Moist Forest is replaced by Tropical Dry Forest.

Publication Climatic Change
Volume 7
Issue 1
Pages 29–43
Date March 1985
Journal Abbr Climatic Change
DOI 10.1007/BF00139439

ISSN 0165-0009 (Print) 1573-1480 (Online)
URL http://www.springerlink.com/content/p78k7h7694271851/
Date Added Sun Aug 28 05:42:07 2011
Modified Sun Aug 28 05:45:16 2011

Notes:

Holdridge Life-Zone Diagram

Climatic change, wildfire, and conservation

Type Journal Article
Author Donald McKenzie
Author Ze'ev Gedalof
Author David L. Peterson
Author Philip Mote
Abstract Climatic variability is a domoinabt factor affecting large wildfire in the western United States, an observation supported by paleoecological data on charcoal in lake sediments and reconstructions from fire-scarred trees. although current fire manahement focuses on fuel reductions to bring fuel loadings back to their historical ranges, at the regional scale extreme fire weater is still the dominant influence on area burned and fire severity. Current forecasting tools are limited to short-term predictions of fire weather, but increased understanding of large-scale oceanic and atmospheric patterns in the Pacific Ocean (e.g., El Niño Southern Oscillation, Pacific Decadal Oscillation) may improve our ability to predict climate variability at seasonal to annual leads. Associations between these quasi-periodic patterns and fire occurrence, though evident in some some regions, have been difficult to establish inothers. Increased temperature in the future will likely extend fire seasons throughout the western United States, with more fires occurring earlier and later than is currently typical, and will increase the total area burned in some regions. If climatic change increases the amplitude and duration of extreme fire weather, we can expect significant changes in the distribution and abundance of dominant plant species in some ecosystems, which would thus affect habitat of some sensitive plant and animal species. Some species that are sensitive to fire may decline, whereas the distribution and abundance of species favored by fire may be enhanced. The effects of climatic change will partially depend on the extent to which resource management modifies vegetation structure and fuels.
Publication Conservation Biology
Volume 18
Issue 4
Pages 890–902
Date August 2004
Journal Abbr Conserv. Biol.
DOI 10.1111/j.1523-1739.2004.00492.x
ISSN 1523-1739
URL http://www3.interscience.wiley.com/journal/118784300/abstract
Extra Keywords: climatic change; conservation; fire history; General Circulation Models (GCM); wildfire.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:45:23 2011

Climatic conditions preceding historically great fires in the North Central Region.

Type Report
Author Donald A. Haines
Author Rodney W. Sando

Abstract This paper examines the importance of various climatic variables before seven well-known fires of the past. Also, the 1871 synoptic weather pattern preceding the Chicago-Peshtigo-Michigan fire disaster is examined in detail.

Report Number RP-NC-34

Report Type Research Paper

Place St. Paul, MN

Institution U.S. Dept. of Agriculture, Forest Service, North Central Forest Experiment Station

Date 1969

Pages 19 p.

URL http://ncrs.fs.fed.us/pubs/viewpub.asp?key=555

Extra Keywords: climatic conditions; fire; North Central Region.

Date Added Mon Aug 29 17:30:07 2011

Modified Wed Aug 31 00:32:27 2011

Climatic controls of Holocene fire patterns in southern South America

Type Journal Article

Author Cathy Whitlock

Author Patricio I. Moreno

Author Patrick J. Bartlein

Abstract Holocene fire–climate–vegetation linkages are mostly understood at individual sites by comparing charcoal and pollen records with other paleoenvironmental proxy and model simulations. This scale of reconstruction often obscures detection of large-scale patterns in past fire activity that are related to changes in regional climate and vegetation. A network of 31 charcoal records from southern South America was examined to assess fire history along a transect from subtropic to subantarctic biomes. The charcoal data indicate that fire activity was greater than present at ca. 12,000 cal yr BP and increased further and was widespread at 9500 cal yr BP. Fire activity decreased and became more spatially variable by 6000 cal yr BP, and this trend continued to present. Atmospheric circulation anomalies during recent high-fire years show a southward shift in westerlies, and paleoclimate model simulations and data syntheses suggest that such conditions may have prevailed for millennia in the early Holocene when the pole-to-equator temperature gradients were weaker and annual temperatures were higher than present, in response to orbital-time-scale insolation changes.

Publication Quaternary Research

Volume 68

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Date July 2007

Journal Abbr Quaternary Res.

DOI 10.1016/j.yqres.2007.01.012

ISSN 0033-5894

URL http://linkinghub.elsevier.com/retrieve/pii/S0033589407000191

Extra Keywords: fire history; Patagonia; charcoal records; early Holocene climate; southern westerlies.

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Climatic controls on fire-induced sediment pulses in Yellowstone National Park and central Idaho: A long-term perspective

Type Journal Article

Author Grant A. Meyer

Author Jennifer L. Pierce

Abstract Fire management addressing postfire erosion and aquatic ecosystems tends to focus on short-term effects persisting up to about a decade after fire. A longer perspective is important in understanding natural variability in postfire erosion and sedimentation, the role of these processes in structuring habitat, and future expectations in light of a warming climate and environmental change. In cool high-elevation forests of northern Yellowstone National Park, stand ages indicate infrequent large stand-replacing fires. In warmer low-elevation forests of the Payette River region of Idaho, fire-scarred tree-rings record frequent low-severity fires before 1900; stand-replacing fires and resulting debris flows in recent decades are usually attributed to 20th-century fire suppression, grazing, and other land uses. In both areas, however, tree-ring records extend back only about 500 years. We use ^{14}C-dated geologic records to examine spatial and temporal patterns of fire-induced sedimentation and its relation to climate over the last 10 000 years. We review sedimentation processes in modern postfire events, which vary in magnitude and impact on stream systems depending on burn severity, basin geomorphology, and the timing and characteristics of postfire storms. Modern deposits also provide analogs for identification of fire-related deposits in alluvial fans. In Yellowstone, episodes of fire-induced sedimentation occurred at intervals of about 300–450 years during the last 3500 years, indicating a regime of infrequent high-severity fires. Millennial-scale variations in the fire-sedimentation record appear to relate to hemispheric-scale climatic change. Fire-related sedimentation is rare in Yellowstone during cooler episodes (e.g., the Little Ice Age ~1200–1900 A.D.), probably because effectively wetter conditions prevented most fires from spreading. During some of the same cool periods, the Payette region experienced light surface fires and frequent, small pulses of fire-induced sediment. Between 900 and 1200 A.D., however, large fire-related debris flows occurred in both study areas, coincident with the Medieval Warm Period. During that time, drought may have limited grass growth in xeric Payette-region forests, restricting surface fire spread and allowing understory shrubs and trees to create ladder fuels. Although fire suppression and land-use effects are clearly involved in recent catastrophic fires in the Payette region, a warming climate and severe drought are probable contributors to major stand-replacing fires and postfire sedimentation, both past and present. Restoration and maintenance of conditions prior to European settlement may be unrealistic because of the potent influence of climate, and the incidence of severe fires will likely increase in both areas with future warming.

Publication Forest Ecology and Management

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Pages 89-104

Date June 2003

Journal Abbr Forest Ecol. Manag.

DOI 10.1016/S0378-1127(03)00055-0

ISSN 0378-1127

Short Title Climatic Controls on Fire-Induced Sediment Pulses in Yellowstone National Park and Central Idaho

URL http://www.sciencedirect.com/science/article/pii/S0378112703000550

Extra Keywords: fire; conifers; erosion; debris flows; climate; drought; Yellowstone; Idaho.

Date Added Tue Aug 30 14:35:38 2011

Modified Tue Aug 30 14:46:07 2011

Climatic controls on historical wildfires in West Virginia, 1939-2008

Type Journal Article

Author Cary Lynch

Author Amy Hessl

Abstract Interannual climatic variability strongly influences patterns of burning in many regions and this control may extend to fire regimes dominated by anthropogenic ignitions or fire suppression. A close linkage between fire and climate could reduce the importance of local processes, such as fuel accumulation, structure, species composition, and even human land use. Here we: (1) summarize historical fire atlases collected by the West Virginia Division of Forestry (1939-2008) in the context of climate and spatial variability; (2) identify the seasonal climatic drivers of fire activity in West Virginia; and (3) define the spatial pattern of fire occurrence from 2001 to 2008. Between 2001 and 2008, 99.9% of fires were recorded as anthropogenic ignitions. More fires tended to burn in the spring, but total area burned was higher in the fall. Same-season precipitation accounts for 27.4 to 32.2% of the variance in area burned and number of fires in spring and fall, with low precipitation leading to larger numbers and sizes of fires. Large fires (>500 ha) are clustered in the southern portion of West Virginia, an area dominated by surface mining (the southern coal fields). This cluster of large fires extends into eastern Kentucky and western Virginia and may be the result of steep topography, local land use, and a culture of incendiarism.

Publication Physical Geography
Volume 31
Issue 3
Pages 254–269
Date May-June 2010
Journal Abbr Phys. Geogr.
DOI 10.2747/0272-3646.31.3.254
ISSN 0272-3646
URL http://bellwether.metapress.com/content/n232602j6322j3m5/
Call Number 0000
Extra Keywords: wildfire; fire atlas; anthropogenic ignitions; superposed epoch analysis; West Virginia.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:21:04 2011

Climatic influences on fire regimes in montane forests of the southern Cascades, California, USA

Type Journal Article
Author Alan H. Taylor
Author Valérie Trouet
Author Carl N. Skinner
Abstract The relationship between climate variability and fire extent was examined in montane and upper montane forests in the southern Cascades. Fire occurrence and extent were reconstructed for seven sites and related to measures of reconstructed climate for the period 1700 to 1900. The climate variables included the Palmer Drought Severity Index (PDSI), summer temperature (TEMP), NINO3, a measure of the El Niño–Southern Oscillation (ENSO), and the Pacific Decadal Oscillation (PDO). Fire extent at the site and regional scale was associated with dry and warm conditions in the year of the fire and regional fire extent was not associated with ENSO or PDO for the full period of analysis. The relationship between regional fire extent and climate was not stable over time. The associations of fire extent with PDSI and TEMP were only significant from ~1775 onward and the associations were strongest between 1805 and 1855. PDO and fire extent were also associated during the 1805–1855 period, and ENSO was associated with fire extent before 1800, but not after. The interannual and interdecadal variability of the fire response to temperature and drought suggests that increased periods of regional fire activity may occur when high interannual PDSI variation coincides with warm decades.
Publication International Journal of Wildland Fire
Volume 17
Issue 1
Pages 60-71
Date February 2008
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07033
ISSN 1049-8001
URL http://www.publish.csiro.au/paper/WF07033.htm
Extra Keywords: American Pacific coast; climatic variation; El Niño–Southern Oscillation; fire ecology; Pacific Decadal Oscillation.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:29 2011

Climatic influences on fire regimes in the northern Sierra Nevada mountains, Lake Tahoe Basin, Nevada, USA

Type Journal Article

Author Alan H. Taylor

Author R. Matthew Beaty

Abstract • Aim: The goal of this study was to understand better the role of interannual and interdecadal climatic variation on local pre-EuroAmerican settlement fire regimes in fire-prone Jeffrey pine (Pinus jeffreyi Grev. & Balf.) dominated forests in the northern Sierra Nevada Mountains. • Location: Our study was conducted in a 6000-ha area of contiguous mixed Jeffrey pine-white fir (Abies concolor Gordon & Glend.) forest on the western slope of the Carson Range on the eastern shore of Lake Tahoe, Nevada. • Methods: Pre-EuroAmerican settlement fire regimes (i.e. frequency, return interval, extent, season) were reconstructed in eight contiguous watersheds for a 200-year period (1650–1850) from fire scars preserved in the annual growth rings of nineteenth century cut stumps and recently dead pre-settlement Jeffrey pine trees. Superposed epoch analysis (SEA) and correlation analysis were used to examine relationships between tree ring-based reconstructions of the Palmer Drought Severity Index (PDSI), Southern Oscillation Index (SOI), Pacific Decadal Oscillation (PDO) and pre-EuroAmerican fire regimes in order to assess the influence of drought and equatorial and north Pacific teleconnections on fire occurrence and fire extent. • Results: For the entire period of record (1650–1850), wet conditions were characteristic of years without fires. In contrast, fire years were associated with drought. Drought intensity also influenced fire extent and the most widespread fires occurred in the driest years. Years with widespread fires were also preceded by wet conditions 3 years before the fire. Widespread fires were also associated with phase changes of the PDO, with the most widespread burns occurring when the phase changed from warm (positive) to cold (negative) conditions. Annual SOI and fire frequency or extent were not associated in our study. At decadal time scales, burning was more widespread during decades that were dryer and characterized by La Niña and negative PDO conditions. Interannual and interdecadal fire–climate relationships were not stable over time. From 1700 to 1775 there was no interannual relationship between drought, PDO, and fire frequency or extent. However, from 1775 to 1850, widespread fires were associated with dry years preceded by wet years. This period also had the strongest association between fire extent and the PDO. In contrast, fire–climate associations at interdecadal time scales were stronger in the earlier period than in the later period. The change from strong interdecadal to strong interannual climate influence was associated with a breakdown in decadal scale constructive relationships between PDO and SOI. • Main conclusions: Climate strongly influenced pre-settlement pine forest fire regimes in northern Sierra Nevada. Both interannual and interdecadal climatic variation regulated conditions conducive to fire activity, and longer term changes in fire frequency and extent correspond with climate-mediated changes observed in both the northern and southern hemispheres. The sensitivity of fire regimes to shifts in modes of climatic variability suggests that climate was a key regulator of pine forest ecosystem structure and dynamics before EuroAmerican settlement. An understanding of pre-EuroAmerican fire–climate relationships may provide useful insights into how fire activity in contemporary forests may respond to future climatic variation.

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Journal Abbr J. Biogeogr.

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Extra Keywords: climatic variation; dendrochronology; drought; El Niño/Southern Oscillation; fire ecology; fire regimes; forest dynamics; global change; Jeffrey pine; Pacific Decadal Oscillation.

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Climatic regionalization and the spatio-temporal occurrence of extreme single-year drought events

(1500–1998) in the interior Pacific Northwest, USA

Type Journal Article
Author Paul A. Knapp
Author Henri D. Grissino-Mayer
Author Peter T. Soulé
Abstract Tree-ring records from western juniper (Juniperus occidentalis var. occidentalis Hook.) growing throughout the interior Pacific Northwest identify extreme climatic pointer years (CPYs) (i.e., severe single-year droughts) from 1500–1998. Widespread and extreme CPYs were concentrated in the 16th and early part of the 17th centuries and did not occur again until the early 20th century. The 217-yr absence of extreme CPYs may have occurred during an extended period of low variance in the Pacific Decadal Oscillation. We mapped climatic boundaries for the interior Pacific Northwest based on the location of sites with similar precipitation variability indices. Three regions, the Northwest (based on chronologies from nine sites), the Southwest (four sites), and the East (five sites) were identified. Our results suggest that western juniper radial growth indices have substantial interannual variability within the northwestern range of the species (central Oregon), particularly when compared with western juniper growing in its eastern range (eastern Oregon, southeastern Idaho, and northern Nevada) and southwestern range (southern Oregon and northeast California). We suspect that the substantial differences in the variability of western juniper radial growth indices are linked to the influence of ENSO events on winter/spring precipitation amounts.
Publication Quaternary Research
Volume 58
Issue 3
Pages 226–233
Date November 2002
Journal Abbr Quaternary Res.
DOI 10.1006/qres.2002.2376
ISSN 0033-5894
URL http://www.sciencedirect.com/science/article/pii/S0033589402923768
Extra Keywords: climatic pointer years; interior Pacific Northwest drought events; climatic regionalization.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:16:19 2011

Climatic response surfaces from pollen data for some eastern North American taxa

Type Journal Article
Author Patrick J. Bartlein
Author I. Colin Prentice
Author Thompson Webb III
Abstract Ecological response surfaces are nonlinear functions describing the way in which the abundances of taxa depend on the joint effects of two or more environmental variables. Continental-scale patterns in the relative abundances of plant taxa are dominated by the effects of macroclimate on the competitive balance among taxa. Pollen analyses record such regional variations for major vegetation components. Empirical ecological response surfaces were derived from high-resolution climate models to yield testable reconstructions of vegeta- eastern North America. The surfaces were obtained by second- or third-degree polynomial regression on two predictor variables, mean July temperature and annual precipitation, with various nonlinear transformations of variables to allow flexibility of shape. Response surface analysis consists of a remapping of abundance patterns from geographic space into climate space, and complements efforts to explain distri- butions in terms of biological processes. Each fitted surface is unique. The surfaces focus attention on the climatic location of range limits and optima, and on less obvious phenomena such as the spatial pattern in the relative sensitivity of different taxa to spatial variation in the climatic variables. Given certain assump- tions, response surfaces based directly on pollen data may be used collectively in a global nonlinear method for estimating past climates from postglacial pollen data. Such response surfaces may also be coupled to palaeoclimatic simulations from high-resolution climate models to yield testable reconstructions of vegeta- tional history.
Publication Journal of Biogeography

Volume 13
Issue 1
Pages 35–57
Date January 1986
Journal Abbr J. Biogeogr.
ISSN 1365-2699
URL http://www.jstor.org/stable/2844848
Date Added Tue Aug 23 01:57:29 2011
Modified Wed Aug 24 04:41:59 2011

Climatically driven biogeographic provinces of Late Triassic tropical Pangea

Type Journal Article
Author Jessica H. Whiteside
Author Danielle S. Grogan
Author Paul E. Olsen
Author Dennis V. Kent
Abstract Although continents were coalesced into the single landmass Pangea, Late Triassic terrestrial tetrapod assemblages are surprisingly provincial. In eastern North America, we show that assemblages dominated by traversodont cynodonts are restricted to a humid 6° equatorial swath that persisted for over 20 million years characterized by "semiprecessional" (approximately 10,000-y) climatic fluctuations reflected in stable carbon isotopes and sedimentary facies in lacustrine strata. More arid regions from 5–20°N preserve procolophonid-dominated faunal assemblages associated with a much stronger expression of approximately 20,000-y climatic cycles. In the absence of geographic barriers, we hypothesize that these variations in the climatic expression of astronomical forcing produced latitudinal climatic zones that sorted terrestrial vertebrate taxa, perhaps by excretory physiology, into distinct biogeographic provinces tracking latitude, not geographic position, as the proto-North American plate translated northward. Although the early Mesozoic is usually assumed to be characterized by globally distributed land animal communities due to of a lack of geographic barriers, strong provinciality was actually the norm, and nearly global communities were present only after times of massive ecological disruptions.
Publication Proceedings of the National Academy of Sciences
Volume 108
Issue 22
Pages 8972-8977
Date May 31, 2011
Journal Abbr PNAS
DOI 10.1073/pnas.1102473108
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1102473108
Call Number 0000
Extra Keywords: biotic provinciality; Cynodontia; orbital forcing; Procolophonidae; latitudinal gradient.
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:47 2011

Climatology: Complex, dynamic, and synoptic

Type Journal Article
Author Arnold Court
Abstract no abstract
Publication Annals of the Association of American Geographers

Volume 47
Issue 2
Pages 125–136
Date June 1957
Journal Abbr Ann. Assoc. Am. Geogr.
DOI 10.1111/j.1467-8306.1957.tb01528.x
ISSN 0004-5608
Short Title Climatology
URL http://www.jstor.org/stable/2561503
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:24 2011

Cloud variations and the Earth's energy budget

Type Journal Article
Author Andrew E. Dessler
Abstract The question of whether clouds are the cause of surface temperature changes, rather than acting as a feedback in response to those temperature changes, is explored using data obtained between 2000 and 2010. An energy budget calculation shows that the energy trapped by clouds accounts for little of the observed climate variations. And observations of the lagged response of top-of-atmosphere (TOA) energy fluxes to surface temperature variations are not evidence that clouds are causing climate change. Key Points: • Clouds are not causing climate change • Observations are not in disagreement with models on this point • Previous work on this is flawed
Publication Geophysical Research Letters
Volume Paper in Press
Issue ?
Pages 14 p.
Date 2011
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2011GL049236
ISSN 0094-8276
URL http://www.agu.org/pubs/crossref/pip/2011GL049236.shtml
Call Number 0000
Date Added Wed Sep 21 23:48:23 2011
Modified Wed Sep 28 17:53:52 2011

CO_2 emissions from fuel combustion - Highlights

Type Report
Author International Energy Agency
Abstract FOREWORD In the lead-up to the UN climate negotiations in Cancún, the latest information on the level and growth of CO_2 emissions, their source and geographic distribution will be essential to lay the foundation for a global agreement. To provide input to and support for the UN process, the IEA is making available for free download – the “Highlights” version of CO_2 Emissions from Fuel Combustion. The PDF publication and an EXCEL file with the tables can be downloaded for free at www.iea.org/co2highlights. Recent years have witnessed a fundamental change in the way governments approach energy-related environmental issues. Promoting sustainable development and combating climate change have become integral aspects of energy planning, analysis and policy making in many countries, including all IEA member states. The purpose of this volume is to put our best and most current information in the hands of those who need it, including in particular the participants in the UNFCCC process. The IEA Secretariat is a contributor to the official Intergovernmental

Panel on Climate Change (IPCC) methodologies for estimating greenhouse-gas emissions. The IEA's basic energy balance data are the figures most often cited in the field. For these reasons, we felt it appropriate to publish this information in a comprehensive form. These data are only for energy-related CO_2, not for any other greenhouse gases. Thus they may differ from countries' official submissions of emissions inventories to the UNFCCC Secretariat. However, the full-scale study contains data for CO_2 from non-energy-related sources and gas flaring, and emissions of CH_4, N_2O, HFC, PFC and SF_6. In addition, the full-scale study also includes information on "Key Sources" from fuel combustion, as developed in the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories. This report is published under my responsibility as Executive Director of the IEA and does not necessarily reflect the views of IEA member countries.

Report Type To provide input to and support for the UN process
Place Paris, France
Institution International Energy Agency (IEA)
Date 2010
Pages 121 p.
URL http://www.iea.org/co2highlights/
Library Catalog International Energy Agency (IEA)
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:05:14 2011

Co_2 Trends

Type Web Page
Author NOAA ESRL
Website Title CO_2
Website Type ftp
Date 2011
URL ftp://ftp.cmdl.noaa.gov/ccg/co2/trends/co2_mm_mlo.txt
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

Comment on "Drought-induced reduction in global terrestrial net primary production from 2000 through 2009"

Type Journal Article
Author Arindam Samanta
Author Marcos H. Costa
Author Edson L. Nunes
Author Simone A. Vieira
Author Liang Xu
Author Ranga B. Myneni
Abstract Zhao and Running (Reports, 20 August 2010, p. 940) reported a reduction in global terrestrial net primary production (NPP) from 2000 through 2009. We argue that the small trends, regional patterns, and interannual variations that they describe are artifacts of their NPP model. Satellite observations of vegetation activity show no statistically significant changes in more than 85% of the vegetated lands south of 70°N during the same 2000 to 2009 period.
Publication Science
Volume 333
Issue 6046
Pages 1093-1093

Date 26 August 2011
Journal Abbr Science
DOI 10.1126/science.1199048
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1199048
Call Number 0001
Date Added Thu Sep 22 05:32:12 2011
Modified Wed Sep 28 17:53:45 2011

Related

- Drought-induced reduction in global terrestrial net primary production from 2000 through 2009

Comparing global vegetation maps with the Kappa statistic

Type Journal Article
Author Robert A. Monserud
Author Rik Leemans
Abstract The Kappa statistic is presented as an objective tool for comparing global vegetation maps. Such maps can result from either compilations of observed spatial patterns or from simulations from models that are global in scope. The method is illustrated by comparing global maps resulting from applying a modified Holdridge Life Zone Classification to current climate and several climate change scenarios (CO_2 doubling). These scenarios were based on the results of several different general circulation models (GCMs). The direction of change in simulated vegetation patterns between different GCMs was found to be quite similar for all future projections. Although there were differences in magnitude and extent, all simulations indicate potential for enormous ecological change. The Kappa statistic proved to be a useful and straightforward measure of agreement between the different global vegetation maps. Furthermore, Kappa statistics for individual vegetation zones clearly indicated differences and similarities between those maps. The Kappa statistic was found to be most useful for rank ordering of agreement, both across a series of maps and across the various vegetation zones within a map.
Publication Ecological Modelling
Volume 62
Issue 4
Pages 275-293
Date August 1992
Journal Abbr Ecol. Model
DOI 10.1016/0304-3800(92)90003-W
ISSN 0304-3800
URL http://www.sciencedirect.com/science/article/B6VBS-48YNVM2-MG/2/0ca895bdf35aad4ed89477a565bd28ff
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 22:59:00 2011

Comparing selected fire regime condition class (FRCC) and LANDFIRE vegetation model results with tree-ring data

Type Journal Article
Author Tyson L. Swetnam
Author Peter M. Brown
Abstract Fire Regime Condition Class (FRCC) has been developed as a nationally consistent interagency method in the US to assess degree of departure between historical and current fire regimes and vegetation structural conditions across differing vegetation types. Historical and existing vegetation map data also are being

developed for the nationwide LANDFIRE project to aid in FRCC assessments. Here, we compare selected FRCC and LANDFIRE vegetation characteristics derived from simulation modeling with similar characteristics reconstructed from tree-ring data collected from 11 forested sites in Utah. Reconstructed reference conditions based on trees present in 1880 compared with reference conditions modeled by the Vegetation Dynamics Development Tool for individual Biophysical Settings (BpS) used in FRCC and LANDFIRE assessments showed significance relationships for ponderosa pine, aspen, and mixed-conifer BpS but not for spruce–fir, piñon–juniper, or lodgepole pine BpS. LANDFIRE map data were found to be ~58% accurate for BpS and ~60% accurate for existing vegetation types. Results suggest that limited sampling of age-to-size relationships by different species may be needed to help refine reference condition definitions used in FRCC assessments, and that more empirical data are needed to better parameterize FRCC vegetation models in especially low-frequency fire types.

Publication International Journal of Wildland Fire
Volume 19
Issue 1
Pages 1-13
Date February 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF08001
ISSN 1049-8001
URL http://dx.doi.org/10.1071/WF08001
Extra Keywords: reference conditions; successional classes; Vegetation Dynamics Development Tool (VDDT).
Date Added Sun Aug 28 17:26:59 2011
Modified Sun Aug 28 17:32:57 2011

Comparing the role of fuel breaks across southern California national forests

Type Journal Article
Author Alexandra D. Syphard
Author Jon E. Keeley
Author Teresa J. Brennan
Abstract Fuel treatment of wildland vegetation is the primary approach advocated for mitigating fire risk at the wildland–urban interface (WUI), but little systematic research has been conducted to understand what role fuel treatments play in controlling large fires, which factors influence this role, or how the role of fuel treatments may vary over space and time. We assembled a spatial database of fuel breaks and fires from the last 30 years in four southern California national forests to better understand which factors are consistently important for fuel breaks in the control of large fires. We also explored which landscape features influence where fires and fuel breaks are most likely to intersect. The relative importance of significant factors explaining fuel break outcome and number of fire and fuel break intersections varied among the forests, which reflects high levels of regional landscape diversity. Nevertheless, several factors were consistently important across all the forests. In general, fuel breaks played an important role in controlling large fires only when they facilitated fire management, primarily by providing access for firefighting activities. Fire weather and fuel break maintenance were also consistently important. Models and maps predicting where fuel breaks and fires are most likely to intersect performed well in the regions where the models were developed, but these models did not extend well to other regions, reflecting how the environmental controls of fire regimes vary even within a single ecoregion. Nevertheless, similar mapping methods could be adopted in different landscapes to help with strategic location of fuel breaks. Strategic location of fuel breaks should also account for access points near communities, where fire protection is most important.
Publication Forest Ecology and Management
Volume 261
Issue 11
Pages 2038-2048
Date 1 June 2011
Journal Abbr Forest Ecol. Manag.

DOI 10.1016/j.foreco.2011.02.030
ISSN 0378-1127
URL http://linkinghub.elsevier.com/retrieve/pii/S037811271100140X
Call Number 0000
Extra Keywords: structural equation model; fuel treatment; national forest; wildland–urban interface; firefighting; fire management.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:04 2011

Comparison of burn severity assessments using Differenced Normalized Burn Ratio and ground data

Type Journal Article
Author Allison E. Cocke
Author Peter Z. Fulé
Author Joseph E. Crouse
Abstract Burn severity can be mapped using satellite data to detect changes in forest structure and moisture content caused by fires. The 2001 Leroux fire on the Coconino National Forest, Arizona, burned over 18 pre-existing permanent 0.1 ha plots. Plots were re-measured following the fire. Landsat 7 ETM+ imagery and the Differenced Normalized Burn Ratio (ΔNBR) were used to map the fire into four severity levels immediately following the fire (July 2001) and 1 year after the fire (June 2002). Ninety-two Composite Burn Index (CBI) plots were compared to the fire severity maps. Pre- and post-fire plot measurements were also analysed according to their imagery classification. Ground measurements demonstrated differences in forest structure. Areas that were classified as severely burned on the imagery were predominantly Pinus ponderosa stands. Tree density and basal area, snag density and fine fuel accumulation were associated with severity levels. Tree mortality was not greatest in severely burned areas, indicating that the ΔNBR is comprehensive in rating burn severity by incorporating multiple forest strata. While the ΔNBR was less accurate at mapping perimeters, the method was reliable for mapping severely burned areas that may need immediate or long-term post-fire recovery.
Publication International Journal of Wildland Fire
Volume 14
Issue 2
Pages 189-198
Date May 2005
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF04010
ISSN 1049-8001
URL http://dx.doi.org/10.1071/WF04010
Extra Keywords: Arizona; mixed conifer forest; ponderosa pine.
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:09:14 2011

Comparison of charcoal and tree-ring records of recent fires in the eastern Klamath Mountains, California, USA

Type Journal Article
Author Cathy Whitlock
Author Carl N. Skinner
Author Patrick J. Bartlein
Author Thomas Minckley
Author Jerry A. Mohr

Abstract Fire-history reconstructions are based on tree-ring records that span the last few centuries and charcoal data from lake-sediment cores that extend back several thousand years. The two approaches have unique strengths and weaknesses in their ability to depict past fire events and fire regimes, and most comparisons of these datasets in western conifer forests have focused on sites characterized by high-severity crown fires. Tree-ring and charcoal data spanning the last 300 years in four watersheds in the montane forests of the Klamath Mountains provided an opportunity to compare the records in a fire regime of frequent low- to moderate-severity surface events. The charcoal data were obtained from small lakes, and tree-ring records were derived from fire-scar chronologies at multiple sites within each watershed. The comparison indicates that the tree-ring records detected individual fires not evident in the lake-sediment profiles, whereas the charcoal data disclosed variations in fuel loading and general levels of burning at broader spatial scales. Regional burning in the late 19th and early 20th centuries was evident in the lake-sediment records, and both datasets registered a decline in fire activity in the late 20th century. Thus, the two types of data provide complementary as well as supplementary information on past fire conditions.

Publication Canadian Journal of Forest Research
Volume 34
Issue 10
Pages 2110–2121
Date October 2004
Journal Abbr Can. J. For. Res.
DOI 10.1139/X04-084
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x04-084
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:24 2011

Comparison of fire scars, fire atlases, and satellite data in the northwestern United States

Type Journal Article
Author Lauren B. Shapiro-Miller
Author Emily K. Heyerdahl
Author Penelope Morgan

Abstract We evaluated agreement in the location and occurrence of 20th century fires recorded in digital fire atlases with those inferred from fire scars that we collected systematically at one site in Idaho and from existing fire-scar reconstructions at four sites in Washington. Fire perimeters were similar for two of three 20th century fires in Idaho (1924 and 1986). Overall spatial agreement was best in 1924 (producer's accuracy = 94% and 68% and user's accuracy = 90% and 70% for the 1924 and 1986 fires, respectively). In 1924, fire extent from the atlas was greater than for fire scars, but the reverse was true for 1986. In 1986, fire extent interpreted from the delta normalized burn ratio derived from pre- and post-fire satellite imagery was similar to that inferred from the fire-scar record (producer's accuracy = 92%, user's accuracy = 88%). In contrast, agreement between fire-scar and fire-atlas records was poor at the Washington sites. Fire atlases are the most readily available source of information on the extent of late 20th century fires and the only source for the early 20th century. While fire atlases capture broad patterns useful at the regional scale, they should be field validated and used with caution at the local scale.

Publication Canadian Journal of Forest Research
Volume 37
Issue 10
Pages 1933-1943
Date October 2007
Journal Abbr Can. J. For. Res.
DOI 10.1139/X07-054
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/X07-054
Archive http://www.treesearch.fs.fed.us/pubs/29499

Call Number 0009
Date Added Tue Sep 20 18:53:39 2011
Modified Wed Sep 21 18:35:32 2011

Comparison of the sensitivity of landscape-fire-succession models to variation in terrain, fuel pattern, climate and weather

Type Journal Article
Author Geoffrey J. Cary
Author Robert E. Keane
Author Robert H. Gardner
Author Sandra Lavorel
Author Michael D. Flannigan
Author Ian D. Davies
Author Chao Li
Author James M. Lenihan
Author T. Scott Rupp
Author Florent Mouillot
Abstract The purpose of this study was to compare the sensitivity of modelled area burned to environmental factors across a range of independently-developed landscape-fire-succession models. The sensitivity of area burned to variation in four factors, namely terrain (flat, undulating and mountainous), fuel pattern (finely and coarsely clumped), climate (observed, warmer & wetter, and warmer & drier) and weather (year-to-year variability) was determined for four existing landscape-fire-succession models (EMBYR, FIRESCAPE, LANDSUM and SEM-LAND) and a new model implemented in the LAMOS modelling shell (LAMOS(DS)). Sensitivity was measured as the variance in area burned explained by each of the four factors, and all of the interactions amongst them, in a standard generalised linear modelling analysis. Modelled area burned was most sensitive to climate and variation in weather, with four models sensitive to each of these factors and three models sensitive to their interaction. Models generally exhibited a trend of increasing area burned from observed, through warmer and wetter, to warmer and drier climates with a 23-fold increase in area burned, on average, from the observed to the warmer, drier climate. Area burned was sensitive to terrain for FIRESCAPE and fuel pattern for EMBYR. These results demonstrate that the models are generally more sensitive to variation in climate and weather as compared with terrain complexity and fuel pattern, although the sensitivity to these latter factors in a small number of models demonstrates the importance of representing key processes. The models that represented fire ignition and spread in a relatively complex fashion were more sensitive to changes in all four factors because they explicitly simulate the processes that link these factors to area burned.
Publication Landscape Ecology
Volume 21
Issue 1
Pages 121–137
Date January 2006
Journal Abbr Landscape Ecol.
DOI 10.1007/s10980-005-7302-9
ISSN 0921-2973
URL http://www.springerlink.com/content/q444q4lj2q7p017u/
Extra Keywords: EMBYR; FIRESCAPE; LAMOS; LANDSUM; model comparison; SEM-LAND; simulation modelling.
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:08:14 2011

Composition, structure and dynamics of Dysart Woods, an old-growth mixed mesophytic forest of

southeastern Ohio

Type Journal Article

Author Brian C. McCarthy
Author Christine J. Small
Author Darrin L. Rubino

Abstract Dysart Woods is a 23 ha old-growth remnant of mixed mesophytic vegetation located in southeastern Ohio, USA. A designation of mixed mesophytic for this forest has historically been difficult, in part due to the abundance of white oak (Quercus alba); however, the dominance of a variety of other hardwoods prevents a simple oak forest designation. Using two 0.35 ha plots on opposing north- and south-facing slopes, we describe the structure and composition of the overstory, understory, and soils, 30 years after their first examination. In 1970, the woods was dominated by beech (Fagus grandifolia), white oak, and sugar maple (Acer saccharum) — historically, the three most abundant species in this region. At that time, white oak was only present in the largest size classes, was not regenerating, and was predicted to decline in importance through succession. These patterns continue today suggesting that inferences made via overstory–understory relations in regards to forest succession are relatively robust over this time period. Beech and maple have increased in importance; white oak has decreased in importance due to mortality in the larger size classes and decreasing density due to regeneration failure. Coarse woody debris distributions correlated strongly with living stem species' composition and structure implying an equilibrium balance. CWD volume and frequency were dominated by Quercus spp. A detailed analysis of forest health showed that all oak species were in severe decline. The oaks are in a disease decline spiral affiliated with a variety of pre-disposing and inciting factors which include their advanced age (>300 years), their large size (> 100 cm DBH), topography, chronic air pollution, drought, and Armillaria root rot fungus. Ca:Al molar ratios in the soil are also extremely low (<1.0) and may be having an additional detrimental effect. All other canopy species appear to be healthy. One of the unusual features of this woods is its relatively diverse and high coverage (up to 90%) understory layer. The herbaceous community was sampled throughout the growing season and found to be markedly dissimilar among sample times and habitat productivity (aspect, soil quality, and light). The role of these factors has not been as well studied for herb communities as it has for tree communities. There appears to be a relatively strong linkage between the overstory regeneration and understory coverage. While a variety of woody seedlings were discovered, most were of shade tolerant species. Only a few small seedlings of white oak were discovered, with none advancing past 30 cm in height, indicating strong competition in the understory. Furthermore, this small remnant forest patch is surrounded by an agricultural and second-growth forest matrix with many non-indigenous plants — none of which have been able to enter the woods, suggesting strong equilibrium stability of these old-growth patches. The hardwood forests of the hills region has been heavily impacted by various human cultures for thousands of years. Dendrochronological analysis of a full basal slab cut from a wind-thrown white oak revealed a fairly active period of fire following European settlement. A lack of fire during the early 1600s to mid 1700s suggests that pre-Anglo fire frequency may have been negligible. There is clearly a continued role for the preservation and study of these old-growth remnants. They remain integrally important as we attempt to understand and better manage our remaining anthropogenically disturbed landscape.

Publication Forest Ecology and Management
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Pages 193–213
Date 15 January 2001
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/S0378-1127(00)00280-2
ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/pii/S0378112700002802
Extra Keywords: forest succession; stand dynamics; disturbance; old-growth; coarse woody debris; fire ecology.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:45:05 2011

Concerning the cause of the general trade-winds

Type Journal Article

Author George Hadley
Abstract no abstract
Publication Philosophical Transactions
Volume 39
Issue 1735 - 1736 (Number 437)
Pages 58–62
Date January 1735
Journal Abbr Phil. Trans.
DOI 10.1098/rstl.1735.0014
ISSN 0260-7085
URL http://www.jstor.org/stable/103976
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:59:00 2011

Confronting climate change in the US Northeast: Science, impacts, and solutions

Type Report
Author Peter C. Frumhoff
Author James J. McCarthy
Author Jerry M. Melillo
Author Susanne C. Moser
Author Donald J. Wuebbles
Abstract The Northeast Climate Impacts Assessment (NECIA) is a collaborative effort between the Union of Concerned Scientists (UCS) and a team of independent experts to develop and communicate a new assessment of climate change and associated impacts on key climate-sensitive sectors in the northeastern United States. The goal of the assessment is to combine state-of-the-art analyses with effective outreach to provide opinion leaders, policy makers, and the public with the best available science upon which to base informed choices about climate-change mitigation and adaptation.
Report Type Synthesis report of the Northeast Climate Impacts Assessment (NECIA)
Place Cambridge, MA
Institution Union of Concerned Scientists
Date July 2007
Pages 146 p.
URL http://www.northeastclimateimpacts.org
Rights © 2007 Union of Concerned Scientists
Extra Keywords: climate; climate change; Connecticut; impacts; Maine; Massachusetts; NECIA; New England; New Hampshire; New York; northeast; Pennsylvania; Rhode Island; Vermont.
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Notes:

Citation:

Frumhoff, P.C., J.J. McCarthy, J.M. Melillo, S.C. Moser, and D.J. Wuebbles. 2007. Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions. Synthesis report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists (UCS).

Constraints on global fire activity vary across a resource gradient

Type Journal Article
Author M.A. Krawchuk
Author M.A. Moritz
Abstract We provide an empirical, global test of the varying constraints hypothesis, which predicts systematic heterogeneity in the relative importance of biomass resources to burn and atmospheric conditions suitable to burning (weather/climate) across a spatial gradient of long-term resource availability. Analyses were based on relationships between monthly global wildfire activity, soil moisture, and mid-tropospheric circulation data from 2001 to 2007, synthesized across a gradient of long-term averages in resources (net primary productivity), annual temperature, and terrestrial biome. We demonstrate support for the varying constraints hypothesis, showing that, while key biophysical factors must coincide for wildfires to occur, the relative influence of resources to burn and moisture/weather conditions on fire activity shows predictable spatial patterns. In areas where resources are always available for burning during the fire season, such as subtropical/tropical biomes with mid-high annual long-term net primary productivity, fuel moisture conditions exert their strongest constraint on fire activity. In areas where resources are more limiting or variable, such as deserts, xeric shrublands, or grasslands/savannas, fuel moisture has a diminished constraint on wildfire, and metrics indicating availability of burnable fuels produced during the antecedent wet growing seasons reflect a more pronounced constraint on wildfire. This macro-scaled evidence for spatially varying constraints provides a synthesis with studies performed at local and regional scales, enhances our understanding of fire as a global process, and indicates how sensitivity to future changes in temperature and precipitation may differ across the world. Key words: circulation anomalies; climate; constraints on wildfire; energy and moisture gradients; global pyrogeography; resources and conditions; soil moisture; Spearman rank correlation; zero-inflated negative binomial regression.
Publication Ecology
Volume 92
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Pages 121–132
Date 2011
Library Catalog Google Scholar
Call Number 0001
Date Added Thu Oct 6 11:53:23 2011
Modified Thu Oct 6 11:53:23 2011

Constraints on the numerical age of the Paleocene-Eocene boundary

Type Journal Article
Author Adam J. Charles
Author Daniel J. Condon
Author Ian C. Harding
Author Heiko Pälike
Author John E. A. Marshall
Author Ying Cui
Author Lee Kump
Author Ian W. Croudace
Abstract Here we present combined radioisotopic dating (U-Pb zircon) and cyclostratigraphic analysis of the carbon isotope excursion at the Paleocene-Eocene (P-E) boundary in Spitsbergen to determine the numerical age of the boundary. Incorporating the total uncertainty from both radioisotopic and cyclostratigraphic data sets gives an age ranging from 55.728 to 55.964 Ma, within error of a recently proposed astronomical age of ~55.93 Ma. Combined with the assumption that the Paleocene Epoch spans twenty-five 405 kyr cycles, our new age for the boundary suggests an age of ~66 Ma for the Cretaceous-Paleogene boundary. Furthermore, our P-E boundary age is consistent with the hypothesis that the onset of the Paleocene-Eocene thermal maximum at the boundary occurred on the falling limb of a 405 kyr cycle, suggesting the event was initiated by a different mechanism to that which triggered the other early Eocene hyperthermals.
Publication Geochemistry Geophysics Geosystems

Volume 12
Issue 6
Pages Q0AA17 (19 p.)
Date 1 June 2011
Journal Abbr Geochem. Geophys. Geosyst.
DOI 10.1029/2010GC003426
ISSN 1525-2027
URL http://www.agu.org/pubs/crossref/2011/2010GC003426.shtml
Extra Keywords: Paleocene; Eocene; PETM; cyclostratigraphy; radioisotopic dating; Spitsbergen.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:26 2011

Contemporary fire regimes of northern Australia, 1997–2001: Change since Aboriginal occupancy, challenges for sustainable management

Type Journal Article
Author Jeremy Russell-Smith
Author Cameron Yates
Author Andrew Edwards
Author Grant E. Allan
Author Garry D. Cook
Author Peter Cooke
Author Ron Craig
Author Belinda Heath
Author Richard Smith
Abstract Considerable research has been undertaken over the past two decades to apply remote sensing to the study of fire regimes across the savannas of northern Australia. This work has focused on two spatial scales of imagery resolution: coarse-resolution NOAA-AVHRR imagery for savanna-wide assessments both of the daily distribution of fires ('hot spots'), and cumulative mapping of burnt areas ('fire-scars') over the annual cycle; and fine-resolution Landsat imagery for undertaking detailed assessments of regional fire regimes. Importantly, substantial effort has been given to the validation of fire mapping products at both scales of resolution. At the savanna-wide scale, fire mapping activities have established that: (1) contrary to recent perception, from a national perspective the great majority of burning in any one year typically occurs in the tropical savannas; (2) the distribution of burning across the savannas is very uneven, occurring mostly in sparsely settled, higher rainfall, northern coastal and subcoastal regions (north-west Kimberley, Top End of the Northern Territory, around the Gulf of Carpentaria) across a variety of major land uses (pastoral, conservation, indigenous); whereas (3) limited burning is undertaken in regions with productive soils supporting more intensive pastoral management, particularly in Queensland; and (4) on a seasonal basis, most burning occurs in the latter half of the dry season, typically as uncontrolled wildfire. Decadal fine-resolution fire histories have also been assembled from multi-scene Landsat imagery for a number of fire-prone large properties (e.g. Kakadu and Nitmiluk National Parks) and local regions (e.g. Sturt Plateau and Victoria River District, Northern Territory). These studies have facilitated more refined description of various fire regime parameters (fire extent, seasonality, frequency, interval, patchiness) and, as dealt with elsewhere in this special issue, associated ecological assessments. This paper focuses firstly on the patterning of contemporary fire regimes across the savanna landscapes of northern Australia, and then addresses the implications of these data for our understanding of changes in fire regime since Aboriginal occupancy, and implications of contemporary patterns on biodiversity and emerging greenhouse issues.
Publication International Journal of Wildland Fire
Volume 12
Issue 4
Pages 283-297
Date January 2003

Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF03015
ISSN 1049-8001
Short Title Contemporary fire regimes of northern Australia, 1997–2001
URL http://www.publish.csiro.au/paper/WF03015
Date Added Mon Aug 29 00:48:23 2011
Modified Mon Aug 29 00:50:34 2011

Contingent Pacific–Atlantic Ocean influence on multicentury wildfire synchrony over western North America

Type Journal Article
Author Thomas Kitzberger
Author Peter M. Brown
Author Emily K. Heyerdahl
Author Thomas W. Swetnam
Author Thomas T. Veblen
Abstract Widespread synchronous wildfires driven by climatic variation, such as those that swept western North America during 1996, 2000, and 2002, can result in major environmental and societal impacts. Understanding relationships between continental-scale patterns of drought and modes of sea surface temperatures (SSTs) such as El Niño-Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO), and Atlantic Multidecadal Oscillation (AMO) may explain how interannual to multidecadal variability in SSTs drives fire at continental scales. We used local wildfire chronologies reconstructed from fire scars on tree rings across western North America and independent reconstructions of SST developed from tree-ring widths at other sites to examine the relationships of multicentury patterns of climate and fire synchrony. From 33,039 annually resolved fire-scar dates at 238 sites (the largest paleofire record yet assembled), we examined forest fires at regional and subcontinental scales. Since 1550 CE, drought and forest fires covaried across the West, but in a manner contingent on SST modes. During certain phases of ENSO and PDO, fire was synchronous within broad subregions and sometimes asynchronous among those regions. In contrast, fires were most commonly synchronous across the West during warm phases of the AMO. ENSO and PDO were the main drivers of high-frequency variation in fire (interannual to decadal), whereas the AMO conditionally changed the strength and spatial influence of ENSO and PDO on wildfire occurrence at multidecadal scales. A current warming trend in AMO suggests that we may expect an increase in widespread, synchronous fires across the western U.S. in coming decades.
Publication Proceedings of the National Academy of Sciences
Volume 104
Issue 2
Pages 543-548
Date January 9, 2007
Journal Abbr PNAS
DOI 10.1073/pnas.0606078104
ISSN 1091-6490 (online)
URL http://www.pnas.org/content/104/2/543.full
Archive http://www.treesearch.fs.fed.us/pubs/27697
Extra Keywords: Atlantic Multidecadal Oscillation; El Niño Southern Oscillation; fire history network; ocean warming; Pacific Decadal Oscillation.
Date Added Tue Aug 30 14:37:15 2011
Modified Mon Sep 19 02:15:33 2011

Continued warming could transform Greater Yellowstone fire regimes by mid-21st century

Type	Journal Article
Author	Anthony L. Westerling
Author	Monica G. Turner
Author	Erica A. H. Smithwick
Author	William H. Romme
Author	Michael G. Ryan
Abstract	Climate change is likely to alter wildfire regimes, but the magnitude and timing of potential climate-driven changes in regional fire regimes are not well understood. We considered how the occurrence, size, and spatial location of large fires might respond to climate projections in the Greater Yellowstone ecosystem (GYE) (Wyoming), a large wildland ecosystem dominated by conifer forests and characterized by infrequent, high-severity fire. We developed a suite of statistical models that related monthly climate data (1972–1999) to the occurrence and size of fires >200 ha in the northern Rocky Mountains; these models were cross-validated and then used with downscaled (~12 km × 12 km) climate projections from three global climate models to predict fire occurrence and area burned in the GYE through 2099. All models predicted substantial increases in fire by midcentury, with fire rotation (the time to burn an area equal to the landscape area) reduced to <30 y from the historical 100–300 y for most of the GYE. Years without large fires were common historically but are expected to become rare as annual area burned and the frequency of regionally synchronous fires increase. Our findings suggest a shift to novel fire–climate–vegetation relationships in Greater Yellowstone by midcentury because fire frequency and extent would be inconsistent with persistence of the current suite of conifer species. The predicted new fire regime would transform the flora, fauna, and ecosystem processes in this landscape and may indicate similar changes for other subalpine forests.
Publication	Proceedings of the National Academy of Sciences
Volume	108
Issue	32
Pages	13165-13170
Date	August 9, 2011
Journal Abbr	PNAS
DOI	10.1073/pnas.1110199108
ISSN	0027-8424
URL	http://www.pnas.org/cgi/doi/10.1073/pnas.1110199108
Date Added	Tue Aug 16 23:37:14 2011
Modified	Tue Aug 16 23:38:40 2011

Contribution of anthropogenic land cover change emissions to pre-industrial atmospheric CO_2

Type	Journal Article
Author	Christian H. Reick
Author	Thomas Raddatz
Author	Julia Pongratz
Author	Martin Claussen
Abstract	Based on a recent reconstruction of anthropogenic land cover change (ALCC), we derive the associated CO_2 emissions since 800 AD by two independent methods: a bookkeeping approach and a process model. The results are compared with the pre-industrial development of atmospheric CO_2 known from antarctic ice cores. Our results show that pre-industrial CO_2 emissions from ALCC have been relevant for the pre-industrial carbon cycle, although before 1750 AD their trace in atmospheric CO_2 is obscured by other processes of similar magnitude. After 1750 AD, the situation is different: the steep increase in atmospheric CO_2 until 1850 AD—this is before fossil fuel emissions rose to significant values—is to a substantial part explained by growing emissions from ALCC.
Publication	Tellus B (Special Issue)
Volume	62
Issue	5
Pages	329-336

Date November 2010
Journal Abbr Tellus B
DOI 10.1111/j.1600-0889.2010.00479.x
ISSN 0280-6509
URL http://doi.wiley.com/10.1111/j.1600-0889.2010.00479.x
Extra Special Issue with Manuscripts Presented at the 8th International Carbon Dioxide Conference, ICDC 8, in Jena, Germany 13-19 September 2009
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:00 2011

Copenhagen accord pledges are paltry

Type Journal Article
Author Joeri Rogelj
Author Julia Nabel
Author Claudine Chen
Author William Hare
Author Kathleen Markmann
Author Malte Meinshausen
Author Michiel Schaeffer
Author Kirsten Macey
Author Niklas Höhne
Abstract Current national emissions targets can't limit global warming to 2 °C, calculate Joeri Rogelj, Malte Meinshausen and colleagues — they might even lock the world into exceeding 3 °C warming. Summary: • Nations will probably meet only the lower ends of their emissions pledges in the absence of a binding international agreement • Nations can bank an estimated 12 gigatonnes of CO_2 equivalents surplus allowances for use after 2012 • Land-use rules are likely to result in further allowance increases of 0.5 $GtCO_2$-eq per year • Global emissions in 2020 could thus be up to 20% higher than today • Current pledges mean a greater than 50% chance that warming will exceed 3°C by 2100 • If nations agree to halve emissions by 2050, there is still a 50% chance that warming will exceed 2°C and will almost certainly exceed 1.5°C
Publication Nature
Volume 464
Issue 7292
Pages 1126-1128
Date 22 April 2010
Journal Abbr Nature
DOI 10.1038/4641126a
ISSN 0028-0836
URL http://dx.doi.org/10.1038/4641126a
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 23:26:07 2011

Coupled climate-carbon simulations indicate minor global effects of wars and epidemics on atmospheric CO_2 between AD 800 and 1850

Type Journal Article
Author Julia Pongratz
Author Ken Caldeira
Author Christian H. Reick

Author Martin Claussen

Abstract Historic events such as wars and epidemics have been suggested as explanation for decreases in atmospheric CO_2 reconstructed from ice cores because of their potential to take up carbon in forests regrowing on abandoned agricultural land. Here, we use a coupled climate–carbon cycle model to assess the carbon and climate effects of the Mongol invasion (~1200 to ~1380), the Black Death (~1347 to ~1400), the conquest of the Americas (~1519 to ~1700), and the fall of the Ming Dynasty (~1600 to ~1650). We calculate their impact on atmospheric CO_2 including the response of the global land and ocean carbon pools. It has been hypothesized that these events have contributed to significant increases in land carbon stocks. However, we find that slow regrowth and delayed emissions from past land cover change allow for small increases of the land biosphere carbon storage only during long-lasting events. The effect of these small increases in land biosphere storage on global CO_2 is reduced by the response of the global carbon pools and largely offset by concurrent emissions from the rest of the world. None of these events would therefore have affected the atmospheric CO_2 concentration by more than 1 ppm. Only the Mongol invasion could have lowered global CO_2, but by an amount too small to be resolved by ice cores.

Publication The Holocene
Volume Published online before print
Date January 20, 2011
Journal Abbr Holocene
DOI 10.1177/0959683610386981
ISSN 0959-6836
URL http://hol.sagepub.com/cgi/doi/10.1177/0959683610386981
Extra Keywords: carbon cycle; climate; historic events; land cover change; land use; last millennium.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:31:02 2011

Cross-scale analysis of fire regimes

Type Journal Article

Author Donald A. Falk
Author Carol Miller
Author Donald McKenzie
Author Anne E. Black

Abstract Cross-scale spatial and temporal perspectives are important for studying contagious landscape disturbances such as fire, which are controlled by myriad processes operating at different scales. We examine fire regimes in forests of western North America, focusing on how observed patterns of fire frequency change across spatial scales. To quantify changes in fire frequency across spatial scale, we derive the event-area (EA) relationship and the analogous interval-area (IA) relationship using historical and simulated data from low- and highseverity fire regimes. The EA and IA provide multiscale descriptions of fire regimes, as opposed to standard metrics that may apply only at a single scale. Parameters and properties of scaling functions (intercept, slope, minimum value) are associated statistically with properties of the fire regime, such as mean fire-free intervals and fire size distributions, but are not direct mathematical transformations of them because they also reflect mechanistic drivers of fire that are non-stationary in time and space. Patterns in fire-scaling relations can be used to identify how controls on fire regimes change across spatial and temporal scales. Future research that considers fire as a cross-scale process will be directly applicable to landscape-scale fire management.

Publication Ecosystems
Volume 10
Issue 5
Pages 809–823
Date August 2007
Journal Abbr Ecosystems
DOI 10.1007/s10021-007-9070-7
ISSN 1432-9840 (Print) 1435-0629 (Online)
URL http://www.springerlink.com/content/d33g467831737200/fulltext.html

Extra Keywords: landscape fire; fire regime; eventarea relationship; interval-area relationship; multiscale analysis; simulation models; neutral models; climate regime; SIMPPLLE.

Date Added Sun Aug 28 05:42:07 2011

Modified Sun Aug 28 05:45:40 2011

Cumulative carbon emissions, emissions floors and short-term rates of warming: Implications for policy

Type Journal Article

Author Niel H. A. Bowerman

Author David J. Frame

Author Chris Huntingford

Author Jason A. Lowe

Author Myles R. Allen

Abstract A number of recent studies have found a strong link between peak human-induced global warming and cumulative carbon emissions from the start of the industrial revolution, while the link to emissions over shorter periods or in the years 2020 or 2050 is generally weaker. However, cumulative targets appear to conflict with the concept of a 'floor' in emissions caused by sectors such as food production. Here, we show that the introduction of emissions floors does not reduce the importance of cumulative emissions, but may make some warming targets unachievable. For pathways that give a most likely warming up to about 4°C, cumulative emissions from pre-industrial times to year 2200 correlate strongly with most likely resultant peak warming regardless of the shape of emissions floors used, providing a more natural long-term policy horizon than 2050 or 2100. The maximum rate of CO_2-induced warming, which will affect the feasibility and cost of adapting to climate change, is not determined by cumulative emissions but is tightly aligned with peak rates of emissions. Hence, cumulative carbon emissions to 2200 and peak emission rates could provide a clear and simple framework for CO_2 mitigation policy.

Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences

Volume 369

Issue 1934

Pages 45-66

Date 13 January 2011

Journal Abbr Phil. Trans. R. Soc. A

DOI 10.1098/rsta.2010.0288

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URL http://rsta.royalsocietypublishing.org/cgi/doi/10.1098/rsta.2010.0288

Extra Keywords: cumulative emissions; emissions floors; rate of warming; climate change.

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Modified Wed Aug 24 04:28:39 2011

Data rescue initiatives: Bringing historical climate data into the 21st century

Type Journal Article

Author Manola Brunet

Author Phil Jones

Abstract The currently limited availability of long and high-quality surface instrumental climate records continues to hamper our ability to carry out more robust assessments of the climate. Such assessments are needed to better understand, detect, predict and respond to global climate variability and change. Despite the wealthy heritage of past climate data and recent efforts to improve data availability and accessibility, much more surface data could be digitised. Additionally, some long records are not of the quality needed for more confidently supporting any climate assessment, service, or application. The present paper discusses the usefulness of undertaking integrated data rescue (DARE) activities by showing several climate assessments as examples. It describes emerging DARE activities worldwide, with a focus on the World Meteorological Organization Mediterranean Data Rescue (MEDARE) and the Atmospheric Circulation Reconstructions over the Earth (ACRE) initiatives to assess the benefits historical instrumental climate data can bring to studies of climate variability and change that consider the 21st century.

Publication Climate Research
Volume 47
Issue 1-2
Pages 29-40
Date March 2011
Journal Abbr Clim. Res.
DOI 10.3354/cr00960
ISSN 0936-577X
Short Title Data rescue initiatives
URL http://www.int-res.com/abstracts/cr/v47/n1-2/p29-40/
Call Number 0000
Extra Keywords: climate change; instrumental period; climate assessments; data rescue; integrated DARE; high-quality climate data development; WMO/MEDARE initiative; ACRE initiative.
Date Added Thu Aug 25 10:47:25 2011
Modified Wed Aug 31 00:33:58 2011

Data.GISS: GISS surface temperature analysis: 2010 how warm was this summer?

Type Web Page
Author GISS NASA
Website Title GISS Surface Temperature Analysis (GISTEMP)
Website Type Media
URL http://data.giss.nasa.gov/gistemp/2010summer/
Date Added Tue Aug 30 17:00:44 2011
Modified Tue Aug 30 17:00:44 2011

Decadal climate variability over the North Pacific and North America: Dynamics and predictability

Type Journal Article
Author Mojib Latif
Author Tim P. Barnett
Abstract The dynamics and predictability of decadal climate variability over the North Pacific and North America are investigated by analyzing various observational datasets and the output of a state of the art coupled ocean-atmosphere general circulation model that was integrated for 125 years. Both the observations and model results support the picture that the decadal variability in the region of interest is based on a cycle involving unstable ocean-atmosphere interactions over the North Pacific. The period of this cycle is of the order of a few decades.The cycle involves the two major circulation regimes in the North Pacific climate system, the subtropical ocean gyre, and the Aleutian low. When, for instance, the subtropical ocean gyre is anomalously strong, more warm tropical waters are transported poleward by the Kuroshio and its extension, leading to a positive SST anomaly in the North Pacific. The atmospheric response to this SST anomaly involves a weakened Aleutian low, and the associated fluxes at the air-sea interface reinforce the initial SST anomaly, so that ocean and atmosphere act as a positive feedback system. The anomalous heat flux, reduced ocean mixing in response to a weakened storm track, and anonmalous Ekman heat transport contribute to this positive feedback.The atmospheric response, however, consists also of a wind stress curl anomaly that spins down the subtropical ocean gyre, thereby reducing the poleward heat transport and the initial SST anomaly. The ocean adjusts with some time lag to the change in the wind stress curl, and it is this transient ocean response that allows continuous oscillations. The transient response can be expressed in terms of baroclinic planetary waves,

and the decadal timescale of the oscillation is therefore determined to first order by wave timescales. Advection by the mean currents, however, is not negligible.The existence of such a cycle provides the basis of long-range climate forecasting over North America at decadal timescales. At a minimum, knowledge of the present phase of the decadal mode should allow a `now-cast' of expected climate `bias' over North America, which is equivalent to a climate forecast several years ahead.

Publication Journal of Climate
Volume 9
Issue 10
Pages 2407-2423
Date October 1996
Journal Abbr J. Climate
DOI 10.1175/1520-0442(1996)009<2407:DCVOTN>2.0.CO;2
ISSN 1520-0442
Short Title Decadal Climate Variability over the North Pacific and North America
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Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:19:46 2011

Decadal prediction: Can it be skillful?

Type Journal Article

Author Gerald A. Meehl
Author Lisa Goddard
Author James Murphy
Author Ronald J. Stouffer
Author George Boer
Author Gokhan Danabasoglu
Author Keith Dixon
Author Marco A. Giorgetta
Author Arthur M. Greene
Author Ed Hawkins
Author Gabriele Hegerl
Author David Karoly
Author Noel Keenlyside
Author Masahide Kimoto
Author Ben Kirtman
Author Antonio Navarra
Author Roger Pulwarty
Author Doug Smith
Author Detlef Stammer
Author Timothy Stockdale

Abstract A new field of study, “decadal prediction,” is emerging in climate science. Decadal prediction lies between seasonal/interannual forecasting and longer-term climate change projections, and focuses on time-evolving regional climate conditions over the next 10–30 yr. Numerous assessments of climate information user needs have identified this time scale as being important to infrastructure planners, water resource managers, and many others. It is central to the information portfolio required to adapt effectively to and through climatic changes. At least three factors influence time-evolving regional climate at the decadal time scale: 1) climate change commitment (further warming as the coupled climate system comes into adjustment with increases of greenhouse gases that have already occurred), 2) external forcing, particularly from future increases of greenhouse gases and recovery of the ozone hole, and 3) internally generated variability. Some decadal prediction skill has been demonstrated to arise from the first two of these factors, and there is evidence that initialized coupled climate models can capture mechanisms of internally generated decadal climate variations, thus increasing predictive skill globally and particularly regionally. Several methods have been proposed for initializing global coupled climate models for decadal predictions, all of which involve global time-evolving three-dimensional ocean data, including temperature and salinity. An experimental framework to address decadal predictability/prediction is described in this paper and has been incorporated into the coordinated Coupled Model Intercomparison Model, phase 5 (CMIP5) experiments, some of which will be assessed for the IPCC Fifth Assessment Report (AR5). These experiments will likely guide work in this emerging field over the next 5 yr.

Publication Bulletin of the American Meteorological Society
Volume 90
Issue 10
Pages 1467-1485
Date October 2009
Journal Abbr BAMS
DOI 10.1175/2009BAMS2778.1
ISSN 0003-0007
URL http://journals.ametsoc.org/doi/abs/10.1175/2009BAMS2778.1
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:22:23 2011

Decadal trends in net ecosystem production and net ecosystem carbon balance for a regional socioecological system

Type Journal Article
Author David P. Turner
Author William D. Ritts
Author Zhiqiang Yang
Author Robert E. Kennedy
Author Warren B. Cohen
Author Maureen V. Duane
Author Peter E. Thornton
Author Beverly E. Law
Abstract Carbon sequestration is increasingly recognized as an ecosystem service, and forest management has a large potential to alter regional carbon fluxes - notably by way of harvest removals and related impacts on net ecosystem production (NEP). In the Pacific Northwest region of the US, the implementation of the Northwest Forest Plan (NWFP) in 1993 established a regional socioecological system focused on forest management. The NWFP resulted in a large (82%) decrease in the rate of harvest removals on public forest land, thus significantly impacting the regional carbon balance. Here we use a combination of remote sensing and ecosystem modeling to examine the trends in NEP and net ecosystem carbon balance (NECB) in this region over the 1985-2007 period, with particular attention to land ownership since management now differs widely between public and private forestland. In the late 1980s, forestland in both ownership classes was subject to high rates of harvesting, and consequently the land was a carbon source (i.e. had a negative NECB). After the policy driven reduction in the harvest level, public forestland became a large carbon sink - driven in part by increasing NEP - whereas private forestland was close to carbon neutral. In the 2003-2007 period, the trend towards carbon accumulation on public lands continued despite a moderate increase in the extent of wildfire. The NWFP was originally implemented in the context of biodiversity conservation, but its consequences in terms of carbon sequestration are also of societal interest. Ultimately, management within the NWFP socioecological system will have to consider trade-offs among these and other ecosystem services.
Publication Forest Ecology and Management
Volume 262
Issue 7

Pages 1318-1325
Date 1 October 2011
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/j.foreco.2011.06.034
ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/pii/S0378112711003963
Call Number 0000
Extra Keywords: carbon sequestration; net ecosystem production; Pacific Northwest Forest Plan; regional; ecosystem services; socioecological system.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:43 2011

Decadal variations in climate associated with the North Atlantic Oscillation

Type Journal Article
Author James W. Hurrell
Author Harry van Loon
Abstract Large changes in the wintertime atmospheric circulation have occurred over the past two decades over the ocean basins of the Northern Hemisphere, and these changes have had a profound effect on regional distributions of surface temperature and precipitation. The changes over the North Pacific have been well documented and have contributed to increases in temperatures across Alaska and much of western North America and to decreases in sea surface temperatures over the central North Pacific. The variations over the North Atlantic are related to changes in the North Atlantic Oscillation (NAO). Over the past 130 years, the NAO has exhibited considerable variability at quasibiennial and quasi-decadal time scales, and the latter have become especially pronounced the second half of this century. Since 1980, the NAO has tended to remain in one extreme phase and has accounted for a substantial part of the observed wintertime surface warming over Europe and downstream over Eurasia and cooling in the northwest Atlantic. Anomalies in precipitation, including dry wintertime conditions over southern Europe and the Mediterranean and wetter-than-normal conditions over northern Europe and Scandinavia since 1980, are also linked to the behavior of the NAO. Changes in the monthly mean flow over the Atlantic are accompanied by a northward shift in the storm tracks and associated synoptic eddy activity, and these changes help to reinforce and maintain the anomalous mean circulation in the upper troposphere. It is important that studies of trends in local climate records, such as those from high elevation sites, recognize the presence of strong regional patterns of change associated with phenomena like the NAO.
Publication Climatic Change
Volume 36
Issue 3-4
Pages 301–326
Date July 1997
Journal Abbr Climatic Change
DOI 10.1023/A:1005314315270
ISSN 0165-0009
URL http://www.springerlink.com/content/kxu9mtn46t65k160/
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 16:10:04 2011

Decreasing frequency of forest fires in the southern boreal zone of Québec and its relation to global warming since the end of the 'Little Ice Age'

Type Journal Article
Author Yves Bergeron

Author Sylvain Archambault

Abstract Although an increasing frequency of forest fires has been suggested as a consequence of global warming, there are no empirical data that have shown a climatically driven change in fire frequency since the warming that has followed the end of the 'Little Ice Age'. We present here evidence from fire and tree-ring chronologies that the post-'Little Ice Age' climate change has profoundly decreased the frequency of fires in the northwestern Québec boreal forest. A 300-year fire history (AD 1688-1988) from the Lake Duparquet area (48°28' N, 79°17' W) shows an important decrease, starting 100 years ago, in the number and the extent of fires. This decrease in fire frequency is also associated with a long- term increase in the mean ring width of northern white cedar (Thuja occidentalis L.) in the same area. Agreement between the standardized tree-ring chronology and fire years, together with a negative correlation with a drought index reconstructed for the AD 1913-1987 period, shows that the decrease in fire frequency may be related to a reduced frequency of drought periods since the end of the 'Little Ice Age'. The contradictory results between predicted and observed effects of warming on fire frequency call into question our present capability to generalize the effect of increasing CO_2 levels on fire frequency.

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Volume 3

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Date September 1993

Journal Abbr Holocene

DOI 10.1177/095968369300300307

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Extra Keywords: Boreal forest; fire frequency; drought; tree rings; Thuja; global warming; climate change 'Little Ice Age'; Canada.

Date Added Tue Aug 23 02:12:54 2011

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Deep-soil savannas and barrens of the Midwestern United States (Chapter 9)

Type Book Section

Author Roser C. Anderson

Author Marlin L. Bowles

Abstract no abstract

Book Title Savannas, Barrens, and Rock Outcrop Plant Communities of North America

Edition 1st edition

Place Cambridge, UK; New York, NY

Publisher Cambridge University Press

Date 1999

Pages 155–170

ISBN 052157322X, 9780521573221

URL http://ebooks.cambridge.org/chapter.jsf?bid=CBO9780511574627&…

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Modified Tue Aug 16 09:38:59 2011

Related

- Savannas, barrens, and rock outcrop plant communities of North America

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Deepwater formation in the North Pacific during the Last Glacial Termination

Type Journal Article
Author Yusuke Okazaki
Author Axel Timmermann
Author Laurie Menviel
Author Naomi Harada
Author Ayako Abe-Ouchi
Author Megumi O. Chikamoto
Author Anne Mouchet
Author Hirofumi Asahi
Abstract Between ~17,500 and 15,000 years ago, the Atlantic meridional overturning circulation weakened substantially in response to meltwater discharges from disintegrating Northern Hemispheric glacial ice sheets. The global effects of this reorganization of poleward heat flow in the North Atlantic extended to Antarctica and the North Pacific. Here we present evidence from North Pacific paleo surface proxy data, a compilation of marine radiocarbon age ventilation records, and global climate model simulations to suggest that during the early stages of the Last Glacial Termination, deep water extending to a depth of ~2500 to 3000 meters was formed in the North Pacific. A switch of deepwater formation between the North Atlantic and the North Pacific played a key role in regulating poleward oceanic heat transport during the Last Glacial Termination.
Publication Science
Volume 329
Issue 5988
Pages 200-204
Date 9 July 2010
Journal Abbr Science
DOI 10.1126/science.1190612
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1190612
Date Added Sat Aug 27 18:47:16 2011
Modified Sat Aug 27 18:47:16 2011

Delineation of ecosystem regions

Type Journal Article
Author Robert G. Bailey
Abstract As a means of developing reliable estimates of ecosystem productivity, ecosystem classification needs to be placed within a geographical framework of regions or zones. This paper explains the basis for the regions delineated on the 1976 mapEcoregions of the United States. Four ecological levels are discussed—domain, division, province, and section—based on climatic and vegetational criteria. Statistical tests are needed to verify and refine map units.
Publication Environmental Management
Volume 7
Issue 4
Pages 365-373
Date July 1983
Journal Abbr Environ. Manage.
DOI 10.1007/BF01866919
ISSN 0364-152X
URL http://dx.doi.org/10.1007/BF01866919
Extra Keywords: ecoregions; ecosystems; ecological land classification; mapping; site production.
Date Added Tue Aug 16 11:31:09 2011
Modified Tue Aug 16 11:31:28 2011

Demographic compensation and tipping points in climate-induced range shifts

Type Journal Article
Author Daniel F. Doak
Author William F. Morris
Abstract To persist, species are expected to shift their geographical ranges polewards or to higher elevations as the Earth's climate warms. However, although many species' ranges have shifted in historical times, many others have not, or have shifted only at the high-latitude or high-elevation limits, leading to range expansions rather than contractions. Given these idiosyncratic responses to climate warming, and their varied implications for species' vulnerability to climate change, a critical task is to understand why some species have not shifted their ranges, particularly at the equatorial or low-elevation limits, and whether such resilience will last as warming continues. Here we show that compensatory changes in demographic rates are buffering southern populations of two North American tundra plants against the negative effects of a warming climate, slowing their northward range shifts, but that this buffering is unlikely to continue indefinitely. Southern populations of both species showed lower survival and recruitment but higher growth of individual plants, possibly owing to longer, warmer growing seasons. Because of these and other compensatory changes, the population growth rates of southern populations are not at present lower than those of northern ones. However, continued warming may yet prove detrimental, as most demographic rates that improved in moderately warmer years declined in the warmest years, with the potential to drive future population declines. Our results emphasize the need for long-term, range-wide measurement of all population processes to detect demographic compensation and to identify nonlinear responses that may lead to sudden range shifts as climatic tipping points are exceeded.
Publication Nature
Volume 467
Issue 7318
Pages 959-962
Date 21 October 2010
Journal Abbr Nature
DOI 10.1038/nature09439
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature09439
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:40:09 2011

Demography and fire history of a western juniper stand

Type Journal Article
Author James A. Young
Author Raymond A. Evans
Abstract The age, density, and fire history of western juniper (Juniperus occidentalis Hook.) trees growing on range sites of contrasting potentials were investigated. The l,OOO-ha study area consisted of 65% big sagebrush Artemisia tridentata Nutt. subsp. wyomingensis (Rybd.) Beetle and 30% low sagebrush (A. arbuscula Nutt.) plant communities. Density of western juniper trees was 150 and 28 trees/ha on the big and low sagebrush sites, respectively. The oldest western juniper found growing in the big sagebrush communities became established in 1855, and 84% of the existing trees became established between 1890 and 1920. The oldest trees on the low sagebrush sites had established by 1600, and most of the existing trees established before 1800. At the beginning of the 20th century, the western juniper populations on big sagebrush sites were doubling in density every 3 years. The rate of establishment on these sites has slowed until 1,370 years would now be required to double the population size. The rate of population growth on low sagebrush sites has varied from decade to decade with a trend to double the population every 200 years and trees that become senescent at about 400 years of age. About 0.4%~ of western juniper on the low sagebrush sites had fire scars, some of which indicated the occurrence of multiple fires. These fire scars indicated that since 1600 there were periods of up to 90 years when no fires scarred the trees. Changes in the frequency of wildfires appear to be the most logical explanation for the sudden invasion of trees into big sagebrush communities, but current technologies for

reconstructing fire chronologies are woefully inadequate in this environment.

Publication Journal of Range Management
Volume 34
Issue 6
Pages 501–506
Date November 1981
Journal Abbr J. Range Manage.
DOI 10.2307/3898108
ISSN 0022-409X
URL http://www.jstor.org/stable/3898108
Date Added Tue Aug 16 01:25:29 2011
Modified Tue Aug 16 01:25:37 2011

Dendrochronology of a fire-scarred ponderosa pine

Type Journal Article
Author John H. Dieterich
Author Thomas W. Swetnam
Abstract Historical fire frequency in a stand of southwestern ponderosa pine has been documented in a master fire chronology developed for a prescribed burning study area in Arizona. One of the 12 specimens used to assemble this chronology was a small, suppressed tree that contained 42 fire scars. Standard crossdating techniques were used to date the fire scars accurately, locate missing and locally absent rings, and identify special problems relating to analysis and dating of this unusual specimen. Mean fire interval for the study area was about 2 years; mean fire interval for the individual specimen was 4 years for the 178-year period, 1722-1900.
Publication Forest Science
Volume 30
Issue 1
Pages 238–247
Date 1 March 1984
Journal Abbr Forest Sci.
ISSN 0015-749X
URL http://www.ingentaconnect.com/content/saf/fs/1984/00000030/00000001/art00035
Extra Keywords: fire history; fire interval; fire frequency.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:40:18 2011

Dendroclimatological analysis and fire history of longleaf pine (Pinus palustris Mill.) in the Atlantic and Gulf Coastal Plain

Type Thesis
Author Joseph P. Henderson
Abstract The purpose of this research was to use longleaf pine trees at three major sites in the Southeastern Coastal Plain to: (1) determine how longleaf pine trees respond to climate, (2) reconstruct past climate conditions using long tree-ring chronologies, (3) determine the effects of atmospheric teleconnections on longleaf pine growth, and (4) reconstruct fire history from fire-scar data. The native range of longleaf pine and its associated communities extends from southeastern Virginia south and westward to the Trinity River in eastern Texas. I collected samples from living and remnant longleaf pine wood in coastal South Carolina, Eglin Air Force Base in the Florida panhandle, and the Big Thicket National Preserve of Texas. In the climate response analysis, the Palmer Drought Severity Index (PDSI) and Palmer Hydrological Drought Index (PHDI) had the highest correlation

with longleaf pine growth. The strongest relationships between longleaf pine growth and the Palmer indices occur between the months of July and November. Precipitation in the spring and summer was also positively related to growth at all sites. The relationship between temperature and growth was the weakest among all climate variables, but warm summer temperatures had a consistent, negative relationship with longleaf pine growth. The climate signal in the latewood was generally more robust than those in total ring width and earlywood width. I developed chronologies for total ring width at all sites and for earlywood and latewood widths in Texas and South Carolina. The master chronologies for each site spanned the years from 1629–2003 in Texas, 1503–2003 in Florida, and 1455–2003 in South Carolina. I reconstructed September PHDI at all sites using a transfer function with tree-ring indices as the independent variable. For all reconstructions, the most widespread and intense year of drought since 1700 was 1925. The driest five-year period common to all reconstructions was 1951–1955. At decadal scales, extremely wet periods were often followed immediately by extremely dry periods. My reconstructions showed evidence for several historic disturbances, including the Charleston earthquake of 1886 and the arctic outbreak of 1835. Spectral analysis showed no significant spectral signatures in any of the reconstructions. Atmospheric teleconnnections such as El Niño-Southern Oscillation (ENSO), the Pacific Decadal Oscillation (PDO), the North Atlantic Oscillation (NAO) and the Atlantic Multidecadal Oscillation (AMO) significantly affected longleaf pine growth at all sites, but the strength of the teleconnections varied through time. ENSO in the summer and fall correlated significantly with tree growth in Texas and South Carolina. The PDO in the year prior to growth was generally directly related to longleaf pine growth, while PDO in the current year usually showed an inverse association. The NAO from August of the previous year and May of the current year were generally negatively related to longleaf pine growth. The AMO was generally positively associated with longleaf pine growth in all months of the year. The reconstruction of fire history revealed that fire was frequent at all sites prior to the advent of fire suppression in the 20th century. The nature of the fire regime varied according to site conditions, such as the size of fire compartments and soil types. Fire frequency and seasonality of fires were also variable over time, reflecting the combined influence of climatic conditions and anthropogenic ignitions. Fire-scarred samples were not particularly abundant at any of the sites, and most scars were embedded deep inside the tree rather than on obvious, fire-scarred surfaces. Trauma rings that are abundant at the root-stem interface may be useful indicators of injury from fire, but more samples will be required to verify this hypothesis.

Type A Dissertation Presented for the Doctor of Philosophy Degree
University The University of Tennessee
Place Knoxville, Tennessee
Date August 2006
# of Pages 463 p.
URL http://web.utk.edu/~grissino/downloads/Joe%20Henderson%20dissertation.pdf
Archive http://gradworks.umi.com/32/36/3236573.html
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:30:07 2011

Notes:

Citation:

Henderson, J.P. 2006. *Dendroclimatological analysis and fire history of longleaf pine (*Pinus palustris *Mill.) in the Atlantic and Gulf coastal plain.* Ph.D. dissertation. University of Tennessee, Knoxville. Available: web.utk.edu/~grissino/downloads /Joe%20Henderson%20dissertation.pdf

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Description of the ecoregions of the United States

Type Web Page
Author Robert G. Bailey
Abstract Description: This volume was originally published in 1978 to provide a general description of the ecosystem geography of the Nation as shown on the 1976 map "Ecoregions of the United States." It was first published as an unnumbered publication by the Intermountain Region, USDA Forest Service, Ogden, Utah. It was reprinted in 1980 by the Forest Service, Washington, DC, as Miscellaneous Publication No. 1391. An explanation of the basis for the regions delineated on the map was presented elsewhere (Bailey 1983). The technique of mapping

ecoregions was subsequently expanded to include the rest of North America (Bailey and Cushwa 1981) and the world (Bailey 1989). In 1993, as part of the Forest Service's National Hierarchical Framework of Ecological Units (ECOMAP 1993), ecoregions were adopted for use in ecosystem management. They will also be used in the proposed National Interagency Ecoregion-Based Ecological Assessments. This volume updates the knowledge of the subject. The goal in preparing this edition, like its predecessor, was not to present information, but to strive for synthesis, i.e., the illustration of interrelationships.

Date 2008

Short Title Ecoregions of the United States

URL http://www.fs.fed.us/land/ecosysmgmt/index.html

Rights US Forest Service

Date Added Tue Aug 16 12:01:14 2011

Modified Thu Sep 1 04:19:16 2011

Design of regular landscape fuel treatment patterns for modifying fire growth and behavior

Type Journal Article

Author Mark A. Finney

Abstract Patterns of disconnected fuel treatment patches that overlap in the heading fire spread direction are theoretically effective in changing forward fire spread rate. The analysis presented here sought to find the unit shape and pattern for a given level of treatment that has the maximum effect on forward spread rate. This occurs when the treatment units cause the fire to spread through them at the same rate as it spreads around them. Simulations suggested that these treatment patterns reduce the spread rate or fireline intensity over much of the area burned, even outside the treatment units where the fire was forced to flank. The ideal patterns are theoretically scale independent, allowing for flexible application across heterogeneous landscapes. The topology of these patterns has implications for designing landscape-level fuel treatment patterns and for understanding spatial dynamics of fuel patterns across landscapes

Publication Forest Science

Volume 47

Issue 2

Pages 219–228

Date May 2001

Journal Abbr Forest Sci.

ISSN 0015-749X

URL http://www.ingentaconnect.com/content/saf/fs/2001/00000047/00000002/art00011

Extra Keywords: fuels; fuel treatments; fire behavior; landscape patterns; fire modeling.

Date Added Thu Sep 15 18:19:52 2011

Modified Thu Sep 15 18:20:02 2011

Detecting the effect of climate change on Canadian forest fires

Type Journal Article

Author Nathan P. Gillett

Author Andrew J. Weaver

Author Francis W. Zwiers

Author Michael D. Flannigan

Abstract The area burned by forest fires in Canada has increased over the past four decades, at the same time as summer season temperatures have warmed. Here we use output from a coupled climate model to demonstrate that human emissions of greenhouse gases and sulfate aerosol have made a detectable contribution to this warming. We further show that human-induced climate change has had a detectable influence on the area burned by forest fire in Canada over recent decades. This increase in area burned is likely to have important implications for terrestrial emissions of carbon dioxide and for forest ecosystems.

Publication Geophysical Research Letters
Volume 31
Issue 18
Pages L18211 (4 p.)
Date September 2004
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2004GL020876
ISSN 0094-8276
URL www.agu.org/journals/ABS/2004/2004GL020876.shtml
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:19:42 2011

Detection and attribution of climate change: A regional perspective

Type Journal Article
Author Peter A. Stott
Author Nathan P. Gillett
Author Gabriele C. Hegerl
Author David J. Karoly
Author Dáithí A. Stone
Author Xuebin Zhang
Author Francis Zwiers
Abstract The Intergovernmental Panel on Climate Change fourth assessment report, published in 2007 came to a more confident assessment of the causes of global temperature change than previous reports and concluded that 'it is likely that there has been significant anthropogenic warming over the past 50 years averaged over each continent except Antarctica.' Since then, warming over Antarctica has also been attributed to human influence, and further evidence has accumulated attributing a much wider range of climate changes to human activities. Such changes are broadly consistent with theoretical understanding, and climate model simulations, of how the planet is expected to respond. This paper reviews this evidence from a regional perspective to reflect a growing interest in understanding the regional effects of climate change, which can differ markedly across the globe. We set out the methodological basis for detection and attribution and discuss the spatial scales on which it is possible to make robust attribution statements. We review the evidence showing significant human-induced changes in regional temperatures, and for the effects of external forcings on changes in the hydrological cycle, the cryosphere, circulation changes, oceanic changes, and changes in extremes. We then discuss future challenges for the science of attribution. To better assess the pace of change, and to understand more about the regional changes to which societies need to adapt, we will need to refine our understanding of the effects of external forcing and internal variability.
Publication Wiley Interdisciplinary Reviews: Climate Change
Volume 1
Issue 2
Pages 192–211
Date March/April 2010
Journal Abbr WIREs Clim. Change
DOI 10.1002/wcc.34
ISSN 1757-7780
Short Title Detection and attribution of climate change
URL http://doi.wiley.com/10.1002/wcc.34
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:52 2011

Determination of world plant formations from simple climatic data.

Type	Journal Article
Author	Leslie R. Holdridge
Abstract	no abstract
Publication	Science
Volume	105
Issue	2727
Pages	367-368
Date	4 April 1947
Journal Abbr	Science
DOI	10.1126/science.105.2727.367
ISSN	0036-8075
URL	http://www.jstor.org/stable/1675393
Date Added	Mon Aug 29 17:30:07 2011
Modified	Mon Aug 29 17:34:54 2011

Development and applications of spatial data resources in energy related assessment and planning

Type	Conference Paper
Author	Richard J. Olson
Author	F. Glenn Goff
Author	Jerry S. Olson
Abstract	Summary: Research in energy related assessment and planning at Oak Ridge National Laboratory involves investigating environmental themes at several levels requiring data at appropriate spatial and temporal scales. In the Environmental Sciences Division, a spatial data base is being developed for the Eastern United States at the county-subcounty unit level of resolution. The data base contains information on terrain, water resources, climate, land use, forest resources, agriculture, wildlife resources, critical natural areas, human population and energy uses. A spatial hierarchy of metric, geodetic, and geopolitical scales as a framework to organizing the data has been defined. Spatial units within a hierarchical level serve as building blocks that can be assembled or aggregated to satisfy analysis needs. Building blocks also allow accessing more detailed spatial data by using pointers to information not stored in the data base. Uses of the data base are related to the capability to cross-reference and integrate information in various subject sectors, utilizing spatial units and temporal periods commensurate with regional themes. An investigation of potential changes in vegetation patterns related to predicted temperature changes from increased atmospheric CO_2 is presented to illustrate an ongoing application of the data resources. Other themes include coal extraction in Appalachia, landscape patterns, habitat and population dynamics of selected biological species, and energy facility siting.
Date	January 1976
Proceedings Title	Proceedings of the Advancements in Retrieval Technology as Related to Information Systems
Conference Name	Proceedings of the Advancements in Retrieval Technology as Related to Information Systems, Arlington, VA, USA, 20 October 1976
Place	Oak Ridge, TN.
Publisher	Enviromental Sciences Division, Oak Ridge National Laboratory
Pages	12.1-12.7 (7 p.)
URL	http://adsabs.harvard.edu/abs/1976STIN...7723609O
Date Added	Sat Aug 27 18:47:16 2011
Modified	Mon Aug 29 22:16:53 2011

Development of coarse-scale spatial data for wildland fire and fuel management

Type Report
Author Kirsten M. Schmidt
Author James P. Menakis
Author Colin C. Hardy
Author Wendel J. Hann
Author David L. Bunnell
Abstract We produced seven coarse-scale, 1-km² resolution, spatial data layers for the conterminous United States to support national-level fire planning and risk assessments. Four of these layers were developed to evaluate ecological conditions and risk to ecosystem components: Potential Natural Vegetation Groups, a layer of climax vegetation types representing site characteristics such as soils, climate, and topography; Current Cover Type, a layer of current vegetation types; Historical Natural Fire Regimes, a layer of fire frequency and severity; and Fire Regime Current Condition Class, a layer depicting the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components. The remaining three layers were developed to support assessments of potential hazards and risks to public health and safety: National Fire Occurrence, 1986 to 1996, a layer and database of Federal and non-Federal fire occurrences; Potential Fire Characteristics, a layer of the number of days of high or extreme fire danger calculated from 8 years of historical National Fire Danger Rating System (NFDRS) data; and Wildland Fire Risk to Flammable Structures, a layer of the potential risk of wildland fire burning flammable structures based on an integration of population density, fuel, and weather spatial data. This paper documents the methodology we used to develop these spatial data layers. In a Geographic Information System (GIS), we integrated biophysical and remote sensing data with disturbance and succession information by assigning characteristics to combinations of biophysical, current vegetation, and historical fire regime spatial datasets. Regional ecologists and fire managers reviewed and refined the data layers, developed succession diagrams, and assigned fire regime current condition classes. "Fire Regime Current Conditions" are qualitative measures describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. For all Federal and non-Federal lands, excluding agricultural, barren, and urban/developed lands, 48 percent (2.4 million km²) of the land area of the conterminous United States is within the historical range (Condition Class 1) in terms of vegetation composition, structure, and fuel loadings; 38 percent (1.9 million km²) is moderately altered from the historical range (Condition Class 2); and 15 percent (736,000 km²) is significantly altered from the historical range (Condition Class 3). Managers can use these spatial data to describe regional trends in current conditions and to support fire and fuel management program development and resource allocation.
Report Number RMRS-GTR-87
Report Type General Technical Report
Place Fort Collins, CO
Institution Publications Distribution U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station
Date April 2002
Pages 41 p. + CD
URL http://www.fs.fed.us/rm/pubs/rmrs_gtr87.html
Extra Keywords: current conditions; fire regimes; fuel management; fire occurrence; potential natural vegetation; cover type; GIS; wildland-urban interface.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:26:07 2011

Notes:

Citation:

Schmidt, Kirsten M.; Menakis, James P.; Hardy, Colin C.; Hann, Wendel J.; Bunnell, David L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 41 p. + CD.

Development of the Indonesian and Malaysian fire danger rating systems

Type Journal Article
Author William J. de Groot
Author Robert D. Field
Author Michael A. Brady
Author Orbita Roswintiarti
Author Maznorizan Mohamad
Abstract Forest and land fires in Southeast Asia have many social, economic, and environmental impacts. Tropical peatland fires affect global carbon dynamics, and haze from peat fires has serious negative impacts on the regional economy and human health. To mitigate these fire-related problems, forest and land management agencies require an early warning system to assist them in implementing fire prevention and management plans before fire problems begin. Fire Danger Rating Systems (FDRS) were developed for Indonesia and Malaysia to provide early warning of the potential for serious fire and haze events. In particular, they identify time periods when fires can readily start and spread to become uncontrolled fires and time periods when smoke from smouldering fires will cause an unacceptably high level of haze. The FDRS were developed by adapting components of the Canadian Forest Fire Danger Rating System, including the Canadian Forest Fire Weather Index (FWI) System and the Canadian Forest Fire Behavior Prediction (FBP) System, to local vegetation, climate, and fire regime conditions. A smoke potential indicator was developed using the Drought Code (DC) of the FWI System. Historical air quality analysis showed that the occurrence of severe haze events increased substantially when DC was above 400. An ignition potential indicator was developed using the Fine Fuel Moisture Code (FFMC) of the FWI System. Historical hot spot analysis, grass moisture, and grass ignition studies showed that fire occurrence and the ability for grass fires to start and spread dramatically increased when FFMC > 82. The Initial Spread Index (ISI) of the FWI System was used to develop a difficulty of control indicator for grassland fires, a fuel type that can exhibit high rates of spread and fire intensity. This ISI-based indicator was developed using the grass fuel model of the FBP System, along with a standard grass fuel load and curing level estimated from previous Indonesian studies. Very high fire intensity is expected in grasslands when ISI ≥ 6. To provide early warning, the FDRS identifies classes of increasing fire danger as the FFMC, DC, and ISI approach these key threshold values. The Indonesian FDRS is now operated nationally at the Indonesian Meteorological and Geophysical Agency. The Malaysian Meteorological Service operates the Malaysian FDRS and displays regional outputs for the Association of Southeast Asian Nations. The FDRS are being used by forestry, agriculture, environment, and fire and rescue agencies to develop and implement fire prevention, detection, and suppression plans.
Publication Mitigation and Adaptation Strategies for Global Change
Volume 12
Issue 1 (Special Issue on Southeast Asian Fire)
Pages 165-180
Date January 2007
Journal Abbr Mitig. Adapt. Strat. Glob. Change
DOI 10.1007/s11027-006-9043-8
ISSN 1381-2386
URL http://www.springerlink.com/content/948t72w572801853/
Extra Keywords: early warning; fire behaviour; fire danger; fire management; fire prevention; fire weather; forest and land fires; transboundary haze.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:29 2011

Diagnosing the uncertainty and detectability of emission reductions for REDD + under current capabilities: an example for Panama

Type Journal Article
Author Johanne Pelletier
Author Navin Ramankutty
Author Catherine Potvin

Abstract In preparation for the deployment of a new mechanism that could address as much as one fifth of global greenhouse gas emissions by reducing emissions from deforestation and forest degradation (REDD +), important work on methodological issues is still needed to secure the capacity to produce measurable, reportable, and verifiable emissions reductions from REDD + in developing countries. To contribute to this effort, we have diagnosed the main sources of uncertainty in the quantification of emission from deforestation for Panama, one of the first countries to be supported by the Forest Carbon Partnership Facility of the World Bank and by UN-REDD. Performing sensitivity analyses using a land-cover change emissions model, we identified forest carbon stocks and the quality of land-cover maps as the key parameters influencing model uncertainty. The time interval between two land-cover assessments, carbon density in fallow and secondary forest, and the accuracy of land-cover classifications also affect our ability to produce accurate estimates. Further, we used the model to compare emission reductions from five different deforestation reduction scenarios drawn from governmental input. Only the scenario simulating a reduction in deforestation by half succeeds in crossing outside the confidence bounds surrounding the baseline emission obtained from the uncertainty analysis. These results suggest that with current data, real emission reductions in developing countries could be obscured by their associated uncertainties. Ways of addressing the key sources of error are proposed, for developing countries involved in REDD + , for improving the accuracy of their estimates in the future. These new considerations confirm the importance of current efforts to establish forest monitoring systems and enhance capabilities for REDD + in developing countries.

Publication Environmental Research Letters
Volume 6
Pages 024005
Date 2011-04-01
DOI 10.1088/1748-9326/6/2/024005
ISSN 1748-9326
Short Title Diagnosing the uncertainty and detectability of emission reductions for REDD + under current capabilities
URL http://stacks.iop.org/1748-9326/6/i=2/a=024005?key=crossref.229e2400878b53e63e3538b67584fe87
Accessed Wed Oct 5 14:05:53 2011
Library Catalog CrossRef
Call Number 0002
Date Added Thu Oct 6 11:55:09 2011
Modified Thu Oct 6 11:55:09 2011

Disastrous fire weather of September 1929

Type Journal Article
Author Charles I. Dague
Abstract The outstanding features of the fire-weather season for 1929 were its estreme dryness, its length, and the heavy fire losses in September, and subsequently thereto, west of the Cascades in Oregon and Washington. It was by far the most severe and most strenuous season within the history of organized forest-fire protection in these two States, and probably for as far back as we have any record or knowledge of forest fires for these sections. There have been seasons with heavier fire losses, but they were before the time of organized protection. The estreme southwestern portion of Oregon and of northwestern California sustained their heaviest forest fire losses for the season during the last decade in November and the first week in December.
Publication Monthly Weather Review
Volume 58
Issue 9
Pages 368-370
Date September 1930
Journal Abbr Mon. Wea. Rev.
DOI 10.1175/1520-0493(1930)58<368:DFWOS>2.0.CO;2
ISSN 1520-0493

URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0493%281930%2958%3C368%3ADFWOS%3E2.0.CO%3B2
Date Added Tue Aug 30 04:16:19 2011
Modified Tue Aug 30 04:23:40 2011

Distribution of lightning- and man-caused wildfires in California

Type Conference Paper
Author Jon E. Keeley
Abstract During the 1970 decade on lands under fire jurisdiction by the California Division of Forestry (CDF) and the United States Forest Service (USFS) there were over 100,000 wildfires, 16.2 percent of which were lightning-caused and these accounted for 13.1 percent of all area burned. On USFS land, August is the peak month for lightning fires whereas July is the peak for man-caused fires. On average, lightning fires occur at higher elevations than man-caused fires and this is reflected in differences in the types of vegetation providing fuel for ignition. The number of lightning fires is positively correlated with distance from the coast and latitude whereas the number of man-caused fires is negatively correlated with these two parameters. Correlations between other parameters are presented and the question of "natural" burning patterns is discussed.
Date June 1982
Proceedings Title Proceedings of the symposium on dynamics and management of Mediterranean-type ecosystems
Conference Name Dynamics and Management of Mediterranean-Type Ecosystems, June 22-26, 1981, San Diego, California
Place Berkeley, California
Publisher U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station
Pages 431-437
Series General Technical Report PSW-58 (psw_gtr058)
URL http://www.fs.fed.us/psw/publications/documents/psw_gtr058/
Date Added Wed Aug 31 02:04:45 2011
Modified Wed Aug 31 02:04:45 2011

Disturbance and landscape dynamics in a changing world

Type Journal Article
Author Monica G. Turner
Abstract Disturbance regimes are changing rapidly, and the consequences of such changes for ecosystems and linked social-ecological systems will be profound. This paper synthesizes current understanding of disturbance with an emphasis on fundamental contributions to contemporary landscape and ecosystem ecology, then identifies future research priorities. Studies of disturbance led to insights about heterogeneity, scale, and thresholds in space and time and catalyzed new paradigms in ecology. Because they create vegetation patterns, disturbances also establish spatial patterns of many ecosystem processes on the landscape. Drivers of global change will produce new spatial patterns, altered disturbance regimes, novel trajectories of change, and surprises. Future disturbances will continue to provide valuable opportunities for studying pattern–process interactions. Changing disturbance regimes will produce acute changes in ecosystems and ecosystem services over the short (years to decades) and long term (centuries and beyond). Future research should address questions related to (1) disturbances as catalysts of rapid ecological change, (2) interactions among disturbances, (3) relationships between disturbance and society, especially the intersection of land use and disturbance, and (4) feedbacks from disturbance to other global drivers. Ecologists should make a renewed and concerted effort to understand and anticipate the causes and consequences of changing disturbance regimes.
Publication Ecology
Volume 91
Issue 10
Pages 2833-2849
Date October 2010

Journal Abbr Ecology
DOI 10.1890/10-0097.1
ISSN 0012-9658
URL http://www.esajournals.org/doi/abs/10.1890/10-0097.1
Extra Keywords: disturbance regime; ecosystem ecology; fire; global change; landscape ecology; MacArthur Address; Pinus contorta; scale; spatial heterogeneity; succession; Yellowstone National Park.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:48 2011

Disturbance regimes in temperate forests

Type Book Section
Author James R. Runkle
Abstract A discussion of the components of a disturbance regime (average rates, distribution in space and time, severity, rates of recovery, and importance of multiple-gap episodes) with examples of natural regimes from cove forests of the southern Appalachians and forests of the Allegheny Plateau, Pennsylvania, USA.
Book Title The Ecology of Natural Disturbance and Patch Dynamics
Edition 1st edition
Place Orlando, New York
Publisher Academic Press
Date 1985
Pages 17–33
ISBN 0-12-554520-7
URL http://books.google.com/books?id=jIj-qAflWxQC&…
Date Added Mon Aug 29 00:48:23 2011
Modified Mon Aug 29 00:48:23 2011

Notes:

Citation:

Runkle, James R. 1985. Disturbance Regimes in Temperate Forests. Chapter 2. pp.15-33 In Pickett, S.T.A. and White, P.S., Eds. :"The Ecology of Natural Disturbance and Patch Dynamics". Academic Press, Orlando, Florida.

Disturbance, diversity, and invasion: Implications for conservation

Type Journal Article
Author Richard J. Hobbs
Author Laura F. Huenneke
Abstract Disturbance is an important component of many ecosystemg and variations in disturbance regime can affect ecosystem and community structure and functioning. The "intermediate disturbance hypothesis" suggests that species diversity should be highest at moderate levels of disturbance. However, disturbance is also known to increase the invasibility of communities. Disturbance therefore poses an important problem for conservation management. Here we review the effects of disturbances such as firg grazing soil disturbanc6 and nutrient addition on plant species diversity and invasion, with particular emphasis on grassland vegetation. Individual components of the disturbance regime can have marked effects on species diversity, but it is often modifications of the existing regime that have the largest influence. Similarly, disturbance can enhance invasion of natural communities, but frequently it is the interaction between different disturbances that has the largest effect. The natural disturbance regime is now unlikely to persist within conservation areas, since fragmentation and human intervention have usually modified physical and biotic conditions. Active

management decisions must now be made on what disturbance regime is required, and this requires decisions on what species are to be encouraged or discouraged.

Publication Conservation Biology
Volume 6
Issue 3
Pages 324-337
Date September 1992
Journal Abbr Conserv. Biol.
DOI 10.1046/j.1523-1739.1992.06030324.x
ISSN 1523-1739
Short Title Disturbance, Diversity, and Invasion
URL http://www3.interscience.wiley.com/journal/119332348/abstract
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 18:16:57 2011

Does high forecast uncertainty preclude effective decision support?

Type Journal Article
Author Peter Reichert
Author Mark E. Borsuk
Abstract The uncertainty in the predictions of models for the behaviour of environmental systems is usually very large. In many cases the widths of the predictive probability distributions for outcomes of interest are significantly larger than the differences between the expected values of the outcomes across different policy alternatives. This seems to lead to a serious problem for model-based decision support because policy actions appear to have an insignificant effect on variables describing their consequences, relative to the predictive uncertainty. However, in some cases it is evident that some of the alternatives at least lead to changes in the desired direction. A formal analysis of this situation is made based on the dependence structure of the variables of interest across different policy alternatives. This analysis leads to the conclusion that the uncertainty in the difference of model predictions corresponding to different policies may be significantly smaller than the uncertainty in the predictions themselves. The knowledge about the uncertainty in this difference may be relevant information for the decision maker in addition to the information usually provided. The conceptual development is supplemented with a presentation of convenient methods for practical implementation. These are illustrated with a simple, didactical model for the effect of phosphorus discharge reduction alternatives on phosphorus loading to a lake.
Publication Environmental Modelling and Software
Volume 20
Issue 8
Pages 991–1001
Date August 2005
Journal Abbr Environ. Model Softw.
DOI 10.1016/j.envsoft.2004.10.005
ISSN 1364-8152
URL http://www.sciencedirect.com/science/article/pii/S1364815204002373
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:24:57 2011

Does it make sense to restore wildland fire in changing climate?

Type Journal Article
Author Peter Z. Fulé

Abstract Forest restoration guided by historical reference conditions of fire regime, forest structure, and composition has been increasingly and successfully applied in fire-adapted forests of western North America. But because climate change is expected to alter vegetation distributions and foster severe disturbances, does it make sense to restore the ecological role of wildland fire through management burning and related activities such as tree thinning? I suggest that some site- and date-specific historical conditions may be less relevant, but reference conditions in the broad sense are still useful. Reference conditions encompass not only the recent past but also evolutionary history, reflecting the role of fire as a selective force over millennia. Taking a long-term functional view of historical reference conditions as the result of evolutionary processes can provide insights into past forest adaptations and migrations under various climates. As future climates change, historical reference data from lower, southerly, and drier sites may be useful in places that are higher, northerly, and currently wetter. Almost all models suggest that the future will have substantial increases in wildfire occurrence, but prior to recent human-caused fire exclusion, fire-adapted pine forests of western North America were among the most frequently burned in the world. Restoration of patterns of burning and fuels/forest structure that reasonably emulate historical conditions prior to fire exclusion is consistent with reducing the susceptibility of these ecosystems to catastrophic loss. Priorities may include fire and thinning treatments of upper elevation ecotones to facilitate forest migration, whereas vulnerable low-elevation forests may merit less management investment.

Publication Restoration Ecology

Volume 16

Issue 4

Pages 526-531

Date December 2008

Journal Abbr Restor. Ecol.

DOI 10.1111/j.1526-100X.2008.00489.x

ISSN 1061-2971

URL http://doi.wiley.com/10.1111/j.1526-100X.2008.00489.x

Extra Keywords: climate change; Durango pine; fire; Jeffrey pine; ponderosa pine.

Date Added Mon Aug 29 05:19:52 2011

Modified Wed Aug 31 00:41:07 2011

Doubled length of western European summer heat waves since 1880

Type Journal Article

Author Paul M. Della-Marta

Author Malcolm R. Haylock

Author Jürg Luterbacher

Author Heinz Wanner

Abstract We analyzed a new data set of 54 high-quality homogenized daily maximum temperature series from western Europe (Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Ireland, Netherlands, Portugal, Spain, Sweden, Switzerland, United Kingdom) to define more accurately the change in extreme warm Daily Summer Maximum Temperature (DSMT). Results from the daily temperature homogeneity analysis suggest that many instrumental measurements in the late 19th and early 20th centuries were warm-biased. Correcting for these biases, over the period 1880 to 2005 the length of summer heat waves over western Europe has doubled and the frequency of hot days has almost tripled. The DSMT Probability Density Function (PDF) shows significant changes in the mean (+1.6 ± 0.4°C) and variance (+6 ± 2%). These conclusions help further the evidence that western Europe's climate has become more extreme than previously thought and that the hypothesized increase in variance of future summer temperature has indeed been a reality over the last 126 years.

Publication Journal of Geophysical Research

Volume 112

Issue 15

Pages D15103 (11 p.)

Date August 2007

Journal Abbr J. Geophys. Res.

DOI 10.1029/2007JD008510
ISSN 0148-0227
URL http://www.agu.org/pubs/crossref/2007/2007JD008510.shtml
Extra Keywords: climate extremes; observations; temperature.
Date Added Tue Aug 30 04:16:19 2011
Modified Tue Aug 30 04:25:16 2011

Driving forces of global wildfires over the past millennium and the forthcoming century

Type Journal Article
Author Olga Pechony
Author Drew T. Shindell
Abstract Recent bursts in the incidence of large wildfires worldwide have raised concerns about the influence climate change and humans might have on future fire activity. Comparatively little is known, however, about the relative importance of these factors in shaping global fire history. Here we use fire and climate modeling, combined with land cover and population estimates, to gain a better understanding of the forces driving global fire trends. Our model successfully reproduces global fire activity record over the last millennium and reveals distinct regimes in global fire behavior. We find that during the preindustrial period, the global fire regime was strongly driven by precipitation (rather than temperature), shifting to an anthropogenic-driven regime with the Industrial Revolution. Our future projections indicate an impending shift to a temperature-driven global fire regime in the 21st century, creating an unprecedentedly fire-prone environment. These results suggest a possibility that in the future climate will play a considerably stronger role in driving global fire trends, outweighing direct human influence on fire (both ignition and suppression), a reversal from the situation during the last two centuries.
Publication Proceedings of the National Academy of Sciences
Volume 107
Issue 45
Pages 19167-19170
Date November 9, 2010
Journal Abbr PNAS
DOI 10.1073/pnas.1003669107
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1003669107
Extra Keywords: biomass burning; fire modeling; human–environment interactions; paleoclimate.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:27:26 2011

Drought and Pacific Decadal Oscillation linked to fire occurrence in the Inland Pacific Northwest

Type Journal Article
Author Amy E. Hessl
Author Don McKenzie
Author Richard Schellhaas
Abstract Historical variability of fire regimes must be understood within the context of climatic and human drivers of disturbance occurring at multiple temporal scales. We describe the relationship between fire occurrence and interannual to decadal climatic variability (Palmer Drought Severity Index [PDSI], El Niño/Southern Oscillation [ENSO], and the Pacific Decadal Oscillation [PDO]) and explain how land use changes in the 20th century affected these relationships. We used 1701 fire-scarred trees collected in five study sites in central and eastern Washington State (USA) to investigate current year, lagged, and low frequency relationships between composite fire histories and PDSI, PDO, and ENSO (using the Southern Oscillation Index [SOI] as a measure of ENSO variability) using superposed epoch analysis and cross-spectral analysis. Fires tended to occur during

dry summers and during the positive phase of the PDO. Cross-spectral analysis indicates that percentage of trees scarred by fire and the PDO are spectrally coherent at 47 years, the approximate cycle of the PDO. Similarly, percentage scarred and ENSO are spectrally coherent at six years, the approximate cycle of ENSO. However, other results suggest that ENSO was only a weak driver of fire occurrence in the past three centuries. While drought and fire appear to be tightly linked between 1700 and 1900, the relationship between drought and fire occurrence was disrupted during the 20th century as a result of land use changes. We suggest that long-term fire planning using the PDO may be possible in the Pacific Northwest, potentially allowing decadal-scale management of fire regimes, prescribed fire, and vegetation dynamics.

Publication Ecological Applications
Volume 14
Issue 2
Pages 425-442
Date April 2004
Journal Abbr Ecol. Appl.
DOI 10.1890/03-5019
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/03-5019
Extra Keywords: climate; cross-spectral; drought; ENSO (El Niño/Southern Oscillation); fire history; Pacific Decadal Oscillation; Pacific Northwest; Pinus ponderosa; SEA (superposed epoch analysis).
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:35 2011

Drought cycles and landscape responses to past aridity on Prairies of the Northern Great Plains, USA

Type Journal Article

Author James S. Clark
Author Eric C. Grimm
Author Joe J. Donovan
Author Sherilyn C. Fritz
Author Daniel R. Engstrom
Author James E. Almendinger

Abstract Widespread drought is among the most likely and devastating consequences of future global change. Assessment of drought impacts forecast by atmospheric models requires an understanding of natural drought variability, especially under conditions more arid than today. Using high-resolution lake-sediment records from the northern Great Plains, we show pronounced 100- to 130-yr drought cycles during the arid middle Holocene (8000 calendar yr BP). During drought phases, grass productivity declined, erosion and forbs increased, and fuel limitation reduced fire importance. Intervening humid decades saw grass production rise, with stabilization of soils and renewed fire as fuels became abundant. Although both C_3 and C_4 grasses declined during droughts, a lasting shift to C_3 dominance occurred during a single drought ~8200 calendar yr BP. During the more humid Late Holocene (2800 calendar yr BP), climate was less variable and without evident drought cyclicity. Consequently, drought severity during past, and possibly future, arid phases cannot be anticipated from the attenuated climate variability evident during contemporary humid phases. Our study demonstrates that agriculturally important grassland ecosystems respond sensitively to drought variability, uncertainty in which has profound implications for the future of these ecosystems.

Publication Ecology
Volume 83
Issue 3
Pages 595–601
Date March 2002
Journal Abbr Ecology
DOI 10.1890/0012-9658(2002)083[0595:DCALRT]2.0.CO;2
ISSN 0012-9658

URL http://www.jstor.org/stable/3071864
Call Number 0066
Extra Keywords: C_4 grassland; climate change; $\delta^{13}C$; diatoms; fire; Holocene; limnology; pollen analysis.
Date Added Sun Sep 4 02:32:08 2011
Modified Mon Sep 5 10:11:29 2011

Drought reconstructions for the continental United States

Type Journal Article
Author Edward R. Cook
Author David M. Meko
Author David W. Stahle
Author Malcolm K. Cleaveland
Abstract The development of a 2° lat × 3° long grid of summer drought reconstructions for the continental United States estimated from a dense network of annual tree-ring chronologies is described. The drought metric used is the Palmer Drought Severity Index (PDSI). The number of grid points is 154 and the reconstructions cover the common period 1700–1978. In producing this grid, an automated gridpoint regression method called "point-by-point regression" was developed and tested. In so doing, a near-optimal global solution was found for its implementation. The reconstructions have been thoroughly tested for validity using PDSI data not used in regression modeling. In general, most of the gridpoint estimates of drought pass the verification tests used. In addition, the spatial features of drought in the United States have been faithfully recorded in the reconstructions even though the method of reconstruction is not explicitly spatial in its design. The drought reconstructions show that the 1930s "Dust Bowl" drought was the most severe such event to strike the United States since 1700. Other more local droughts are also revealed in the regional patterns of drought obtained by rotated principal component analysis. These reconstructions are located on a NOAA Web site at the World Data Center-A in Boulder, Colorado, and can be freely downloaded from there.
Publication Journal of Climate
Volume 12
Issue 4
Pages 1145–1162
Date April 1999
Journal Abbr J. Climate
DOI 10.1175/1520-0442(1999)012<1145:DRFTCU>2.0.CO;2
ISSN 1520-0442
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0442%281999%29012%3C1145%3ADRFTCU%3E2.0.CO%3B2
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:11 2011

Drought under global warming: A review

Type Journal Article
Author Aiguo Dai
Abstract This article reviews recent literature on drought of the last millennium, followed by an update on global aridity changes from 1950 to 2008. Projected future aridity is presented based on recent studies and our analysis of model simulations. Dry periods lasting for years to decades have occurred many times during the last millennium over, for example, North America, West Africa, and East Asia. These droughts were likely triggered by anomalous tropical sea surface temperatures (SSTs), with La Niña-like SST anomalies leading to drought in North America, and El-Niño-like SSTs causing drought in East China. Over Africa, the southward shift of the warmest SSTs in the Atlantic and warming in the Indian Ocean are responsible for the recent Sahel droughts. Local feedbacks may enhance and prolong drought. Global aridity has increased substantially since

the 1970s due to recent drying over Africa, southern Europe, East and South Asia, and eastern Australia. Although El Niño-Southern Oscillation (ENSO), tropical Atlantic SSTs, and Asian monsoons have played a large role in the recent drying, recent warming has increased atmospheric moisture demand and likely altered atmospheric circulation patterns, both contributing to the drying. Climate models project increased aridity in the 21st century over most of Africa, southern Europe and the Middle East, most of the Americas, Australia, and Southeast Asia. Regions like the United States have avoided prolonged droughts during the last 50 years due to natural climate variations, but might see persistent droughts in the next 20–50 years. Future efforts to predict drought will depend on models' ability to predict tropical SSTs.

Publication Wiley Interdisciplinary Reviews: Climate Change
Volume 2
Issue 1
Pages 45–65
Date January/February 2011
Journal Abbr WIREs Clim. Change
DOI 10.1002/wcc.81
ISSN 1757-7780
URL http://doi.wiley.com/10.1002/wcc.81
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 01:04:58 2011

Drought variability in the Pacific Northwest from a 6,000-yr lake sediment record

Type Journal Article
Author Daniel B. Nelson
Author Mark B. Abbott
Author Byron Steinman
Author Pratigya J. Polissar
Author Nathan D. Stansell
Author Joseph D. Ortiz
Author Michael F. Rosenmeier
Author Bruce P. Finney
Author Jon Riedel
Abstract We present a 6,000-yr record of changing water balance in the Pacific Northwest inferred from measurements of carbonate δ18O and grayscale on a sediment core collected from Castor Lake, Washington. This subdecadally resolved drought record tracks the 1,500-yr tree-ring-based Palmer Drought Severity Index reconstructions of Cook et al. [Cook ER, Woodhouse CA, Eakin CM, Meko DM, Stahle DW (2004) Science 306:1015–1018] in the Pacific Northwest and extends our knowledge back to 6,000 yr B.P. The results demonstrate that low-frequency drought/pluvial cycles, with occasional long-duration, multidecadal events, are a persistent feature of regional climate. Furthermore, the average duration of multidecadal wet/dry cycles has increased since the middle Holocene, which has acted to increase the amplitude and impact of these events. This is especially apparent during the last 1,000 yr. We suggest these transitions were driven by changes in the tropical and extratropical Pacific and are related to apparent intensification of the El Niño Southern Oscillation over this interval and its related effects on the Pacific Decadal Oscillation. The Castor Lake record also corroborates the notion that the 20th century, prior to recent aridity, was a relatively wet period compared to the last 6,000 yr. Our findings suggest that the hydroclimate response in the Pacific Northwest to future warming will be intimately tied to the impact of warming on the El Niño Southern Oscillation.
Publication Proceedings of the National Academy of Sciences
Volume 108
Issue 10
Pages 3870-3875
Date March 8, 2011
Journal Abbr PNAS

DOI 10.1073/pnas.1009194108
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1009194108
Extra Keywords: lake sediment; oxygen isotope.
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

Drought-induced reduction in global terrestrial net primary production from 2000 through 2009

Type Journal Article
Author Maosheng Zhao
Author Steven W. Running
Abstract Terrestrial net primary production (NPP) quantifies the amount of atmospheric carbon fixed by plants and accumulated as biomass. Previous studies have shown that climate constraints were relaxing with increasing temperature and solar radiation, allowing an upward trend in NPP from 1982 through 1999. The past decade (2000 to 2009) has been the warmest since instrumental measurements began, which could imply continued increases in NPP; however, our estimates suggest a reduction in the global NPP of 0.55 petagrams of carbon. Large-scale droughts have reduced regional NPP, and a drying trend in the Southern Hemisphere has decreased NPP in that area, counteracting the increased NPP over the Northern Hemisphere. A continued decline in NPP would not only weaken the terrestrial carbon sink, but it would also intensify future competition between food demand and proposed biofuel production.
Publication Science
Volume 329
Issue 5994
Pages 940-943
Date 20 August 2010
Journal Abbr Science
DOI 10.1126/science.1192666
ISSN 0036-8075 (print), 1095-9203 (online)
URL http://www.sciencemag.org/content/329/5994/940.full
Date Added Tue Aug 16 01:11:43 2011
Modified Tue Aug 16 01:11:43 2011

Related

- Comment on "Drought-induced reduction in global terrestrial net primary production from 2000 through 2009"

Drought-induced shift of a forest–woodland ecotone: Rapid landscape response to climate variation

Type Journal Article
Author Craig D. Allen
Author David D. Breshears
Abstract In coming decades, global climate changes are expected to produce large shifts in vegetation distributions at unprecedented rates. These shifts are expected to be most rapid and extreme at ecotones, the boundaries between ecosystems, particularly those in semiarid landscapes. However, current models do not adequately provide for such rapid effects—particularly those caused by mortality—largely because of the lack of data from field studies. Here we report the most rapid landscape-scale shift of a woody ecotone ever documented: in northern New Mexico in the 1950s, the ecotone between semiarid ponderosa pine forest and piñon–juniper woodland shifted extensively (2 km or more) and rapidly (<5 years) through mortality of ponderosa pines in response to a severe drought. This shift has persisted for 40 years. Forest patches within the shift zone became much more fragmented, and soil erosion greatly accelerated. The rapidity and the complex dynamics of the persistent shift point to the need to represent more accurately these dynamics, especially the mortality factor, in

assessments of the effects of climate change.

Publication Proceedings of the National Academy of Sciences
Volume 95
Issue 25
Pages 14839-14842
Date December 8, 1998
Journal Abbr PNAS
ISSN 1091-6490
Short Title Drought-induced shift of a forest–woodland ecotone
URL http://www.pnas.org/content/95/25/14839.long
Date Added Mon Aug 15 23:01:23 2011
Modified Mon Aug 15 23:01:23 2011

Droughts and hot weather

Type Journal Article
Author Edward A. Beals
Abstract no abstract.
Publication Monthly Weather Review
Volume 44
Issue 3
Pages 135-138
Date March 1916
Journal Abbr Mon. Wea. Rev.
DOI 10.1175/1520-0493(1916)44<135:DAHW>2.0.CO;2
ISSN 1520-0493
URL http://dx.doi.org/10.1175%2F1520-0493%281916%2944%3C135%3ADAHW%3E2.0.CO%3B2
Date Added Tue Aug 23 02:01:52 2011
Modified Wed Aug 24 04:41:47 2011

Notes:

Extracts from paper,

“Forecasts of weather favorable to the increase of forest fires,” read before the Pan-American Scientific Congress at Washington, D. C., Dec. 30, 1915.

Dry forests and wildland fires of the inland Northwest USA: Contrasting the landscape ecology of the pre-settlement and modern eras

Type Journal Article
Author Paul F. Hessburg
Author James K. Agee
Author Jerry F. Franklin
Abstract Prior to Euro–American settlement, dry ponderosa pine and mixed conifer forests (hereafter, the “dry forests”) of the Inland Northwest were burned by frequent low- or mixed-severity fires. These mostly surface fires maintained low and variable tree densities, light and patchy ground fuels, simplified forest structure, and favored fire-tolerant trees, such as ponderosa pine, and a low and patchy cover of associated fire-tolerant shrubs and herbs. Low- and mixed-severity fires provided other important feedbacks and effects to ponderosa

pine-dominated stands and landscapes. For example, in stands, frequent surface fires favored an ongoing yet piecemeal regeneration of fire-tolerant trees by periodically exposing patches of mineral soil. They maintained fire-tolerant forest structures by elevating tree crown bases and scorching or consuming many seedlings, saplings, and pole-sized trees. They cycled nutrients from branches and foliage to the soil, where they could be used by other plants, and promoted the growth and development of low and patchy understory shrub and herb vegetation. Finally, surface fires reduced the long-term threat of running crown fires by reducing the fuel bed and metering out individual tree and group torching, and they reduced competition for site resources among surviving trees, shrubs, and herbs. In landscapes, the patterns of dry forest structure and composition that resulted from frequent fires reinforced the occurrence of low- or mixed-severity fires, because frequent burning spatially isolated conditions that supported high-severity fires. These spatial patterns reduced the likelihood of severe fire behavior and effects at each episode of fire. Rarely, dry forest landscapes were affected by more severe climate-driven events. Extant dry forests no longer appear or function as they once did. Large landscapes are homogeneous in their composition and structure, and the regional landscape is set up for severe, large fire and insect disturbance events. Among ecologists, there is also a high degree of concern about how future dry forests will develop, if fires continue to be large and severe. In this paper, we describe the key landscape pattern and process changes wrought by the sum of the settlement and management influences to date, and we point to an uncertain future for ecosystem management. Widespread selection cutting of the largest and oldest ponderosa pine and Douglas-fir in the 20th century has reduced much of the economic opportunity that might have been associated with restoration, and long-term investment will likely be needed, if large-scale restoration activities are attempted. An uncertain future for ecosystem management is based on the lack of current and improbable future social consensus concerning desired outcomes for public forestlands, the need for significant financial investment in ecosystem restoration, a lack of integrated planning and decision tools, and mismatches between the existing planning process, Congressional appropriations, and complex management and restoration problems.

Publication Forest Ecology and Management
Volume 211
Issue 1-2
Pages 117-139
Date 6 June 2005
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/j.foreco.2005.02.016
ISSN 0378-1127
Short Title Dry forests and wildland fires of the inland Northwest USA
URL http://linkinghub.elsevier.com/retrieve/pii/S0378112705000587
Extra Keywords: Pinus ponderosa; Abies grandis; Abies concolor; Pseudostuga menziesii; landscape ecology; mixed conifer forests; fire ecology; fire history; European settlement; historical range of variability.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 01:41:01 2011

Dynamic plant ecology: The spectrum of vegetational change in space and time

Type Journal Article
Author Hazel R. Delcourt
Author Paul A. Delcourt
Author Thompson Webb III
Abstract Different environmental forcing functions influence vegetational patterns and processes over a wide range of spatial and temporal scales. On the micro-scale (1 year to 5 x 10^3 years, 1 m^2 to $10^6 m^2$) natural and anthropogenic disturbances affect establishment and succession of species populations. At the macro-scale (5 x 10^3 years to 10^6 years and $10^6 m^2$ to $10^{12} m^2$) climatic changes influence regional vegetational processes that include migrations of species as well as displacement of ecosystems. Mega-scale phenomena such as plate tectonics, evolution of the biota and development of global patterns of vegetation occur on the time scale of $>10^6$ years and over areas $>10^{12}$ m^2. Our knowledge of past vegetational changes resulting from Quaternary climatic change can be used to predict biotic responses to future climatic changes such as global warming that may be induced by increased carbon dioxide (CO_2) concentrations in the atmosphere. The time scale for future

climatic warming may be much more rapid than that characterizing the early- to mid-Holocene, increasing the probability of rapid turnover in species composition, changes in local and regional dominance of important taxa, displacement of species ranges and local extinction of species. Integration of ecological and paleoecological perspectives on vegetational dynamics is fundamental to understanding and managing the biosphere.

Publication Quaternary Science Reviews
Volume 1
Issue 3
Pages 153-175
Date 1982
Journal Abbr Quaternary Sci. Rev.
DOI 10.1016/0277-3791(82)90008-7
ISSN 0277-3791
Short Title Dynamic plant ecology
URL http://www.sciencedirect.com/science/article/pii/0277379182900087
Date Added Tue Aug 30 04:16:19 2011
Modified Tue Aug 30 06:05:10 2011

Dynamics of an anthropogenic fire regime

Type Journal Article
Author Richard P. Guyette
Author Rose-Marie Muzika
Author Daniel C. Dey
Abstract Human interaction with fire and vegetation occurs at many levels of human population density and cultural development, from subsistence cultures to highly technological societies. The dynamics of these interactions with respect to wildland fire are often difficult to understand and identify at short temporal scales. Dendrochronological fire histories from the Missouri Ozarks, coupled with human population data, offer a quantitative means of examining historic (1680-1990) changes in the anthropogenic fire regime. A temporal analysis of fire scar dates over the last 3 centuries indicates that the percent of sites burned and fire intervals of anthropogenic fires are conditioned by the following four limiting factors: (a) anthropogenic ignition, (b) surface fuel production, (c) fuel fragmentation, and (d) cultural behavior. During an ignition-dependent stage (fewer than 0.64 humans/km²), the percent of sites burned is logarithmically related to human population (r^2 = 0.67). During a fuel-limited stage, where population density exceeds a threshold of 0.64 humans/km², the percent of sites burned is independent of population increases and is limited by fuel production. During a fuel-fragmentation stage, regional trade allows population densities to increase above 3.4 humans/km², and the percent of sites burned becomes inversely related to population (r^2 = 0.18) as decreases in fuel continuity limit the propagation of surface fires. During a culture-dependent stage, increases in the value of timber over forage greatly reduce the mean fire interval and the percent of sites burned. Examples of the dynamics of these four stages are presented from the Current River watershed of the Missouri Ozarks.
Publication Ecosystems
Volume 5
Issue 5
Pages 472–486
Date August 2002
Journal Abbr Ecosystems
ISSN 1432-9840 (Print) 1435-0629 (Online)
URL http://www.jstor.org/stable/3658900
Extra Keywords: human population density; Ozarks; Missouri; disturbance; dendrochronology; fire regimes.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:08 2011

Ecological and evolutionary responses to recent climate change

Type Journal Article

Author Camille Parmesan

Abstract Ecological changes in the phenology and distribution of plants and animals are occurring in all well-studied marine, freshwater, and terrestrial groups. These observed changes are heavily biased in the directions predicted from global warming and have been linked to local or regional climate change through correlations between climate and biological variation, field and laboratory experiments, and physiological research. Range-restricted species, particularly polar and mountaintop species, show severe range contractions and have been the first groups in which entire species have gone extinct due to recent climate change. Tropical coral reefs and amphibians have been most negatively affected. Predator-prey and plant-insect interactions have been disrupted when interacting species have responded differently to warming. Evolutionary adaptations to warmer conditions have occurred in the interiors of species' ranges, and resource use and dispersal have evolved rapidly at expanding range margins. Observed genetic shifts modulate local effects of climate change, but there is little evidence that they will mitigate negative effects at the species level.

Publication Annual Review of Ecology, Evolution, and Systematics

Volume 37

Issue 1

Pages 637-669

Date December 2006

Journal Abbr Annu. Rev. Ecol. Evol. Syst.

DOI 10.1146/annurev.ecolsys.37.091305.110100

ISSN 1543-592X

URL http://arjournals.annualreviews.org/doi/abs/10.1146/annurev.ecolsys.37.091305.110100

Extra Keywords: aquatic; global warming; phenology; range shift; terrestrial; trophic asynchrony.

Date Added Sun Aug 28 00:27:26 2011

Modified Sun Aug 28 00:29:36 2011

Ecological and sampling constraints on defining landscape fire severity

Type Journal Article

Author Carl H. Key

Abstract Ecological definition and detection of fire severity are influenced by factors of spatial resolution and timing. Resolution determines the aggregation of effects within a sampling unit or pixel (alpha variation), hence limiting the discernible ecological responses, and controlling the spatial patchiness of responses distributed throughout a burn (beta variation). As resolution decreases, alpha variation increases, extracting beta variation and complexity from the spatial model of the whole burn. Seasonal timing impacts the quality of radiometric data in terms of transmittance, sun angle, and potential contrast between responses within burns. Detection sensitivity can degrade toward the end of many fire seasons when low sun angles, vegetation senescence, incomplete burning, hazy conditions, or snow are common. Thus, a need exists to supersede many rapid response applications when remote sensing conditions improve. Lag timing, or time since fire, notably shapes the ecological character of severity through first-order effects that only emerge with time after fire, including delayed survivorship and mortality. Survivorship diminishes the detected magnitude of severity, as burned vegetation remains viable and resprouts, though at first it may appear completely charred or consumed above ground. Conversely, delayed mortality increases the severity estimate when apparently healthy vegetation is in fact damaged by heat to the extent that it dies over time. Both responses depend on fire behavior and various species-specific adaptations to fire that are unique to the pre-fire composition of each burned area. Both responses can lead initially to either over- or underestimating severity. Based on such implications, three sampling intervals for short-term burn severity are identified; rapid, initial, and extended assessment, sampled within about two weeks, two months, and depending on the ecotype, from three months to one year after fire, respectively. Spatial and temporal conditions of sampling strategies constrain data quality and ecological information obtained about fire severity. Though commonly overlooked, such considerations determine the objectives and hypotheses that are appropriate for each application, and are especially important when building comparative studies or long-term reference databases on fire severity.

Publication Fire Ecology
Volume 2
Issue 2
Pages 34-59
Date December 2006
Journal Abbr Fire Ecol.
DOI 10.4996/fireecology.0202034
ISSN 1933-9747
URL http://fireecology.net/index.php?option=com_journal&…
Extra Keywords: fire; burn; severity; fire effects; differenced Normalized Burn Ratio; dNBR; change detection; Landsat TM/ETM+.
Date Added Tue Aug 30 14:37:15 2011
Modified Thu Sep 15 19:07:17 2011

Ecological effects of climate fluctuations

Type Journal Article
Author Nils C. Stenseth
Author Atle Mysterud
Author Geir Ottersen
Author James W. Hurrell
Author Kung-Sik Chan
Author Mauricio Lima
Abstract Climate influences a variety of ecological processes. These effects operate through local weather parameters such as temperature, wind, rain, snow, and ocean currents, as well as interactions among these. In the temperate zone, local variations in weather are often coupled over large geographic areas through the transient behavior of atmospheric planetary-scale waves. These variations drive temporally and spatially averaged exchanges of heat, momentum, and water vapor that ultimately determine growth, recruitment, and migration patterns. Recently, there have been several studies of the impact of large-scale climatic forcing on ecological systems. We review how two of the best-known climate phenomena—the North Atlantic Oscillation and the El Niño–Southern Oscillation—affect ecological patterns and processes in both marine and terrestrial systems.
Publication Science
Volume 297
Issue 5585
Pages 1292-1296
Date 23 August 2002
Journal Abbr Science
DOI 10.1126/science.1071281
ISSN 0036-8075, 1095-9203
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1071281
Call Number 0728
Date Added Thu Sep 22 05:57:55 2011
Modified Wed Sep 28 17:53:54 2011

Ecological effects of prescribed fire season: A literature review and synthesis for managers

Type Report
Author Eric E. Knapp

Author Becky L. Estes
Author Carl N. Skinner
Abstract Prescribed burning may be conducted at times of the year when fires were infrequent historically, leading to concerns about potential adverse effects on vegetation and wildlife. Historical and prescribed fire regimes for different regions in the continental United States were compared and literature on season of prescribed burning synthesized. In regions and vegetation types where considerable differences in fuel consumption exist among burning seasons, the effects of prescribed fire season appears, for many ecological variables, to be driven more by fire-intensity differences among seasons than by phenology or growth stage of organisms at the time of fire. Where fuel consumption differs little among burning seasons, the effect of phenology or growth stage of organisms is often more apparent, presumably because it is not overwhelmed by fire-intensity differences. Most species in ecosystems that evolved with fire appear to be resilient to one or few out-of-season prescribed burn(s). However, a variable fire regime including prescribed burns at different times of the year may alleviate the potential for undesired changes and maximize biodiversity.
Report Number PSW-GTR-224
Report Type General Technical Report
Place Albany, CA
Institution U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station
Date September 2009
Pages 80 p.
Short Title Ecological effects of prescribed fire season
URL http://www.treesearch.fs.fed.us/pubs/33628
Extra Keywords: fire effects; fire intensity; fire season; fuel consumption; historical fire regime; phenology; prescribed fire; pyrodiversity.
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:37:15 2011

Notes:

Citation:

Knapp, Eric E.; Estes, Becky L.; Skinner, Carl N. 2009. Ecological effects of prescribed fire season: a literature review and synthesis for managers. Gen. Tech. Rep. PSW-GTR-224. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 80 p.

Ecological foundations for fire management in North American forest and shrubland ecosystems

Type Report
Author Jon E. Keeley
Author Greg H. Aplet
Author Norman L. Christensen
Author Susan G. Conard
Author Edward A. Johnson
Author Philip A. Omi
Author David L. Peterson
Author Thomas W. Swetnam
Abstract This review uses a scientific synthesis to provide an ecological foundation for management of the diverse ecosystems and fire regimes of North America. This foundation is based on the principles that inform management of fire-affected ecosystems. Although a large amount of scientific data on fire exists, most of those data have been collected at fine spatial and short temporal scales, whereas most of the potential issues and applications of those data are at broad and long-term scales. Basing decisions and actions on these data often requires extrapolation to different scales and different conditions, such that error can be introduced in the process.
Report Number PNW-GTR-779

Report Type General Technical Report
Place Portland, OR
Institution U.S. Dept. of Agriculture, Forest Service, Pacific Northwest Research Station
Date March 2009
Pages 92 p.
URL http://www.treesearch.fs.fed.us/pubs/32483
Extra Keywords: fire ecology; fire hazard; fire regime; fire risk; fire management; fuels; fuel manipulation; prescription burning; restoration.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:18:27 2011

Notes:

Citation:

Keeley, J.E.; Aplet, G.H.; Christensen, N.L.; Conard, S.G.; Johnson, E.A.; Omi, P.N.; Peterson, D.L.; Swetnam, T.W. 2009. Ecological foundations for fire management in North American forest and shrubland ecosystems. Gen. Tech. Rep. PNW-GTR-779. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 92 p.

Ecological importance of intermediate windstorms rivals large, infrequent disturbances in the northern Great Lakes

Type Journal Article
Author Kirk M. Stueve
Author Charles H. Perry
Author Mark D. Nelson
Author Sean P. Healey
Author Andrew D. Hill
Author Gretchen G. Moisen
Author Warren B. Cohen
Author Dale D. Gormanson
Author Chengquan Huang
Abstract Exogenous disturbances are critical agents of change in temperate forests capable of damaging trees and influencing forest structure, composition, demography, and ecosystem processes. Forest disturbances of intermediate magnitude and intensity receive relatively sparse attention, particularly at landscape scales, despite influencing most forests at least once per generation. Contextualizing the spatial extent and heterogeneity of such damage is of paramount importance to increasing our understanding of forested ecosystems. We investigated patterns of intermediate wind disturbance across a forested landscape in the northern Great Lakes, USA. A vegetation change tracker (VCT) algorithm was utilized for processing near-biennial Landsat data stacks (1984–2009) spanning forests sustaining damage from four recent windstorms. VCT predominantly maps stand-clearing disturbance and regrowth patterns, which were used to identify forest boundaries, young stands, and disturbance patterns across space and time. To map wind damage severity, we compared satellite-derived normalized difference vegetation index (NDVI) values calculated from pre- and post-storm Landsat imagery. A geographic information system (GIS) was used to derive wind damage predictor variables from VCT, digital terrain, soils/landform, land cover, and storm tracking data. Hierarchical and random forests regressions were applied to rank the relative importance of predictor variables in influencing wind damage. A conservative estimate of aggregate damage from the intermediate windstorms (extrapolated to 150,000 ha, 25,500 severe) rivaled individual large, infrequent disturbances in the region. Damage patterns were relatively congruent among storms and became more spatially heterogeneous with increasing disturbance intensity. Proximity to forest-nonforest edge, stand age, and soils/landform were consistently important damage predictors. The spatial extent and distribution of the first two damage predictors are extremely sensitive to

anthropogenic modifications of forested landscapes, the most important disturbance agent in the northern Great Lakes. This provides circumstantial evidence suggesting anthropogenic activities are augmenting and/or diminishing the ecological effects of the natural wind disturbance regime. Natural disturbances of intermediate size and intensity are significant agents of change in this region, and likely in other regions, deserving more attention from ecologists and biogeographers.

Publication	Ecosphere
Volume	2
Issue	1
Pages	Article 2 (21 p.)
Date	January 2011
Journal Abbr	Ecosphere
DOI	10.1890/ES10-00062.1
ISSN	2150-8925
URL	http://www.treesearch.fs.fed.us/pubs/37586
Extra	Keywords: blowdown; hierarchical partitioning; landscape ecology; mixed northern hardwoods; northern Wisconsin; random forests; remote sensing; Upper Peninsula of Michigan; vegetation change tracker.
Date Added	Sun Aug 28 17:26:59 2011
Modified	Sun Aug 28 17:26:59 2011

Ecological land classification: A survey approach

Type	Journal Article
Author	J. Stan Rowe
Author	John W. Sheard
Abstract	A landscape approach to ecological land mapping, as illustrated in this article, proceeds by pattern recognition based on ecological theory. The unit areas delineated are hypotheses that arise from a knowledge of what is ecologically important in the land. Units formed by the mapper are likely to be inefficient or irrelevant for ecological purposes unless he possesses a sound rationale as to the interactions and controlling influences of the structural components of ecosystems. Here is the central problem with what have been called "objective" multivariate approaches to mapping based on grid units and the sometimes arbitrary attributes thereof; they tend to conceal the importance of ecological theory and the necessity for theory-based supervision of pattern recognition. Multivariate techniques are best used iteratively to verify and refine map units initially recognized and delineated by theoretical considerations. These ideas are illustrated by an example of a reconnaissance survey in the Northwest Territories of Canada.
Publication	Environmental Management
Volume	5
Issue	5
Pages	451-464
Date	September 1981
Journal Abbr	Environ. Manage.
DOI	10.1007/BF01866822
ISSN	0364-152X
Short Title	Ecological land classification
URL	http://www.springerlink.com/content/u3r7412350310400/
Extra	Keywords: ecological land classification; landscape ecosystems; parametric terrain mapping; boreal forest; Northwest Territories (Canada); discriminant analysis.
Date Added	Mon Aug 29 00:48:23 2011
Modified	Wed Aug 31 00:25:33 2011

Ecological systems of the United States: A working classification of US terrestrial systems

Type	Report
Author	Patrick Comer
Author	Don Faber-Langendoen
Author	Rob Evans
Author	Sue Gawler
Author	Carmen Josse
Author	Gwen Kittel
Author	Shannon Menard
Author	Milo Pyne
Author	Marion Reid
Author	Keith Schulz
Author	Kristin Snow
Author	Judy Teague
Abstract	Conservation of the Earth's diversity of life requires a sound understanding of the distribution and condition of the components of that diversity. Efforts to understand our natural world are directed at a variety of biological and ecological scales—from genes and species, to natural communities, local ecosystems, and landscapes. While scientists have made considerable progress classifying fine-grained ecological communities on the one hand, and coarse-grained ecoregions on the other, land managers have identified a critical need for practical, mid-scale ecological units to inform conservation and resource management decisions. This report introduces and outlines the conceptual basis for such a mid-scale classification unit-—ecological systems.
Place	Arlington, Virginia
Institution	NatureServe
Date	June 2003
Pages	83 p.
Short Title	Ecological systems of the United States
URL	http://www.natureserve.org/publications/usEcologicalsystems.jsp
Call Number	0000
Extra	Ecological Data: http://www.natureserve.org/getData/ecologyData.jsp
Date Added	Tue Aug 30 02:03:25 2011
Modified	Wed Aug 31 00:34:51 2011

Notes:

Citation:
Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, Virginia.

Ecological units of the Highlands (Chapter 1)

Type	Book Section
Author	Tom Foti
Author	George Bukenhofer
Abstract	no abstract
Book Title	Ozark-Ouachita Highlands Assessment: Terrestrial Vegetation and Wildlife
Series	General Technical Report SRS
Series Number	GTR-SRS-035
Volume	5
# of Volumes	5
Place	Asheville, N.S.

Publisher U.S. Dept. of Agriculture, Forest Service, Southern Research Station
Date December 1999
Pages 1-6
Short Title Ozark-Ouachita Highlands Assessment
URL http://www.srs.fs.usda.gov/pubs/2039
Call Number 0000
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:42:03 2011

Notes:

Source:

U.S. Department of Agriculture, Forest Service. 1999. Ozark-Ouachita Highlands Assessment: terrestrial vegetation and wildlife. Report 5 of 5. Gen. Tech. Rep. SRS-35. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 201 p.

Ecoregion-based design for sustainability

Type Book
Author Robert G. Bailey
Abstract ABOUT THIS BOOK This richly illustrated volume completes Robert G. Bailey's celebrated study of ecoregions, begun in the landmark Ecosystem Geography (1996) and further articulated in Ecoregions (1998). In this third installment, the author expands his system for defining large-scale ecological zones to encompass principles of land management, regional planning, and design. In an engaging, nontechnical discussion, he shows how larger patterns and processes that characterize a region--its climate, topography, soils, vegetation, fauna, and human culture--provide essential keys to the sustainability of ecosystems. Ecoregion-Based Design for Sustainability will be welcomed by land and resource managers, landscape architects and urban planners, ecologists, students, and anyone interested in ecology-based design. "Bob Bailey [is] the man behind the ecosystem mapping of the world." -Lingua Franca Reviews of Ecoregions: "The book provides easy access to the geographic distribution, characteristics, and processes operating behind every major ecosystem in the world." -Geoscience Canada "Ecoregions offers an invaluable source of description, interpretation and analysis of global patterns of ecosystem distribution and successfully provides the reader with a means of making sense of these patterns." -Geography Robert G. Bailey is a geographer with the United States Forest Service in Fort Collins, Colorado. Formerly the leader of the agency's Ecosystem Management Analysis Center, he is currently in charge of ecoregion studies at the Inventory and Monitoring Institute.
Edition 1st edition, illustrated
Place New York, NY
Publisher Springer-Verlag
Date 2002
# of Pages 222 p.
ISBN 0387954295, 9780387954295
URL http://www.springer.com/environment/environmental+management/book/978-0-387-95430-1
Date Added Tue Aug 16 11:38:37 2011
Modified Tue Aug 16 11:38:49 2011

Notes:

Table of contents:

- Ch.3 Regional Scale Ecosystem Units, Ecoregions
- Ch.4 An Ecoregional Approach to Sustaining Ecosystems
- Ch.5 Significance to Ecosystem Management
- Ch.6 How Land Management Agencies, Conservation Organizations, and Others Use Ecoregion Maps
- Ch.7 Summary and Conclusions
- Appendix A Ecological Climate Zones
- Appendix B Climate Diagrams
- Appendix C Resource Guide
- Appendix D Common and Scientific Names
- Appendix E Conversion Factors

Ecoregions of the United States - Ecoregions - RMRS - US Forest Service

Type Web Page
Author Robert G. Bailey
Abstract Description: This data set shows ecoregions, which are ecosystems of regional extent, in the United States, Puerto Rico, and the U.S. Virgin Islands. Four levels of detail are included to show a hierarchy of ecosystems. The largest ecosystems are domains, which are groups of related climates and which are differentiated based on precipitation and temperature. Divisions represent the climates within domains and are differentiated based on precipitation levels and patterns as well as temperature. Divisions are subdivided into provinces, which are differentiated based on vegetation or other natural land covers. The finest level of detail is described by subregions, called sections, which are subdivisions of provinces based on terrain features. Also identified are mountainous areas that exhibit different ecological zones based on elevation.
Website Title Ecoregions of the United States
Date 2009
Short Title Ecoregions
URL http://www.fs.fed.us/rm/ecoregions/products/map-ecoregions-united-states/
Rights Rocky Mountain Research Station
Date Added Tue Aug 16 12:03:37 2011
Modified Thu Sep 1 04:18:06 2011

Ecosystem disturbance, carbon, and climate

Type Journal Article
Author Steven W. Running
Abstract Models of climate change effects should incorporate land-use changes and episodic disturbances such as fires and insect epidemics.
Publication Science
Volume 321
Issue 5889
Pages 652–653
Date 1 August 2008
Journal Abbr Science
DOI 10.1126/science.1159607
ISSN 0036-8075
URL http://sciencemag.org/cgi/content/short/321/5889/652
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:44 2011

Ecosystem vulnerability assessment and synthesis: A report from the Climate Change Response Framework Project in northern Wisconsin

Type	Report
Author	Chris Swanston
Author	Maria Janowiak
Author	Louis Iverson
Author	Linda Parker
Author	David Mladenoff
Author	Leslie Brandt
Author	Patricia Butler
Author	Matt St. Pierre
Author	Anantha Prasad
Author	Stephen Matthews
Author	Matthew Peters
Author	Dale Higgins
Author	Avery Dorland
Abstract	The forests of northern Wisconsin will likely experience dramatic changes over the next 100 years as a result of climate change. This assessment evaluates key forest ecosystem vulnerabilities to climate change across northern Wisconsin under a range of future climate scenarios with a focus on the Chequamegon-Nicolet National Forest. We describe the contemporary landscape and major existing climate trends using state climatological data, as well as potential future climate trends for this region using downscaled global data from general circulation models. We identify potential vulnerabilities by incorporating these future climate projections into species distribution and ecosystem process models and assessing potential changes to northern Wisconsin forests. Warmer temperatures and shifting precipitation patterns are expected to influence ecosystem drivers and increase stressors, including more frequent disturbances and increased amount or severity of pests and diseases. Forest ecosystems will continue to adapt to changing conditions. Even under conservative climate change scenarios, suitable habitat for many tree species is expected to move northward. Many species, including balsam fi r, white spruce, paper birch, and quaking aspen, are projected to decline as their suitable habitat decreases in quality and extent. Certain species, communities, and ecosystems may not be particularly resilient to the increases in stress or changes in habitat, and they may be subject to severe declines in abundance or may be lost entirely from the landscape. These include fragmented and static ecosystems, as well as ecosystems containing rare species or species already in decline. Identifying vulnerable species and forests can help landowners, managers, regulators, and policymakers establish priorities for management and monitoring.
Report Number	GTR-NRS-82
Report Type	General Technical Report
Place	Newtown Square, PA
Institution	U.S. Department of Agriculture, Forest Service, Northern Research Station
Date	June 2011
Pages	142 p.
Short Title	Ecosystem vulnerability assessment and synthesis
URL	http://www.treesearch.fs.fed.us/pubs/38255
Call Number	0000
Extra	Keywords: climate change; forests; vulnerability; Wisconsin; tree species distributions; Climate Change Atlas; LANDIS-II.
Date Added	Sun Aug 28 17:26:59 2011
Modified	Wed Aug 31 00:28:14 2011

Notes:

Citation:

Swanston, Chris; Janowiak, Maria; Iverson, Louis; Parker, Linda; Mladenoff, David; Brandt, Leslie; Butler, Patricia; St. Pierre, Matt;

Prasad, Anantha; Matthews, Stephen; Peters, Matthew; Higgins, Dale; Dorland, Avery. 2011. Ecosystem vulnerability assessment and synthesis: a report from the Climate Change Response Framework Project in northern Wisconsin. Gen. Tech. Rep. NRS-82. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 142 p.

Ecosystems and human well-being: Our human planet (Summary for decision-makers)

Type	Book
Author	Millennium Ecosystem Assessment
Abstract	no abstract
Series	Millennium Ecosystem Assessment Series
Volume	5
# of Volumes	5
Edition	1st edition
Place	Washington, D.C.
Publisher	Island Press
Date	December 2005
# of Pages	109 p.
ISBN	9781559633864
Short Title	Ecosystems and human well-being
URL	http://islandpress.org/bookstore/details21e3.html?prod_id=458
Date Added	Tue Aug 30 14:35:38 2011
Modified	Tue Aug 30 14:35:38 2011

Notes:

Table Of Contents:

Effect of climate change on air quality

Type Journal Article
Author Daniel J. Jacob
Author Darrell A. Winner
Abstract Air quality is strongly dependent on weather and is therefore sensitive to climate change. Recent studies have provided estimates of this climate effect through correlations of air quality with meteorological variables, perturbation analyses in chemical transport models (CTMs), and CTM simulations driven by general circulation model (GCM) simulations of 21st-century climate change. We review these different approaches and their results. The future climate is expected to be more stagnant, due to a weaker global circulation and a decreasing frequency of mid-latitude cyclones. The observed correlation between surface ozone and temperature in polluted regions points to a detrimental effect of warming. Coupled GCM–CTM studies find that climate change alone will increase summertime surface ozone in polluted regions by 1–10 ppb over the coming decades, with the largest effects in urban areas and during pollution episodes. This climate penalty means that stronger emission controls will be needed to meet a given air quality standard. Higher water vapor in the future climate is expected to decrease the ozone background, so that pollution and background ozone have opposite sensitivities to climate change. The effect of climate change on particulate matter (PM) is more complicated and uncertain than for ozone. Precipitation frequency and mixing depth are important driving factors but projections for these variables are often unreliable. GCM–CTM studies find that climate change will affect PM concentrations in polluted environments by ±0.1–1 $\mu g m^{-3}$ over the coming decades. Wildfires fueled by climate change could become an increasingly important PM source. Major issues that should be addressed in future research include the ability of GCMs to simulate regional air pollution meteorology and its sensitivity to climate change, the response of natural emissions to climate change, and the atmospheric chemistry of isoprene. Research needs to be undertaken on the effect of climate change on mercury, particularly in view of the potential for a large increase in mercury soil emissions driven by increased respiration in boreal ecosystems.
Publication Atmospheric Environment
Volume 43
Issue 1
Pages 51–63
Date January 2009
Journal Abbr Atmo. Environ.
DOI 10.1016/j.atmosenv.2008.09.051
ISSN 1352-2310
URL http://linkinghub.elsevier.com/retrieve/pii/S1352231008008571
Extra Keywords: climate change; air quality; air pollution meteorology; ozone; particulate matter; mercury.
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:11:59 2011

Effect of climate change on fire regimes in northwestern Minnesota

Type Journal Article
Author James S. Clark
Abstract Of all the impacts of projected climate change on forest ecosystems, perhaps the most difficult to forecast is the potential for altered fire frequency and intensity. Fire regimes in forests are poorly understood for lack of long-term evidence. Here I used petrographic thin sections to determine the annual production of charcoal within a lake catchment in northwestern Minnesota over the past 750 years providing the long and high-resolution record required to elucidate fire regimes. Maximum abundance and frequency occurred in the warm, dry fifteenth and sixteenth centuries. Fire importance decreased dramatically with the onset or intensification of the 'little ice age' about AD 1600. Fire cycles with harmonics corresponding to multiples of the 22-year drought cycles of the region and increased fire frequency at times when early successional stands were breaking up, suggest a synergistic influence of climate and fuel accumulation. The anomalously warm, dry twentieth-century climate would have produced substantially different fire regimes from the previous century in the absence of fire suppression.
Publication Nature
Volume 334
Issue 6179

Pages 233-235
Date 21 July 1988
Journal Abbr Nature
DOI 10.1038/334233a0
ISSN 1476-4687
URL http://dx.doi.org/10.1038/334233a0
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:45 2011

Effects of environment and land-use history on upland forests of the Cary Arboretum, Hudson Valley, New York

Type Journal Article
Author Jeff S. Glitzenstein
Author Charles D. Canham
Author Mark J. McDonnell
Author Donna R. Streng
Abstract Relationships of vegetation to environment and land-use history were investigated in fbrests of the Mary Flagler Cary Arboretum in the Hudson Valley of New York. Vegetation data were obtained from 76 1/4 ha circular plots randomly located within the forest. Environmental data collected at each plot included slope, aspect, canopy openness, soil texture and nutrients, topographic position, and presence of exposed rock; gravimetric soil moisture was determined weekly during 1985 for a subsample of 25 stands. Land-use history information came from historical records (land deeds and U.S. and N.Y.S. census records), stone-fence locations, landscape patterns in stand ages, an old aerial photograph, and soils data. Vegetation analyses identified three major community types. One group of stands, dominated by chestnut oak (Quercus prinus L.) and northern red oak (Quercus rubra L.), occurred on steep, rocky, upper slope sites never cleared for agriculture. Distinct vertical stratification of dominant canopy species in these stands is consistent with a probable history of intensive selective cutting early in this century. Both of the other major community types occurred primarily on abandoned agricultural land. Stands dominated by white oak (Quercus alba L.), black oak (Quercus velutina Lam.) and pignut hickory (Carya glabra (Mill.) Sweet) tended to occur at lower elevations on rocky, nutrient poor sites probably derived from abandoned pastures. The significantly more open canopy in these stands, less distinct vertical stratification of canopy trees, and a diverse herbaceous understory frequently including grasses and sedges, also suggests very gradual invasion of these forests onto old pasture sites. The third major vegetation type, dominated by red maple (Acer rubrum L.) and white pine (Pinus strobus L.), tended to occur on finer textured, less rocky old field sites possibly abandoned from cultivation. Comparison of current vegetation with witness tree data from early land survey records suggests that the white oak-black oakhickory type was prevalent on lower slope sites prior to forest cleating, but has declined in importance relative to the red maple type during the past 100 years of abandonment of land from agriculture.
Publication Bulletin of the Torrey Botanical Club
Volume 117
Issue 2
Pages 106–122
Date April - June 1990
Journal Abbr B. Torrey Bot. Club
DOI 10.2307/2997050
ISSN 0040-9618
URL http://www.jstor.org/stable/2997050
Extra Keywords: environment; forest vegetation; land-use history; Hudson Valley; New York.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:08 2011

Effects of fire and spruce beetle outbreak legacies on the disturbance regime of a subalpine forest in Colorado

Type Journal Article
Author D. Kulakowski
Author T.T. Veblen
Author P. Bebi
Abstract Aim There is increasing research attention being given to the role of interactions among natural disturbances in ecosystem processes. We studied the interactions between fire and spruce beetle (Dendroctonus rufipennis Kirkby) disturbances in a Colorado subalpine forest. The central questions of this research were: (1) How does fire history influence stand susceptibility to beetle outbreak? And conversely, (2) How does prior occurrence of a beetle outbreak influence stand susceptibility to subsequent fire? Methods We reconstructed the spatial disturbance history in a c. 4600 ha area by first identifying distinct patches in the landscape on aerial photographs. Then, in the field we determined the disturbance history of each patch by dating stand origin, fire scars, dates of mortality of dead trees, and releases on remnant trees. A geographical information system (GIS) was used to overlay disturbance by fire and spruce beetle. Results and main conclusions The majority of stands in the study area arose following large, infrequent, severe fires occurring in c. 1700, 1796 and 1880. The study area was also affected by a severe spruce beetle outbreak in the 1940s and a subsequent lowseverity fire. Stands that originated following stand-replacing fire in the late nineteenth century were less affected by the beetle outbreak than older stands. Following the beetle outbreak, stands less affected by the outbreak were more affected by low-severity fire than stands more severely affected by the outbreak. The reduced susceptibility to lowseverity fire possibly resulted from increased moisture on the forest floor following beetle outbreak. The landscape mosaic of this subalpine forest was strongly influenced by the interactions between fire and insect disturbances. Keywords dendrochronology, Dendroctonus, disturbance, interactions, legacies, fire, subalpine forest, Colorado. INTRODUCTION There is increasing research attention being given to the role of interactions among natural disturbances in ecosystem processes (e.g. Paine et al., 1998; Turner et al., 1998; Frelich & Reich, 1999). Many disturbances do not act in isolation and synergism has long been recognized as a component of disturbance regimes (White & Pickett, 1985). Nevertheless, while much research has focused on various parameters of natural disturbances such as distribution, frequency, size, and magnitude, relatively little research attention has been given to the synergism or interactions among disturbances. Most disturbance regimes are affected not only by climatic (e.g. Johnson et al., 1990; Veblen et al., 2000) and topographical factors (e.g. Swanson et al., 1988; Foster & Boose, 1992; Kramer et al., 2001), but may also be affected by the site's disturbance history (e.g. Veblen et al., 1994; Kulakowski & Veblen, 2002). Large infrequent disturbances can leave long-lasting legacies which affect subsequent ecological processes. Fire and insect disturbances have been shown to interact and synergistically affect forest succession, nutrient cycling, species composition, and diversity (McCullough et al., 1998). For example, interactions between standreplacing fires and outbreaks of spruce beetle (Dendroctonus J B I 9 1 2 B Dispatch: 19.5.03 Journal: JBI CE: Hari Journal Name Manuscript No. Author Received: No. of pages: 12 PE: Sri * Correspondence: Department of Geography, University of Colorado, Boulder, CO 80309-0260, USA. E-mail: dominik.kulakowski@colorado.edu Journal of Biogeography, 30, 1–12 ⬚ 2003
Publication Journal of Biogeography
Volume 30
Pages 1–12
Date 2003
Library Catalog Google Scholar
Call Number 0054
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

Effects of fire on landscape heterogeneity in Yellowstone National Park, Wyoming

Type Journal Article
Author Monica G. Turner

Author William W. Hargrove
Author Robert H. Gardner
Author William H. Romme
Abstract A map of burn severity resulting from the 1988 fires that occurred in Yellowstone National Park (YNP) was derived from Landsat Thematic Mapper (TM) imagery and used to assess the isolation of burned areas, the heterogeneity that resulted from fires burning under moderate and severe burning conditions, and the relationship between heterogeneity and fire size. The majority of severely burned areas were within close proximity (50 to 200 m) to unburned or lightly burned areas, suggesting that few burned sites are very far from potential sources of propagules for plant reestablishment. Fires that occurred under moderate burning conditions early during the 1988 fire season resulted in a lower proportion of crown fire than fires that occurred under severe burning conditions later in the season. Increased dominance and contagion of burn severity classes and a decrease in the edge: area ratio for later fires indicated a slightly more aggregated burn pattern compared to early fires. The proportion of burned area in different burn severity classes varied as a function of daily fire size. When daily area burned was relatively low, the proportion of burned area in each burn severity class varied widely. When daily burned area exceeded 1250 ha, the burned area contained about 50 % crown fire, 30 % severe surface burn, and 20 % light surface burn. Understanding the effect of fire on landscape heterogeneity is important because the kinds, amounts, and spatial distribution of burned and unburned areas may influence the reestablishment of plant species on burned sites.
Publication Journal of Vegetation Science
Volume 5
Issue 5
Pages 731-742
Date October 1994
Journal Abbr J. Veg. Sci.
DOI 10.2307/3235886
ISSN 1100-9233
URL http://www.jstor.org/stable/3235886
Extra Keywords: GIS; landscape ecology; Landsat Thematic Mapper; remote sensing; scale; spatial heterogeneity.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:50 2011

Effects of fire regime and habitat on tree dynamics in north Florida longleaf pine savannas

Type Journal Article
Author Jeff S. Glitzenstein
Author William J. Platt
Author Donna R. Streng
Abstract Frequent, low intensity fire was an important component of the natural disturbance regime of presettlement savannas and woodlands in the southeastern USA dominated by longleaf pine (Pinus palustris), and prescribed burning is now a critical part of the management of these endangered habitats. Fire season, fire frequency, and fire intensity are three potentially important, though still little understood, components of both natural and managed fire regimes. In this long—term (8—yr) study, we experimentally (through the use of prescribed burning) tested for effects of fire season (eight different times throughout the year) and fire frequency (annual vs. biennial burning), on population dynamics (recruitment, growth, mortality, change in density, and change in basal area [the total basal area of all stems in a plot]) and species composition of trees in two quite different types of longleaf—pine—dominated habitats (north Florida sandhills and flatwoods). Limited fire temperature and intensity data were also collected during one year to examine the relationship between fire behavior (temperature and intensity) and tree mortality. Contrary to prior hypotheses, our results showed few systematic or predictable effects of season or frequency of burning on dynamics of longleaf pine. Instead, variability in the population dynamics of this species appeared to be related largely to variation in fire behavior, regardless of the season of burning. Consistent with prior hypotheses, we found that deciduous oak species (Quercus laevis, Q. margaretta, and Q. incana) were least vulnerable to dormant—season burning and most vulnerable to burning early in the growing season. This was shown particularly by seasonal trends in the effect of burning on oak mortality (both topkill and complete kill) and, to a lesser extent, on oak recruitment. Oak densities and basal

areas also declined in the spring—burned plots, resulting in a shift away from oaks and towards increased dominance by longleaf pine. Detrimental effects of spring burning on oaks were partly explained by fire behavior, but there appeared also to be an important residual effect of burning season, particularly on complete kill. Though longleaf pine population dynamics did not differ markedly as a result of burning season and frequency, we did find important differences in pine dynamics between the two habitats (i.e., sandhills and flatwoods). In general, populations of longleaf pines in the sandhills appeared to be density regulated, while flatwoods pine populations were declining regardless of the level of intraspecific competition. This suggests that long—term persistence of longleaf pine, and perhaps other fire—adapted species in frequently burned longleaf—pine—dominated communities, may be determined by complex interactions between habitat factors and fire regimes.

Publication Ecological Monographs
Volume 65
Issue 4
Pages 441-476
Date November 1995
Journal Abbr Ecol. Monogr.
DOI 10.2307/2963498
ISSN 0012-9615
URL http://www.jstor.org/stable/2963498
Extra Keywords: burning frequency; burning season; competition; fire regimes; fiatwoods; habitat; North Florida; Pinus palustris; Quercus incana; Quercus laevis; sandhills; species change.
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:20:08 2011

Effects of fire regime on the serotiny level of jack pine

Type Journal Article
Author Sylvie Gauthier
Author Yves Bergeron
Author Jean-Pierre Simon
Abstract Summary 1. Serotiny, the capacity to retain seed in the plant canopy, has evolved in many species under the selective pressure of fires. The effect of disturbance type (lethal or nonlethal fire), time-since-fire and different fire regimes on the serotiny of jack pine (Pinus banksiana), was evaluated in populations from two adjacent landscapes in the southern part of the Canadian boreal forest. The island landscape (Lake Duparquet) has a complex fire regime of small fires of variable intensity, whereas the adjacent mainland has a fire regime characterized by large intense fires. 2. Twenty-four jack pine populations (11 island and 13 mainland) on xeric sites were sampled for the degree of serotiny of trees. Fire history and age structure were reconstructed for each population using the fire scar method. For each tree, recruit- ment was categorized as after a lethal fire, after a nonlethal fire or in the absence of fire. 3. Likelihood chi-square tests were used to investigate the variation in serotiny at individual, population and landscape levels. 4. At the individual level, the results support our prediction that the occurrence of lethal fires favours trees with high serotiny while low serotiny trees are favoured by other types of disturbances. 5. At the population level, the frequency of low serotiny trees increases with time since stand initiation, as a result of higher establishment opportunities after disturbances other than lethal fires. The proportion of low serotiny trees also increases with the occurrence of nonlethal fires. 6. Significant differences were found between the two landscapes. On the mainland, serotinous trees were more abundant, whereas on the islands where nonlethal fires were recorded, low serotiny trees were more frequent. These results support the hypothesis that fire imposes differential selective pressures on serotiny in jack pine.
Publication Journal of Ecology
Volume 84
Issue 4
Pages 539-548
Date August 1996
Journal Abbr J. Ecol.

ISSN 0022-0477
URL http://www.jstor.org/stable/2261476
Extra Keywords: cone polymorphism; disturbance regime; fire intensity; fire interval; Pinus banksiana Lamb.
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:19:07 2011

Effects of fire, topography and year-to-year climatic variation on species composition in tallgrass prairie

Type Journal Article
Author David J. Gibson
Author Lloyd C. Hulbert
Abstract Native unploughed tallgrass prairie from Konza Prairie, Kansas, USA is described with respect to plant species compositional changes over a five year period in response to fire and topography. The principal gradient of variation in the vegetation is related to time since burning. Species show an individualistic response in terms of relative abundance to this gradient. Both the percentage of and cover of C_4 species and all grasses decrease as the prairie remains unburnt. Forb and woody plant species numbers and abundance increase along this gradient. A secondary gradient of variation reflects topography (i.e. upland versus lowland soils). Upland soils support a higher species richness and diversity. Upland and lowland plant assemblages are distinct except on annually burnt prairie. The interaction between burning regime, topography and year-to-year climatic variation affects the relative abundance of the plant species differentially. The most dominant species overall, Andropogon gerardii, was affected only by year-to-year variation (i.e. climate). Its position at the top of the species abundance hierarchy was unaffected by burning regime or soil type. The other dominant species showed a suite of varying responses to these factors.
Publication Vegetatio
Volume 72
Issue 3
Pages 175-185
Date November 15, 1987
Journal Abbr Vegetatio
ISSN 0042-3106
URL http://www.jstor.org/stable/20038215
Extra Keywords: American prairie; Andropogon gerardii; diversity; grassland; multivariate analysis; regression analysis.
Date Added Mon Aug 29 06:17:09 2011
Modified Sun Sep 4 02:50:26 2011

Effects of invasive alien plants on fire regimes

Type Journal Article
Author Matthew L. Brooks
Author Carla M. D'antonio
Author David M. Richardson
Author James B. Grace
Author Jon E. Keeley
Author Joseph M. Ditomaso
Author Richard J. Hobbs
Author Mike Pellant
Author David Pyke

Abstract Plant invasions are widely recognized as significant threats to biodiversity conservation worldwide. One way invasions can affect native ecosystems is by changing fuel properties, which can in turn affect fire behavior and, ultimately, alter fire regime characteristics such as frequency, intensity, extent, type, and seasonality of fire. If the regime changes subsequently promote the dominance of the invaders, then an invasive plant–fire regime cycle can be established. As more ecosystem components and interactions are altered, restoration of preinvasion conditions becomes more difficult. Restoration may require managing fuel conditions, fire regimes, native plant communities, and other ecosystem properties in addition to the invaders that caused the changes in the first place.We present a multiphase model describing the interrelationships between plant invaders and fire regimes, provide a system for evaluating the relative effects of invaders and prioritizing them for control, and recommend ways to restore preinvasion fire regime properties.

Publication BioScience
Volume 54
Issue 7
Pages 677-688
Date July 2004
Journal Abbr BioScience
DOI 10.1641/0006-3568(2004)054[0677:EOIAPO]2.0.CO;2
ISSN 0006-3568
URL http://www.bioone.org/doi/full/10.1641/0006-3568%282004%29054%5B0677%3AEOIAPO%5D2.0.CO%3B2
Extra Keywords: disturbance; fire frequency; fire intensity; fuel; nonnative plants.
Date Added Wed Aug 24 12:16:11 2011
Modified Fri Aug 26 20:34:14 2011

Effects of long-term water balances on fire regime, north-western Minnesota

Type Journal Article
Author James S. Clark
Abstract Summary: (1) Water balances, modelled from 150 years of temperature and precipitation data, were used together with long-term fire-history data to assess the effect of climate variability on fire occurrence determined in a separate study. (2) The water balance shifted from consistently positive effective precipitation (precipitation minus potential evapotranspiration) during the Nineteenth century to one where precipitation roughly equalled potential evapotranspiration during the Twentieth century. Droughts during the 1890s and 1930s were characterized by a negative water balance. Fire-season precipitation was particularly low in the 1890s. (3) Analyses of soil storage and effective precipitation showed that fires tended to take place during decades of high moisture deficits and in dry years occurring in the course of moister decades. In some cases where fire occurrence was not well predicted by annual water balance, fire was predicted by fire-season (March-June and October-November) water balance. Annual water balances of fire years showed higher deficits than those of non-fire years. The empirical relationship between fire history and long-term water balance provides a crude basis for prediction of changing wildfire regimes to be expected with climate change. (4) In the absence of fire suppression, fire frequency is predicted to increase by 10-25% during the Twentieth century as a consequence of a more negative water balance.
Publication Journal of Ecology
Volume 77
Issue 4
Pages 989-1004
Date December 1989
Journal Abbr J. Ecol.
ISSN 0022-0477
URL http://www.jstor.org/stable/2260818
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:08:56 2011

Effects of settlement and fire suppression on landscape structure

Type Journal Article
Author William L. Baker
Abstract Natural landscapes subject to disturbances have a patchy structure that is important to many species living in these landscapes. This structure may be modified when the disturbance regime is altered by either climatic change or human influences (e.g., fire suppression), yet little is known about how this structure will change. I used a GIS (geographic information system)-based spatial model and data on historical changes in fire sizes and intervals to simulate the effects of settlement and fire suppression on the structure of the landscape in the Boundary Waters Canoe Area, Minnesota. I used seven measures to assess change in landscape structure. Settlement and fire suppression altered some but not all components of landscape structure. Settlement produced an immediate significant effect on some measures (age, shape, Shannon diversity, richness, and angular second moment), but no effect on other measures (size, fractal dimension). In contrast, suppression produced an immediate response in fewer measures (shape, Shannon diversity, richness), a delay for several decades in the case of some measures (age, fractal dimension), and a delay for hundreds of years in the case of other measures (size, angular second moment). Landscapes that have been altered by settlement and fire suppression cannot be restored using traditional methods of prescribed burning, which will simply produce further alteration. Causes of landscape change cannot be separated without control landscapes that lack prescribed burning, fire suppression, or other alterations of the natural fire regime.
Publication Ecology
Volume 73
Issue 5
Pages 1879–1887
Date October 1992
Journal Abbr Ecology
DOI 10.2307/1940039
ISSN 0012-9658
URL http://www.jstor.org/stable/1940039
Extra Keywords: Boundary Waters Canoe Area, Minnesota; fire; fire suppression; landscape change; landscape ecology; simulation; spatial model.
Date Added Tue Aug 23 01:41:11 2011
Modified Wed Aug 24 04:42:45 2011

Effects of site, landscape features, and fire regime on vegetation patterns in presettlement southern Wisconsin

Type Journal Article
Author Lawrence A. Leitner
Author Christopher P. Dunn
Author Glenn R. Guntenspergen
Author Forest Stearns
Author David M. Sharpe
Abstract The presettlement tree cover (1831 -33) of 3 townships in a southern Wisconsin landscape was analyzed using original survey records. Four forest types were identified: closed forest, open forest, savanna, and prairie. Comparisons of vegetation types and landscape pattern were made between the east and west sides of the Pecatonica River, which bisects the landscape and could have acted as a natural fire barrier. West of the river, presettlement tree species richness and diversity were lower and trees were smaller in diameter and less dense than to the east. The major vegetation types to the west were prairie (42% of landscape) and savanna (40%), both fire-susceptible types. Prairie was more common on gentle slopes than on other landforms. To the east, the landscape was 70% forested (closed plus open forest). Here, prairie was more frequent on steep dry sites. These vegetation differences, including the contrasting landscape placement of prairie, are attributed to distinct site characteristics and to disturbance (fire) regimes, with the west likely having more frequent fires. In terms of the

four vegetation types, the east landscape was more homogeneous, being dominated by closed forest (50%). West of the Pecatonica River, the landscape was more heterogeneous because of the high proportion of both prairie and savanna; however, in terms of flammability of vegetation, the west was essentially homogeneous (82% prairie plus savanna).

Publication Landscape Ecology
Volume 5
Issue 4
Pages 203–217
Date July 1991
Journal Abbr Landscape Ecol.
DOI 10.1007/BF00141435
ISSN 0921-2973 (print) 1572-9761 (online)
URL http://www.springerlink.com/content/ujp616418x175482/?p=e575bca388c14a28b9a3c7f76ead55d4&…
Extra Keywords: disturbance; fire; heterogeneity; landscape pattern; topography; Wisconsin.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:10 2011

Effects of syn-pandemic fire reduction and reforestation in the tropical Americas on atmospheric CO_2 during European conquest

Type Journal Article
Author Richard J. Nevle
Author Dennis K. Bird
Abstract A new reconstruction of Late Holocene biomass burning in the tropical Americas is consistent with the expansion of fire use by Mesoamerican and Amazonian agriculturalists and a subsequent period of fire reduction beginning ~ 500 years BP. The marked reduction of biomass burning after ~ 500 years BP, a unique feature of the fire history of the tropical Americas relative to other regions of the globe, is synchronous with the collapse of the American indigenous population during pandemics accompanying European conquest. We predict that fire reduction contemporaneous with pandemics in the tropical Americas was associated with massive forest regeneration on ~ 5×10^5 km^2 of land and sequestration of 5–10 Gt C into the terrestrial biosphere, which contributed to the ~ 2% global reduction in atmospheric CO_2 levels and the 0.1‰ increase in $\delta^{13}C$ of atmospheric CO_2 from 1500 to 1750 A.D. This study 1) builds upon prior fire history reconstructions by synthesizing a substantially greater number of stratigraphic charcoal accumulation records and soil charcoal ^{14}C dates to resolve features of the Late Holocene biomass burning record in the tropical Americas; and 2) corroborates the hypothesis advanced by Ruddiman [Ruddiman, W.F., 2003. The Anthropogenic Era began thousands of years ago. Climatic Change 61, 261–293, Ruddiman, W.F., 2005. Plows, Plagues, and Petroleum. Princeton University Press, Princeton, New Jersey] that biospheric carbon sequestration via reforestation of cropland abandoned during pandemics contributed to changes in atmospheric CO_2 concentration during the past millennium.
Publication Palaeogeography, Palaeoclimatology, Palaeoecology
Volume 264
Issue 1-2
Pages 25–38
Date 7 July 2008
Journal Abbr PALAEO
DOI 10.1016/j.palaeo.2008.03.008
ISSN 0031-0182
URL http://www.sciencedirect.com/science/article/pii/S0031018208001806
Extra Keywords: biomass burning; carbon dioxide; charcoal; pandemic; reforestation; Tropical forest.
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:37:26 2011

Effects of vegetation zones and climatic changes on fire-induced atmospheric carbon emissions: A model based on paleodata

Type Journal Article
Author Laurent Bremond
Author Christopher Carcaillet
Author Charly Favier
Author Adam A. Ali
Author Cédric Paitre
Author Yves Bégin
Author Yves Bergeron
Author Pierre J. H. Richard
Abstract An original method is proposed for estimating past carbon emissions from fires in order to understand long-term changes in the biomass burning that, together with vegetation cover, act on the global carbon cycle and climate. The past carbon release resulting from paleo-fires during the Holocene is examined using a simple linear model between measured carbon emissions from modern fires and sedimentary charcoal records of biomass burning within boreal and cold temperate forests in eastern Canada (Quebec, Ontario). Direct carbon emissions are estimated for each ecozone for the present period and the fire anomaly per kilo annum (ka) v. present day (0 ka) deduced from charcoal series of 46 lakes and peats. Over the postglacial, the Taiga Shield ecozone does not match the pattern of fire history and carbon release of Boreal Shield, Atlantic Maritime, and Mixedwood Plains ecozones. This feature results from different air mass influences and the timing of vegetation dynamics. Our estimations show, first, that the contribution of the Mixedwood Plains and the Atlantic Maritime ecozones on the total carbon emissions by fires remains negligible compared with the Boreal Shield. Second, the Taiga Shield plays a key role by maintaining important carbon emissions, given it is today a lower contributor.
Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 1015–1025
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09096
ISSN 1448-5516
Short Title Effects of vegetation zones and climatic changes on fire-induced atmospheric carbon emissions
URL http://www.publish.csiro.au/?paper=WF09096
Extra Keywords: air masses; biomass burning; boreal forest; Canadian vegetation ecozone; charcoal database; modelling; paleo-fires.
Date Added Wed Aug 24 12:11:59 2011
Modified Fri Aug 26 20:33:53 2011

Effects on ecosystems (Chapter 10) (Climate Change: The IPCC scientific assessment 1990)

Type Book Section
Author Jerry M. Melillo
Author Terry V. Callaghan
Author F. Ian Woodward
Author Enéas Salati
Author Suresh K. Sinha
Abstract no abstract

Book Title	Climate Change: The IPCC Scientific Assessment (1990)
Edition	1st edition
Place	Cambridge, New York and Melbourne
Publisher	Cambridge University Press
Date	1990
Pages	283-310
ISBN	0521407206, 9780521407205
Short Title	Climate Change
URL	http://lamar.colostate.edu/~mryan/Publications/Melillo_et_al_1990_IPCC1_WG1.PDF
Archive	http://www.ipcc.ch/publications_and_data/publications_ipcc_first_assessment_1990_wg1.shtml
Date Added	Tue Aug 30 14:35:38 2011
Modified	Wed Aug 31 00:22:33 2011

El Niño lends more confidence to strong global warming

Type	Journal Article
Author	Richard A. Kerr
Abstract	Some scientists have argued from observations that global warming will alter clouds in ways that will largely counter warming by greenhouse gases. But the overwhelming majority of climate scientists sides with the models, which show clouds changing in ways that amplify warming, not dampen it. Whom to believe? To help sort it out, a climate researcher looked at the example of El Niño and La Niña, naturally occurring weather patterns that cause warming (El Niño) and cooling (La Niña) in the tropical Pacific and around the globe. In a report on page 1523 of this week's issue of Science, he analyzes how they have actually influenced clouds and concludes that—at least on the scale of decades—clouds do not counter warming.
Publication	Science
Volume	330
Issue	6010
Pages	1465-1465
Date	10 December 2010
Journal Abbr	Science
DOI	10.1126/science.330.6010.1465
ISSN	0036-8075 (print), 1095-9203 (online)
URL	http://www.sciencemag.org/cgi/doi/10.1126/science.330.6010.1465
Date Added	Tue Aug 30 14:37:15 2011
Modified	Tue Aug 30 14:37:15 2011

El Niño and climate change

Type	Journal Article
Author	Kevin E. Trenberth
Author	Timothy J. Hoar
Abstract	A comprehensive statistical analysis of how an index of the Southern Oscillation changed from 1882 to 1995 was given by Trenberth and Hoar [1996], with a focus on the unusual nature of the 1990–1995 El Niño-Southern Oscillation (ENSO) warm event in the context of an observed trend for more El Niño and fewer La Niña events after the late 1970s. The conclusions of that study have been challenged by two studies which deal with only the part of our results pertaining to the length of runs of anomalies of one sign in the Southern Oscillation Index. They therefore neglect the essence of Trenberth and Hoar, which focussed on the magnitude of anomalies for certain periods and showed that anomalies during both the post-1976 and 1990-mid-1995 periods were highly unlikely given the previous record. With updated data through mid 1997, we have performed additional tests using a regression model with autoregressive-moving average (ARMA) errors that

simultaneously estimates the appropriate ARMA model to fit the data and assesses the statistical significance of how unusual the two periods of interest are. The mean SOI for the post-1976 period is statistically different from the overall mean at <0.05% and so is the 1990-mid-1995 period. The recent evolution of ENSO, with a major new El Niño event underway in 1997, reinforces the evidence that the tendency for more El Niño and fewer La Niña events since the late 1970s is highly unusual and very unlikely to be accounted for solely by natural variability.

Publication Geophysical Research Letters
Volume 24
Issue 23
Pages 3057–3060
Date December 1997
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/97GL03092
ISSN 0094–8276
URL http://www.agu.org/pubs/crossref/1997/97GL03092.shtml
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:08 2011

El Niño and its impact on fire weather conditions in Alaska

Type Journal Article
Author Jason C. Hess
Author Carven A. Scott
Author Gary L. Hufford
Author Michael D. Fleming
Abstract Examining the relationship of El Niño to weather patterns in Alaska shows wide climate variances that depend on the teleconnection between the tropics and the northern latitudes. However, the weather patterns exhibited in Alaska during and just after moderate to strong El Niño episodes are generally consistent: above normal temperature and precipitation along the Alaskan coast, and above normal temperature and below normal precipitation in the interior, especially through the winter. The warm, dry conditions in the Alaskan interior increase summer wildfire potential. Statistics on the area burned since 1940 show that 15 out of 17 of the biggest fire years occurred during a moderate to strong El Niño episode. These 15 years account for nearly 63% of the total area burned over the last 58 years. Evidence points to increased dry thunderstorms and associated lightning activity during an El Niño episode; the percentage of total area burned by lightning caused fires during five episodes increased from a normal of less than 40% to a high of about 96%.
Publication International Journal of Wildland Fire
Volume 10
Issue 1
Pages 1-13
Date January 2001
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF01007
ISSN 1448-5516
URL http://www.publish.csiro.au/paper/WF01007
Extra Keywords: El Niño; ENSO; Alaska; wildfires; weather patterns; burned area.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:33 2011

El Niño dynamics

Type Journal Article
Author J. David Neelin
Author Mojib Latif
Abstract Bringer of storms and droughts, the El Niño⁄Southern Oscillation results from the complex, sometimes chaotic interplay of ocean and atmosphere.
Publication Physics Today
Volume 51
Issue 12
Pages 32–36
Date December 1998
Journal Abbr Phys. Today
DOI 10.1063/1.882496
ISSN 0031-9228
URL http://dx.doi.org/10.1063/1.882496
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

El Niño–Southern Oscillation effect on a fire regime in northeastern Mexico has changed over time

Type Journal Article
Author Larissa L. Yocom
Author Peter Z. Fulé
Author Peter M. Brown
Author Julián Cerano
Author José Villanueva-Díaz
Author Donald A. Falk
Author Eladio Cornejo-Oviedo
Abstract The El Niño Southern Oscillation (ENSO) is a climate-forcing mechanism that has been shown to affect precipitation and the occurrence of wildfires in many parts of the world. In the southern United States and northern Mexico, warm events (El Niño) are associated with moist winter conditions and fewer fires, while cool events (La Niña) tend to favor dry winters and more fires. We tested this relationship in a region of northeastern Mexico by characterizing the historical fire regime and climatic influences. Fire regimes were reconstructed from fire-scar samples collected from 100 trees in three high-elevation sites on Peña Nevada in southern Nuevo León. The sites were ~25 ha each, and the site centers were ~1 km apart. The earliest recorded fire occurred in 1521 and the time period we used for analysis was 1645–1929. The sites were characterized by frequent surface fires before the 1920s. In the three sites, mean fire intervals ranged from 8.6 to 9.6 years (all fires) and 11.9 to 18.6 years (fires that scarred ≥25% of recording trees). The per-tree mean fire return interval was 17 years, and all three sites burned in the same year seven times between 1774 and 1929. After 1929, fires were nearly eliminated in all sites, likely due to human causes. We found a temporal change in the association between ENSO events and fires; before the 1830s La Niña events were significantly associated with fire years, while after the 1830s this association was not significant. In 1998, when the most severe El Niño event of the past century occurred, the three sites experienced severe, stand-replacing fires that killed many trees that had survived multiple surface fires in the past. Prior to the 1830s, fires tended to occur during dry La Niña years, but since then both La Niña and El Niño have been associated with dry years in this region, especially during the last three decades. This result suggests that ENSO effects have changed over time in this location and that phases of ENSO are not consistent indicators of precipitation, fire occurrence, or fire behavior in this area of northeastern Mexico.
Publication Ecology
Volume 91
Issue 6
Pages 1660-1671
Date June 2010

Journal Abbr Ecology
DOI 10.1890/09-0845.1
ISSN 0012-9658
URL http://www.esajournals.org/doi/abs/10.1890/09-0845.1
Extra Keywords: El Niño Southern Oscillation; fire history; fire scars; Peña Nevada; southern Nuevo León; Mexico; Pinus hartwegii.
Date Added Tue Aug 16 01:30:32 2011
Modified Tue Aug 16 01:30:42 2011

Emergence of a mid-season period of low floral resources in a montane meadow ecosystem associated with climate change

Type Journal Article
Author George Aldridge
Author David W. Inouye
Author Jessica R. K. Forrest
Author William A. Barr
Author Abraham J. Miller-Rushing
Abstract Summary 1. Shifts in the spatial and temporal patterns of flowering could affect the resources available to pollinators, and such shifts might become more common as climate change progresses. 2. As mid-summer temperatures have warmed, we found that a montane meadow ecosystem in the southern Rocky Mountains of the United States exhibits a trend toward a bimodal distribution of flower abundance, characterized by a mid-season reduction in total flower number, instead of a broad, unimodal flowering peak lasting most of the summer season. 3. We examined the shapes of community-level flowering curves in this system and found that the typical unimodal peak results from a pattern of complementary peaks in flowering among three distinct meadow types (dry, mesic and wet) within the larger ecosystem. However, high mid-summer temperatures were associated with divergent shifts in the flowering curves of these individual meadow types. Specifically, warmer summers appeared to cause increasing bimodality in mesic habitats, and a longer interval between early and late flowering peaks in wet and dry habitats. 4. Together, these habitat-specific shifts produced a longer mid-season valley in floral abundance across the larger ecosystem in warmer years. Because of these warming-induced changes in flowering patterns, and the significant increase in summer temperatures in our study area, there has been a trend toward non-normality of flowering curves over the period 1974–2009. This trend reflects increasing bimodality in total community-wide flowering. 5. The resulting longer periods of low flowering abundance in the middle of the summer season could negatively affect pollinators that are active throughout the season, and shifts in flowering peaks within habitats might create mismatches between floral resources and demand by pollinators with limited foraging ranges. 6. Synthesis. Early-season climate conditions are getting warmer and drier in the high altitudes of the southern Rocky Mountains. We present evidence that this climate change is disrupting flowering phenology within and among different moisture habitats in a sub-alpine meadow ecosystem, causing a mid-season decline in floral resources that might negatively affect mutualists, especially pollinators. Our findings suggest that climate change can have complex effects on phenology at small spatial scales, depending on patch-level habitat differences.
Publication Journal of Ecology
Volume 99
Issue 4
Pages 905-913
Date July 2011
Journal Abbr J. Ecol.
DOI 10.1111/j.1365-2745.2011.01826.x
ISSN 0022-0477
URL http://doi.wiley.com/10.1111/j.1365-2745.2011.01826.x
Extra Keywords: climate change; cumulative flowering density; flower abundance; flowering phenology; plant–climate interactions; pollinators; resource availability; Rocky Mountain Biological Laboratory.
Date Added Mon Aug 15 22:55:48 2011

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Empirical analyses of plant-climate relationships for the western United States

Type Journal Article
Author Gerald E. Rehfeldt
Author Nicholas. L Crookston
Author Marcus V. Warwell
Author Jeffrey S. Evans
Abstract The Random Forests multiple-regression tree was used to model climate profiles of 25 biotic communities of the western United States and nine of their constituent species. Analyses of the communities were based on a gridded sample of ca. 140,000 points, while those for the species used presence-absence data from ca. 120,000 locations. Independent variables included 35 simple expressions of temperature and precipitation and their interactions. Classification errors for community models averaged 19%, but the errors were reduced by half when adjusted for misalignment between geographic data sets. Errors of omission for species-specific models approached 0, while errors of commission were less than 9%. Mapped climate profiles of the species were in solid agreement with range maps. Climate variables of most importance for segregating the communities were those that generally differentiate maritime, continental, and monsoonal climates, while those of importance for predicting the occurrence of species varied among species but consistently implicated the periodicity of precipitation and temperature-precipitation interactions. Projections showed that unmitigated global warming should increase the abundance primarily of the montane forest and grassland community profiles at the expense largely of those of the subalpine, alpine, and tundra communities but also that of the arid woodlands. However, the climate of 47% of the future landscape may be extramural to contemporary community profiles. Effects projected on the spatial distribution of species-specific profiles were varied, but shifts in space and altitude would be extensive. Species-specific projections were not necessarily consistent with those of their communities.
Publication International Journal of Plant Sciences
Volume 167
Issue 6
Pages 1123–1150
Date November 2006
Journal Abbr Int. J. Plant Sci.
DOI 10.1086/507711
ISSN 1058-5893
URL http://www.jstor.org/stable/10.1086/507711
Archive http://www.treesearch.fs.fed.us/pubs/25706
Call Number 0088
Extra Keywords: bioclimatic models; Random Forests multiple-regression tree; climatic distributions; climatic niche; response to climate change; global warming.
Date Added Mon Sep 5 02:09:00 2011
Modified Mon Sep 5 10:11:13 2011

Energy transformations and meridional circulations associated with simple baroclinic waves in a two-level, quasi-geostrophic model

Type Journal Article
Author Norman A. Phillips
Abstract The changes in geostrophic kinetic energy predicted by the "2 — ½ dimensional" quasi-geostrophic vorticity equations without friction are shown to be compatible with the mechanical energy equation. The second-order effects on a zonal current due to the presence of very simple unstable baroclinic waves are then analysed, using a two-level model of finite lateral width without friction or heat sources. In addition to the poleward transport

of sensible heat and the creation of kinetic energy by these waves, it is shown that they are accompanied in this model by a weak meridional circulation. This circulation consists of an indirect cell in middle latitudes with direct cells to the north and south. The possible importance of this mechanism in providing appropriately distributed sources and sinks of relative zonal momentum (and therefore in prescribing the distribution with latitude of the surface zonal winds) is demonstrated with the aid of Widger's observations of the horizontal momentum transfer by eddies during January 1946. Finally it is shown that about 95 per cent of the perturbation energy in the unstable waves of this type comes from the “potential energy” of the basic current, the small remainder coming from the kinetic energy of that current.

Publication Tellus
Volume 6
Issue 3
Pages 273-286
Date August 1954
Journal Abbr Tellus
DOI 10.1111/j.2153-3490.1954.tb01123.x
ISSN 0040-2826
URL http://doi.wiley.com/10.1111/j.2153-3490.1954.tb01123.x
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:30:27 2011

ENSO and PDO variability affect drought-induced fire occurrence in Rocky Mountain subalpine forests

Type Journal Article
Author Tania Schoennagel
Author Thomas T. Veblen
Author William H. Romme
Author Jason S. Sibold
Author Edward R. Cook
Abstract Understanding the effect of variation in climate on large-fire occurrence across broad geographic areas is central to effective fire hazard assessment. The El Niño– Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO) affect winter temperature and precipitation regimes in western North America through mid-latitude teleconnections. This study examines relationships of ENSO and the PDO to drought-induced fire occurrence in subalpine forests of three study areas across the Rocky Mountains: Jasper National Park (JNP, northern Rockies), Yellowstone National Park (YNP, central Rockies) and Rocky Mountain National Park (RMNP, southern Rockies) over the 1700–1975 period. Large-scale climatic anomalies captured by ENSO (NIÑO3) and PDO indices had differential effects on large-fire occurrence across the study areas. Superposed epoch analysis (SEA) showed that large fires in RMNP occurred during extreme La Niña years, while the PDO, although predominantly negative during fire years, did not depart significantly from the mean. In YNP and JNP, neither ENSO nor PDO indices were significantly different from the mean during large-fire years, although fires tended to occur during El Niño and positive PDO years. Constructive phases (years of combined warm [positive] or cool [negative] phases) of ENSO and the PDO were significantly associated with large-fire occurrence across the Rockies, even though these large-scale climatic anomalies were not significant when considered singly in SEAs. Combined warm phases (positive PDO during El Niño) co-occurred with large fires in the central and northern Rockies, while the combined cool phases (negative PDO during La Niña) appeared to promote large fires in the southern Rockies. Almost 70% of large fires in RMNP burned during La Niña events that coincided with a negative PDO, although these phases co-occurred during only 29% of the 1700–1975 period. Spatial teleconnection patterns between drought, PDO and ENSO across western North America independently support the sign and strength of relationships between these climatic anomalies and subalpine fire occurrence along a broad north–south gradient of the Rockies. Forecasts of ENSO that are dependent on the expected PDO phase suggest promise for fire hazard prediction across the West.
Publication Ecological Applications
Volume 15

Issue 6
Pages 2000–2014
Date December 2005
Journal Abbr Ecol. Appl.
DOI 10.1890/04-1579
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/04-1579
Extra Keywords: climate; drought; El Niño–Southern Oscillation; fire ecology; Pacific Decadal Oscillation; subalpine forests.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:26:12 2011

ENSO as a forewarning tool of regional fire occurrence in northern Patagonia, Argentina

Type Journal Article
Author Thomas Kitzberger
Abstract Composite series of ENSO indices recorded over 36 months preceding major fire years in four National Parks in northern Patagonia were compared with series of these indices for individual years over the period 1950–1996 by means of an additive temporal phase coherence index. Logistic regressions of the dichotomous variable high vs low regional fire occurrence against the coherence index gained highest significant classificatory power using an index based on SST anomaly data between January of year –3 to August of year –1. Thus, warnings of extreme fire seasons could be declared as early as 3 months before the full fire season starts (i.e. early September). A regional fire season readiness index is proposed based on the periodicity of the Southern Oscillation, strong links with climate at particular regions of the globe, and empirically derived climatic controls on fine fuel buildup and coarse fuel desiccation. This long-range alerting tool could help decision-makers prepare preventative measures to mitigate the effects of large, high intensity wildfire seasons. However, it should be used with caution given that differences in timing in the onset of ENSO events and instability in teleconnection patterns could change climatic sequences, differentially affecting fire susceptibility.
Publication International Journal of Wildland Fire
Volume 11
Issue 1
Pages 33-39
Date January 2002
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF01041
ISSN 1448-5516
URL http://www.publish.csiro.au/paper/WF01041
Extra Keywords: ENSO; regional fire occurrence; El Niño; forecasting; Patagonia.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:15:47 2011

Notes:

Composite series of ENSO indices recorded over 36 months preceding major fire years in four National Parks in northern Patagonia were compared with series of these indices for individual years over the period 1950–1996 by means of an additive temporal phase coherence index. Logistic regressions of the dichotomous variable high vs low regional fire occurrence against the coherence index gained highest significant classificatory power using an index based on SST anomaly data between January of year –3 to August of year –1. Thus, warnings of extreme fire seasons could be declared as early as 3 months before the full fire season starts (i.e. early September). A regional fire season readiness index is proposed based on the periodicity of the Southern Oscillation, strong links with climate at particular regions of the globe, and empirically derived climatic controls on fine fuel buildup and coarse fuel desiccation. This long-range alerting tool could help decision-makers prepare preventative measures to mitigate the effects of large, high intensity wildfire seasons. However, it should be used with caution given that differences in timing in the onset of ENSO events and instability in teleconnection patterns could change climatic sequences, differentially affecting fire susceptibility.

Environmental controls on the distribution of wildfire at multiple spatial scales

Type Journal Article

Author Marc-André Parisien

Author Max A. Moritz

Abstract Despite its widespread occurrence globally, wildfire preferentially occupies an environmental middle ground and is significantly less prevalent in biomes characterized by environmental extremes (e.g., tundra, rain forests, and deserts). We evaluated the biophysical "environmental space" of wildfire from regional to subcontinental extents, with methods widely used for modeling habitat distributions. This approach is particularly suitable for the biogeographic study of wildfire, because it simultaneously considers patterns in multiple factors controlling wildfire suitability over large areas. We used the Maxent and boosted regression tree algorithms to assess wildfire–environment relationships for three levels of complexity (in terms of inclusion of variables) at three spatial scales: the conterminous United States, the state of California, and five wildfire-prone ecoregions of California. The resulting models were projected geographically to obtain spatial predictions of wildfire suitability and were also applied to other regions to assess their generality and spatial transferability. Predictions of the potential range of wildfire had high classification accuracy; they also highlighted areas where wildfires had not recently been observed, indicating the potential (or past) suitability of these areas. The models identified several key variables that were not suspected to be important in the large-scale control of wildfires, but which might indirectly affect control by influencing the presence of flammable vegetation. Models transferred to different areas were useful only when they overlapped appreciably with the target area's environmental space. This approach should allow exploration of the potential shifts in wildfire range in a changing climate, the potential for restoration of wildfire where it has been "extirpated," and, conversely, the "invasiveness" of wildfire after changes in plant species composition. Our study demonstrates that habitat distribution models and related concepts can be used to characterize environmental controls on a natural disturbance process, but also that future work is needed to refine our understanding of the direct causal factors controlling wildfire at multiple spatial scales.

Publication Ecological Monographs

Volume 79

Issue 1

Pages 127-154

Date February 2009

Journal Abbr Ecol. Monogr.

DOI 10.1890/07-1289.1

ISSN 0012-9615

URL http://www.esajournals.org/doi/abs/10.1890/07-1289.1

Extra Keywords: boosted regression trees; disturbance ecology; environmental space; fire regime controls; habitat distribution models; Maxent algorithm; spatial fire prediction; wildfire.

Date Added Sun Aug 28 00:27:26 2011

Modified Sun Aug 28 00:29:28 2011

Environmental drivers of large, infrequent wildfires: The emerging conceptual model

Type Journal Article
Author Andrea Meyn
Author Peter S. White
Author Constanze Buhk
Author Anke Jentsch
Abstract Large, infrequent fires (LIFs) can have substantial impacts on both ecosystems and the economy. To better understand LIFs and to better predict the effects of human management and climate change on their occurrence, we must first determine the factors that produce them. Here, we review local and regional literature investigating the drivers of LIFs. The emerging conceptual model proposes that ecosystems can be typified based on climatic conditions that determine both fuel moisture and fuel amount. The concept distinguishes three ecosystem types: (1) biomass-rich, rarely dry ecosystems where fuel moisture rather than fuel amount limits LIFs; (2) biomass-poor, at least seasonally dry ecosystems where fuel amount rather than fuel moisture limits LIFs; and (3) biomass-poor, rarely dry ecosystems where both fuel amount and fuel moisture limit the occurrence of LIFs. Our main goal in this paper is to discuss the drivers of LIFs and the three mentioned ecosystem types in a global context. Further, we will discuss the drivers that are not included within the `fuels' versus `climate' discussion. Finally, we will address the question: what kinds of additional information are needed if models predicting LIFs are to be coupled with global climate models? As with all generalizations, there are local deviations and modifications due to processes such as disturbance interaction or human impact. These processes tend to obscure the general patterns of the occurrence of LIFs and are likely to cause much of the observed controversy and confusion in the literature.
Publication Progress in Physical Geography
Volume 31
Issue 3
Pages 287 -312
Date June 2007
Journal Abbr Prog. Phys. Geog.
DOI 10.1177/0309133307079365
ISSN 1477-0296
Short Title Environmental drivers of large, infrequent wildfires
URL http://ppg.sagepub.com/content/31/3/287.abstract
Extra Keywords: biomass; climate; disturbance interaction; fire size; fire suppression; fire weather; fuel amount; fuel moisture.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:46:12 2011

Estimates of CO_2 from fires in the United States: Implications for carbon management

Type Journal Article
Author Christine Wiedinmyer
Author Jason C. Neff
Abstract • Background: Fires emit significant amounts of CO_2 to the atmosphere. These emissions, however, are highly variable in both space and time. Additionally, CO_2 emissions estimates from fires are very uncertain. The combination of high spatial and temporal variability and substantial uncertainty associated with fire CO_2 emissions can be problematic to efforts to develop remote sensing, monitoring, and inverse modeling techniques to quantify carbon fluxes at the continental scale. Policy and carbon management decisions based on atmospheric sampling/modeling techniques must account for the impact of fire CO_2 emissions; a task that may prove very difficult for the foreseeable future. This paper addresses the variability of CO_2 emissions from fires across the US, how these emissions compare to anthropogenic emissions of CO_2 and Net Primary Productivity, and the potential implications for monitoring programs and policy development. • Results: Average annual CO_2 emissions from fires in the lower 48 (LOWER48) states from 2002– 2006 are estimated to be 213 (± 50 std. dev.) Tg CO_2 yr^{-1} and 80 (± 89 std. dev.) Tg CO_2 yr^{-1} in Alaska. These estimates have significant interannual and spatial variability. Needleleaf forests in the Southeastern US and the Western US are the dominant source regions for US fire CO_2 emissions. Very high emission years typically coincide with droughts,

and climatic variability is a major driver of the high interannual and spatial variation in fire emissions. The amount of CO_2 emitted from fires in the US is equivalent to 4–6% of anthropogenic emissions at the continental scale and, at the statelevel, fire emissions of CO_2 can, in some cases, exceed annual emissions of CO_2 from fossil fuel usage. • Conclusion: The CO_2 released from fires, overall, is a small fraction of the estimated average annual Net Primary Productivity and, unlike fossil fuel CO_2 emissions, the pulsed emissions of CO_2 during fires are partially counterbalanced by uptake of CO_2 by regrowing vegetation in the decades following fire. Changes in fire severity and frequency can, however, lead to net changes in atmospheric CO_2 and the short-term impacts of fire emissions on monitoring, modeling, and carbon management policy are substantial.

Publication Carbon Balance and Management
Volume 2
Issue 10
Pages 12 p.
Date November 2007
Journal Abbr Carbon Bal. Manage
DOI 10.1186/1750-0680-2-10
ISSN 1750-0680
URL http://www.cbmjournal.com/content/2/1/10
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:17 2011

Estimating wildfire behavior and effects

Type Report
Author Frank A. Albini
Abstract This paper presents a brief survey of the research literature on wildfire behavior and effects and assembles formulae and graphical computation aids based on selected theoretical and empirical models. The uses of mathematical fire behavior models are discussed, and the general capabilities and limitations of currently available models are outlined. Rothermel's fire spread model is used to develop nomographs for estimating rate of spread, reaction intensity, and flame length for a variety of fuel complexes, under widely variable conditions. Factors affecting spread rate and overall shape of a fire are quantified, as well as some fire effects such as crown scorching and duff removal. Appendices give more details of the formulations presented graphically in the text, including the definitions of terms used to quantify fire behavior and effects and tables of numerical factors for converting values to different units of measurement.
Report Number GTR-INT-030
Report Type General Technical Report
Place Ogden, UT
Institution U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station
Date 1976
Pages 92 p.
URL http://www.treesearch.fs.fed.us/pubs/29574
Extra Keywords: fire control; fire behavior model; fire management; computer program.
Date Added Mon Aug 15 22:54:31 2011
Modified Mon Aug 15 22:54:31 2011

Notes:

Citation:

Albini, Frank A. 1976. Estimating wildfire behavior and effects. Gen. Tech. Rep. INT-GTR-30. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 92 p.

Evaluating predictive models of critical live fuel moisture in the Santa Monica Mountains, California

Type Journal Article
Author Philip E. Dennison
Author Max A. Moritz
Author Robert S. Taylor
Abstract Large wildfires in the Santa Monica Mountains of southern California occur when low levels of live and dead fuel moisture coincide with Santa Ana wind events. Declining live fuel moisture may reach a threshold that increases susceptibility to large wildfires. Live fuel moisture and fire history data for the Santa Monica Mountains from 1984 to 2005 were used to determine a potential critical live fuel moisture threshold, below which large fires become much more likely. The ability of live fuel moisture, remote sensing, and precipitation variables to predict the annual timing of 71 and 77% live fuel moisture thresholds was assessed. Spring precipitation, measured through the months of March, April, and May, was found to be strongly correlated with the annual timing of both live fuel moisture thresholds. Large fires in the Santa Monica Mountains only occurred after the 77% threshold was surpassed, although most large fires occurred after the less conservative 71% threshold. Spring precipitation has fluctuated widely over the past 70 years but does not show evidence of long-term trends. Predictive models of live fuel moisture threshold timing may improve planning for large fires in chaparral ecosystems.
Publication International Journal of Wildland Fire
Volume 17
Issue 1
Pages 18–27
Date February 2008
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07017
ISSN 1448-5516
URL http://www.publish.csiro.au/paper/WF07017.htm
Extra Keywords: chamise; chaparral; precipitation; wildfire danger.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:39 2011

Evaluating the purpose, extent, and ecological restoration applications of indigenous burning practices in Southwestern

Type Journal Article
Author Linda Storm
Author Daniela Shebitz
Abstract Understanding the historic fire regime is essential before restoring fire to an ecosystem. Historical ecology provides a means to use both quantitative and qualitative data from different disciplines to address questions about how the traditional ecological management (TEM) practices of indigenous peoples influenced prairie and savanna ecosystems in the past. In this article, we evaluated paleoecological, archaeological, ethnographic, and ethnobotanical information about the Upper Chehalis River basin prairies of southwestern Washington to better understand the extent to which TEM influenced prairie distribution, composition, and availability of wild plant food resources. We also surveyed areas that had been burned at differing frequencies to test whether frequent fires increase camas (Camassia quamash) productivity. Preliminary results support the hypothesis that camas productivity increases with fire-return intervals of one to two years.
Publication Ecological Restoration
Volume 24
Issue 4
Pages 256-268
Date December 2006

Journal Abbr Ecological Restoration
DOI 10.3368/er.24.4.256
ISSN 1543-4060
URL http://er.uwpress.org/content/24/4/256.short
Library Catalog The University of Wisconsin Press
Call Number 0014
Extra Keywords: prairie restoration; historical ecology; traditional ecological management (TEM); fire; camas; Camassia quamash; Coast Salish subsistence.
Date Added Sun Sep 4 05:13:56 2011
Modified Mon Sep 5 10:11:05 2011

Evidence for active El Niño Southern Oscillation variability in the Late Miocene greenhouse climate

Type Journal Article
Author Simone Galeotti
Author Anna von der Heydt
Author Matthew Huber
Author David Bice
Author Henk Dijkstra
Author Tom Jilbert
Author Luca Lanci
Author Gert-Jan Reichart
Abstract An evaporite varve thickness record from the Late Miocene Mediterranean reveals significant signals of interannual variability, the frequency and persistence of which are compared with climatic oscillations affecting the region today. Sustained variability in the 2–7 yr band resembles the modern spectrum of the El Niño Southern Oscillation (ENSO) and contrasts with that of the North Atlantic Oscillation (NAO), the cyclicity of which is less stationary in frequency and less sustained in duration. Fully coupled climate model simulations demonstrate not only that ENSO variability persisted during the Late Miocene, but also that its teleconnections may have extended further than today, as high-latitude climate modes weakened due to a reduced meridional temperature gradient. ENSO appears to have exerted a stronger influence on the evaporative balance of the Mediterranean in the Late Miocene than it does today. This evidence suggests that the Pacific prior to the Northern Hemisphere glaciation was characterized by ongoing interannual variability.
Publication Geology
Volume 38
Issue 5
Pages 419-422
Date May 2010
Journal Abbr Geology
DOI 10.1130/G30629.1
ISSN 1943-2682
URL http://geology.gsapubs.org/content/38/5/419.abstract
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:36 2011

Evidence for habitual use of fire at the end of the Lower Paleolithic: Site-formation processes at Qesem Cave, Israel

Type Journal Article
Author Panagiotis Karkanas

Author Ruth Shahack-Gross
Author Avner Ayalon
Author Mira Bar-Matthews
Author Ran Barkai
Author Amos Frumkin
Author Avi Gopher
Author Mary C. Stiner

Abstract The Amudian (late Lower Paleolithic) site of Qesem Cave in Israel represents one of the earliest examples of habitual use of fire by middle Pleistocene hominids. The Paleolithic layers in this cave were studied using a suite of mineralogical and chemical techniques and a contextual sedimentological analysis (i.e., micromorphology). We show that the lower ca. 3 m of the stratigraphic sequence are dominated by clastic sediments deposited within a closed karstic environment. The deposits were formed by small-scale, concentrated mud slurries (infiltrated terra rosa soil) and debris flows. A few intervening lenses of mostly in situ burnt remains were also identified. The main part of the upper ca. 4.5 m consists of anthropogenic sediment with only moderate amounts of clastic geogenic inputs. The deposits are strongly cemented with calcite that precipitated from dripping water. The anthropogenic component is characterized by completely combusted, mostly reworked wood ash with only rare remnants of charred material. Micromorphological and isotopic evidence indicates recrystallization of the wood ash. Large quantities of burnt bone, defined by a combination of microscopic and macroscopic criteria, and moderately heated soil lumps are closely associated with the woodash remains. The frequent presence of microscopic calcified rootlets indicates that the upper sequence formed in the vicinity of the former cave entrance. Burnt remains in the sediments are associated with systematic blade production and faunas that are dominated by the remains of fallow deer. Use-wear damage on blades and blade tools in conjunction with numerous cut marks on bones indicate an emphasis on butchering and prey-defleshing activities in the vicinity of fireplaces.

Publication Journal of Human Evolution
Volume 53
Issue 2
Pages 197-212
Date August 2007
Journal Abbr J. Hum. Evol.
DOI 10.1016/j.jhevol.2007.04.002
ISSN 0047-2484
URL http://linkinghub.elsevier.com/retrieve/pii/S004724840700084X
Extra Keywords: micromorphology; geoarchaeology; fire; wood ash; Amudian; Lower Paleolithic.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:17:55 2011

Evidence for increasing red maple abundance in the eastern United States

Type Journal Article

Author Songlin Fei
Author Kim C. Steiner

Abstract Red maple (Acer rubrum L.) is widely believed to be increasing in abundance in eastern North America, but most evidence is anecdotal or localized. In this article we present analyses of FIA data sets designed to formally quantify changes in abundance of red maple in the eastern United States during the period of 1980 to 2005. The results indicate that recent increases in red maple abundance are almost ubiquitous on a state-by-state basis throughout the species' natural range and generally greatest in the western portions of the range. No states experienced a significant decrease in red maple abundance during this period. There is evidence that the species has naturalized into areas west of its putative pre-Columbian distribution. Red maple had an inverse “J” population structure, and density of red maple trees has increased in all diameter classes across the region. The trend of increasing red maple abundance will continue unless the circumstances that cause this phenomenon are changed.

Publication Forest Science

Volume 53
Issue 4
Pages 473–477
Date August 2007
Journal Abbr Forest Sci.
ISSN 0015-749X
URL http://www.ingentaconnect.com/content/saf/fs/2007/00000053/00000004/art00002
Extra Keywords: FIA; natural range; population structure.
Date Added Sun Aug 28 05:42:07 2011
Modified Sun Aug 28 05:45:55 2011

Evidence for the postconquest demographic collapse of the Americas in historical CO_2 levels

Type Journal Article
Author Franz X. Faust
Author Cristóbal Gnecco
Author Hermann Mannstein
Author Jörg Stamm
Abstract This article promotes the hypothesis that the massive demographic collapse of the native populations of the Americas triggered by the European colonization brought about the abandonment of large expanses of agricultural fields soon recovered by forests, which in due turn fixed atmospheric CO_2 in significant quantities. This hypothesis is supported by measurements of atmospheric CO_2 levels in ice cores from Law Dome, Antarctica. Changing the focus from paleoclimate to global population dynamics and using the same causal chain, the measured drop in historic atmospheric CO_2 levels can also be looked upon as further, strong evidence for the postconquest demographic collapse of the Americas.
Publication Earth Interactions
Volume 10
Issue 11
Pages 1–14
Date May 2006
Journal Abbr Earth Interact.
DOI 10.1175/EI157.1
ISSN 1087-3562
URL http://journals.ametsoc.org/doi/abs/10.1175/EI157.1
Extra Keywords: climate; forest; carbon.
Date Added Sun Aug 28 05:42:07 2011
Modified Wed Aug 31 01:13:34 2011

Exploring use of climate information in wildland fire management: A decision calendar study

Type Conference Paper
Author Thomas W. Corringham
Author Anthony L. Westerling
Author Barbara J. Morehouse
Abstract Wildfire management is an institutionally complex process involving a complex budget and appropriations cycle, a variety of objectives, and a set of internal and external political constraints. Significant potential exists for enhancing the use of climate information and long-range climate forecasts in wildland fire management in the Western U.S. Written surveys and interviews of fire and fuels managers at local, regional, and national levels, provide information and insights into the decision processes, information flows, and decision nodes used in wildfire planning and management, and allow the construction of decision calendars showing how climate

information needs vary seasonally, over space, and through the organizational network. Potential exists for fostering use of climate information, including seasonal to inter-annual climate forecasts at all organizational levels, ultimately opening possibilities for improved targeting of fuels treatments and prescribed burns, more effective positioning and movement of initial attack resources, and improved staffing and budgeting decisions. Longer-term (decadal) forecasts could be useful at the national level in setting budget and research priorities. We examine the kinds of organizational changes that could facilitate effective use of existing climate information and climate forecast capabilities.

Date	2006
Proceedings Title	Monitoring Science and Technology Symposium: Unifying Knowledge for Sustainability in the Western Hemisphere
Conference Name	Monitoring Science and Technology Symposium, September 20-24, 2004, Denver, CO
Place	Fort Collins, CO
Publisher	U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station
Pages	603-613
Series	Proceedings RMRS-P-42CD
Short Title	Exploring Use of Climate Information in Wildland Fire Management
URL	http://www.treesearch.fs.fed.us/pubs/26546
Archive	http://www.fs.fed.us/rm/pubs/rmrs_p042.html
Loc. in Archive	USDA Forest Service Proceedings RMRS-P-42CD
Extra	Keywords: monitoring; assessment; sustainability; Western Hemisphere; sustainable management; ecosystem resources; climate; wildland fire management.
Date Added	Tue Aug 30 02:03:25 2011
Modified	Tue Aug 30 02:03:25 2011

Notes:

Citation:

Corringham, Thomas W.; Westerling, Anthony L.; Morehouse, Barbara J. 2006. Exploring Use of Climate Information in Wildland Fire Management: A Decision Calendar Study. In: Aguirre-Bravo, C.; Pellicane, Patrick J.; Burns, Denver P.; and Draggan, Sidney, Eds. 2006. Monitoring Science and Technology Symposium: Unifying Knowledge for Sustainability in the Western Hemisphere Proceedings RMRS-P-42CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. p. 603-613.

Extended megadroughts in the southwestern United States during Pleistocene interglacials

Type	Journal Article
Author	Peter J. Fawcett
Author	Josef P. Werne
Author	R. Scott Anderson
Author	Jeffrey M. Heikoop
Author	Erik T. Brown
Author	Melissa A. Berke
Author	Susan J. Smith
Author	Fraser Goff
Author	Linda Donohoo-Hurley
Author	Luz M. Cisneros-Dozal
Author	Stefan Schouten
Author	Jaap S. Sinninghe Damsté
Author	Yongsong Huang
Author	Jaime Toney

Author Julianna Fessenden
Author Giday WoldeGabriel
Author Viorel Atudorei
Author John W. Geissman
Author Craig D. Allen
Abstract The potential for increased drought frequency and severity linked to anthropogenic climate change in the semi-arid regions of the southwestern United States (US) is a serious concern. Multi-year droughts during the instrumental period and decadal-length droughts of the past two millennia1, were shorter and climatically different from the future permanent, 'dust-bowl-like' megadrought conditions, lasting decades to a century, that are predicted as a consequence of warming. So far, it has been unclear whether or not such megadroughts occurred in the southwestern US, and, if so, with what regularity and intensity. Here we show that periods of aridity lasting centuries to millennia occurred in the southwestern US during mid-Pleistocene interglacials. Using molecular palaeotemperature proxies to reconstruct the mean annual temperature (MAT) in mid-Pleistocene lacustrine sediment from the Valles Caldera, New Mexico, we found that the driest conditions occurred during the warmest phases of interglacials, when the MAT was comparable to or higher than the modern MAT. A collapse of drought-tolerant C_4 plant communities during these warm, dry intervals indicates a significant reduction in summer precipitation, possibly in response to a poleward migration of the subtropical dry zone. Three MAT cycles ~2 °C in amplitude occurred within Marine Isotope Stage (MIS) 11 and seem to correspond to the muted precessional cycles within this interglacial. In comparison with MIS 11, MIS 13 experienced higher precessional-cycle amplitudes, larger variations in MAT (4–6 °C) and a longer period of extended warmth, suggesting that local insolation variations were important to interglacial climatic variability in the southwestern US. Comparison of the early MIS 11 climate record with the Holocene record shows many similarities and implies that, in the absence of anthropogenic forcing, the region should be entering a cooler and wetter phase.
Publication Nature
Volume 470
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Date 24 February 2011
Journal Abbr Nature
DOI 10.1038/nature09839
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature09839
Date Added Sun Aug 28 05:42:07 2011
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Extent and status of Midwest oak savanna: Presettlement and 1985

Type Journal Article
Author Victoria A. Nuzzo
Abstract Oak savanna covered some 11,000,000 to 13,000,000 hectares of the Midwest at the time of settlement, extending over portions of Minnesota, Iowa, Missouri, Illinois, Wisconsin, Michigan, Indiana and Ohio. Definitions for the community vary between the states, due in part to different concepts of the presettlement appearance and structure of the community, a general lack of phytosociological data about oak savanna, and difficulty in interpreting historical data. Community definitions, a map of the real or potential distribution of presettlement oak savanna, and description and location of high quality savanna remnants, are presented for each state. In 1985, 113 sites totaling more than 2,607 hectares of relatively high-quality oak savanna were located in the Midwest, approximately 0.02 percent of the presettlement extent of the community.
Publication Natural Areas Journal
Volume 6
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Date 1986

Journal Abbr Nat. Areas J.
ISSN 0885-8608
Short Title Extent and status of Midwest oak savanna
URL http://www.epa.gov/ecopage/upland/oak/oak94/Proceedings/Nuzzo.html
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External forcing as a metronome for Atlantic multidecadal variability

Type Journal Article
Author Odd Helge Otterå
Author Mats Bentsen
Author Helge Drange
Author Lingling Suo
Abstract Instrumental records, proxy data and climate modelling show that multidecadal variability is a dominant feature of North Atlantic sea-surface temperature variations, with potential impacts on regional climate5. To understand the observed variability and to gauge any potential for climate predictions it is essential to identify the physical mechanisms that lead to this variability, and to explore the spatial and temporal characteristics of multidecadal variability modes. Here we use a coupled ocean–atmosphere general circulation model to show that the phasing of the multidecadal fluctuations in the North Atlantic during the past 600 years is, to a large degree, governed by changes in the external solar and volcanic forcings. We find that volcanoes play a particularly important part in the phasing of the multidecadal variability through their direct influence on tropical sea-surface temperatures, on the leading mode of northern-hemisphere atmosphere circulation and on the Atlantic thermohaline circulation. We suggest that the implications of our findings for decadal climate prediction are twofold: because volcanic eruptions cannot be predicted a decade in advance, longer-term climate predictability may prove challenging, whereas the systematic post-eruption changes in ocean and atmosphere may hold promise for shorter-term climate prediction.
Publication Nature Geoscience
Volume 3
Issue 10
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Journal Abbr Nature Geosci.
DOI 10.1038/ngeo955
ISSN 1752-0894
URL http://www.nature.com/doifinder/10.1038/ngeo955
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Modified Sat Aug 27 18:48:20 2011

Extreme fires under warmer and drier conditions inferred from sedimentary charcoal morphotypes from Opatcho Lake, central British Columbia, Canada

Type Journal Article
Author Mihaela D. Enache
Author Brian F. Cumming
Abstract Predictions of the extent of forest fires under warmer and drier conditions in boreal regions require knowledge of long-term relationships between fire and climate. However, many long-term studies that utilize the remains of total charcoal in lacustrine sediments fail to demonstrate a relationship between climate change and fire activity. A new approach to reconstruct the relative-area burned based on specific types of charcoal particles (the charcoal-morphotype (CM) fire index) has shown significant correlations to recorded forest fires. Here we assess the utility of the CM derived from an analysis of charcoal morphotypes in sediment cores from Opatcho

Lake (British Columbia, Canada) using two independent paleoclimate proxies over the last 400 years, and since the mid Holocene. Over the past 400 years, significant correlations between the CM fire index and independent climate reconstructions (diatom-inferred salinity, dendroclimatic reconstructions of temperature and precipitation, and reconstructions of the Pacific Decadal Oscillation) range from 0.35 to 0.42. Similarly, since the mid Holocene the correlation between the CM fire index and independent proxies of past climate (diatom-inferred salinity and temperature inferences from chironomids from the southern interior of British Columbia) range from 0.70 to 0.76. These significant correlations strongly contrast with the very low and insignificant correlations between the CM fire index and total charcoal, suggesting that this approach provides paleofire information not available from traditional techniques. The CMfire index suggests that fires were at least two- and five-fold larger than those observed during the instrumental period, over the last 400 and 6000 years, respectively.

Publication The Holocene
Volume 19
Issue 6
Pages 835-846
Date September 2009
Journal Abbr Holocene
DOI 10.1177/0959683609337357
ISSN 0959-6836
URL http://hol.sagepub.com/cgi/doi/10.1177/0959683609337357
Extra Keywords: fire index; climate; charcoal morphotypes; total charcoal; diatoms; Holocene; Opatcho Lake; British Columbia; Canada.
Date Added Sun Aug 28 05:42:07 2011
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Factors affecting sustained smouldering in organic soils from pocosin and pond pine woodland wetlands

Type Journal Article
Author James Reardon
Author Roger Hungerford
Author Kevin Ryan
Abstract The smouldering combustion of peat and muck soil plays an important role in the creation and maintenance of wetland communities. This experimental study was conducted to improve our understanding of how moisture and mineral content constrain smouldering in organic soil. Laboratory burning was conducted with root mat and muck soil samples from pocosin and pond pine woodland wetlands common on the North Carolina coastal plain. The results of laboratory and prescribed burning were compared. Laboratory results showed that moisture and mineral content influenced sustained smouldering in root mat soils. Predictions based on logistic regression analysis show that root mat soils with an average mineral content of 4.5% had an estimated 50% probability of sustained smouldering at a moisture content of 93%, whereas at moisture contents above 145% the estimated probability was less than 10%. The odds that root mat soil will sustain smouldering decrease by 19.3% for each 5% increase in moisture content. Root mat soils with an average mineral content of 5.5% and a moisture content of 93% had an estimated 61% probability of sustained smouldering. The odds that root mat soil will sustain smouldering combustion increased by 155.9% with each 1% increase in mineral content. Root mat and muck soils differ in physical and chemical characteristics expected to influence smouldering behaviour. The formation of muck soil has led to increases in density, smaller soil particle size, changes in water holding characteristics and increases in waxes, resins and bituminous compounds. Muck soil smouldered at higher moisture contents than root mat soil. Muck soil at a moisture content of 201% had an estimated 50% probability of sustained smouldering, whereas at moisture contents above 260% the estimated probability was less than 10%. The odds that muck soil will sustain smouldering combustion decrease by 17.2% with each 5% increase in moisture content. Ground fire in the prescribed burns stopped its vertical spread in organic soils at moisture contents consistent with logistic regression predictions developed from our laboratory results.
Publication International Journal of Wildland Fire
Volume 16

Issue 1
Pages 107–118
Date February 2007
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF06005
ISSN 1448-5516
URL http://www.publish.csiro.au/?paper=WF06005
Date Added Mon Aug 29 00:48:23 2011
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Federal forest-fire policy in the United States

Type Journal Article
Author Scott L. Stephens
Author Lawrence W. Ruth
Abstract Forest-fire policy of U.S. federal agencies has evolved from the use of small patrols in newly created National Parks to diverse policy initiatives and institutional arrangements that affect millions of hectares of forests. Even with large expenditures and substantial infrastructure dedicated to fire suppression, the annual area burned by wildfire has increased over the last decade. Given the current and future challenges of fire management, and based on analytical research and review of existing policies and their implications, we believe several changes and re-emphases in existing policy are warranted. Most importantly, the actual goal of fuels-management projects should be the reduction of potential fire behavior and effects, not the simple reduction of fuels. To improve safety and economic efficiency, fire-suppression policies should recognize differences in the characteristics of wildfires, and strategies should be tailored to better respond to the unique demands of each fire. Where forest fires are burning large areas, as in the western United States, reducing the trend of increased amounts of burned area may require a diversity of treatments, including prescribed burning, mechanical fuels treatment, and increased use of the Wildland Fire Use Policy. Assessment of how fire is affecting forests would be enhanced if land-management agencies reported the area burned by low-, mixed-, and high-severity fire and what proportion is outside the desired trend or range of conditions for each forest type. Congress should provide an improved budgetary process for fire and fuels management, with a larger annual federal fire-suppression budget. Additionally, reducing annual area burned will require long-term coordinated efforts by federal and state governments, with robust partnerships between land-management agencies and the public in collaborative planning and stewardship. Research and adaptive management are essential in allowing fire-hazard-reduction projects to move forward where proposed projects are met with uncertainty and mistrust. While legislative reform may be desirable, a strategy that is not entirely dependent on new legislation is needed. Building on existing programs that are consistent with a science-based strategy will enable land-management agencies to better utilize information in pursuit of the overall objective of reducing uncharacteristically severe wildfires.
Publication Ecological Applications
Volume 15
Issue 2
Pages 532-542
Date April 2005
Journal Abbr Ecol. Appl.
DOI 10.1890/04-0545
ISSN 1051-0761
URL http://www.esajournals.org/doi/full/10.1890/04-0545
Extra Keywords: fire hazard; fire suppression; forest policy; fuels management; U.S. government policy; wildfire.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:57 2011

Feedback and sensitivity in an electrical circuit: An analog for climate models

Type Journal Article
Author Stephen E. Schwartz
Abstract Earth's climate sensitivity is often interpreted in terms of feedbacks that can alter the sensitivity from that of a no-feedback Stefan-Boltzmann radiator, with the feedback concept and algebra introduced by analogy to the use of this concept in the electronics literature. This analogy is quite valuable in interpreting the sensitivity of the climate system, but usage of this algebra and terminology in the climate literature is often inconsistent, with resultant potential for confusion and loss of physical insight. Here a simple and readily understood electrical resistance circuit is examined in terms of feedback theory to introduce and define the terminology that is used to quantify feedbacks. This formalism is applied to the feedbacks in an energy-balance model of Earth's climate and used to interpret the magnitude of feedback in the climate system that corresponds to present estimates of Earth's climate sensitivity.
Publication Climatic Change
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Pages 315–326
Date May 2011
Journal Abbr Climatic Change
DOI 10.1007/s10584-010-9903-9
ISSN 0165-0009
URL http://www.springerlink.com/content/mk562236uh26w878/
Call Number 0002
Date Added Sun Aug 28 17:26:09 2011
Modified Tue Aug 30 12:11:20 2011

Feedbacks between climate and boreal forests during the Holocene epoch

Type Journal Article
Author Jonathan A. Foley
Author John E. Kutzbach
Author Michael T. Coe
Author Samuel Levis
Abstract PREVIOUS studies have demonstrated that the predictions of global climate models are highly sensitive to large changes in vegetation cover, such as the complete removal of tropical or boreal forests. Although these studies have illustrated the potential effects of massive deforestation on the climate system, vegetation changes of this scale are very unlikely to occur. Investigating past environments may better illustrate the possible interactions between climate and vegetation cover. For example, palaeobotanical evidence indicates that 6,000 years ago boreal forests extended north of the modern treeline, apparently in response to high-latitude warming resulting from variations in the Earth's orbit. The expanded boreal forests, which took the place of tundra, must also have affected climate by significantly reducing the surface albedo. Here we use a global climate model to examine the relative effects of orbitally-induced insolation variations and of the northward extension of boreal forests on the mid-Holocene climate. Orbital variations alone warm the high latitudes by 2 °C or more in summer, autumn and winter. The subsequent northward extension of boreal forests gives rise to an additional warming of approximately 4 °C in spring and about 1 °C in the other seasons. This suggests that large positive feedbacks between climate and boreal forests may have taken place in the recent geological past.
Publication Nature
Volume 371
Issue 6492
Pages 52–54
Date 1 September 1994
Journal Abbr Nature

DOI 10.1038/371052a0
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Date Added Mon Aug 29 05:19:52 2011
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Figures on Global Climate Show 2010 Tied 2005 as the Hottest Year on Record

Type Newspaper Article
Author Justin Gillis
Abstract no abstract
Publication The New York Times
Place New York
Date January 12, 2011
Section Science / Environment
ISSN 0362-4331
URL http://www.nytimes.com/2011/01/13/science/earth/13climate.html
Call Number 0000
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:14 2011

Fire and climate change during the last 750 yr in northwestern Minnesota

Type Journal Article
Author James S. Clark
Abstract Charcoal stratigraphic analysis and fire scars on red pine (Pinus resinosa) trees were used to determine spatial and temporal occurrence of fire in 1 km² of old—growth mixed conifer/hardwood forests in northwestern Minnesota. Charcoal was analyzed year by year on petrographic thin sections from annually laminated sediments of three small (≤5 ha) lakes having adjacent catchments. Dated fire scars (n = 150) from recent treefalls provided an independent record of the spatial patterns of past burns. Sedimentology of the varved sediments, water—balance models that use 150 yr of instrumental temperature and precipitation data, and published data were used to identify climate changes in separate studies, and they were used in this study to examine the possible connection between changing fire regimes and climate change. Fire—history data were used to show the changing probability of fire with time since the last fire and the effects of spatial variance (slope and aspect) on the distribution of fires through time. Over the last 750 yr, fire was most frequent (8.6 ± 2.9—yr intervals) during the warm/dry 15th and 16th centuries. Intervals were longer (13.2 ± 8.0 yr) during cooler/moister times from AD 1240 to 1440 and since 1600 (the Little Ice Age). The fire regime during the Little Ice Age consisted of periods during the mid—18th and mid—19th centuries characterized by longer fire intervals of 24.5 ± 10.4 and 43.6 ± 15.9 yr, respectively, and short—term warm/dry periods from 1770 to 1820 and 1870 to 1920 when intervals were 17.9 ± 10.6 and 12.7 ± 10.1, respectively. The probability of fire increased through time, probably in step with fuel accumulation. South— and west—facing slopes burned more frequently than did north and east aspects. Fire suppression began in 1910. During warm periods, probability of fire was sufficiently high that a continuous litter layer was all that was necessary for fire to spread and scar trees. During cool and moist times fire was most likely to occur in years with higher moisture deficits. The combined methods for fire—history analysis provided a more detailed spatial and temporal documentation of fire regimes than has previously been possible from analysis of fire scars or of charcoal counts derived from fossil pollen preparations. Results support predictions of particle—motion physics that thin sections record a local fire history. Because climate varies continuously, the responsiveness of disturbance regime to short— and long—term climatic change suggests caution in the interpretation of fire frequencies that derive from space/time analogies or extrapolation from short—term data.
Publication Ecological Monographs
Volume 60

Issue 2
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Date June 1990
Journal Abbr Ecol. Monogr.
DOI 10.2307/1943042
ISSN 0012-9615
URL http://www.jstor.org/stable/1943042
Extra Keywords: charcoal analysis; climatic change; fire history; fire scars; forest dynamics; fuel loading; Itasca; Little Ice Age; Minnesota; stochastic process; thin sections; varves.
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Fire and climatic change in temperate ecosystems of the western Americas

Type Book
Editor Thomas T. Veblen
Editor William L. Baker
Editor Gloria Montenegro
Editor Thomas W. Swetnam
Abstract no abstract
Series Ecological Studies
Volume 160
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Place New York, NY
Publisher Springer Verlag
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ISBN 978-0-387-95455-4
URL http://www.springer.com/life+sciences/ecology/book/978-0-387-95455-4
Extra Keywords: climate change; ecology; fire; forest management.
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:53:52 2011

Fire and geomorphic processes

Type Conference Paper
Author Frederick J. Swanson
Abstract Fire, geomorphic processes, and landforms interact to determine natural patterns of ecosystems over landscapes. Fire alters vegetation and soil properties which change soil and sediment movement through watersheds. Landforms affect fire behavior and form firebreaks which determine burn boundaries. Geomorphic consequences of fire in a landscape-ecosystem type are determined by (a) characteristics of the fire regime, mainly frequency and intensity; and (b) geomorphic sensitivity or erodibility of the landscape.
Date 1981
Proceedings Title Proceedings, Fire Regimes and Ecosystems Conference
Conference Name Fire Regimes and Ecosystem Conference, Honolulu, Hawaii, December 11-15, 1978
Place Washington, D.C.
Publisher U.S. Department of Agriculture, Forest Service, Washington, D.C , General Technical Report WO-26
Pages 401-420

URL http://andrewsforest.oregonstate.edu/search/Show_Catalog_Item.cfm?Catalog_id=157&Catalog_type=Publication&topnav=82
Extra Keywords: fire; erosion; watershed management; sedimentation.
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Notes:

Citation:

Swanson, F.J., 1981, Fire and geomorphic processes, in Mooney, H.A., et al., eds., Proceedings, Fire Regimes and Ecosystems Conference: Honolulu, Hawaii, U.S. Department of Agriculture, Forest Service, General Technical Report WO-26, p. 401–420.

Swanson, Frederick J. 1981. Fire and geomorphic processes. In: Mooney, H. A.; Christensen, T. M.; Lotan, J. E.; Reiners, W. A., eds. Proceedings of the conference on fire regimes and ecosystems; Honolulu, HI. Gen. Tech. Rep. WO-26. Washington, DC: U.S. Department of Agriculture, Forest Service: 401-420.

Fire and human history of a barren-forest mosaic in southern Indiana

Type Journal Article
Author Richard P. Guyette
Author Daniel C. Dey
Author Michael C. Stambaugh
Abstract The purpose of this paper is to provide quantitative fire history information from a historically unique region, the oak barrens of the Interior Low Plateau Ecoregion. We sampled 27 post oak (Quercus stellata Wangenh.) trees from the Boone Creek watershed in southern Indiana. The period of tree-ring record ranged in calendar years from 1654 to 1999 and fire scar dates (n = 84) ranged from 1656 to 1992. The mean fire interval for the period 1656 to 1992 was 8.4 y and individual fire intervals ranged from 1 to 129 y. The average percentage of trees scarred at the site was 19% or about 1 in 5 trees sampled. No significant relationship was identified between fire years and drought conditions however, variability in the fire record coincided with Native American migrations and Euro-American settlement periods. Temporal variability in the fire record illustrates not only the dynamic nature of anthropogenic fire regimes but also the importance of humans in culturing presettlement barrens communities.
Publication The American Midland Naturalist
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Date 2003
Journal Abbr Am. Midl. Nat.
DOI 10.1674/0003-0031(2003)149[0021:FAHHOA]2.0.CO;2
ISSN 0003-0031
URL http://www.bioone.org/doi/abs/10.1674/0003-0031%282003%29149%5B0021%3AFAHHOA%5D2.0.CO%3B2
Date Added Mon Aug 29 06:17:09 2011
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Fire and land management planning and implementation across multiple scales

Type Journal Article
Author Wendel J. Hann
Author David L. Bunnell

Abstract Ecosystem conditions on Federal public lands have changed, particularly within the last 30 years. Wildfires in the west have increased to levels close to or above those estimated for historical conditions, despite increasing efforts and expertise in fire prevention and suppression capability. To reverse these trends, planning for fire and land management policies, budgets, and restoration must address multiple decision levels (national, regional, local, and project) and incorporate an improved understanding of conditions and their linkage across these scales. Three fundamental issues are identified and discussed that relate to traditional types of planning and the associated lack of achievement of multi-scale integrated resource and fire objectives. Various examples of planning that address these three fundamental issues at different scales are compared to traditional types of planning. Outcomes predicted for an example national scale landscape dynamics model are used to illustrate the differences between three different multi-scale management scenarios.

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Date 2001
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF01037
ISSN 1448-5516
URL http://www.publish.csiro.au/paper/WF01037
Extra Keywords: ecosystem management; landscape ecology; land management planning; fire management planning.
Date Added Mon Aug 29 17:30:07 2011
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Fire and landscape diversity in subalpine forests of Yellowstone National Park

Type Journal Article
Author William H. Romme

Abstract Fire history was determined by fire scar analysis in a 73—km² subalpine watershed in Yellowstone National Park, Wyoming, USA. Evidence was found for 15 fires since 1600, of which 7 were major fires that burned >4 ha, destroyed the existing forest, and initiated secondary succession. Most of the upland forest area was burned by large, destructive fires in the middle and late 1700's. Fires since then have been small and have occurred at long intervals. Fire frequency in this area is partly controlled by changes in the fuel complex during succession. Fuels capable of supporting a crown fire usually do not develop until a stand is 300—400 yr old, and ignitions prior to that time usually extinguish naturally before covering more than a few hectares. Thereafter a destructive crown fire is likely whenever lightning ignites small fuels during warm, dry, windy weather. On the extensive subalpine plateaus of Yellowstone National Park there appears to be a natural fire cycle of 300—400 yr in which large areas burn during a short period, followed by a long, relatively fire—free period during which a highly flammable fuel complex again develops. The 73—km² study area appears to be about midway between major fire events in this cycle. This, rather than human fire suppression, apparently is the major reason for the small number and size of fires in the area during the last 180 yr. On the basis of the fire history data, the sequence of vegetation mosaics during the last 200 yr was reconstructed for the watershed. Indices of landscape diversity were computed for each reconstruction, treating forest types and successional stages as taxa and incorporating components of richness, evenness, and patchiness. Landscape diversity was highest in the early 1800's following the large fires in the 1700's, then declined in the late 1800's during a 70—yr period when no major fires occurred and the landscape was dominated by even—aged forests developing on the areas burned in the 1700's. Landscape diversity has increased somewhat during the last half—century as a result of two small fires and the effects of the mountain pine beetle. These landscape reconstructions for the last 200 yr suggest that the Yellowstone subalpine ecosystem is a nonsteady—state system characterized by long—term, cyclic changes in landscape composition and diversity. Such cyclic patterns may significantly influence wildlife habitat, streamflow, nutrient cycling, and other ecological processes and characteristics within the Park, and they may be an important consideration in judging whether recent ecological changes are natural or man induced. The landscape reconstructions were also made using a simulation model based on hypothetical fire management policies of total fire exclusion and selective fire control (permitting only small fires to burn). These hypothetical management policies generally reduced the richness and patchiness of the landscape compared to the natural fire regime, but they increased the evenness and reduced the magnitude of periodic

fluctuations in overall landscape diversity. At times, overall landscape diversity may actually be higher with a fire control policy than with a natural fire regime. At other times, fire significantly increases landscape diversity, as would be expected.

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Date June 1982
Journal Abbr Ecol. Monogr.
DOI 10.2307/1942611
ISSN 0012-9615
URL http://www.jstor.org/stable/1942611
Extra Keywords: fire; fuels; landscape diversity; lodgepole pine; mathematical model; mountain pine beetle; steady state; subalpine forest; succession; Yellowstone National Park.
Date Added Mon Aug 29 00:48:23 2011
Modified Mon Aug 29 00:50:07 2011

Fire and other factors controlling the Big Woods vegetation of Minnesota in the mid-nineteenth century

Type Journal Article

Author Eric C. Grimm

Abstract Bearing—tree data from the original land—survey records of 1847—1850 were used to reconstruct the vegetation of the Big Woods and adjacent areas along the prairie—woodland border in south—central Minnesota. The characteristic tree taxa of the Big Woods were elm (Ulmus), basswood (Tilia americana), sugar maple (Acer saccharum), ironwood (Ostrya virginiana), bitternut hickory (Carya cordiformis), butternut (Junglans cinerea), and ash (Fraxinus). The most common tree was elm, which comprised 27% of the bearing trees. A buffer zone of fire—tolerant oaks and aspen generally lay between the Big Woods and prairie. The width of this zone depended on topography and on the presence of additional firebreaks, which in places formed sharp boundaries between the Big Woods and oak—aspen. The prairie—woodland border was characteristically a sharp boundary along firebreaks (water bodies and physiographic breaks). In some places very effective firebreaks formed sharp boundaries between prairie and the Big Woods, with no intervening oak—aspen zone. The vegetation was most strongly correlated with the fire—probability pattern, which was a function of both abiotic and biotic factors. Soils influenced the probability of fire, but they also were the major factor controlling the vegetation within areas of similar fire probability. Soil drainage was the most important factor controlling vegetation within the units of the overall pattern. Because the locations of firebreaks and the existing pattern of vegetation controlled the fire probability pattern, sites with virtually identical physical characteristics supported qualitatively different types of persistent or stable vegetation.

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Date September 1984
Journal Abbr Ecol. Monogr.
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URL http://www.esajournals.org/doi/abs/10.2307/1942499
Call Number 0247
Extra Keywords: Big Woods; fire ecology; fire-probability pattern; land-survey records; maple-basswood forest; Minnesota vegetation; multiple stable states; nonmetric multidimensional scaling; prairie fires; prairie-peninsula; prairie-woodland border; presettlement vegetation; vegetation reconstruction.
Date Added Sun Sep 4 05:50:41 2011

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Fire and restoration of pinon–juniper woodlands in the western United States: a review

Type Journal Article
Author W.L. Baker
Author D.J. Shinneman
Abstract Pinons and junipers, that dominate many semi-arid landscapes in the western United States, have invaded some sagebrush and grassland areas and possibly increased in density since EuroAmerican settlement. Exclusion of fire by livestock grazing and intentional suppression is thought to have been a cause of these changes. National assessments suggest that many woodlands have missed one or more low-severity surface fires and are thus in poor condition, requiring restoration. We undertook a systematic review of seven questions about fire history, fire severity, and the role of fire in these woodlands to evaluate the scientific basis for the national assessment. First, unless pin˜ons and junipers record fire by means of fire scars, it will be difficult to reconstruct fire history. Evidence suggests that most species of pin˜ons and junipers can record fire by means of scars, but scars may be uncommon or absent in some cases and common in others. This variability in scarring has competing explanations that are poorly substantiated. Second, evidence exists for at least three modes of low-severity surface fires in these woodlands: (1) spreading surface fires, (2) patchy surface fires of small extent, and (3) an absence or near absence of surface fires. Methodological problems limit our ability to assess how common each mode is, but spreading, low-severity surface fires were likely not common. Third, there are no reliable estimates of mean fire intervals for low-severity surface fires in these woodlands because of methodological problems. Fourth, fires can kill small trees in true savannas and grasslands, helping to maintain a low tree density, but in most pin˜on–juniper woodlands low-severity surface fires do not consistently lower tree density and may become high-severity fires. Fifth, nearly all observed fires since EuroAmerican settlement in these woodlands were high-severity fires. In only two studies is there sufficient information to allow a conclusion about whether high-severity fires have or have not increased since settlement, and in these cases the authors conclude they have not. Sixth, the fire rotation for high-severity fires is estimated in only two studies, 400 years in one case, 480 years in the other. Finally, fires may in some cases burn with mixed severity. In conclusion, national fire plans and assessments of the condition and health of pin˜on–juniper woodlands in the western United States are based on premature and likely incorrect conclusions about the natural fire regime in pin˜on–juniper woodlands. Local research is essential, at the present time, if effective, scientifically based restoration prescriptions are to be derived.
Publication Forest Ecology and Management
Volume 189
Pages 1–21
Date 2004
Short Title Fire and restoration of pinon–juniper woodlands in the western United States
Library Catalog Google Scholar
Call Number 0074
Date Added Mon Oct 10 11:06:12 2011
Modified Mon Oct 10 11:06:12 2011

Fire and sustainability: Considerations for California’s altered future climate

Type Journal Article
Author Max A. Moritz
Author Scott L. Stephens
Abstract In addition to reducing greenhouse gas emissions, actions to achieve a sustainable coexistence with wildfire need to be taken now. In this paper we suggest several important policy, planning, and management changes that should be made, regardless of the many uncertainties in predicting future fire regimes. Similar to how other natural hazards are addressed, a risk-based framework for fire-related decisions is crucial. Reintroduction of fire to fire-prone ecosystems, careful use of fire surrogates, and creation of new and flexible policies will be needed for successful ecosystem management. Growing incompatibilities between urban development and

wildfire also require a serious reevaluation of urban planning and building in fire-prone locations to reach a sustainable coexistence with fire. Our future cities and communities must be less susceptible to wildfire damage, and the ecosystems upon which we depend must be made more resilient to further disruptions in fire regimes.

Publication Climatic Change
Volume 87
Issue Supplement 1
Pages 265-271
Date March 2008
Journal Abbr Climatic Change
DOI 10.1007/s10584-007-9361-1
ISSN 0165-0009 (print) 1573-1480 (online)
Short Title Fire and sustainability
URL http://www.springerlink.com/content/5411702235mx5432/
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:49 2011

Fire and the Australian flora: A review

Type Journal Article
Author A. Malcolm Gill
Abstract Summary: Fire is a natural environmental variable over most of Australia. It is a unique environmental variable in that it: tends to be self propagating; occurs for extremely limited periods in anyone locality; may have devastating effects; occurs over a wide range of environments and plant communities. In many ecosystems fire is a normal environmental variable. Its immediate effects on vegetation depend on fire intensity but longer-term effects depend also on fire frequency and season of occurrence. Using these three variables, various fire regimes may be defined. Species may be adapted to these fire regimes but not to fire per se. Interaction between fire and an adaptive trait may facilitate survival or reproduction of a species but this effect alone does not guarantee that the species is adapted to a certain fire regime - this depends on many characteristics of the life cycle. Much of the relevant Australian literature is concerned with adaptive traits while relatively little considers adaptations of species. A knowledge of species' adaptation is necessary if we are to predict species' behaviour under various natural or imposed fire regimes.
Publication Australian Forestry
Volume 38
Issue 1
Pages 4-25
Date June 1975
Journal Abbr Aust. For.
ISSN 0004-9158
URL http://www.forestry.org.au/ifa/c/c2-ifa.asp
Extra Keywords: fire; flora; effects.
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:17:09 2011

Fire and the development of oak forests: In eastern North America, oak distribution reflects a variety of ecological paths and disturbance conditions

Type Journal Article
Author Marc D. Abrams
Abstract no abstract

Publication BioScience
Volume 42
Issue 5
Pages 346–353
Date May 1992
Journal Abbr BioScience
ISSN 0006-3568
URL http://www.jstor.org/stable/1311781
Call Number 0000
Date Added Tue Jul 12 10:27:59 2011
Modified Mon Aug 15 22:51:15 2011

Fire and the dynamic relationship between Florida sandhill and sand pine scrub vegetation

Type Journal Article
Author Ronald L. Myers
Abstract Sandhill vegetation dominated by Pinus palustris, Pinus elliottii var. densa, Quercus laevis, and Aristida stricta, and sand pine scrub dominated by Pinus clausa, scrub oaks, and Caryafloridana form mutually exclusive, fire-dependent communities on Florida's sand ridges. Soil differences have long been attributed as causing this separation. Data from 1932 maps, 1929 photo plots, vegetation analyses, age structure of the pines, and fire scar dates indicate sandhills convert to xeric hardwood-mixed pine after approximately 50 years without fire, e.g., importance value of Carya floridana increased from 3.2 to 75.6; relative importance value of scrub species increased from 2.5 to 54 percent. This intermediate stage may develop into a xeric hardwood forest without fire, and with fire it may be replaced by sand pine scrub. Apparently different fire regimes not soil differences separate the two veg- etation types. Historic and prehistoric shifts in fire regimes may account for the distribution of the two types.
Publication Bulletin of the Torrey Botanical Club
Volume 112
Issue 3
Pages 241–252
Date July-September 1985
Journal Abbr B. Torrey Bot. Club
DOI 10.2307/2996539
ISSN 0040-9618
URL http://www.jstor.org/stable/2996539
Extra Keywords: age structure; fire; fire history; Florida; pines; sandhill vegetation; sand pine scrub; succession.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:24:05 2011

Fire and the ecological history of oak forests in the eastern United States

Type Conference Paper
Author Marc D. Abrams
Abstract Oak distribution and dominance has exhibited major changes since European settlement during the 18th and 19th centuries. Large-scale increases in oak species have occurred as a result of fire exclusion in the central tallgrass prairie and savanna regions, cutting and burning of the northern conifer and hardwood forests of New England and the Lake States region, and land clearing, the charcoal iron industry, and the eradication of Castanea dentata following in the mid-Atlantic region. Studies of the dendroecology and successional dynamics of several old-growth forests indicate that prior to European settlement oak grew and regenerated in uneven-aged conditions. At times oak growth was very slow (< 1.0 mm/year) for long periods, which is usually

characteristic of highly shade tolerant species. Oak species exhibited continuous recruitment into the canopy during the 17th, 18th and 19th centuries, but stopped recruiting in the early 20th century. Since that time, later successional, mixed-mesophytic species have dominated understory and canopy recruitment, which coincides with the period of fire exclusion throughout much of the eastern biome. Major oak replacement species include Acer rubrum, A. saccharum, Nyssa sylvatica and others. Logging of oak forests that have understories dominated by later successional species often accelerates the oak replacement process. Basal cross sections were obtained from a partial timber cut in two old-growth forest stands in Western Maryland, USA, in 1986. We recorded 42 fires from 1615 to 1958, which occurred on average every eight years. There were no significant differences in mean return interval between pre-European settlement (before 1750) and the post-settlement (1750-1900) periods. However, there were no major fire years (25% of samples with scars) after 1900. Oaks recruited consistently from the early 1600s to the early 1900s, but there was increasing amounts of A. rubrum and B. lenta after 1900. Tree-ring dynamics, species recruitment patterns, and long-term fire history reviewed in this paper offer important direct support for the hypothesis that periodic fire played an important role in the historical development of oak forests of the mid-Atlantic region before and after European settlement, and that fire suppression during the 20th century is facilitating a replacement of canopy oak by later successional tree species.

Date September 2000
Proceedings Title Proceedings: Workshop on Fire, People, and the Central Hardwoods Landscape
Conference Name Workshop on Fire, People, and the Central Hardwoods Landscape; 2000 March 12-14; Richmond, KY.
Place Newtown Square, PA
Publisher U.S. Department of Agriculture, Forest Service, Northeastern Research Station
Pages 46-55
Series General Technical Report NE-274
URL http://www.treesearch.fs.fed.us/pubs/23075
Call Number 0024
Extra Keywords: native burning; prescribed fire; prescribed burning; oak; mixed-oak; oakhickory; barrens; ridgetop-pine; soil microbes; rare plants.
Date Added Sun Sep 4 00:17:52 2011
Modified Mon Sep 5 10:11:26 2011

Related

- Fire on the edge: Prehistoric fire along the escarpment zone of the Cumberland Plateau
- Humans, topography, and wildland fire: The ingredients for long-term patterns in ecosystems

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Fire and the forest history of the North Cascade Range

Type Journal Article
Author Les C. Cwynar
Abstract Postglacial vegetation changes are often ascribed to the direct effects of climate change. I studied pollen, plant macrofossils, and sediment charcoal in order to determine the potential role of changes in the disturbance (fire) regime in the postglacial development of local vegetation at Kirk Lake in the foothills of the North Cascade Range in northwestern Washington. Five pollen assemblage zones are recognized: a Pinus--Populus zone >12 000 BP, a Picea-Alnus sinuata zone from >12 000 to 11 030 BP, an Alnus rubra-Pteridium zone from 11 030 to 6830 BP, a Cupressaceae zone beginning at 6830 BP, and a late Holocene Pinus-Alnus rubra zone from 2400 to 900 BP. The first forests (>12 000 BP) were an open mixture of conifers and deciduous trees, chiefly Tsuga mertensiana, Abies, Pinus contorta, and Populus on a landscape subject to erosion. Just before 12 000 BP, the pioneer species Picea sitchensis, Alnus rubra, and A. sinuata became important constituents of the forest. Although pollen accumulation rates were high, the abundance of Alnus sinuata indicates an open-canopy forest. Beginning ≈11 200 BP, climatic warming initiated major changes in forest composition and the fire regime. Tsuga heterophylla migrated into the region, rapidly expanded, then declined shortly thereafter, while Pseudotsuga menziesii, Alnus rubra, and Pteridium expanded, and Pinus contorta, Picea sitchensis, Populus, and Alnus sinuata declined. The abundance of Pseudotsuga, Alnus rubra, and pteridium between 11 030 and 6830 BP corresponds with increased influxes of charcoal into the sediment; this zone is interpreted as a closed forest with a relatively high fire frequency and composed of a mosaic of postfire successional communities in which fire-adapted Pseudotsuga and Alnus rubra predominated over fire-sensitive Tsuga heterophylla. Pinus

monticola became locally important ≈ 8000 BP. Between 6800 and 6400 BP Thuja plicata arrived, Tsuga heterophylla expanded, and Alnus rubra, Pseudotsuga and Pteridium declined. These changes are accompanied by a reduced fire frequency, inferred from lower charcoal accumulation rates, and they indicate a shift to wet-temperate climate similar to today's. The late Holocene fossil record shows the development of the adjacent peatland, which Pinus contorta eventually invaded.

Publication Ecology
Volume 68
Issue 4
Pages 791-802
Date August 1987
Journal Abbr Ecology
DOI 10.2307/1938350
ISSN 0012-9658
URL http://www.jstor.org/stable/1938350
Extra Keywords: Cascade Range; charcoal; fire; forest history; paleoecology; palynology; plant macrofossils; Quaternary studies.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:44 2011

Fire and the Miocene expansion of C_4 grasslands

Type Journal Article
Author Jon E. Keeley
Author Philip W. Rundel
Abstract C_4 photosynthesis had a mid-Tertiary origin that was tied to declining atmospheric CO_2, but CO_4-dominated grasslands did not appear until late Tertiary. According to the 'CO_2-threshold' model, these C_4 grasslands owe their origin to a further late Miocene decline in CO_2 that gave C_4 grasses a photosynthetic advantage. This model is most appropriate for explaining replacement of C_3 grasslands by C_4 grasslands, however, fossil evidence shows C_4 grasslands replaced woodlands. An additional weakness in the threshold model is that recent estimates do not support a late Miocene drop in ρCO_2. We hypothesize that late Miocene climate changes created a fire climate capable of replacing woodlands with C_4 grasslands. Critical elements were seasonality that sustained high biomass production part of year, followed by a dry season that greatly reduced fuel moisture, coupled with a monsoon climate that generated abundant lightning-igniting fires. As woodlands became more open from burning, the high light conditions favoured C_4 grasses over C_3 grasses, and in a feedback process, the elevated productivity of C_4 grasses increased highly combustible fuel loads that further increased fire activity. This hypothesis is supported by paleosol data that indicate the late Miocene expansion of C_4 grasslands was the result of grassland expansion into more mesic environments and by charcoal sediment profiles that parallel the late Miocene expansion of C_4 grasslands. Many contemporary C_4 grasslands are fire dependent and are invaded by woodlands upon cessation of burning. Thus, we maintain that the factors driving the late Miocene expansion of C_4 were the same as those responsible for maintenance of C_4 grasslands today.
Publication Ecology Letters
Volume 8
Issue 7
Pages 683-690
Date July 2005
Journal Abbr Ecol. Lett.
DOI 10.1111/j.1461-0248.2005.00767.x
ISSN 1461-023X
URL http://doi.wiley.com/10.1111/j.1461-0248.2005.00767.x
Call Number 0000
Extra Keywords: grasslands; Miocene; paleosols; photosynthesis; savannas; woodlands.
Date Added Tue Aug 30 14:37:15 2011

Modified Wed Aug 31 00:18:31 2011

Fire and the origin of Table Mountain pine–pitch pine communities in the southern Appalachian Mountains, USA

Type Journal Article
Author Patrick H. Brose
Author Thomas A. Waldrop
Abstract The prevalence of stand-replacing fire in the formation of Table Mountain pine – pitch pine (Pinus pungens Lamb. and Pinus rigida Mill., respectively) communities was investigated with dendrochronological techniques. Nine stands in Georgia, South Carolina, and Tennessee were analyzed for age structure, species recruitment trends, and radial growth patterns to determine whether they had originated as a result of stand-replacing fires. The oldest pines date from the late 1700s or early 1800s. Continuous or frequent episodic pine regeneration from those times to the early to mid 1900s was evident at all sites. During the first half of the 20th century, all sites experienced large surges in pine regeneration. However, no clear evidence of stand-replacing wildfires could be definitively linked to these surges. Rather, the regeneration appeared to have been caused by noncatastrophic surface fires and canopy disturbances occurring together or by the cessation of a frequent fire regime. For the past 25–50 years, there has been little pine regeneration at any of the sites. Restoring the dual disturbance regime of periodic fires and canopy disturbances should help sustain Table Mountain pine – pitch pine communities in southern Appalachian Mountains landscapes.
Publication Canadian Journal of Forest Research
Volume 36
Issue 3
Pages 710–718
Date March 2006
Journal Abbr Can. J. For. Res.
DOI 10.1139/X05-281
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x05-281
Date Added Wed Aug 24 12:16:34 2011
Modified Fri Aug 26 20:34:20 2011

Fire and the prairie-forest mosaic of Devils Tower National Monument

Type Journal Article
Author R. F. Fisher
Author Michael J. Jenkins
Author William F. Fisher
Abstract The pattern of vegetation types has changed markedly at Devils Tower in the past 100 years. Fire scars on ponderosa pine (Pinus ponderosa Laws.) at the Monument indicate that there has been a marked change in fire frequency over this period. Changes in fire regime are clearly important in driving the changes in vegetation pattern. Studies of soil-borne opal phytoliths also indicate the presence of a stable ecotone in the past followed by a dynamic boundary in recent times. Changes in fire frequency from 1770-1900, a time when the Sioux were rapidly expanding into the Black Hills, indicates that native Americans may have dramatically affected the prairie-forest mosaic observed by early Europeans.
Publication American Midland Naturalist
Volume 117
Issue 2
Pages 250-257
Date April 1987
Journal Abbr Am. Midl. Nat.

DOI 10.2307/2425966
ISSN 0003-0031
URL http://www.jstor.org/stable/2425966
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:17 2011

Fire and vegetation dynamics: Studies from the North American boreal forest

Type Book
Author Edward A. Johnson
Abstract Description: It is almost dogma that the boreal forest in North America is a fire-dependent forest, yet ecologists often do not consider in any technical detail how forest fires produce effects on individual plants and on plant populations. Consequently, the causal connection between the behaviour of fire and its ecological consequences is poorly understood. This book sets out to correct this deficiency by assembling the relevant studies of fire intensity, rate of spread, fuel consumption, fire frequency and fire weather in the North American boreal forest. The central thesis is that the North American boreal forest has at least four wildfire characteristics that are important in understanding the dynamics of its plant populations: the large size of the burns with respect to dispersal distances, the short recurrence time of fire with respect to tree lifespans, the high mortality of plants due to the predominance of crown fires, and a good germination surface due to the large area of the forest floor which is covered by ash.
Series Cambridge Studies in Ecology
Edition reprint, illustrated
Place Cambridge, United Kingdom: New York, NY, USA
Publisher Cambridge University Press
Date 1996
# of Pages 148 p.
ISBN 9780521349437, 9780511623516, doi: 10.1017/CBO9780511623516
Short Title Fire and vegetation dynamics
URL http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511623516
Extra Subjects: life sciences; natural resource management; agriculture; horticulture and forestry; ecology and conservation. (online e-book available)
Date Added Sun Aug 28 03:05:14 2011
Modified Thu Sep 1 04:10:09 2011

Fire and vegetation history from the coastal rain forest of the western Oregon Coast Range

Type Journal Article
Author Colin J. Long
Author Cathy Whitlock
Abstract High-resolution charcoal and pollen analyses were used to reconstruct a 4600-yr-long history of fire and vegetation near Taylor Lake in the wettest forests of coastal Oregon. Today, fires in these forests are rare because the season of ignition does not coincide with months of dry fuels. From ca. 4600 to 2700 cal yr B.P. fire episodes occurred at intervals of 140±30 yr while forest vegetation was dominated by disturbance-adapted taxa such as Alnus rubra. From ca. 2700 cal yr B.P. to the present, fire episodes have become less common, occurring at intervals of 240±30 yr, and fire-sensitive forest taxa, such as Tsuga heterophylla and Picea sitchensis, have become more prominent. Fire occurrence during the mid-Holocene was similar to that of the more xeric forests in the eastern Coast Range and suggests that summer drought was widespread. After ca. 2700 cal yr B.P., a decrease in fire episode frequency suggests that cooler conditions and possibly increased summer fog allowed the establishment of present-day Picea sitchensis forests within the watershed. These results provide evidence that fire has been an important disturbance agent in the Coast Range of Oregon, and variations in fire frequency and climate have led to the establishment of present-day forests.

Publication Quaternary Research
Volume 58
Issue 3
Pages 215-225
Date November 2002
Journal Abbr Quaternary Res.
DOI 10.1006/qres.2002.2378
ISSN 0033-5894
URL http://www.sciencedirect.com/science/article/pii/S0033589402923781
Extra Keywords: Pacific Northwest; fire history; pollen records; millennial-scale climate change; paleoecology.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:46 2011

Fire as a global 'herbivore': The ecology and evolution of flammable ecosystems

Type Journal Article
Author William J. Bond
Author Jon E. Keeley
Abstract It is difficult to find references to fire in general textbooks on ecology, conservation biology or biogeography, in spite of the fact that large parts of the world burn on a regular basis, and that there is a considerable literature on the ecology of fire and its use for managing ecosystems. Fire has been burning ecosystems for hundreds of millions of years, helping to shape global biome distribution and to maintain the structure and function of fire-prone communities. Fire is also a significant evolutionary force, and is one of the first tools that humans used to re-shape their world. Here, we review the recent literature, drawing parallels between fire and herbivores as alternative consumers of vegetation. We point to the common questions, and some surprisingly different answers, that emerge from viewing fire as a globally significant consumer that is analogous to herbivory.
Publication Trends in Ecology and Evolution
Volume 20
Issue 7
Pages 387-394
Date July 2005
Journal Abbr Trends Ecol. Evol.
DOI 10.1016/j.tree.2005.04.025
ISSN 0169-5347
Short Title Fire as a global 'herbivore'
URL http://www.sciencedirect.com/science/article/pii/S0169534705001321
Date Added Tue Aug 23 02:54:15 2011
Modified Wed Aug 24 04:39:49 2011

Fire as an interactive component of dynamic vegetation models

Type Journal Article
Author Vivek K. Arora
Author George J. Boer
Abstract Fire affects ecosystems by altering both their structure and the cycling of carbon and nutrients. The emissions from fires represent an important biogeochemical pathway by which the biosphere affects climate. For climate change studies it is important to model fire as a mechanistic climate-dependent process in dynamic global vegetation models (DGVMs) and the terrestrial ecosystem components of climate models. We expand on those current approaches which neglect disturbance by fire, which use constant specified loss rates, or which depend

on simple empirical relationships, and develop a process-based fire parameterization for use in the terrestrial ecosystem components of climate and Earth system models. The approach is straightforward and general enough to apply globally and for current and future climates. All three aspects of the fire triangle, fuel availability, the readiness of fuel to burn depending on conditions, and the presence of an ignition source, are taken into account. The approach also represents some anthropogenic effects on natural fire regimes, albeit in a simple manner. The fire parameterization is incorporated in the Canadian Terrestrial Ecosystem Model (CTEM) which simulates net primary productivity, leaf area index, and vegetation biomass. The fire parameterization generates burned area, alters vegetation biomass, and generates CO_2 emissions. The parameterization is tested by comparing simulated fire return intervals and CO_2 emissions with observation-based estimates for tropical savanna, tropical humid forests, mediterranean, and boreal forest locations.

Publication Journal of Geophysical Research
Volume 110
Issue G2
Pages G02008 (20 p.)
Date November 2005
Journal Abbr J. Geophys. Res.
DOI 10.1029/2005JG000042
ISSN 0148-0227
URL http://www.agu.org/pubs/crossref/2005/2005JG000042.shtml
Extra Keywords: fire; dynamic vegetation model; ecosystem models.
Date Added Tue Aug 16 00:14:37 2011
Modified Tue Aug 16 21:42:55 2011

Fire as the dominant driver of central Canadian boreal forest carbon balance

Type Journal Article
Author Ben Bond-Lamberty
Author Scott D. Peckham
Author Douglas E. Ahl
Author Stith T. Gower
Abstract Changes in climate, atmospheric carbon dioxide concentration and fire regimes have been occurring for decades in the global boreal forest with future climate change likely to increase fire frequency—the primary disturbance agent in most boreal forests. Previous attempts to assess quantitatively the effect of changing environmental conditions on the net boreal forest carbon balance have not taken into account the competition between different vegetation types on a large scale. Here we use a process model with three competing vascular and non-vascular vegetation types to examine the effects of climate, carbon dioxide concentrations and fire disturbance on net biome production, net primary production and vegetation dominance in 100 Mha of Canadian boreal forest. We find that the carbon balance of this region was driven by changes in fire disturbance from 1948 to 2005. Climate changes affected the variability, but not the mean, of the landscape carbon balance, with precipitation exerting a more significant effect than temperature. We show that more frequent and larger fires in the late twentieth century resulted in deciduous trees and mosses increasing production at the expense of coniferous trees. Our model did not however exhibit the increases in total forest net primary production that have been inferred from satellite data. We find that poor soil drainage decreased the variability of the landscape carbon balance, which suggests that increased climate and hydrological changes have the potential to affect disproportionately the carbon dynamics of these areas. Overall, we conclude that direct ecophysiological changes resulting from global climate change have not yet been felt in this large boreal region. Variations in the landscape carbon balance and vegetation dominance have so far been driven largely by increases in fire frequency.
Publication Nature
Volume 450
Issue 7166
Pages 89–92
Date 1 November 2007

Journal Abbr Nature
DOI 10.1038/nature06272
ISSN 1476-4687
URL http://www.nature.com/nature/journal/v450/n7166/full/nature06272.html
Date Added Tue Aug 23 02:56:25 2011
Modified Wed Aug 24 04:39:44 2011

Fire climatology in the western United States: Introduction to special issue

Type Journal Article
Author Thomas W. Swetnam
Author R. Scott Anderson
Abstract Advances in fire climatology have derived from recent studies of modern and paleoecological records. We convened a series of workshops and a conference session to report and review regional-scale findings, and these meetings led to the 10 papers in this special issue. Two papers focus on fire and climate patterns in the modern era using documentary records, four papers utilise tree rings to evaluate recent centuries of change, and four papers evaluate charcoal and pollen in lake, bog, and alluvial sediments over the Holocene. Here we summarise some of the key findings from these papers in the context of other recent fire climatology literature. These studies illustrate the value of long-term perspectives and spatial networks of fire and climate data in discovering the patterns and modes of past fire regime and climate variations.
Publication International Journal of Wildland Fire
Volume 17
Issue 1
Pages 1–7
Date February 2008
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF08016
ISSN 1448-5516
Short Title Fire climatology in the western United States
URL http://www.publish.csiro.au/paper/WF08016.htm
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:09 2011

Fire cycles in North American interior grasslands and their relation to prairie drought

Type Journal Article
Author Kendrick J. Brown
Author James S. Clark
Author Eric C. Grimm
Author Joe J. Donovan
Author Pietra G. Mueller
Author Barbara C. S. Hansen
Author Ivanka Stefanova
Abstract High-resolution analyses of a late Holocene core from Kettle Lake in North Dakota reveal coeval fluctuations in loss-on-ignition carbonate content, percentage of grass pollen, and charcoal flux. These oscillations are indicative of climate–fuel–fire cycles that have prevailed on the Northern Great Plains (NGP) for most of the late Holocene. High charcoal flux occurred during past moist intervals when grass cover was extensive and fuel loads were high, whereas reduced charcoal flux characterized the intervening droughts when grass cover, and hence fuel loads, decreased, illustrating that fire is not a universal feature of the NGP through time but oscillates with climate. Spectral and wavelet analyses reveal that the cycles have a periodicity of ≈160 yr,

although secular trends in the cycles are difficult to identify for the entire Holocene because the periodicity in the early Holocene ranged between 80 and 160 yr. Although the cycles are evident for most of the last 4,500 yr, their occasional muting adds further to the overall climatic complexity of the plains. These findings clearly show that the continental interior of North America has experienced short-term climatic cycles accompanied by a marked landscape response for several millennia, regularly alternating between dual landscape modes. The documentation of cycles of similar duration at other sites in the NGP, western North America, and Greenland suggests some degree of regional coherence to climatic forcing. Accordingly, the effects of global warming from increasing greenhouse gases will be superimposed on this natural variability of drought.

Publication Proceedings of the National Academy of Sciences
Volume 102
Issue 25
Pages 8865–8870
Date June 21, 2005
Journal Abbr PNAS
DOI 10.1073/pnas.0503621102
ISSN 1091-6490
URL http://www.pnas.org/content/102/25/8865.long
Extra Keywords: charcoal; Holocene; Northern Great Plains; pollen; aridity cycles.
Date Added Wed Aug 24 12:31:48 2011
Modified Fri Aug 26 20:34:31 2011

Fire dynamics during the 20th century simulated by the Community Land Model

Type Journal Article
Author Silvia Kloster
Author Natalie M. Mahowald
Author James T. Randerson
Author Peter E. Thornton
Author Forrest M. Hoffman
Author Samuel Levis
Author Peter J. Lawrence
Author Johannes J. Feddema
Author Keith W. Oleson
Author David M. Lawrence
Abstract Fire is an integral Earth System process that interacts with climate in multiple ways. Here we assessed the parametrization of fires in the Community Land Model (CLM-CN) and improved the ability of the model to reproduce contemporary global patterns of burned areas and fire emissions. In addition to wildfires we extended CLMCN to account for fires related to deforestation. We compared contemporary fire carbon emissions predicted by the model to satellite-based estimates in terms of magnitude and spatial extent as well as interannual and seasonal variability. Long-term trends during the 20th century were compared with historical estimates. Overall we found the best agreement between simulation and observations for the fire parametrization based on the work by Arora and Boer (2005). We obtained substantial improvement when we explicitly considered human caused ignition and fire suppression as a function of population density. Simulated fire carbon emissions ranged between 2.0 and 2.4 Pg C/year for the period 1997–2004. Regionally the simulations had a low bias over Africa and a high bias over South America when compared to satellite-based products. The net terrestrial carbon source due to land use change for the 1990s was 1.2 Pg C/year with 11% stemming from deforestation fires. During 2000–2004 this flux decreased to 0.85 Pg C/year with a similar relative contribution from deforestation fires. Between 1900 and 1960 we predicted a slight downward trend in global fire emissions caused by reduced fuels as a consequence of wood harvesting and also by increases in fire suppression. The model predicted an upward trend during the last three decades of the 20th century as a result of climate variations and large burning events associated with ENSO-induced drought conditions.
Publication Biogeosciences
Volume 7

Issue 6
Pages 1877-1902
Date June 2010
Journal Abbr Biogeosciences
DOI 10.5194/bg-7-1877-2010
ISSN 1726-4189
URL http://www.biogeosciences.net/7/1877/2010/
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:15:26 2011

Fire ecology (Chapter 5)

Type Book Section
Author Stephen J. Pyne
Author Patricia L. Andrews
Author Richard D. Laven
Abstract no abstract
Book Title Introduction to wildland fire
Edition 2nd edition
Place New York, NY
Publisher John Wiley & Sons Inc.
Date April 1996
Pages 171-212
ISBN 0471549134, 9780471549130
URL http://www.nrem.iastate.edu/class/nrem390.htm
Date Added Sun Aug 28 00:27:26 2011
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Fire ecology of Pacific Northwest forests

Type Book
Author James K. Agee
Abstract no abstract
Place Washington, D.C.
Publisher Island Press
Date 1993
# of Pages 493 p.
ISBN 1559632291, 9781559632300
URL http://books.google.com/books?id=52x1XvcUA0AC&…
Extra Island Press: http://islandpress.org/bookstore/details1a0d.html?prod_id=309
Date Added Mon Aug 15 22:34:21 2011
Modified Mon Aug 15 22:51:41 2011

Fire ecology, United States and southern Canada

Type Book

Author Henry A. Wright
Author Arthur W. Bailey
Abstract no abstract
Edition 2nd edtion
Place Indianapolis, IN
Publisher John Wiley & Sons Inc
Date 1982
# of Pages 528 p.
ISBN 0471090336, 9780471090335
URL http://www.wiley.com/WileyCDA/WileyTitle/productCd-0471090336.html
Extra Wiley Classics in Ecology and Environmental Science
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:26:37 2011

Notes:

Contents:

Fire effects on California chaparral systems: An overview

Type Journal Article
Author Susan C. Barro
Author Susan G. Conard
Abstract Chaparral is a shrubby, sclerophyllous vegetation type that is common in middle elevations throughout much of California. It occupies 3.4 Mha throughout the state in some of the steepest terrain and adjacent to some of the most populated urban areas. Although chaparral has little direct commodity value, it does have great value in slope stabilization, watershed cover, wildlife habitat, and nutrient cycling. Combined effects of the summer-dry climate and the high flammability of chaparral vegetation render it extremely susceptible to periodic crown fires. Fires in the urban interface not only impact the chaparral ecosystem, but may burn homes, and also can effect regional air and water quality. Wildfires remove plant crown cover and may alter vegetation composition. Many chaparral plant species are well adapted to regenerate after fire, either through the ability to sprout vegetatively, or through fire-related cues that enhance germination. Fire also alters animal habitat and affects species composition and population levels. Perhaps most dramatic are the postfire effects on water and sediment movement. Flooding and debris flows which are common in years after fires may cause substantial loss of soil and nutrients and major damage to homes and other structures.
Publication Environment International

Volume 17
Issue 2-3
Pages 135-149
Date 1991
Journal Abbr Environ. Int.
DOI 10.1016/0160-4120(91)90096-9
ISSN 0160-4120
Short Title Fire effects on California chaparral systems
URL http://www.sciencedirect.com/science/article/pii/0160412091900969
Date Added Tue Aug 23 01:56:02 2011
Modified Wed Aug 24 04:42:05 2011

Fire frequency and community heterogeneity in tallgrass prairie vegetation

Type Journal Article
Author Scott L. Collins
Abstract Few studies have directly addressed the effects of disturbance on spatial and temporal heterogeneity. Spatial heterogeneity. Spatial heterogeneity is the degree of dissimilarity in species composition from one point to another into a community, whereas temporal heterogeneity is compositional change within a site over time. The purposes of this study were to determine (1) if a quadratic relationship exists between within-site heterogeneity and disturbance frequency as predicted by the intermediate disturbance hypothesis (IDH), (2) if disturbed and undisturbed sites have similar heterogeneity as implied by the disturbance heterogeneity hypothesis (DHM), and whether or not these results differed with scale, and (3) if there is a relationship between spatial and temporal heterogeneity as implied by the DHM. Analyses were based on plant species composition data collected over 9 yr in quadrats permanently located in experimental management units subjected to differ burning frequencies at Konza Prairie Research Natural Area, Kansas, USA. The relationship between disturbance frequency and within-site heterogeneity was opposite that predicted by the IDH. Heterogeneity was lowest at intermediate disturbance frequencies. Heterogeneity in annually burned prairie was lower than in unburned prairie and prairies burned once every 4 yr in contrast to predictions of the DHM. However, this relationship did not hold at larger spatial scales. There was a positive relationship between within-site spatial and temporal heterogeneity on annual burned sites, sites burned once every 4 yr, and nearly so on sites burned every other year. Within-site heterogeneity was negatively correlated with cover of Andropogon gerardii, and positively correlated with total richness and species diversity. Studies of variation, in addition to averages, will increase our ability to predict patterns of species distribution and abundance within and between communities in response to disturbance.
Publication Ecology
Volume 73
Issue 6
Pages 2001–2006
Date December 1992
Journal Abbr Ecology
DOI 10.2307/1941450
ISSN 0012-9658
URL http://www.jstor.org/stable/1941450
Extra Keywords: Andropogon gerardii; fire; grassland vegetation; intermediate disturbance hypothesis; Konza Prairie; spatial heterogeneity; species density; species diversity.
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:09:22 2011

Fire frequency and subalpine forest succession along a topographic gradient in Wyoming

Type Journal Article
Author William H. Romme
Author Dennis H. Knight
Abstract Differences in fire frequency and the rate of secondary succession following fire have had a major effect on the present composition of forest vegetation in a 4500-ha undisturbed watershed in the subalpine zone of the Medicine Bow Mountains, southeastern Wyoming. USA. Periodic fire coupled with slow secondary succession has perpetuated lodgepole pine forest on the upland, while mature Engelmann spruce-subalpine fire forests have developed in sheltered ravines and valley bottoms where fire is less frequent and succession following fire is more rapid and/or more direct. A graphic model is presented showing the relationship between topographic position, fire-free interval, and the occurrence of mature forests dominated by spruce and fire.
Publication Ecology
Volume 62
Issue 2
Pages 319–326
Date April 1981
Journal Abbr Ecology
DOI 10.2307/1936706
ISSN 0012-9658
URL http://www.jstor.org/stable/1936706
Extra Keywords: Abies lasiocarpa; dendrochronology; fire; Medicine Bow Mountains; Picea engelmannii; Rocky Mountains; Pinus contorta; succession; Wyoming.
Date Added Mon Aug 29 00:48:23 2011
Modified Mon Aug 29 00:50:05 2011

Fire frequency and the Pine Barrens of New Jersey

Type Journal Article
Author Richard T. T. Forman
Author Ralph E. Boerner
Abstract State fire records and literature citations were examined to estimate both regional fire frequency and point fire frequency. The number of annual wild-fires in the 550,000 hectare Pine Barrens has remained at approximately 1100 since 1940 when fire control became effective. The total area burned annually dropped sharply from about 22,000 ha during 1906-1939 to 8,000 ha in the past four decades. Extensive wildfires of 8,000-16,000 ha each are common. Since 1838, about every two decades on the average, 10% or more of the predominant pine and oak forest burns in a single year (50,000 ha). An average point in the pine and oak forest burns currently at about 65 year intervals, compared with 20 year intervals earlier this century. The number of wildfires in the region correlates linearly with the number of dry months in a year. However, the area burned annually is constant with up to four dry months during the January-to-September period; both average and variability of area burned increases with five or more dry months. The results suggest the upland Pine Barrens are a mosaic of fire-caused patches at two levels of scale: a fine-grained scale of small (averaging 6 ha) young patches imprinted on a coarse-grained scale of large (several tens of ha), variable-sized patches more than four decades old. The drop in point fire frequency favors (a) non fire-adapted populations, (b) hardwoods swamp replacing cedar swamp, and (c) loss of the coarsegrained landscape mosaic.
Publication Bulletin of the Torrey Botanical Club
Volume 108
Issue 1
Pages 34-50
Date January - March 1981
Journal Abbr B. Torrey Bot. Club
DOI 10.2307/2484334
ISSN 0040-9618
URL http://www.jstor.org/stable/2484334

Extra Keywords: Pine Barrens; fire; pine and oak forest; landscape; scale.
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:26 2011

Fire frequency and vegetation dynamics for the south-central boreal forest of Québec, Canada

Type Journal Article
Author Daniel Lesieur
Author Sylvie Gauthier
Author Yves Prairie
Abstract Fire history and forest dynamics were reconstructed for a 3800-km² territory located in the south-central boreal forest of Québec. Fire cycle was characterized using a random sampling strategy combined with archival data on fires that had occurred since 1923 on private land owned by Smurfit-Stone. Bioclimatic subdomain, land use, surficial deposit, and mean distance from a firebreak did not affect the fire cycle. Fire cycles have been longer since the end of the Little Ice Age (~1850). Warming after the Little Ice Age seems to have triggered a change in fire frequency. Forest dynamics were characterized by transition matrices for changes in dominant canopy composition from 344 permanent sampling plots. These permanent plots were sampled approximately every 15 years over the preceding 40 years. We observed two distinct patterns of replacement: (i) deciduous and mixed stands were replaced by balsam fir (Abies balsamifera (L.) Mill.) (and, to a lesser extent, by black spruce (Picea mariana (Mill.) BSP)) and (ii) jack pine (Pinus banksiana Lamb.) was replaced by black spruce. Analyses confirm that species replacement occurs in the eastern boreal forest of Canada when the fire-return interval is long enough and that the substrate plays an important role along with other disturbances, such as insect outbreaks. Our results also suggest that the proportion of old-growth forests (>100 years old) in the landscape should increase as a result of the lengthening of the fire cycle. More and more stands are likely to experience species replacement. From the standpoint of sustainable forest management, this perspective calls into question the widespread use of clear-cutting in the boreal forest. Regional context must be taken into account in forest management if the conservation of biodiversity and ecosystem integrity are serious objectives. Economically and ecologically sound silvicultural scenarios that emulate natural processes are discussed.
Publication Canadian Journal of Forest Research
Volume 32
Issue 11
Pages 1996–2009
Date November 2002
Journal Abbr Can. J. For. Res.
DOI 10.1139/x02-113
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x02-113
Call Number 0000
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:22 2011

Fire frequency effects on longleaf pine (Pinus palustris P. Miller) vegetation in South Carolina and northeast Florida, USA

Type Journal Article
Author Jeff S. Glitzenstein
Author Donna R. Streng
Author Dale D. Wade
Abstract Southeastern United States habitats dominated by longleaf pine (Pinus palustris P. Miller) have declined precipitously in area and extent. Conservation of diverse ground-layer vegetation in these endangered habitats depends on prescribed fire. While the need for prescribed fire is now generally accepted, there is disagreement

concerning the most appropriate fire regime. One of the more important variables is frequency of fire. Several hypothetical relationships between fire frequency and vascular plant richness and composition are suggested by the existing literature. Results of two long-term prescribed fire studies support the hypothesis that burning as frequently as fuels permit is optimal for maintaining the largest number of native ground-layer plant species. However, fire frequency effects on species composition differed between the two studies. Increasing fire frequency in South Carolina Ultisol flatwoods and wet savannas was associated with a distinct shift from woody to herbaceous-dominated communities. Herbs, particularly bunchgrasses and perennial forbs, dominated annual- and biennial-burn treatment plots, whereas triennial- and quadrennial-burn plots were shrub-dominated. In contrast, annual and biennial fires did not produce herbaceous dominated ground-layer vegetation in North Florida Spodosol flatwoods. Reduced dominance of saw palmetto and somewhat increased importance of forbs and grasses, particularly rhizomatous grasses, distinguished the annually burned plots. However, biennial- and quadrennial-burn plots were similar in composition and did not differ significantly in species richness at the largest spatial scale.

Publication Natural Areas Journal
Volume 23
Issue 1
Pages 22-37
Date January 2003
Journal Abbr Nat. Areas J.
ISSN 0885-8608
URL http://www.treesearch.fs.fed.us/pubs/5266
Archive http://www.naturalarea.org/journal.asp
Extra Index terms: fire frequency; fire regime; longleaf pine; Pinus palustris; prescribed burning.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:38 2011

Fire frequency on an oak-hickory ridgetop in the Missouri Ozarks

Type Journal Article
Author Bruce E. Cutter
Author Richard P. Guyette
Abstract Wedges taken from 24 post oaks (Quercus stellata Wang.) growing on a ridge in an oak-hickory stand were used to reconstruct the fire history in the Houston Ranger District in Missouri's Mark Twain National Forest. A chronology was constructed dating from 1734 to 1991. Fire frequency was greatest between 1740 and 1850 with a mean return interval of 2.8 yr. After 1850, the fire return interval increased to 24 yr. This change in fire return regimes is coincident with settlement of the area by Anglo-Americans.
Publication American Midland Naturalist
Volume 132
Issue 2
Pages 393–398
Date October 1994
Journal Abbr Am. Midl. Nat.
ISSN 0003-0031
URL http://www.jstor.org/stable/2426595
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:37 2011

Fire frrequency in the interior Columbia River basin: Building regional models from fire history data

Type Journal Article

Author Donald McKenzie
Author David L. Peterson
Author James K. Agee

Abstract Fire frequency affects vegetation composition and successional pathways; thus it is essential to understand fire regimes in order to manage natural resources at broad spatial scales. Fire history data are lacking for many regions for which fire management decisions are being made, so models are needed to estimate past fire frequency where local data are not yet available. We developed multiple regression models and tree-based (classification and regression tree, or CART) models to predict fire return intervals across the interior Columbia River basin at 1-km resolution, using georeferenced fire history, potential vegetation, cover type, and precipitation databases. The models combined semiqualitative methods and rigorous statistics. The fire history data are of uneven quality; some estimates are based on only one tree, and many are not cross-dated. Therefore, we weighted the models based on data quality and performed a sensitivity analysis of the effects on the models of estimation errors that are due to lack of cross-dating. The regression models predict fire return intervals from 1 to 375 yr for forested areas, whereas the tree-based models predict a range of 8 to 150 yr. Both types of models predict latitudinal and elevational gradients of increasing fire return intervals. Examination of regional-scale output suggests that, although the tree-based models explain more of the variation in the original data, the regression models are less likely to produce extrapolation errors. Thus, the models serve complementary purposes in elucidating the relationships among fire frequency, the predictor variables, and spatial scale. The models can provide local managers with quantitative information and provide data to initialize coarse-scale fire-effects models, although predictions for individual sites should be treated with caution because of the varying quality and uneven spatial coverage of the fire history database. The models also demonstrate the integration of qualitative and quantitative methods when requisite data for fully quantitative models are unavailable. They can be tested by comparing new, independent fire history reconstructions against their predictions and can be continually updated, as better fire history data become available.

Publication Ecological Applications
Volume 10
Issue 5
Pages 1497–1516
Date October 2000
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(2000)010[1497:FFITIC]2.0.CO;2
ISSN 1051-0761
Short Title Fire Frequency in the Interior Columbia River Basin
URL http://www.jstor.org/stable/2641300
Extra Keywords: coarse scale; Columbia River Basin; cover types; fire effects; fire frequency; fire history; fire return interval; potential vegetation; semiqualitative methods; tree-based model.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:22:10 2011

Fire history along elevational transects in the Sierra Nevada, California

Type Report
Author Thomas W. Swetnam
Author Christopher H. Baisan
Author Kiyomi Morino
Author Anthony C. Caprio

Abstract Preface: This report documents research completed by investigators at the Laboratory of Tree-Ring Research with support from the Sierra Nevada Global Change research program for the period 1991 to 1997. The body of this report is prepared as a draft manuscript intended for revision and submission to a peer reviewed journal (probably Ecology or Ecological Monographs). This paper describes the completed work on the reconstruction of fire histories along transects in the Sierra Nevada, an evaluation of fire regime patterns related to elevation, and an investigation of interannual climate-fire patterns. Appendices list and illustrate additional details of the fire history data, and ongoing research using these data. A computer disk with all of the related data files is also

delivered with this report. Since this report is considered a draft and is subject to revision following comments from reviewers and additional work by the authors, we ask that it not be distributed beyond the National Parks (Sequoia, Kings Canyon, and Yosemite).

Report Type Final Report To Sierra Nevada Global Change Research Program

Place Tucson, AZ: Three Rivers, CA

Institution Laboratory of Tree-Ring Research, The University of Arizona: Sequoia & Kings Canyon National Parks, National Park Service

Date November 1998

Pages 40 p.

URL http://www.ltrr.arizona.edu/~tswetnam/tws-pdf/SierraNevadaTransects-FinalReport1998.pdf

Date Added Sun Aug 28 17:26:59 2011

Modified Wed Aug 31 00:28:19 2011

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Citation:

Swetnam, T. W., C. H. Baisan, K. Morino, and A. Caprio. 1998. Fire history along elevational transects in the Sierra Nevada, California. Final report. Sierra Nevada Global Change Research Program, U.S. Geological Survey, Biological Resources Division, Sequoia, Kings Canyon Field
Station, Three Rivers, California, USA.

Fire history along environmental gradients in the Sacramento Mountains, New Mexico: Influences of local patterns and regional processes

Type Journal Article

Author Peter M. Brown

Author Margot W. Kaye

Author Laurie S. Huckaby

Author Christopher H. Baisan

Abstract Patterning in fire regimes occurs at multiple spatiotemporal scales owing to differences in scaling of local and regional influences. Local fire occurrence and behavior may be controlled largely by site factors, while regional climate and changes in human land use can synchronize fire timing across large areas. We examined historical patterns in fires during the past five centuries across gradients in forest types and physiography and in relation to regional climate variability and land use change in the Sacramento Mountains in southern New Mexico. Forest stand-level chronologies of fires were reconstructed for 19 pinyon-juniper, ponderosa pine, and mixed-conifer stands using fire-scar records in crossdated tree-ring series. The fire history documents both local and regional factors effected fire occurrences in stands. Lower-elevation stands recorded more frequent fire than higher-elevation stands, although there were not significant differences between means of fire frequencies from clusters of ponderosa pine and mixed-conifer stands. Mean fire intervals ranged from approximately 3 to 11 years in ponderosa pine sites to 4 to 14 years in mixed-conifer sites. Sites on the steeper west side of the range, where fire spread more readily between forest types, recorded significantly more frequent fire than sites on the more physiographically heterogeneous east side. Fires were also synchronized by regional factors. Fire occurrences and fire-free years are related to variability in both annual Palmer Drought Severity Indices and El Nino-Southern Oscillation events. Fire regimes in the stands were also profoundly effected by changes in human land use patterns, with fire cessation in all sites following intensive Euro-American settlement beginning in the 1880s.

Publication Ecoscience

Volume 8

Issue 1

Pages 115–126

Date 2001

Journal Abbr Ecoscience

ISSN 1195-6860
Short Title Fire history along environmental gradients in the Sacramento Mountains, New Mexico
URL http://www.ecoscience.ulaval.ca/catalogue/E_detail.php?id=182&retour=29
Extra Keywords : dendroecology; crossdating; fire regimes; fire history; fire scars; spatiotemporal scales; ponderosa pine; mixed-conifer; pinyon-juniper; New Mexico.
Date Added Wed Aug 24 04:27:01 2011
Modified Fri Aug 26 20:34:35 2011

Fire history and climate change in giant sequoia groves

Type Journal Article
Author Thomas W. Swetnam
Abstract Fire scars in giant sequoia [Sequoiadendron giganteum (Lindley) Buchholz] were used to reconstruct the spatial and temporal pattern of surface fires that burned episodically through five groves during the past 2000 years. Comparisons with independent dendroclimatic reconstructions indicate that regionally synchronous fire occurrence was inversely related to yearly fluctuations in preCipitation and directly related to decadal-to-centennial variations in temperature. Frequent small fires occurred during a warm period from about A.D. 1000 to 1300, and less frequent but more widespread fires occurred during cooler periods from about A.D. 500 to 1000 and after A.D. 1300. Regionally synchronous fire histories demonstrate the importance of climate in maintaining nonequilibrium conditions.
Publication Science
Volume 262
Issue 5135
Pages 885-889
Date 5 November 1993
Journal Abbr Science
DOI 10.1126/science.262.5135.885
ISSN 0036-8075 (print), 1095-9203 (online)
URL http://www.sciencemag.org/cgi/content/abstract/262/5135/885
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:17 2011

Fire history and climate influences from forests in the Northern Sierra Nevada, Usa

Type Journal Article
Author Tadashi J. Moody
Author Jo Ann Fites-Kaufman
Author Scott L. Stephens
Abstract Fire chronologies were developed for four regions representing two general forest types in the Plumas National Forest, Northern Sierra Nevada, California. Chronologies were developed using dendrochronological techniques largely from remnant woody materials, since past logging has left few live trees with long fire scar records. Over the period from 1454 to 2001, 113 fire years were identified in the four regions. Individual sample sites were 0.3-2.0 ha in size. Mean composite fire return intervals (CFI) for the sites ranged from 8 to 22 years when examining fires scarring more than 10% of samples. These values are consistent with fire return intervals derived from similar forests in the Southern Cascades and Northern Sierra Nevada. Differences in CFI were not significantly different between most sites or forest types, or between two management eras. Fire scar formation was predominantly recorded in the latewood and at the ring boundary, suggesting that most fires for this region occurred in the late summer or fall. Fire years in each of four regions were found to correspond significantly to drought conditions when compared to the Palmer Drought Severity Index and to salinity levels in the San Francisco Bay. Fire years also corresponded significantly to transitions from warm to cool phases of

the Pacific Decadal Oscillation and the El Niño-Southern Oscillation, which are climate forcing atmospheric processes operating on decadal time scales.

Publication	Fire Ecology
Volume	2
Issue	1
Pages	115-142
Date	April 2006
Journal Abbr	Fire Ecol.
DOI	10.4996/fireecology.0201115
ISSN	1933-9747
Short Title	Fire history and climate influences
URL	http://fireecology.net/index.php?option=com_journal&…
Extra	Keywords: fire intervals; dendrochronology; fire climate interactions; mixed conifer; ponderosa pine; Jeffrey pine forests.
Date Added	Thu Sep 15 19:11:27 2011
Modified	Thu Sep 15 19:19:06 2011

Fire history and climatic patterns in ponderosa pine and mixed-conifer forests of the Jemez Mountains, northern New Mexico

Type	Book Section
Author	Ramzi Touchan
Author	Craig D. Allen
Author	Thomas W. Swetnam
Abstract	We reconstructed fire history in ponderosa pine and mixedconifer forests across the Jemez Mountains in northern New Mexico. We collected fire-scarred samples from ten ponderosa pine areas, and three mesic mixed-conifer areas. Prior to 1900, ponderosa pine forests were characterized by high frequency, low intensity surface fire regimes. The mixed-conifer stands sustained somewhat less frequent surface fires, along with patchy crown fires. We also examined the associations between past fires and winter-spring precipitation. In both ponderosa pine and mixedconifer forests, precipitation was significantly reduced in the winter-spring period immediately prior to fire occurrence. In addition, winter-spring precipitation during the second year preceding major fire years in the ponderosa pine forest was significantly increased. The results of this study provide baseline knowledge concerning the ecological role of fire in ponderosa pine and mixed-conifer forests. This information is vital to support ongoing ecosystem management efforts in the Jemez Mountains.
Book Title	Fire effects in southwestern forests: Proceedings of the second La Mesa Fire symposium
Series	General Technical Report
Series Number	RM-GTR-286
Place	Fort Collins, CO
Publisher	U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station
Date	September 1996
Pages	33–46
URL	http://www.fort.usgs.gov/Products/Publications/pub_abstract.asp?PubID=3677
Archive	http://www.treesearch.fs.fed.us/pubs/38455
Date Added	Sat Aug 27 06:05:17 2011
Modified	Mon Aug 29 23:30:28 2011

Notes:

Citation:

Touchan, R., C.D. Allen, and T.W. Swetnam. 1996. Fire history and climatic patterns in ponderosa pine and mixed-conifer forests of the Jemez Mountains, Northern New Mexico. In: C.D. Allen (ed.). Fire effects in southwestern forests: proceedings of the second La Mesa Fire symposium; 1994 March 29-31, Los Alamos, NM. RM-GTR-286. Fort Collins, CO: USDA-Rocky Mountain Forest and Range Experiment Station. p. 33-46.

Fire history and composition of the subalpine forest of western Colorado during the Holocene

Type Journal Article

Author Patricia L. Fall

Abstract Pollen and plant macrofossils from the Keystone Ironbog are used to document changes in species composition and the dynamics of the subalpine forest in western Colorado over the past 8000 years. Modern pollen spectra (particularly pollen influx), plant macrofossils, observations on modern species composition, and quantified densities and mean basal areas of forest trees are used to interpret the paleoecology of the forest. From 8000 to 2600 years ago the fen was surrounded by a subalpine forest. However, unlike the modern subalpine forest where Abies lasiocarpa (Hooker) Nuttall is slightly more abundant than Picea engelmannii (Parry) Engelmann, these Holocene forests had a greater dominance of P. engelmannii, perhaps reflecting a summer wet climate like that of the modern southern Rocky Mountains and Colorado Plateau. Mesic conditions promoted a dense understory of Sphagnum moss, forbs, grasses, and shrubs which periodically burned with long (centennial) return-interval and stand-replacing fires. Populus tremuloides Michaux was the dominant successional forest tree 8000-6400 and 4400-2600 years ago, with Picea engelmannii and Abies lasiocarpa becoming reestablished within a couple hundred years. A subalpine meadow or grassland covered the fen for about 2000 years between 6400 and 4400 years ago. Over the past 2600 years a stable, non-successional Pinus contorta (Douglas) spp latifolia (Engelmann) Critchfield forest grew around the fen. This forest stand had a relatively sparse understory. The persistence of Pinus contorta at this elevation (2920 m) probably reflects a shift to drier climatic conditions, perhaps coupled with a change in fire regime to relatively frequent (decadal) surface fires. Following fire Pinus contorta became reestablished at least within 200 years, but the subalpine Picea engelmannii-Abies lasiocarpa forest never regenerated at this elevation.

Publication Journal of Biogeography

Volume 24

Issue 3

Pages 309-325

Date May 1997

Journal Abbr J. Biogeogr.

DOI 10.1046/j.1365-2699.1997.00094.x

ISSN 1365-2699

URL http://www.jstor.org/stable/2846236

Extra Keywords: Abies lasiocarpa; Picea engelmannii; Pinus contorta; subalpine forest dynamics; succession; paleoecology; pollen; plant macrofossils; Colorado; Rocky Mountains.

Date Added Sun Aug 28 05:42:07 2011

Modified Sun Aug 28 05:45:42 2011

Fire history and fire–climate relationships along a fire regime gradient in the Santa Fe Municipal Watershed, NM, USA

Type Journal Article

Author Ellis Q. Margolis

Author Jeff Balmat

Abstract The Santa Fe municipal watershed provides up to 40% of the city's water and is at high risk of a stand-replacing fire that could threaten the water resource and cause severe ecological damage. Restoration and crown fire hazard reduction in the ponderosa pine (PP) forest is in progress, but the historic role of crown fire in the mixed-conifer/aspen (MC) and spruce-dominated forests is unknown but necessary to guide management here and in similar forests throughout the southwestern United States. The objective of our study was to use dendroecological techniques to reconstruct fire history and fire–climate relationships along an elevation, forest type, and fire regime gradient in the Santa Fe River watershed and provide historical ecological data to guide management. We combined systematic (gridded) sampling of forest age structure with targeted sampling of fire scars, tree-ring growth changes/injuries, and death dates to reconstruct fire occurrence and severity in the 7016 ha study area (elevation 2330–3650 m). Fire scars from 141 trees (at 41 plots) and age structure of 438 trees (from 26 transects) were used to reconstruct 110 unique fire years (1296–2008). The majority (79.0%) of fires burned during the late spring/early summer. Widespread fires that scarred more than 25% of the recording trees were more frequent in PP (mean fire interval (MFI)25% = 20.8 years) compared to the MC forest (31.6 years). Only 24% of the fires in PP were recorded in the MC forest, but these accounted for a large percent of all MC fires (69%). Fire occurrence was associated with anomalously wet (and usually El Niño) years preceding anomalously dry (and usually La Niña) years both in PP and in the MC forest. Fire in the MC occurred during more severe drought (mean summer Palmer Drought Severity Index; PDSI = −2.59), compared to the adjacent PP forest (PDSI = −1.03). The last fire in the spruce forest (1685) was largely stand-replacing (1200 ha, 93% of sampled area), recorded as fire scars at 68% of plots throughout the MC and PP forests, and burned during a severe, regional drought (PDSI = −6.92). The drought–fire relationship reconstructed in all forest types suggests that if droughts become more frequent and severe, as predicted, the probability of large, severe fire occurrence will increase.

Publication Forest Ecology and Management

Volume 258

Issue 11

Pages 2416-2430

Date 10 November 2009

Journal Abbr Forest Ecol. Manag.

DOI 10.1016/j.foreco.2009.08.019

ISSN 0378-1127

URL http://linkinghub.elsevier.com/retrieve/pii/S0378112709005817

Extra Keywords: fire history; gradient; mixed-severity fire; fire–climate; mixed-conifer; spruce; ponderosa pine.

Date Added Tue Aug 30 14:35:38 2011

Modified Wed Aug 31 00:21:45 2011

Fire history and landscape dynamics in a late-successional reserve, Klamath Mountains, California, USA

Type Journal Article

Author Alan H. Taylor

Author Carl N. Skinner

Abstract The frequency, extent, and severity of fires strongly influence development patterns of forests dominated by Douglas-fir in the Pacific Northwest. Limited data on fire history and stand structure suggest that there is geographical variation in fire regimes and that this variation contributes to regional differences in stand and landscape structure. Managers need region-specific fire regime data to develop process-based management schemes to manage new late-successional reserves (LSR). This study quantifies fire regimes and stand structural patterns in a LSR in Douglas-fir-dominated forests in northern California. We analyzed tree species composition, structure (diameter, age), and fire scars from 75 plots in a 1570 ha area in the northern Klamath Mountains. Tree species composition varied with elevation and aspect, and median fire return intervals were similar (12–19 years) among species composition groups. However, median fire return intervals (FRI) were shorter on south- (8 years) and west-facing (13 years) slopes than on northern (15 years) or eastern (16.5 years) aspects. Fire return intervals also varied by historical period. Median FRIs were longer (21.8 years) during the suppression period (1905–1992) than in the settlement (1850–1904) (12.5 years) or presettlement (1627–1849) (14.5 years) period. The average burn area for a fire was 350 ha, and 16 fires larger than 500 ha burned between 1627 and 1992. Fire rotations varied by century from 15.5 to 25.5 years and were longest in the fire suppression period. Stand conditions were multi-aged, and Douglas-fir recruitment occurred after fire. Patterns of past fire severity, inferred from age-classes, indicate that upper slopes, ridgetops, and south- and west-facing slopes experienced more severe fires between 1850 and 1950 than lower slopes or east- and north-facing slopes. Implications are that lower slopes and north and east aspects are more likely than other topographic

positions to sustain or promote long-term, late-successional conditions. Prescribed fire will likely be an integral component of management plans that successfully maintain natural processes and structures in newly established late-successional reserves in the Klamath Mountains.

Publication	Forest Ecology and Management
Volume	111
Issue	2-3
Pages	285–301
Date	7 December 1998
Journal Abbr	Forest Ecol. Manag.
DOI	10.1016/S0378-1127(98)00342-9
ISSN	0378-1127
URL	http://linkinghub.elsevier.com/retrieve/pii/S0378112798003429
Extra	Keywords: age-classes; Douglas-fir; fire ecology; fire regimes; landscape ecology; stand structure.
Date Added	Sat Aug 27 06:05:17 2011
Modified	Wed Aug 31 01:41:15 2011

Fire history and pattern in a Cascade Range landscape

Type	Report
Author	Peter H. Morrison
Author	Frederick J. Swanson
Abstract	Fire history from years 1150 to 1985 was reconstructed by analyzing forest stands in two 1940-hectare areas in the central-western Cascade Range of Oregon. Serving as records for major fire episodes, these stands revealed a highly variable fire regime. The steeper, more dissected, lower elevation Cook-Quentin study area experienced more frequent fires (natural fire rotation = 95 years) that were commonly low to moderate in severity. The Deer study area, with its cooler, moister conditions and gentler topography, had a regime of less frequent (natural fire rotation = 149 years), predominantly stand-replacement fires. Fires created a complex mosaic of stands with variable date and severity of last burn. Fire-created forest patches originating in 1800-1900 are mostly less than 10 hectares. Since 1900, very little of the study areas burned, possibly because of fire suppression. Old-growth forest conditions have persisted on some sites through numerous fires and over many centuries.
Report Number	GTR-PNW-254
Report Type	General Technical Report
Place	Portland, OR
Institution	U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station
Date	May 1990
Pages	77 p.
URL	http://www.treesearch.fs.fed.us/pubs/5627
Extra	Keywords: history (fire); patch dynamics; old-growth forest; wildfire fire ecology.
Date Added	Tue Aug 30 14:35:38 2011
Modified	Tue Aug 30 14:35:38 2011

Fire history and the establishment of oaks and maples in second-growth forests

Type	Journal Article
Author	Todd F. Hutchinson
Author	Robert P. Long
Author	Robert D. Ford
Author	Elaine Kennedy Sutherland

Abstract We used dendrochronology to examine the influence of past fires on oak and maple establishment. Six study units were located in southern Ohio, where organized fire control began in 1923. After stand thinning in 2000, we collected basal cross sections from cut stumps of oak (n = 137) and maple (n = 204). The fire history of each unit was developed from the oaks, and both oak and maple establishment were examined in relation to fire history. Twenty-six fires were documented from 1870 to1933; thereafter, only two fires were identified. Weibull median fire-return intervals ranged from 9.1 to 11.3years for the period ending 1935; mean fire occurrence probabilities (years/fires) for the same period ranged from 11.6 to 30.7years. Among units, stand initiation began ca. 1845 to 1900, and virtually no oak recruitment was recorded after 1925. Most maples established after the cessation of fires. In several units, the last significant fire was followed immediately by a large pulse of maple establishment and the cessation of oak recruitment, indicating a direct relationship between fire cessation and a shift from oak to maple establishment.

Publication Canadian Journal of Forest Research
Volume 38
Issue 5
Pages 1184–1198
Date May 2008
Journal Abbr Can. J. For. Res.
DOI 10.1139/X07-216
ISSN 0045-5067
URL http://www.nrcresearchpress.com/doi/full/10.1139/X07-216
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:30:07 2011

Fire history and the global carbon budget: A 1 degree x 1 degree fire history reconstruction for the 20 th century

Type Journal Article
Author Florent Mouillot
Author Christopher B. Field
Abstract A yearly global fire history is a prerequisite for quantifying the contribution of previous fires to the past and present global carbon budget. Vegetation fires can have both direct (combustion) and long-term indirect effects on the carbon cycle. Every fire influences the ecosystem carbon budget for many years, as a consequence of internal reorganization, decomposition of dead biomass, and regrowth. We used a two-step process to estimate these effects. First we synthesized the available data available for the 1980s or 1990s to produce a global fire map. For regions with no data, we developed estimates based on vegetation type and history. Second, we then worked backwards to reconstruct the fire history. This reconstruction was based on published data when available. Where it was not, we extrapolated from land use practices, qualitative reports and local studies, such as tree ring analysis. The resulting product is intended as a first approximation for questions about consequences of historical changes in fire for the global carbon budget. We estimate that an average of 608 Mha yr^{-1} burned (not including agricultural fires) at the end of the 20th century. 86% of this occurred in tropical savannas. Fires in forests with higher carbon stocks consumed 70.7 Mha yr^{-1} at the beginning of the century, mostly in the boreal and temperate forests of the Northern Hemisphere. This decreased to 15.2 Mha yr^{-1} in the 1960s as a consequence of fire suppression policies and the development of efficient fire fighting equipment. Since then, fires in temperate and boreal forests have decreased to 11.2 $Mhayr^{-1}$. At the same time, burned areas increased exponentially in tropical forests, reaching 54 Mha yr^{-1} in the 1990s, reflecting the use of fire in deforestation for expansion of agriculture. There is some evidence for an increase in area burned in temperate and boreal forests in the closing years of the 20th century.
Publication Global Change Biology
Volume 11
Issue 3
Pages 398–420
Date March 2005
Journal Abbr Glob. Change Biol.

DOI 10.1111/j.1365-2486.2005.00920.x
ISSN 1365-2486
Short Title Fire history and the global carbon budget
URL http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2005.00920.x/full
Extra Keywords: fire history; global change; global fires.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:47:55 2011

Fire history and vegetation pattern in Mesa Verde national Park, Colorado, USA

Type Journal Article
Author M. Lisa Floyd
Author William H. Romme
Author David D. Hanna
Abstract Piñon–juniper woodlands (Pinus edulis, Juniperus osteosperma, and J. scopulorum) and petran chaparral communities (Quercus gambelii, Amelanchier utahensis, Cercocarpus montanus, and other tall shrub species) cover much of the Colorado Plateau in the southwestern United States. Long-term fire history and successional dynamics are poorly understood in these vegetation types. Therefore, we lack a suitable historical context for interpreting the ecological significance of large fires and dramatic vegetative changes that have occurred recently in these ecosystems. For example, in Mesa Verde National Park, located in southwestern Colorado, four large intense fires in the last 50 years have threatened significant cultural and natural resources and have caused debate over whether Mesa Verde's fire regime has been significantly altered by human activities in the last century. In this study, we dated prehistoric fires in shrublands dominated by Gambel oak (Quercus gambelii) by aging stems that resprouted after fire. We mapped the spatial extent of all fires >10 ha that occurred during the last 150 years within a 6600-ha, shrub-dominated portion of Mesa Verde National Park. The turnover time (years required to burn an area equal to the entire shrubland zone) was 100 years under the "natural" fire regime of the mid- to late 19th century. Fire occurrence was reduced substantially during the first half of the 20th century, but the current fire regime (since about 1950) appears to be similar to that of the 19th century—despite a continuing policy of total fire suppression. The "natural" fire turnover time in piñon–juniper woodlands of Mesa Verde is about 400 years. A sharp boundary exists between piñon–juniper woodlands at slightly lower elevations in the southern portion of the park and petran chaparral at slightly higher elevations in the north. This pattern is explained, in part, by more extensive fires in the northern area, which favor resprouting shrubs and eliminate the fire-sensitive piñon and juniper. The less frequent occurrence of large fires, and resulting persistence of woodland in the southern portion of the park, may be due in part to natural barriers to fire spread (cliffs and sparsely vegetated slopes) to the south and west of the piñon–juniper woodlands. Our findings demonstrate that fire frequency and extent in Mesa Verde during the last 50 years have not been greatly different from the "natural" fire regime of the late 1800s. Therefore, the recent large fires in the park, and the vegetative responses to those fires, appear to be within the historic range of variation for this ecosystem. Keywords: disturbance, fire history, fire interval, fire turnover time, Mesa Verde National Park, USA, petran chaparral, piñon–juniper woodlands, Quercus gambelii, vegetation pattern
Publication Ecological Applications
Volume 10
Issue 6
Pages 1666–1680
Date December 2000
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(2000)010[1666:FHAVPI]2.0.CO;2
ISSN 1051-0761
URL http://www.esajournals.org/doi/full/10.1890/1051-0761%282000%29010%5B1666%3AFHAVPI%5D2.0.CO%3B2
Extra Keywords: disturbance; fire history; fire interval; fire turnover time; Mesa Verde National Park; USA; petran chaparral; piñon–juniper woodlands; Quercus gambelii; vegetation pattern.
Date Added Mon Aug 29 05:19:52 2011

Modified Wed Aug 31 00:41:44 2011

Fire history and western juniper encroachment in sage-brush steppe

Type Journal Article
Author Richard F. Miller
Author Jeffrey A. Rose
Abstract The recent expansion of juniper into sagebrush steppe communities throughout the semiarid Intermountain West is most frequently attributed to the reduced role of fire, introduction and overstocking of domestic livestock in the late 1800s, and mild and wet climate conditions around the turn of the century. This hypothesis has, however, limited quantitative support. There are few studies of fire history in the sagebrush steppe and none that examine the chronosequence of changes in mean fire intervals, introduction of livestock, and coincident climatic conditions with the initiation of post-settlement juniper expansion. This study was undertaken to test the hypothesis that the postsettlement expansion of juniper was synchronous with the introduction of domestic livestock, reduction in fire frequency, and optimal climate conditions for plant growth. We documented the fire history and western juniper (Juniperus occidentalis Hook.) woodland chronology for a sagebrush steppe in a 5,000 ha watershed in south central Oregon Regional tree ring data were used as proxy data for presettlement climatic conditions. Western juniper age distribution was determined by coring trees across the study area. Fire history was constructed from several small clusters of presettlement ponderosa pine (Pinus ponderosa Laws.) scattered across the study area. Samples were crossdated to determine fire occurrence to the calendar year. Mean fire intervals were computed for each cluster based on cumulative fire history of each tree sampled within the cluster. Fire events in low sagebrush (Artemisia arbuscula Nutt.) were documented by determining death dates of fire-killed western juniper trees. Records dating the introduction and buildup of livestock during the late 1800s and dates of initial fire suppression were summarized. Western juniper expansion began between 1875 and 1885 with peak expansion rates occurring between 1905 and 1925. The fire record spans 1601 to 1996. Before 1891, mean fire intervals within individual clusters ranged from 12 to 15 years with years between fixes varying between 3 to 28. Nearly one third of the fires in the basin were large and usually proceeded by one year of above-average tree ring growth. Two fire events were record in the sparsely vegetated low sagebrush site, 1717 and 1855. The last large fire occurred in the study area in 1870 and the last small fire in 1897. The time sequence of wet climatic conditions between 1870 and 1915, introduction of livestock, and the reduced role of fire support the hypothesis that these factors contributed to the postsettlement expansion of western juniper.
Publication Journal of Range Management
Volume 52
Issue 6
Pages 550–559
Date November 1999
Journal Abbr J. Range Manage.
ISSN 0022-409X
URL http://www.jstor.org/stable/4003623
Extra Keywords: woodland; succession; Juniperus occidentalis; Artemisia.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:00 2011

Fire history at the eastern Great Plains margin, Missouri River Loess Hills

Type Journal Article
Author Michael C. Stambaugh
Author Richard P. Guyette
Author Erin R. McMurry
Author Daniel C. Dey

Abstract The purpose of this paper is to provide quantitative fire history information for a geographically unique region, the Loess Hills of northwest Missouri. We sampled 33 bur oak (Quercus macrocarpa Michx.), chinkapin oak (Q. muehlenbergii Engelm.), and black oak (Q. velutina Lam.) trees from the Brickyard Hill Conservation Area in northwest Missouri. The period of tree-ring record ranged in calendar years from 1671 to 2004 and fire-scar dates (n = 97) ranged from 1672 to 1980. Fire intervals for individual trees ranged from 1 to 87 years. The mean fire interval was 6.6 years for the pre-Euro-American settlement period (1672-1820), and 5.2 years for the entire record (1672-1980). A period of more frequent fire (mean fire interval = 1.6 for 1825 to 1850) coincided with Euro-American settlement of the area. The average percentage of trees scarred at the site was 16.8%, or about 1 in 7 trees sampled per fire. No significant relationship between fire years and drought conditions was found; however, events prior to 1820 may have been associated with wet to dry mode transitions.

Publication Great Plains Research: A Journal of Natural and Social Sciences
Volume 16
Issue 2
Pages 149–159
Date Fall 2006
Journal Abbr Great Plains Research
URL http://digitalcommons.unl.edu/greatplainsresearch/840/
Library Catalog University of Nebraska–Lincoln
Call Number 0009
Extra Keywords: bur oak; fire history; Great Plains; Loess Hills; Quercus.
Date Added Sun Sep 4 06:32:32 2011
Modified Mon Sep 5 10:11:28 2011

Fire history at the forest-grassland ecotone in southwestern Montana

Type Journal Article

Author Stephen F. Arno
Author George E. Gruell

Abstract The history and influence of fires was studied at the forest grassland ecotone in high valleys of southwestern Montana. Investigations were focused upon several sites having early landscape photographs and modern retakes that allow for detection of vegetational changes. Fire intervals were determined for these sites by analyzing fire scars on trees. Prior to 1910, mean fire intervals at Pseudotsuga forest-grassland ecotones were 35 to 40 years, and probably shorter in grassland proper. No fires were detected on the study areas after 1918. Photographic comparisons and field inspections show a substantial increase in mountain big sagebrush (Artemisia tridentata subsp. vaseyana) and conifers since 1900.

Publication Journal of Range Management
Volume 36
Issue 3
Pages 332–336
Date May 1983
Journal Abbr J. Range Manage.
ISSN 0022-409X
URL http://digitalcommons.library.arizona.edu/holdings/journal/issue?r=http://jrm.library.arizona.edu/Volume36/Number3/
Loc. in Archive http://www.jstor.org/stable/3898481
Date Added Wed Aug 24 04:26:51 2011
Modified Fri Aug 26 20:28:49 2011

Fire history in high elevation subalpine forests in the Colorado Front Range

Type Journal Article
Author Rosemary L. Sherriff
Author Thomas T. Veblen
Author Jason S. Sibold
Abstract Resource managers rely on knowledge of fire history-to guide management decisions, but for the subalpine zone of the Colorado Front Range little information exists on fire history documenting changes in fire regimes over the past several centuries. We examined fire history at 13 high elevation sites in the Colorado Front Range to detect long-term trends that may be related to changes in land use and/or to climatic variability. There is a high degree of spatial and temporal variation in fire regimes across sites; however, most sites exhibit an increase in fire frequency during the 20th century compared to the 19th century. We did not find any evidence that fire suppression after the creation of National Forests and Rocky Mountain National Park in the early 1900s decreased fire frequency at the highest elevations of forest cover in the Front Range. Human influences over the last 200 years have played less of a role in these high elevation subalpine forests than in the lower elevation forests of the Colorado Front Range. In the absence of effective fire exclusion in these high elevation forests, there is no basis for assuming that forest structure and fuel conditions are outside of the historic range of variability for this habitat. Fire occurrence in these high elevation sites is highly dependent on drought, which often results from La Nina events. In comparison with lower elevation ponderosa pine forests of the Front Range, fire is less dependent on increased fuel production following wet El Niño events.
Publication Ecoscience
Volume 8
Issue 3
Pages 369–380
Date 2001
Journal Abbr Ecoscience
ISSN 1195-6860
URL http://www.ecoscience.ulaval.ca/catalogue/E_detail.php?id=213&retour=70
Extra Keywords : fire; climate change; subalpine forests; Colorado Front Range; El Niño-Southern Oscillation.
Date Added Sun Aug 28 17:26:09 2011
Modified Sun Aug 28 17:26:09 2011

Fire history in interior ponderosa pine communities of the Black Hills, South Dakota, USA

Type Journal Article
Author Peter M. Brown
Author Carolyn Hull Sieg
Abstract Chronologies of fire events were reconstructed from crossdated fire-scarred ponderosa pine trees for four sites in the south-central Black Hills. Compared to other ponderosa pine forests in the southwest US or southern Rocky Mountains, these communities burned less frequently. For all sites combined, and using all fires detected, the mean fire interval (MFI), or number of years between fire years, was 16 years (± 14 SD) for the period 1388 to 1900. When a yearly minimum percentage of trees recording scars of ≥ 25% is imposed, the MFI was 20 years (± 14 SD). The length of the most recent fire-free period (104 years, from 1890 to 1994) exceeds the longest intervals in the pre-settlement era (before ca. 1874), and is likely the result of human-induced land use changes. Based on fire scar position within annual rings, most past fires occurred late in the growing season or after growth had ceased for the year. These findings have important implications for management of ponderosa pine forests in the Black Hills and for understanding the role of fire in pre-settlement ecosystem function.
Publication International Journal of Wildland Fire
Volume 6
Issue 3
Pages 97–105
Date 1996
Journal Abbr Int. J. Wildland Fire

DOI 10.1071/WF9960097
ISSN 1049-8001
URL http://www.publish.csiro.au/?paper=WF9960097
Extra Keywords: pinus ponderosa; dendrochronology; crossdating; fire scars; fire chronology; mean fire interval; Black Hills, South Dakota.
Date Added Wed Aug 24 04:26:42 2011
Modified Fri Aug 26 20:34:40 2011

Fire history in northern Patagonia: The roles of humans and climatic variation

Type Journal Article

Author Thomas T. Veblen
Author Thomas Kitzberger
Author Ricardo Villalba
Author Joseph Donnegan

Abstract The effects of humans and climatic variation on fire history in northern Patagonia, Argentina, were examined by dating fire scars on 458 trees at 21 sites in rain forests of Fitzroya cupressoides and xeric woodlands of Austrocedrus chilensis from 39° to 43° S latitude. Climatic variation associated with fires was analyzed on the basis of 20th-century observational records and tree ring proxy records of climatic variation since approximately AD 1500. In the Austrocedrus woodlands, fire frequency increases after about 1850, coincident with greater use of the area by Native American hunters. Increased burning, particularly in the zone of more mesic forests, is also strongly associated with forest clearing by European settlers from about 1880 to the early 1900s. The marked decline in fire frequency during the 20th century coincides with both the demise of Native American hunters in the 1890s and increasingly effective fire exclusion. Strong synchroneity in the years of widespread fire at sample sites dispersed over a north–south distance of ~400 km indicates a strong climatic influence on fire occurrence at an annual scale. Tree ring reconstructions of regional precipitation and temperature show a steeply declining influence of climatic variability on fire occurrence from annual to multidecadal scales. It is the interannual variability in climate, rather than variations in average climatic conditions over longer periods, that strongly influences fire regimes in northern Patagonia. Although climatic variability overrides human influences on fire regimes at an interannual scale, human activity is an equally important determinant of fire frequency at multidecadal scales. Climatic conditions conducive to widespread fire in both xeric Austrocedrus woodlands and Fitzroya rain forests are typical of the late stages of La Niña (cold phase of the Southern Oscillation) events, as indicated by trends in the Southern Oscillation Index and eastern tropical Pacific sea surface temperatures during the 1–2 years before and after fire event years. Years of extreme fire occurrence are associated both with dry winter–springs of La Niña events and with the warm summers following El Niño events. Years in which the southeast Pacific subtropical anticyclone is intense and located farther south than normal are years of enhanced drought and fire. Similarly, years of widespread fire in northern Patagonia are associated with variations in mean sea level atmospheric pressure at about 50°–60° S latitude in the South American–Antarctic Peninsula sector of the Southern Ocean, as reconstructed from tree rings for AD 1746–1984. Precipitation and, hence, fire regimes in northern Patagonia are significantly influenced by high-latitude blocking events, which drive westerly cyclonic storms northward. Variations at decadal to centennial time scales in major circulation features, such as ENSO activity and the meridionality of regional air flow at high latitudes, as well as changes in the degree of coupling of these features, influence climate and fire regimes of northern Patagonia.

Publication Ecological Monographs
Volume 69
Issue 1
Pages 47-67
Date February 1999
Journal Abbr Ecol. Monogr.
DOI 10.1890/0012-9615(1999)069[0047:FHINPT]2.0.CO;2
ISSN 0012-9615
Short Title Fire History in Northern Patagonia

URL http://www.esajournals.org/doi/abs/10.1890/0012-9615%281999%29069%5B0047%3AFHINPT%5D2.0.CO%3B2?journalCode=emon

Extra Keywords: anthropogenic influences; Argentina; Austrocedrus chilensis; climatic variation; dendroecology; El Niño; fire history; Fitzroya cupressoides; global change; Patagonia; Southern Oscillation; tree rings.

Date Added Sat Aug 27 02:07:29 2011

Modified Sat Aug 27 15:53:56 2011

Fire history in the ponderosa pine/Douglas-fir forests on the east slope of the Washington Cascades

Type Journal Article

Author Richard L. Everett

Author Richard Schellhaas

Author Dave Keenum

Author Don Spurbeck

Author Pete Ohlson

Abstract We collected 490 and 233 fire scars on two ponderosa pine (Pinus ponderosa)/Douglas-fir (Pseudotsuga menziesii) dominated landscapes on the east slope of the Washington Cascades that contained a record of 3901 and 2309 cross-dated fire events. During the pre-settlement period (1700/1750–1860), the Weibull median fire-free interval (WMFFI) and the mean fire-free interval (MFFI) were 6.6–7 years at both sites. The MFFI during the settlement period (1860–1910) varied within 3 years of the pre-settlement value, but increased to 38 and 43 years for a truncated fire suppression period between 1910 and 1996. Increased variation in MFFI among aspect polygons suggests fire regimes have become more complex since Euro-settlement. In the pre-settlement period, an area equal to approximately 50–60% of the study areas burned every 6–7 years, an amount of fire disturbance apparently in balance with landscape and stand vegetation structure. Overlapping fires have created a complex mosaic of different fire histories on these forested landscapes. Mapped fire events from the 1700–1910 showed 134 and 157 separate fire history polygons (FHP) at the two sites. Fire disturbance rates and patterns are suggested as ecologically defensible reference points for landscape heterogeneity to reduce the potential for catastrophic fires and to establish vegetation disturbance management guidelines.

Publication Forest Ecology and Management

Volume 129

Issue 1-3

Pages 207–225

Date 17 April 2000

Journal Abbr Forest Ecol. Manag.

DOI 10.1016/S0378-1127(99)00168-1

ISSN 0378-1127

URL http://www.sciencedirect.com/science/article/pii/S0378112799001681

Extra Keywords: ecosystem integrity; fire-free intervals; fire history polygons; fire regimes; landscape dynamics; natural fire rotation; patch mosaic.

Date Added Sun Aug 28 05:42:07 2011

Modified Sun Aug 28 05:45:32 2011

Fire history in three vegetation types on the eastern side of the Oregon Cascades

Type Thesis

Author Joyce L. Bork

Abstract Historic fire return intervals in three different vegetation types dominated by ponderosa pine (Pinus ponderosa Laws.) were determined using fire scarred trees. Dendrochronological techniques were used to achieve accuracy in dating fire scars on samples collected from six 40 acre plots established in each site. Mean fire return intervals (MFRI) differed for site and plots within each site; Pringle Butte site showed the shortest MFRI of 4 years with an average of 11 years for individual plots, Cabin Lake site had a 7 year MFRI and a 24 year MFRI for plots, while Lookout Mountain site had a MFRI of 8 years and 16 years for plots. The overall average for plots incorporates all of the data for the site but uses a 40 acre plot mean to determine length of time required for fire to return to the same location, giving a more accurate indication of MFRI in a given stand. The plot mean may be the most useful way of expressing the data. Basal area and understory vegetation were found to be useful for predicting MFRI. Tree-ring chronologies from the three sites were examined to determine their suitability for climatic interpretation. Statistics show low mean sensitivities, high serial correlations and low variance for all trees and cores, suggesting that chronologies are of limited use for climatic analysis. However, climatic information was found. Growth patterns in sites show similar years for drought and high precipitation. Long-term trends were not evident at Cabin Lake or Lookout Mountain. Pringle Butte provided the chronology most useful for estimating climatic history, with 3 long periods of slow growth, 1900-1980, 1710-1790, and 1590-1640.

Type Ph.D. Dissertation
University Oregon State University
Place Corvallis, OR
Date June 1984
# of Pages 105 p.
URL http://scholarsarchive.library.oregonstate.edu/xmlui/handle/1957/10122
Library Catalog Oregon State University
Extra Keywords: forest fires; Oregon; history.
Date Added Wed Aug 24 04:26:36 2011
Modified Fri Aug 26 20:33:09 2011

Fire history of a post oak (Quercus stellata Wang.) woodland in Hamilton County, Illinois

Type Journal Article
Author William E. McClain
Author Terry L. Esker
Author Bob R. Edgin
Author Greg Spyreas
Author John E. Ebinger
Abstract Cross-sections of 36 post oaks (Quercus stellata Wang.) were examined to determine the fire history of a post oak woodland in Hamilton County, Illinois. The 226-year tree ring record contained three distinct periods; a fire era from 1776 to1850 having a mean fire return interval of 1.97 years, a fire-free period from 1851 to1884, and a second fire era from 1885 to 1996 having a mean fire return interval of 1.44 years. The fire-free interval corresponds with the rapid settlement of Hamilton County during 1850–85. The fires between 1770 and 1850 are considered landscape fires associated with Native Americans and/or early European settlers, while those between 1885 and 1996 are thought to be due to burning of local woodlands, a practice that became increasingly less common in the late 20th century. Three post oak cohorts were identified, including 211–224 year-old (217-year mean), 137–151 year-old (144-year mean), and 104–115 year-old (105-year mean) age classes. Post oak recruitment ended and fire sensitive hickories (Carya ovata and C. tomentosa), black cherry (Prunus serotina), sassafras (Sassafras albidum), and black oak (Quercus velutina) now dominate the seedling and sapling layers of the woodland.
Publication Castanea
Volume 75
Issue 4
Pages 461-474
Date December 2010
Journal Abbr Castanea
DOI 10.2179/09-007.1
ISSN 0008-7475
URL http://www.bioone.org/doi/abs/10.2179/09-007.1

Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:22:02 2011

Fire history of a ridge and valley oak forest

Type Report
Author Thomas M. Schuler
Author W. Russ McClain
Abstract We document the fire history of an oak stand located near Pike Knob, Pendleton County, WV using 17 northern red oak (Quercus rubra L.) basal cross sections. The FHX2® program was used to characterize fire intervals and to evaluate the goodness of fit between fire intervals and the normal and Weibull distributions. The composite fire chronology was compared to mean fall and spring Palmer Drought Severity Index (PDSI) from 1895 to 2002. A 156-year fire history chronology was developed from 1846 to 2002 and fire intervals ranged from 7 to 32 years for a single forest stand. The most recent fire occurred in 1962 based on the fire scar presence. The Weibull median fire interval was 14.76 years for one or more trees scarred during a single year, and 17.11 years when at least two trees were scarred during a single year. Mean fall PDSI was less for fire years than nonfire years (p = 0.046), but there was no evidence that mean spring PDSI differed between fire years and nonfire years (p = 0.596). Oak recruitment ceased after 1937, during an unusually long fire-free interval, offering indirect support of the important role of fire in perpetuating oak forests of the region.
Report Number RP-NE-724
Report Type Research Paper
Place Newtown Square, PA
Institution U.S. Department of Agriculture, Forest Service, Northeastern Research Station
Date April 2003
Pages 9 p.
URL http://www.treesearch.fs.fed.us/pubs/5600
Extra Keywords: northern red oak; fire history; fire interval; Palmer Drought Severity Index.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:26:20 2011

Notes:

Citation:

Schuler, Thomas M.; McClain, W. Russ. 2003. Fire History of a Ridge and Valley Oak Forest. Res. Pap. NE-724. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 9 p.

Fire history of a sequoia-mixed conifer forest

Type Journal Article
Author Bruce M. Kilgore
Author Dan Taylor
Abstract Data on the years in which fires burned, on fire frequency, and on intensity and areal extent of fires were gathered from 935 scars on 220 stumps of mixed conifer forest species in an 1800-ha study area in the Sierra Nevada, California, USA. Before 1875, fires scarred clusters of living trees every 9 yr on west-facing slopes at Redwood Mountain and every 16 yr on east-facing slopes. Mean fire-free intervals between 1700 and 1875 varied by habitat phase from 5 yr in ponderosa pine on a dry ridge to 15-18 yr in most moist sites with white fir. For most 1-ha sites, the maximum time without fire was 14-28 yr. From 1700 to 1875, fires on various sizes were found every 2-3 yr somewhere in a given drainage (not necessarily the same site) and every 5-9 yr in 3- to 16-ha sites. This compares with fires every 8-18 yr in 1-ha clusters and 11-39 yr on individual trees. Scar records of pre-1700 fires suggest intervals fairly comparable to those from 1700 to 1875. Evidence of fires diminished greatly after Indian burning was eliminated in the early 1870's, and such fire records became almost

nonexistent after 1900, when fire suppression became more effective. Most of the pre-1875 fires were small and of low intensity. Even the larger fires were usually confined to 1 slope or 1 drainage area. The short mean intervals between fires suggest that pre-1875 mixed conifer forests did not usually have heavy accumulations of litter or dense thickets of understory trees. Instead, small-acreage, low-intensity surface first must have consumed accumulated litter at frequent intervals and at the same time killed most of the conifer regeneration which had become established since previous fires. Such frequent fires would have led to an intricate mosaic of age classes and vegetation subtypes which, in turn, insured that a subsequent fire would not burn large areas with great intensity. Intense fires which moved from crown to crown were absent in the study area for the past 400 to 2000 yr. If frequency of lightning ignition of fires over the past 50 yr is typical, ignitions by Indians must have augmented lightning-caused fires to yield the pre-1865 frequency of fires in the Sierra mixed conifer forest. Since 1900, the lack of frequent, low-intensity fires has resulted in a major increase in understory forest and fuels.

Publication Ecology
Volume 60
Issue 1
Pages 129–142
Date February 1979
Journal Abbr Ecology
DOI 10.2307/1936475
ISSN 0012-9658
URL http://www.jstor.org/stable/1936475
Extra Keywords: California; fire frequency; fire history; fire intensity; Indian burning; mixed conifer forest; Pinus ponderosa; Sequoiadendron giganteum.
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:40:22 2011

Fire history of a temperate forest with an endemic fire-dependent herb

Type Journal Article

Author Jennifer A. Hoss
Author Charles W. Lafon
Author Henri D. Grissino-Mayer
Author Serena R. Aldrich
Author Georgina G. DeWeese

Abstract A dendroecological fire history study was conducted for The Nature Conservancy's Narrows Preserve on Peters Mountain, Virginia, where the predominant vegetation is oak (Quercus L.)-dominated forest containing some other hardwoods and pines (Pinus L.). The site encompasses all the known habitat of the endangered and endemic Peters Mountain mallow (Iliamna corei Sherff.), a perennial herb that requires fire for seed germination and habitat maintenance. Fire scars from 73 pines indicate frequent burning in the past (Weibull median composite fire interval = 2.2 years), primarily during the dormant season. Fire frequency exhibited little temporal variability from the beginning of the fire chronology in 1794 until the 1940s, despite changing land uses. However, the incidence of fire declined subsequently with the advent of effective fire protection measures. Ageing trees near the mallow population indicates that the fire-tolerant chestnut oak (Quercus montana Willd.) recruited relatively continuously under frequent fire, but that other species were established primarily during the fire protection era. The decline in burning appears to have permitted an increase in tree density that likely inhibits the growth and recruitment of mallow plants. Our results suggest that reintroducing frequent fire would be an appropriate technique for managing the mallows and the greater Peters Mountain landscape.

Publication Physical Geography
Volume 29
Issue 5
Pages 424-441
Date September-October 2008

Journal Abbr Phys. Geogr.
DOI 10.2747/0272-3646.29.5.424
ISSN 0272-3646
URL http://bellwether.metapress.com/openurl.asp?genre=article&…
Call Number 0004
Extra Keywords: Appalachian Mountains; dendrochronology; disturbance; fire regime; fire scar; tree ring; vegetation dynamics.
Date Added Thu Sep 22 03:27:06 2011
Modified Wed Sep 28 17:53:51 2011

Fire history of oak gallery forests in a northeast Kansas tallgrass prairie

Type Journal Article
Author Marc D. Abrams
Abstract Bur oak (Quercus macrocarpa) and chinquapin oak (Q. muehlenbergii) were repeatedly scarred from recurring fire in gallery forests on Konza Prairie in NE Kansas, and were therefore suitable for fire history evaluation. Fire scars were recorded in 23 different years, ranging from 1862 to 1983, on 19 sample trees taken from three noncontiguous gallery forest stands. The mean fire interval (MFI) calculated for these forests ranged from 11.2-19.7 years. The actual MFI, however, probably lies somewhere between that range and the historical interval for Flint Hills prairie fire of 2-3 years.
Publication American Midland Naturalist
Volume 114
Issue 1
Pages 188–191
Date July 1985
Journal Abbr Am. Midl. Nat.
ISSN 0003-0031
URL http://www.jstor.org/stable/2425255
Date Added Wed Aug 24 04:25:25 2011
Modified Fri Aug 26 20:28:07 2011

Fire history of oak gallery forests in a northeast Kansas tallgrass prairie

Type Journal Article
Author Marc D. Abrams
Abstract Bur oak (Quercus macrocarpa) and chinquapin oak (Q. muehlenbergii) were repeatedly scarred from recurring fire in gallery forests on Konza Prairie in NE Kansas, and were therefore suitable for fire history evaluation. Fire scars were recorded in 23 different years, ranging from 1862 to 1983, on 19 sample trees taken from three noncontiguous gallery forest stands. The mean fire interval (MFI) calculated for these forests ranged from 11.2-19.7 years. The actual MFI, however, probably lies somewhere between that range and the historical interval for Flint Hills prairie fire of 2-3 years.
Publication American Midland Naturalist
Volume 114
Issue 1
Pages 188-191
Date July 1985
Journal Abbr Am. Midl. Nat.
DOI 10.2307/2425255
ISSN 0003-0031

URL http://www.jstor.org/stable/2425255
Date Added Mon Aug 29 01:54:51 2011
Modified Mon Aug 29 01:58:43 2011

Fire history of oak-pine forests in the Lower Boston Mountains, Arkansas, USA

Type Journal Article
Author Richard P. Guyette
Author Martin A. Spetich
Abstract Perspective on present day issues associated with wildland fire can be gained by studying the long-term interactions among humans, landscape, and fire. Fire frequency and extent over the last 320 years document these interactions north of the Arkansas River on the southern edge of the Lower Boston Mountains. Dendrochronological methods were used to construct three fire chronologies from 309 dated fire scars that were identified on 45 shortleaf pine (Pinus echinata) remnants. Fire frequency increased with human population density from a depopulated period (the late 1600s and early 1700s) to a peak in fire frequency circa 1880. Fire frequency then decreased as human population continued to increase. Fire frequency and human population density were positively correlated during an early period (1680–1880) with low levels of population, but negatively correlated during a later period (1881–1910) with high levels of population. We hypothesized that this difference is due to limits on fire propagation and ignition caused by land use and culture, as well as human population density. Relatively high human population densities (>5 humans/km²) were associated with a peak in the maximum number of fires per decade in this highly dissected, 'bluff and bench' landscape compared to less dissected regions of the Ozarks.
Publication Forest Ecology and Management
Volume 180
Issue 1-3
Pages 463–474
Date 17 July 2003
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/S0378-1127(02)00613-8
ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/pii/S0378112702006138
Extra Keywords: Ozarks; dendrochronology; human population; fire scar; Arkansas River.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 01:40:53 2011

Fire history of Paunsaugunt Plateau in southern Utah

Type Journal Article
Author Steven J. Stein
Abstract A fine history of the Paunsaugunt Plateau in southern Utah was developed using dendrochronological methods. Fire frequencies of individual ponderosa pine trees from three sites on the plateau varied from 19.5 to 47 years. Composite fire intervals for the three sites ranged from 15.2 to 18.4 years. The last recorded fires in these study areas occurred in 1892, 1902, and 1911, corresponding to the initiation of fire suppression policies in the West. The absence of fire since 1911 may be contributing to a recently documented decrease in ponderosa pine regeneration within the high-elevation, mixed-coniferous forests of the Paunsaugunt Plateau.
Publication Western North American Naturalist
Volume 48
Issue 1
Pages 58–63
Date 1988
Journal Abbr West N. Am. Naturalist

ISSN 1527-0904
URL https://ojs.lib.byu.edu/ojs/index.php/wnan/article/view/1815
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 01:04:27 2011

Fire history of the westernmost portion of Great Smoky Mountains National Park

Type Journal Article
Author Mark Harmon
Abstract Fire scars, soil charcoal, historical accounts, and fire control records indicate that the fire re- gime in the western portion of Great Smoky Mountains National Park has changed dramatically during the last 200 years. The mean interval between fires, based on fire scars from pine forests for the period 1856 to 1940 was 12.7 years. Most of these fires were probably set by settlers, and man-set fires may have been an important influence since Indians migrated into the Little Tennessee River Valley.
Publication Bulletin of the Torrey Botanical Club
Volume 109
Issue 1
Pages 74–79
Date January-March 1982
Journal Abbr Bull. Torr. Bot. Club
DOI 10.2307/2484470
ISSN 0040-9618
URL http://www.jstor.org/stable/2484470
Extra Keywords: fire history; Great Smoky Mountains National Park; North Carolina; Tennessee.
Date Added Mon Aug 29 06:39:34 2011
Modified Tue Aug 30 14:53:02 2011

Fire history on a desert mountain range: Rincon Mountain Wilderness, Arizona, USA

Type Journal Article
Author Christopher H. Baisan
Author Thomas W. Swetnam
Abstract Modem fire records and fire-scarred remnant material collected from logs, snags, and stumps were used to reconstruct and analyze fire history in the mixed-conifer and pine forest above 2300 m within the Rincon Mountain Wilderness of Saguaro National Monument, Arizona, United States. Cross-dating of the remnant material allowed dating of fire events to the calendar year. Estimates of seasonal occurrence were compiled for larger fires. It was determined that the fire regime was dominated by large scale (>200 ha), early-season (May-July) surface fires. The mean fire interval over the Mica Mountain study area for the period 1657-1893 was 6.1 years with a range of 113 years for larger fires. The mean fire interval for the mixed-conifer forest type (1748-1886) was 9.9 years with a range of 319 years. Thirty-five major tire years between 1700 and 1900 were compared with a tree-ring reconstruction of the Pa mer drought severity index (PDSI). Mean July PDSI for 2 years prior to fires was higher (wetter) than average, while mean fire year PDSI was near average. This 490-year record of fire occurrence demonstrates the value of high-resolution (annual and seasonal) tree-ring analyses for documenting and interpreting temporal and spatial patterns of past fire regimes.
Publication Canadian Journal of Forest Research
Volume 20
Issue 10
Pages 1559–1569
Date October 1990
Journal Abbr Can. J. For. Res.

DOI 10.1139/x90-208
ISSN 0045-5067
Short Title Fire history on a desert mountain range
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x90-208
Date Added Tue Aug 16 12:12:11 2011
Modified Tue Aug 16 12:12:11 2011

Fire history reconstructions based on sediment records from lakes and wetlands (Chapter 1)

Type Book Section
Author Cathy Whitlock
Author R. Scott Anderson
Abstract no abstract
Book Title Fire and Climatic Change in Temperate Ecosystems of the Western Americas
Series Ecological Studies
Volume 160
Edition 1st edition
Place New York, NY
Publisher Springer-Verlag
Date 2003
Pages 3-31
ISBN 978-0-387-95455-4
URL http://www.springerlink.com/content/l44r331p2768q320/
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:43 2011

Notes:

Citation:

Whitlock, C., and R.S. Anderson. 2003. Fire history reconstructions based on sediment records from lakes and wetlands. In Fire and Climatic Change in Temperate Ecosystems of the Western Americas (T.T. Veblen, W.L. Baker, G. Montenegro, and T.W. Swetnam, eds.), pp. 3-31. Ecological Studies, vol. 160. Springer-Verlag, New York.

Fire history, fire regimes, and climate change – integrating information for management and planning

Type Journal Article
Author William T. Sommers
Author Stanley Coloff
Author Susan G. Conard
Author Josh McDaniel
Abstract Background/Question/Methods Federal and other natural resource managers in the United States are now required to consider climate change in their planning. Wildland fire is a major component included in many of these planning efforts. Fire is a widespread ecosystem disturbance process that is global in scope with local to regional, event driven, resource and societal impacts. The frequency, severity and extent of Wildland fires are largely a function of interactions between vegetation and atmospheric processes. Fire activity and management costs have increased significantly over the last few decades. There is growing evidence that these increases relate to measured changes in climate variables. Our understanding of fire history, fire regimes, and past interactions between fire and climate has grown substantially in recent years. Fire regimes provide a context for interpreting fire history to facilitate our understanding of fire in relation to climate and other factors, and

provide a bridge between ecosystem characteristics and climate change projections. The challenge is to provide managers with placed-based information about fire and climate change, involving multiple scales of atmospheric and ecosystem process interaction, that they can use for planning and communication purposes. Results/Conclusions We present results of an on going study that integrates fire history, fire regime, and climate change information in formats designed for use by managers in their climate change planning efforts. A representative group of land managers reviewed our proposed information structure in an interactive workshop setting, and provided recommendations for how to make this information accessible and useful to them. We characterize atmospheric scales of importance to fire as the climate change, climate variability, and event scales. These relate to long-term evolution of vegetation, seasonal to decadal drought, and fire events. We use Bailey's vegetation classification at various ecosystem scales to organize the fire history and fire regime information. Bailey classifications also serve as a bridge to LANDFIRE components, such as the Fire Regime Condition Class (FRCC), and as a link to GCM-based climate projections. In addition to reporting overall findings, we present examples of specific place-based information for representative ecosystems in different areas of the United States.

Publication Nature Precedings
Date November 2010
Journal Abbr Nature Precedings
DOI 10.1038/npre.2010.5238.1
ISSN 1756-0357
URL http://precedings.nature.com/doifinder/10.1038/npre.2010.5238.1
Date Added Sun Aug 28 17:26:59 2011
Modified Sun Aug 28 17:31:38 2011

Fire in America: A cultural history of wildland and rural fire

Type Book
Author Stephen J. Pyne
Abstract no abstract
Edition 1st edition
Place Princeton, New Jersey
Publisher Princeton University Press
Date 1982
# of Pages 654 p.
ISBN 978-0-691-08300-1
Short Title Fire in America
URL http://www.stephenpyne.com/cycle_of_fire___and_more_92910.htm
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:27:26 2011

Notes:

Review:

"*Fire in America* is the biggest, most ambitious, and fact-filled book about woodland, brush and prairie fires in the United States. Reading it is like backpacking through the nation's forests in company with a modern-day Thoreau."--Dennis Smith, *The New York Times Book Review*

(from: http://press.princeton.edu/titles/4407.html#reviews)

A comprehensive review in 8 chapters.

Chapter 1: Nature's fire [pp. 6-65] covers lightning fire, the principles of fire behaviour and ecology and a fire history of the northeastern USA.

Chapter 2: The fire from Asia [pp. 66-122] describes fire and the American Indian, the fire history of the prairies, and the history of and controversy over light [controlled] burning (Paiute forestry).

Chapter 3: The fire from Europe [pp. 123-180] gives a fire history of the south and of fire prevention.

Chapter 4: The great barbeque [pp. 181-238] gives a fire history of the Lake States and of private and early government fire protection.

Chapter 5: The heroic age [pp. 239-321] gives a fire history of the N. Rockies and the history of fire policy in the US Forest Service and in the Department of the Interior and interagency organizations.

Chapter 6: A continental experiment [pp. 322-386] gives a fire history of the northwest, and describes fire protection by different States, with a history of manpower use in fire control (suppression).

Chapter 7: The cold war on fire [pp. 387-461] includes a fire history of S. California, fire equipment and rural fire defence, and

Chapter 8: Fields of fire [pp. 462-529] covers wildland fire research and the fire histories of Alaska and the southwest.

At the end of the book, notes are given on each chapter with references, and there is a bibliographic essay on the major American sources and an index.

Fire in California's ecosystems

Type	Book
Editor	Neil G. Sugihara
Editor	Jan W. van Wagtendonk
Editor	Kevin E. Shaffer
Editor	Jo Ann Fites-Kaufman
Editor	Andrea E. Thode
Abstract	Description Fire is both an integral natural process in the California landscape and growing threat to its urban and suburban developments as they encroach on wildlands. Written by many of the foremost authorities on the subject, this comprehensive volume, an ideal text and authoritative reference tool, is the first to synthesize our knowledge of the science, ecology, and management of fire in California. Part I introduces the basics of fire ecology. It includes an historical overview of fire, vegetation, and climate in California; overviews of fire as a physical and ecological process; and reviews the interactions between fire and the physical, plant, and animal components of the environment. Part II explores the history and ecology of fire in each of California's nine bioregions. Part III examines fire management in California, including both Native American and post-European settlement; discusses current issues related to fire policy and management, including air quality, watershed management, invasive plant species, native species, and fuel management; and considers the future of fire management. (from: http://www.amazon.com/Fire-Californias-Ecosystems-Neil-Sugihara/dp/0520246055)
Place	Berkeley, California
Publisher	University of California Press, Berkeley
Date	2006
# of Pages	596 p.
ISBN	0520246055, 9780520246058
URL	http://www.ucpress.edu/book.php?isbn=9780520246058
Extra	e-book available
Date Added	Sun Aug 28 17:26:59 2011
Modified	Wed Aug 31 00:28:29 2011

Notes:

Contents:

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page 2: Bailey (1996) and Bailey et al. (1994) developed an ecosystem classification based on climate, as affected by latitude, continental position, elevation, and landform.

Fire in eastern ecosystems (Chapter 4)

Type	Report
Author	Dale D. Wade
Author	Brent L. Brock
Author	Patrick H. Brose
Author	James B. Grace
Author	Greg A. Hoch
Author	William A. Patterson III
Abstract	Prior to Euro-American settlement, fire was a ubiquitous force across most of the Eastern United States. Fire regimes spanned a time-scale from chronic to centuries. Fire severity varied from benign to extreme (fig. 1-2). Today, fire is still a major force on the landscape. In some ecosystems fire stabilizes succession at a particular sere, while in others, succession is set back to pioneer species. The wide range in fire regimes coupled with elevation and moisture gradients produce a myriad of plant communities that continually change over time in both stature and composition, although it is not uncommon for the major species to remain dominant. Discussion is primarily about major vegetation types, for example, oak-hickory. However, some minor types such as spruce-fir and Table Mountain pine are also covered. Vegetation types are discussed under the most representative fire regime type, recognizing that some vegetation types overlap two fire regime types (table 4-1).
Report Number	GTR-RMRS-042-vol. 2
Report Type	General Technical Report
Series Title	Wildland fire in ecosystems
Place	Ogden, UT
Institution	U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
Date	December 2000
Pages	53-96
URL	http://www.treesearch.fs.fed.us/pubs/4554
Date Added	Sat Aug 27 00:55:16 2011
Modified	Mon Aug 29 23:49:07 2011

Notes:

Citation:

Wade, Dale D.; Brock, Brent L.; Brose, Patrick H.; Grace, James B.; Hoch, Greg A.; Patterson, William A. 2000. Fire in eastern ecosystems. Pages 53-96 In: Brown, James K.; Smith, Jane Kapler. (ed.). Wildland Fire in Ecosystems: Effects of Fire on Flora.

General Technical Report RMRS-GTR-42-vol. 2. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station.

Fire in ecosystem distribution and structure: Western forests and scrublands

Type Book Section
Author Bruce M. Kilgore
Abstract Fire plays an important role in determining structure of forests and scrublands throughout the West. Distribution and structure of vegetation depends upon topography, climatic regime, and fire regime. Six fire regimes are defined based on fire frequency and intensity, varying from frequent, lowintensity surface fires to very long return interval, stand replacement fires. In certain western forests and scrublands fire suppression for the past 50 to 100 years has led to longer intervals between fires, increases in surface and crown fuels, changes in forest structure, and sequential impacts on fire intensity, postfire age structure, species composition, fuel accumulation, and both horizontal and vertical pattern. Better understanding of fire regimes is basic to our management of western ecosystems.
Book Title Fire Regimes and Ecosystem Properties Proceedings of the Conference
Series General Technical Report
Series Number WO-GTR-26
Place Washington D.C.
Publisher USDA Forest Service
Date June 1981
Pages 58-89
Short Title Fire in ecosystem distribution and structure
URL http://digitalcommons.usu.edu/barkbeetles/81/
Extra Keywords: western forests; fire regimes; fire frequency; fire intensity; scrublands.
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:37:15 2011

Notes:

Citation:

Kilgore, B. (1981). Fire in ecosystem distribution and structure : western forests and scrublands. In: HA Mooney, TM Bonnicksen, and NL Christensen (tech.cord) Proceedings of the Conference: Fire Regimes and Ecosystem Properties, pp. 58-89. USDA Forest Service, General Technical Report WO-GTR-26.

Fire in forestry: Volume 1. Forest fire behavior and effects

Type Book
Author Craig C. Chandler
Author Phillip Cheney
Author Philip Thomas
Author Louis V. Trabaud
Author Dave J. Williams
Abstract This first volume is a comprehensive reference on the behavior of forest fires, the factors affecting that behavior, and the effects of fires on forest ecosystems. Discusses how to organize the control and use of forest fires in land management. Complex concepts and mathematics are kept to a minimum. Thoroughly international in scope.
Volume 1
# of Volumes 2
Place New York, NY

Publisher John Wiley & Sons, INC.
Date 1983
# of Pages 450 p.
ISBN 0471874426
Short Title Fire in forestry. Vol. 1
URL http://md1.csa.com/partners/viewrecord.php?requester=gs&collection=ENV&…
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:08:22 2011

Notes:

Contents:

There are 11 chapters in volume 1:

1. Chemistry and physics of ignition and combustion; 2. Forest fuels; 3. Forest fire weather; 4. Fire behavior; 5. Fire behavior prediction; 6. Ecological principles and their relationship to fire; 7. Fire effects on soil, water and air; 8. Fire effects on wildlife; 9. Fire effects on vegetation; 10. Fire as a natural process in forests; and 11. Forest fire terminology and conversion factors.

Forest fire management and organization.Volume 2 also contains 11 chapters:

1. Fire management policy; 2. Economics of fire management; 3. Fire prevention; 4. Presuppression activities; 5. Forest fire equipment; 6. Forest fire suppression; 7. Large fire organization; 8. Fire at the urban-forest interface; 9. Managing fire use - controlled burning; 10. Fireline safety; and 11. Forest fire terminology and conversion factors.

Author and subject indexes are included in both volumes.

Fire in the American south: Vegetation impacts, history, and climatic relations

Type Journal Article
Author Charles W. Lafon
Abstract Fire plays a key role in many ecosystems of the southeastern U.S. Longleaf pine (Pinus palustris) and Table Mountain pine-pitch pine (P. pungens – P. rigida) forests along with other ecosystems – including oak (Quercus) forests, grasslands, and spruce-fir (Picea-Abies) forests – illustrate the range of fire effects and plant persistence strategies in the American South. Fire history research reveals that fires and fire-associated vegetation were common before the fire exclusion of the past century. Both lightning and anthropogenic ignitions (caused by American Indians or European settlers) contributed to burning, but their relative importance is debated. The humid climate constrains burning, especially by lightning-ignited fires, which often occur during moist conditions. Studies of fire climatology indicate the importance of dry conditions (e.g. drought years and relatively dry areas) for widespread burning in this humid region. Landscape fragmentation also influences burning. In the past some fires also likely grew much larger than today because they were

unimpeded by roads, farms, and other barriers.

Publication Geography Compass
Volume 4
Issue 8
Pages 919-944
Date August 2010
Journal Abbr Geography Compass
DOI 10.1111/j.1749-8198.2010.00363.x
ISSN 1749-8198
URL http://doi.wiley.com/10.1111/j.1749-8198.2010.00363.x
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:40:39 2011

Fire in the Earth System

Type Journal Article
Author D. M. J. S. Bowman
Author Jennifer K. Balch
Author Paulo Artaxo
Author William J. Bond
Author Jean M. Carlson
Author Mark A. Cochrane
Author Carla M. D'Antonio
Author Ruth S. DeFries
Author John C. Doyle
Author Sandy P. Harrison
Author Fay H. Johnston
Author Jon E. Keeley
Author Meg A. Krawchuk
Author Christian A. Kull
Author J. Brad Marston
Author Max A. Moritz
Author I. Colin Prentice
Author Christopher I. Roos
Author Andrew C. Scott
Author Thomas W. Swetnam
Author Guido R. van der Werf
Author Stephen J. Pyne
Abstract Fire is a worldwide phenomenon that appears in the geological record soon after the appearance of terrestrial plants. Fire influences global ecosystem patterns and processes, including vegetation distribution and structure, the carbon cycle, and climate. Although humans and fire have always coexisted, our capacity to manage fire remains imperfect and may become more difficult in the future as climate change alters fire regimes. This risk is difficult to assess, however, because fires are still poorly represented in global models. Here, we discuss some of the most important issues involved in developing a better understanding of the role of fire in the Earth system.
Publication Science
Volume 324
Issue 5926
Pages 481-484
Date 24 April 2009

Journal Abbr Science
DOI 10.1126/science.1163886
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/content/abstract/324/5926/481
Date Added Tue Aug 23 03:44:02 2011
Modified Wed Aug 24 04:28:43 2011

Fire in the Earth System

Type Book Section
Author Sandy P. Harrison
Author Jennifer R. Marlon
Author Patrick J. Bartlein
Abstract Fire is an important component of the Earth System that is tightly coupled with climate, vegetation, biogeochemical cycles, and human activities. Observations of how fire regimes change on seasonal to millennial timescales are providing an improved understanding of the hierarchy of controls on fire regimes. Climate is the principal control on fire regimes, although human activities have had an increasing influence on the distribution and incidence of fire in recent centuries. Understanding of the controls and variability of fire also underpins the development of models, both conceptual and numerical, that allow us to predict how future climate and land-use changes might influence fire regimes. Although fires in fire-adapted ecosystems can be important for biodiversity and ecosystem function, positive effects are being increasingly outweighed by losses of ecosystem services. As humans encroach further into the natural habitat of fire, social and economic costs are also escalating. The prospect of near-term rapid and large climate changes, and the escalating costs of large wildfires, necessitates a radical re-thinking and the development of approaches to fire management that promote the more harmonious co-existence of fire and people.
Book Title Changing Climates, Earth Systems and Society
Series International Year of Planet Earth
Edition 1st edition
Place Dordrecht, Heidelberg, London, New York
Publisher Springer
Date 2010
Pages 21–48
ISBN 978-90-481-8715-7
URL http://www.springerlink.com/content/t13341464245456u/
Extra Keywords: wildfire; fire regimes; fire patterns.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:49 2011

Notes:

Source:

J. Dodson (ed.), Changing Climates, Earth Systems and Society, International Year of Planet Earth, DOI 10.1007/978-90-481-8716-4_3, © Springer Science+Business Media B.V. 2010

Fire in the Earth System: A paleoperspective

Type Journal Article
Editor Cathy Whitlock
Editor Willy Tinner

Editor Louise Newman
Editor Thorsten Kiefer
Abstract This newsletter issue provides an overview of the state-of-art in Paleofire research. It also includes a number of openly submitted scientific articles, and provides information on recently held meetings and upcoming events.
Publication PAGES Newsletter
Volume 18
Issue 2
Pages 54-96
Date August 2010
Journal Abbr PAGES News
ISSN 1811-1602
URL http://www.pages-igbp.org/index.php/products/2011-03-28-16-23-06/153-pages-news-vol-18-no-2
Loc. in Archive PAGES
Call Number 0000
Rights PAGES (Past Global Changes) International Project Office
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:22 2011

Fire in the environment: The ecological, atmospheric and climatic importance of vegetation fires: Report of the Dahlem Workshop, Berlin, 15-20 March, 1992

Type Book
Editor Paul J. Crutzen
Editor Johann Georg Goldammer
Abstract no abstract
Series Dahlem workshop reports, Environmental sciences research report
Series Number ES 13
Volume 1992
Place Chichester, England; New York, NY
Publisher John Wiley & Sons Inc.
Date July 1993
# of Pages 400 p.
ISBN 0471936049, 9780471936046
Short Title Fire in the environment
URL http://books.google.com/books/about/Fire_in_the_environment.html?id=ZoPwAAAAMAAJ
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:32 2011

Fire in the forest

Type Conference Paper
Author James M. Saveland
Abstract From ancient philosophies to present day science, the ubiquity of change and the process of transformation are core concepts. The primary focus of a recent white paper on disturbance ecology is summed up by the Greek philosopher Heraclitus who stated, “Nothing is permanent but change.” Disturbance processes, such as fire, provide a window into the emerging world of nonequilibrium theory. In contrast to a steady state view of the world, nonequilibrium theory asserts that biological communities are always recovering from the last disturbance. Disturbance is somewhat of a misnomer, connoting disruption of an equilibrium. Disturbance is

about death and rebirth, the continuous process of renewal. Incorporating the process of renewal and transformation is the key to creating healthy forests and effective organizations. The process of continuous renewal in organizations is embodied in the concept of learning organizations. Building shared vision is one of the cornerstones of a learning organization and is the first step to incorporating disturbance ecology in land management practices.

Date September 1995
Proceedings Title Forest Health Through Silviculture: Proceedings of the 1995 National Silviculture Workshop
Conference Name The 1995 National Silviculture Workshop, Mescalero, New Mexico, May 8-11,1995
Place Fort Collins, CO
Publisher U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station
Pages 14-19
Series General Technical Report RM-GTR-267
URL http://treesearch.fs.fed.us/pubs/5136
Archive http://treesearch.fs.fed.us/pubs/22037
Extra Keywords: change; process of transformation; disturbance processes; disturbance ecology.
Date Added Sun Aug 28 17:22:49 2011
Modified Mon Aug 29 22:57:32 2011

Notes:

Citation:

Saveland, J. 1995. Fire in the Forest. Pages 14-19 in: L.G. Eskew compiler. Forest Health Through Silviculture: Proceedings of the 1995 National Silviculture Workshop, Mescalero, NM, May 8-11, 1995. USDA For. Serv. Gen. Tech. Rep. RM-GTR-267.

Fire in the forests of Maine and New Hampshire

Type Journal Article
Author Timothy J. Fahey
Author William A. Reiners
Abstract Modern fire records for Maine and New Hampshire and other his- torical evidence were investigated to infer the occurrence and distribution of fire in pre-settle- ment time. Between the decades of 1910-1920 and 1960-1970 fire incidence increased and aver- age fire size decreased sharply, with the net effect being a several-fold diminution of land burned per year. Fire was unequally distributed among forest types. Pine-dominated forests in the south-coastal part of the States were burned most frequently, with northern hardwood forests in central portions intermediate and spruce-fir forests least influenced by fire. The spruce-fir type in northern New England appears to be an exception to the generalization that coniferous forests burn more readily than hardwoods. Historical evidence suggests that in pre- Columbian time a significant potential for fire ignition existed in association with lightning and the incendiary activities of Native Americans. Because human control of fire size was lack- ing, the extent of prehistoric fires may have equalled that in the early Twentieth century.
Publication Bulletin of the Torrey Botanical Club
Volume 108
Issue 3
Pages 362–373
Date July-September 1981
Journal Abbr Bull. Torr. Bot. Club
DOI 10.2307/2484716
ISSN 0040-9618
URL http://www.jstor.org/stable/2484716
Extra Keywords: Maine; New Hampshire; fire history; coniferous forests; hardwood forests.
Date Added Sun Aug 28 05:42:07 2011

Modified Tue Aug 30 14:52:29 2011

Fire in the virgin forests of the Boundary Waters Canoe Area, Minnesota

Type Journal Article

Author Miron L. Heinselman

Abstract Fire largely determined the composition and structure of the presettlement vegetation of the Boundary Waters Canoe Area as well as the vegetation mosaic on the landscape and the habitat patterns for wildlife. It also influenced nutrient cycles, and energy pathways, and helped maintain the diversity, productivity, and long-term stability of the ecosystem. Thus the whole ecosystem was fire-dependent. At least some overstory elements in virtually all forest stands still date from regeneration that followed one or more fires since 1595 A.D. The average interval between significant fire years was about 4 yr in presettlement times, but shortened to 2 yr from 1868 to 1910 during settlement. However, 83% of the area burned before the beginning of suppression programs resulted from just nine fire periods: 1894, 1875, 1863-1964, 1824, 1801, 1755-1959, 1727, 1692, 1681. The average interval between these major fire years was 26 yr. Most present virgin forests date from regeneration that followed fires in these years. Significant areas were also regenerated by fires in 1903, 1910, 1936, and 1971. Most major fire years occurred during prolonged summer droughts of subcontinental extent, such as those of 1864, 1910, and 1936. Many fires were man-caused, but lightning ignitions were also common. Lightning alone is probably a sufficient source of ignitions to guarantee that older stands burned before attaining climax. Dry matter accumulations, spruce budworm outbreaks, blowdowns, and other interactions related to time since fire increase the probability that old stands will burn. Vegetation patterns on the landscape were influenced by such natural firebreaks as lakes, streams, wetlands, and moist slopes. Red and white pine are most common on islands, and to the east, northeast, or southeast of such firebreaks. Jack pine, aspen-birch, and sprout hardwood forests are most common on large uplands distant from or west of such firebreaks. A Natural Fire Rotation of about 100 yr prevailed in presettlement times, but many red and white pine stands remained largely intact for 150-350 yr, and some jack pine and aspen-birch forests probably burned at intervals of 50 yr or less. There is paleoecological evidence that fire was an ecosystem factor before European man arrived, and even before early man migrated to North America. Probably few areas ever attained the postulated fir-spruce-cedar-birch climax in postglacial times. To understand the dynamics of fire-dependent ecosystems fire must be studied as an integral part of the system. The search for stable communities that might develop without fire is futile and avoids the real challenge of understanding nature on her own terms. To restore the natural ecosystem of the Canoe Area fire should soon be reintroduced through a program of prescribed fires and monitored lightning fires. Failing this, major unnatural, perhaps unpredictable, changes in the ecosystem will occur.

Publication Quaternary Research

Volume 3

Issue 3

Pages 329-382

Date October 1973

Journal Abbr Quaternary Res.

DOI 10.1016/0033-5894(73)90003-3

ISSN 0033-5894

URL http://www.sciencedirect.com/science/article/B6WPN-4DV0W55-B0/2/6c3006007355de5841f69a5113098256

Date Added Mon Aug 29 17:30:07 2011

Modified Wed Aug 31 00:31:38 2011

Fire intensity and frequency as factors in the distribution and structure of northern ecosystems.

Type Conference Paper

Author Miron L. Heinselman

Abstract Most presettlement Canadian and Alaskan boreal forests and Rocky Mountain subalpine forests had lightning fire regimes of large-scale crown fires and high-intensity surface fires, causing total stand replacement on fire rotations (or cycles) of 50 to 200 years. Cycles and fire size varied with latitude, elevation, and topographic-climate factors. Some areas had smaller, less-intense surface fires at shorter intervals. The Great Lakes-Acadian forests had regimes of short cycle crown fires in near-boreal jack pine and spruce forests, combinations of moderate intensity short-interval surface fires and small-scale crown fires at longer intervals in red-white pine forests, and low intensity long-interval fires in hardwoods. Fire maintained the structure and pattern of the forest mosaic. These regimes still prevail in the far north. Elsewhere regimes and the forest mosaic are greatly modified by logging, man-caused fires, and fire suppression.

Date 1981

Proceedings Title Fire regimes and ecosystem properties

Conference Name Fire regimes and ecosystem properties proceedings of the conference : December 11-15, 1978

Place Honolulu, Hawaii

Publisher DC: U.S. Department of Agriculture, Forest Service

Pages 7-57

Series General Technical Report WO-26

URL http://www.npwrc.usgs.gov/resource/literatr/firewild/bib/103.htm

Extra Keywords: fire; frequency; regimes; northern; ecosystems.

Date Added Mon Aug 29 17:30:07 2011

Modified Wed Aug 31 00:31:27 2011

Notes:

Citation:

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Heinselman, Miron L. 1981. Fire intensity and frequency as factors in
the distribution and structure of northern ecosystems. In: Mooney, H.
A.; Bonnicksen, T. M.; Christensen, N. L.; [and others], technical
coordinators. Fire regimes and ecosystem properties: Proceedings of the
conference; 1978 December 11-15; Honolulu, HI. Gen. Tech. Rep. WO-26.
Washington, DC: U.S. Department of Agriculture, Forest Service: pp. 7-57.

Heinselman, M.L. 1981. Fire intensity and frequency as factors in the
distribution and structure of northern ecosystems. In Fire Regimes and
Ecosystem Properties. Eds. H.A. Mooney, T.M. Bonnicksen, N.L. Christensen,
J.E. Lotan and W.A. Reiners. USDA Forest Service, Gen. Tech. Rep. WO-26,
pp 7--57.
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Fire intensity, fire severity and burn severity: A brief review and suggested usage

Type Journal Article

Author Jon E. Keeley

Abstract Several recent papers have suggested replacing the terminology of fire intensity and fire severity. Part of the problem with fire intensity is that it is sometimes used incorrectly to describe fire effects, when in fact it is justifiably restricted to measures of energy output. Increasingly, the term has created confusion because some authors have restricted its usage to a single measure of energy output referred to as fireline intensity. This metric is most useful in understanding fire behavior in forests, but is too narrow to fully capture the multitude of ways fire energy affects ecosystems. Fire intensity represents the energy released during various phases of a fire, and different metrics such as reaction intensity, fireline intensity, temperature, heating duration and radiant energy are useful for different purposes. Fire severity, and the related term burn severity, have created considerable confusion because of recent changes in their usage. Some authors have justified this by contending that fire severity is defined broadly as ecosystem impacts from fire and thus is open to individual interpretation. However, empirical studies have defined fire severity operationally as the loss of or change in organic matter aboveground and belowground, although the precise metric varies with management needs. Confusion arises because fire or burn severity is sometimes defined so that it also includes ecosystem responses. Ecosystem responses include soil erosion, vegetation regeneration, restoration of community structure, faunal recolonization, and a plethora of related response variables. Although some ecosystem responses are correlated with measures of fire or burn severity, many important ecosystem processes have

either not been demonstrated to be predicted by severity indices or have been shown in some vegetation types to be unrelated to severity. This is a critical issue because fire or burn severity are readily measurable parameters, both on the ground and with remote sensing, yet ecosystem responses are of most interest to resource managers.

Publication International Journal of Wildland Fire
Volume 18
Issue 1
Pages 116–126
Date February 2009
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07049
ISSN 1049-8001
Short Title Fire intensity, fire severity and burn severity
URL http://www.publish.csiro.au/paper/WF07049.htm
Extra Keywords: BAER; dNBR Landsat Thematic Mapper; soil burn severity.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:18:24 2011

Fire management and policy since European settlement (Chapter 18)

Type Book Section
Author Scott L. Stephens
Author Neil G. Sugihara
Abstract Fire is both an integral natural process in the California landscape and growing threat to its urban and suburban developments as they encroach on wildlands. Written by many of the foremost authorities on the subject, this comprehensive volume, an ideal text and authoritative reference tool, is the first to synthesize our knowledge of the science, ecology, and management of fire in California. Part I introduces the basics of fire ecology. It includes an historical overview of fire, vegetation, and climate in California; overviews of fire as a physical and ecological process; and reviews the interactions between fire and the physical, plant, and animal components of the environment. Part II explores the history and ecology of fire in each of California's nine bioregions. Part III examines fire management in California, including both Native American and post-European settlement; discusses current issues related to fire policy and management, including air quality, watershed management, invasive plant species, native species, and fuel management; and considers the future of fire management. Fire is both an integral natural process in the California landscape and growing threat to its urban and suburban developments as they encroach on wildlands. Written by many of the foremost authorities on the subject, this comprehensive volume, an ideal text and authoritative reference tool, is the first to synthesize our knowledge of the science, ecology, and management of fire in California. Part I introduces the basics of fire ecology. It includes an historical overview of fire, vegetation, and climate in California; overviews of fire as a physical and ecological process; and reviews the interactions between fire and the physical, plant, and animal components of the environment. Part II explores the history and ecology of fire in each of California's nine bioregions. Part III examines fire management in California, including both Native American and post-European settlement; discusses current issues related to fire policy and management, including air quality, watershed management, invasive plant species, native species, and fuel management; and considers the future of fire management.
Book Title Fire in California’s ecosystems
Place Berkeley, California
Publisher University of California Press, Berkeley
Date 2006
Pages 431–443
ISBN 0520246055, 9780520246058
URL http://nature.berkeley.edu/stephens-lab/Publications/Stephens%20Sug.%20AFE%20fire%20Book%20Policy%209-06.pdf
Archive http://nature.berkeley.edu/stephens-lab/Articles.htm
Date Added Sun Aug 28 17:26:59 2011

Modified Sun Aug 28 23:11:38 2011

Notes:

Citation:

Stephens, S.L., Sugihara, N.G., 2006. Fire management and policy since European settlement. In: Sugihara, NG, van Wagtendonk, J, Shaffer, KE , Fites-Kaufman, J, , Thode, AE, editors. Fire in California's ecosystems. California: University of California Press. Berkeley. pp. 431-443.

Fire management of California shrubland landscapes

Type Journal Article

Author Jon E. Keeley

Abstract Fire management of California shrublands has been heavily influenced by policies designed for coniferous forests, however, fire suppression has not effectively excluded fire from chaparral and coastal sage scrub landscapes and catastrophic wildfires are not the result of unnatural fuel accumulation. There is no evidence that prescribed burning in these shrublands provides any resource benefit and in some areas may negatively impact shrublands by increasing fire frequency. Therefore, fire hazard reduction is the primary justification for prescription burning, but it is doubtful that rotational burning to create landscape age mosaics is a cost effective method of controlling catastrophic wildfires. There are problems with prescription burning in this crown-fire ecosystem that are not shared by forests with a natural surface-fire regime. Prescription weather conditions preclude burning at rotation intervals sufficient to effect the control of fires ignited under severe weather conditions. Fire management should focus on strategic placement of prescription burns to both insure the most efficient fire hazard reduction and to minimize the amount of landscape exposed to unnaturally high fire frequency. A major contributor to increased fire suppression costs and increased loss of property and lives is the continued urban sprawl into wildlands naturally subjected to high intensity crown fires. Differences in shrubland fire history suggest there may be a need for different fire management tactics between central coastal and southern California. Much less is known about shrubland fire history in the Sierra Nevada foothills and interior North Coast Ranges, and thus it would be prudent to not transfer these ideas too broadly across the range of chaparral until we have a clearer understanding of the extent of regional variation in shrubland fire regimes.

Publication Environmental Management

Volume 29

Issue 3

Pages 395–408

Date March 2002

Journal Abbr Environ. Manage.

DOI 10.1007/s00267-001-0034-Y

ISSN 1432-1009

URL http://www.springerlink.com/content/r5frxtumwrbkt1cv/

Extra Keywords: buffer zones; chaparral; ecosystem management; fire management; fuel breaks; prescription burning.

Date Added Tue Aug 30 14:37:15 2011

Modified Wed Aug 31 00:43:37 2011

Fire on the edge: Prehistoric fire along the escarpment zone of the Cumberland Plateau

Type Conference Paper

Author Cecil R. Ison

Abstract Unlike many areas of the United States, anthropogenic fires are the prime agent for affecting changes in plant and animal species composition in the southern Appalachian Highlands. Although the extensive use of fire by

the American Indians has been recognized from the earliest European observers, it is somewhat difficult to determine the impact prehistoric fires had on forest structure. By examining the fossil and charcoal record from Cliff Palace Pond with the archaeological record recovered from nearby prehistoric sites, a 9,500-year record of the vegetational development can be established for the escarpment zone of Eastern Kentucky. This record indicates that anthropogenic fires played a central role in shaping the forest structure, especially after the transition from a hunting and gathering economy to one based on swidden agricultural practices.

Date September 2000

Proceedings Title Proceedings: Workshop on Fire, People, and the Central Hardwoods Landscape

Conference Name Workshop on Fire, People, and the Central Hardwoods Landscape, Richmond, Kentucky, March 12-14, 2000

Place Newtown Square, PA

Publisher United States Department of Agriculture, Forest Service, Northeastern Research Station

Pages 36-45

Series General Technical Report NE-274

Short Title Fire on the edge

URL http://www.treesearch.fs.fed.us/pubs/23074

Archive http://www.treesearch.fs.fed.us/pubs/3762

Extra Keywords: native burning; prescribed fire; prescribed burning; oak; mixed-oak; oakhickory; barrens; ridgetop-pine; soil microbes; rare plants.

Date Added Sun Aug 28 03:05:14 2011

Modified Sat Sep 3 23:42:05 2011

Notes:

Citation:

Ison, Cecil 2000. Fire on the Edge: Prehistoric Fire Along the Escarpment Zone of the Cumberland Plateau. In: Yaussy, Daniel A., comp. 2000. Proceedings: workshop on fire, people, and the central hardwoods landscape; 2000 March 12-14; Richmond, KY. Gen. Tech. Rep. NE-274. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station: pp.36-45.

Related

- Humans, topography, and wildland fire: The ingredients for long-term patterns in ecosystems
- Fire and the ecological history of oak forests in the eastern United States

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Fire parameterization on a global scale

Type Journal Article

Author Olga Pechony

Author Drew T. Shindell

Abstract We present a convenient physically based global-scale fire parameterization algorithm for global climate models. We indicate environmental conditions favorable for fire occurrence based on calculation of the vapor pressure deficit as a function of location and time. Two ignition models are used. One assumes ubiquitous ignition, the other incorporates natural and anthropogenic sources, as well as anthropogenic fire suppression. Evaluation of the method using Global Precipitation Climatology Project precipitation, National Centers for Environmental Prediction/National Center for Atmospheric Research temperature and relative humidity, and Moderate Resolution Imaging Spectroradiometer (MODIS) Leaf Area Index as a proxy for global vegetation density gives results in remarkable correspondence with global fire patterns observed from the MODIS and Visible and Infrared Scanner satellite instruments. The parameterized fires successfully reproduce the spatial distribution of global fires as well as the seasonal variability. The interannual variability of global fire activity derived from the 20-year advanced very high resolution radiometer record are well reproduced using Goddard Institute for Space Studies general circulation models climate simulations, as is the response to the climate changes following the eruptions of El Chichon and Mount Pinatubo. In conjunction with climate models and data sets on vegetation changes with time, the suggested fire parameterization offers the possibility to estimate relative variations of global fire activity for past and future climates.

Publication Journal of Geophysical Research
Volume 114
Issue 16
Pages D16115 (10 p.)
Date August 2009
Journal Abbr J. Geophys. Res.
DOI 10.1029/2009JD011927
ISSN 0148-0227
URL http://www.agu.org/pubs/crossref/2009/2009JD011927.shtml
Extra Keywords: global fire parameterization; flammability; global climate models.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:30:01 2011

Fire recurrence in the subarctic and its implications for vegetation composition

Type Journal Article
Author Edward A. Johnson
Abstract The Weibull distribution is shown to fit well with empirical data of fire intervals for a population of sites. The distribution demonstrates that the recurrence of fire in the subarctic forests of the Northwest Territories, Canada, is predictable. The three parameters of the distribution describe in ecological terms the lag before reburning can occur, the expected recurrence time of fire, and the shape of the variation around the expected recurrence. The parameters behave consistently with logically independent empirical evidence related to the regional and local climate and topography. The relationship of the distribution's hazard of burning function to vegetation composition and r–K selection is discussed.
Publication Canadian Journal of Botany
Volume 57
Issue 12
Pages 1374-1379
Date June 1979
Journal Abbr Can. J. Bot.
DOI 10.1139/b79-171
ISSN 1480-3305
URL http://www.nrcresearchpress.com/doi/abs/10.1139/b79-171
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:05:14 2011

Fire regime in a conservation reserve in Chihuahua, Mexico

Type Journal Article
Author Peter Z. Fulé
Author José Villanueva-Díaz
Author Mauro Ramos-Gómez
Abstract Fire regime characteristics were reconstructed from fire-scarred trees in the Tutuaca reserve, a newly designated protected area in the Sierra Madre Occidental of western Chihuahua. The reserve was created to protect thick-billed parrot nesting habitat (large snags) and a relict forest of Chihuahua spruce (Picea chihuahuana Martínez). We collected fire-scarred samples from conifers (Pinus ayacahuite Ehrenb., Pinus durangensis Martínez, and Pseudotsuga menziesii (Mirb.) Franco) in three 25-ha sites arrayed at different watershed positions, from a low site adjacent to the spruce trees up to the watershed divide. Fire analysis periods began in 1702, 1704, or 1761 and continued through the final fire in 1955 (two sites) or 1995. All sites had frequent fire regimes (mean fire interval (MFI) 3.9-5.2 years; MFI for years in which 25% or more of the

samples were scarred: 6.9-8.4 years). Almost all fires occurred before cambial growth began or early during the season of cambial growth. Fire years were significantly dry, and the years immediately preceding fire were significantly wet. After 1955, no further fires occurred at two of the three study sites, a pattern similar to that observed elsewhere in northern Mexico. The third site had fires in 1987 and 1995. The extended fire-free period in portions of the Tutuaca landscape may result in fuel accumulation and eventually in severe wildfire. For effective conservation of fire-susceptible habitat features, managers should seek to incorporate surface fire as a management tool.

Publication Canadian Journal of Forest Research
Volume 35
Issue 2
Pages 320–330
Date February 2005
Journal Abbr Can. J. For. Res.
DOI 10.1139/x04-173
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x04-173
Extra Keywords: Chihuahua; fire regime; Mexico; MFI - mean fire interval; Tutuaca reserve.
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:33:38 2011

Fire regime in red pine stands at the northern limit of the species' range

Type Journal Article
Author Yves Bergeron
Author Jacques Brisson
Abstract In order to define more precisely the fire regime prevailing in red pine stands, and to evaluate its effect on the maintenance of marginal populations in the boreal forest, we documented the frequency, extent, and intensity of fires that affected red pine populations in northwest Quebec. We focused on two islands in Lake Duparquet, divided the islands into 5 x 5 m plots, and recorded topography, soil moisture, and vegetation for each plot. We mapped stems and noted fire scars, took core samples and stem cross sections to determine the age of trees, and used fire scars, post-fire regeneration, surviving trees, and changes in growth rates as indications of fire passage and intensity. Fire frequency was also estimated using fire history data from 13 other stands. Before 1906 the fire regime was characterized by: (1) a short but very irregular fire interval averaging ≈30 yr, (2) a large variation in burned area, including patches that were generally left unburned, (3) a low fire intensity, although some fires were locally very intense, and (4) the occurrence, roughly every 68 yr, of fires of sufficient intensity to kill most trees on the entire island. Since 1906 the frequncy of fire has decreased dramatically. The fire regime appears to be controlled by abiotic conditions. The high-frequency fires of variable intensity primarily affect the xeric habitats. The less frequent, intense (possibly crown) fires that affect the entire island may depend on stand development from a less susceptible pine and hardwood forest towards a more typical spruce-fir boreal forest in more mesic habitats. The fire regime described for these insular stands at the limit of species range is similar to that described for other parts of the range of red pine. We hypothesize that red pine is restricted to insular habitats at this northern limit of its range because of the particular fire regime that prevails there; the larger and more intense fires of the mainland here led to the elimination of the species.
Publication Ecology
Volume 71
Issue 4
Pages 1352–1364
Date August 1990
Journal Abbr Ecology
ISSN 0012-9658
URL http://www.jstor.org/stable/1938272
Extra Keywords: boreal forest; firefrequency; fire intensity; fire regime; insular habitats; lake landscape; marginal population; northern limit; northwest Quebec; Pinus resinosa; red pine regeneration; tree species distribution.

Date Added Tue Aug 23 02:14:10 2011
Modified Wed Aug 24 04:40:40 2011

Fire regime, fire intensity and tree survival in a tropical savanna in northern Australia

Type Journal Article
Author Richard J. Williams
Author Garry D. Cook
Author A. Malcolm Gill
Author Peter H. R. Moore
Abstract Dry season fires are a feature of the tropical savannas of northern Australia. As part of a landscape-scale fire experiment, we examined the effects of fire regimes on tree survival in a tropical savanna in Kakadu National Park, northern Australia. The fire regimes were annual early dry season (June) fires, annual late dry season (September) fires, and, no fire (control). Prescriptive, experimental fires were lit annually, between 1990 and 1994, in replicate compartments, each 15–20 km². In addition to the prescribed fires, however, one of the control compartments, which had been unburnt for seven years, was burnt by an unplanned, high intensity fire (~ 20 000 kW m^{-1}) in September 1994. This provided an opportunity to compare the impacts on the tree stratum of frequent, prescribed burning at various intensities, and a single unplanned fire. In all fire regimes, stem survival was substantially lower than whole-plant survival, and decreased linearly with increasing fire intensity. Significantly, stem death following the single, high intensity 20 000 kWm^{-1} fire (75%) was comparable to that of a regime of annual late dry season burning for five years, at an average intensity of c. 8000 kWm^{-1}. In the high intensity unplanned fire, stem survival showed a non-linear response to stem size, being least in the small (< 10 cm DBH) and large (> 40 cm DBH) size classes, and highest in the intermediate size classes. Stem survival was also species-dependent, being higher in the dominant Eucalyptus miniata than in the subdominant, broad-leaf deciduous trees. In the absence of fire for 5–10 years, the structure and composition of the tree stratum of these savannas tends to become more complex than in sites burnt more frequently, especially by high intensity fire. Such a long-term absence of fire may be a conservation objective for some areas of savanna. However, build-up of fuel to near maximal levels can occur in 2–4 years without fire. This may predispose the savannas to high-intensity, late dry season fires. Whatever the fire-management goal within a given patch of savanna, whether it be the prescribed use of fire on a biennial basis, or the exclusion of fire at a semidecadal scale, careful attention still needs to be given to the consequences of fuel build-up in fire-excluded sites.
Publication Australian Journal of Ecology
Volume 24
Issue 1
Pages 50–59
Date February 1999
Journal Abbr Aust. J. Ecol.
DOI 10.1046/j.1442-9993.1999.00946.x
ISSN 1442-9993
URL http://onlinelibrary.wiley.com/doi/10.1046/j.1442-9993.1999.00946.x/abstract
Extra Keywords: conservation; fuel; GLM; Kapalga; Kakadu National Park; prescribed fire; tree mortality; unplanned fire; wet–dry tropics.
Date Added Sat Aug 27 00:55:16 2011
Modified Tue Aug 30 00:01:40 2011

Fire regimes and approaches for determining fire history

Type Conference Paper
Author James K. Agee

Abstract Fire has been an important evolutionary influence in forests, affecting species composition, structure, and functional aspects of forest biology. Restoration of wildland forests of the future will depend in part on restoring fire to an appropriate role in forest ecosystems. This may include the "range of natural variability" or other concepts associated with fire as a disturbance factor. Yet fire on the forested landscape has not been a constant in either space or time. Its frequency, intensity, seasonality, extent, and other characters - collectively know as a fire regime-varied considerably across western forest landscapes. A series of techniques can be used to understand this history, and accurate interpretation depends on using the best fire history technique for a given fire regime. The following synopsis of these techniques is based on a more detailed explanation provided in Agee (1993).

Date June 1996
Proceedings Title The Use of Fire in Forest Restoration
Conference Name 1995 Annual Meeting of the Society for Ecological Restoration
Place University of Washington, Seattle, September 14-16, 1995.
Publisher U.S. Department of Agriculture, Forest Service, Intermountain Research Station: Ogden, UT
Pages 12–13
Series General Technical Report INT-341
URL http://www.treesearch.fs.fed.us/pubs/28480
Extra Keywords: fire ecology; fire regimes; forest restoration; fire history.
Date Added Mon Aug 15 22:42:47 2011
Modified Tue Aug 16 00:10:48 2011

Notes:

Citation:

Agee, James K. 1996. Fire regimes and approaches for determining fire history.   In: Hardy, Colin C.; Arno, Stephen F., eds. The use of fire in forest restoration. Gen. Tech. Rep. INT-GTR-341. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. p. 12-13.

In: Hardy, Colin C.; Arno, Stephen F., eds. 1996. The use of fire in forest restoration. Gen. Tech. Rep. INT-GTR-341. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. ----- The 26 papers in this document address the current knowledge of fire as a disturbance agent, fire history and fire regimes, applications of prescribed fire for ecological restoration, and the effects of fire on the various forested ecosystems of the north-western United States. The main body of this document is organized in three sections: Assessing Needs for Fire in Restoration; Restoration of Fire in Inland Forests; and Restoration in Pacific Westside Forests.

Related

- The seminal importance of fire in ecosystem management-impetus for this publication

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Fire regimes and ecoregions (Chapter 2)

Type Report
Author Robert G. Bailey

Abstract Introduction: The public land management agencies are phasing in a radically new approach to land management. They are shifting from their focus on individual resources to a more holistic approach of managing whole ecosystems. Fire-excluded systems are prone to changes in composition and density and are susceptible to catastrophic fire and invasion by non-native species. The cause of the problem in many areas includes more than a century of fire exclusion and suppression along with increased human development at the wildland-urban interface. Grazing and logging have also contributed to this problem. To correct this problem, fire and land management must return ecosystems to a healthier, sustainable condition. One way to do this is to modify the current structure of ecosystems to mimic natural structures (Bailey 2002).

Report Number RMRS-GTR-231

Report Type General Technical Report
Series Title Cumulative watershed effects of fuel management in the western United States
Place Fort Collins, CO
Institution U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station
Date January 2010
Pages 7-18
URL http://www.treesearch.fs.fed.us/pubs/contents/34301
Extra Keywords: cumulative effects; watershed; wildfire; fuel management; water quality; soil erosion.
Date Added Tue Aug 16 12:04:26 2011
Modified Mon Sep 5 10:10:59 2011

Notes:

Citation:

Bailey, Robert G. 2010. Fire regimes and ecoregions. In: Elliot, William J.; Miller, Ina Sue; Audin, Lisa, eds. Cumulative watershed effects of fuel management in the western United States. Gen. Tech. Rep. RMRS-GTR-231. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. p. 7-18.

Related

- Fire regimes in different regional ecosystems and their management implications

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Fire regimes and ecosystem properties

Type Report
Contributor Harold A. Mooney
Contributor Thomas M. Bonnicksen
Contributor Norman L. Christensen
Contributor J. E. Lotan
Contributor W. A. Reiners
Report Number GTR-WO-26
Report Type General Technical Report
Place Washington D.C.
Institution USDA Forest Service
Date June 1981
Pages 594 p.
URL http://lccn.loc.gov/81603157
Extra http://frames.nacse.org/2000/2769.html
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:23 2011

Fire regimes and forest changes in mid and upper montane forests of the southern Cascades, Lassen Volcanic National Park, California, USA

Type Journal Article
Author Alan H. Taylor
Abstract • Aim: Spatial and temporal variation in fire regime parameters and forest structure were assessed. • Location: A 2630-ha area of mid- and upper montane forest in Lassen Volcanic National Park (LVNP). • Methods: Two hypotheses were tested concerned with fire-vegetation relationships in southern Cascades forests: (1) fire

regime parameters (return interval, season of burn, fire size, rotation period) vary by forest dominant, elevation and slope aspect; and (2) fire exclusion since 1905 has caused forest structural and compositional changes in both mid- and upper montane forests. The implications of the study for national park management are also discussed. • Results: Fire regime parameters varied by forest compositional group and elevation in LVNP. Median composite and point fire return intervals were shorter in low elevation Jeffrey pine (Pinus jeffreyi) (JP) (4–6 years, 16 years) and Jeffrey pine–white fir (Abies concolor) (JP-WF) (5–10 years, 22 years) and longer in high elevation red fir (Abies magnifica)— western white pine (Pinus monticola) (RF-WWP) forests (9–27 years, 70 years). Median fire return intervals were also shorter on east-facing (6–9 years, 16.3 years) and longer on south- (11 years, 32.5 years) and west-facing slopes (22–28 years, 54-years) in all forests and in each forest composition group. Spatial patterns in fire rotation length were the same as those for fire return intervals. More growing season fires also occurred in JP (33.1%) and JP-WF (17.5%) than in RF-WWP (1.1%) forests. A dramatic decline in fire frequency occurred in all forests after 1905. • Conclusions: Changes in forest structure and composition occurred in both mid- and upper montane forests due to twentieth-century fire exclusion. Forest density increased in JP and JP-WF forests and white fir increased in JP-WF forests and is now replacing Jeffrey pine. Forest density only increased in some RF-WWP stands, but not others. Resource managers restoring fire to these now denser forests need to burn larger areas if fire is going to play its pre-settlement role in montane forest dynamics.

Publication Journal of Biogeography
Volume 27
Issue 1
Pages 87–104
Date January 2000
Journal Abbr J. Biogeogr.
DOI 10.1046/j.1365-2699.2000.00353.x
ISSN 1365-2699
URL http://www.jstor.org/stable/2655989
Extra Keywords: fire regimes; forest change; California; dendroecology; disturbance; montane forests.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:18 2011

Fire regimes for pine-grassland communities in the southeastern United States

Type Journal Article
Author Thomas A. Waldrop
Author David L. White
Author Steven M. Jones
Abstract Four combinations of season and frequency of burning were applied in Coastal Plain loblolly pine stands over a 43-year period. Overstory species composition and growth were unaffected by treatment. Above-ground portions of small hardwoods (less than 12.5 cm d.b.h.) were killed and replaced by numerous sprouts under periodic summer, periodic winter, and annual winter burning regimes. With annual summer burning, small hardwoods and shrubs were killed and replaced by vegetation typical of grassland communities. Grasses and forbs also dominated the understory of annual winter burns but numerous hardwood sprouts survived. Study results emphasize that frequent burning over a long period is needed to create and maintain the pine-grassland community observed by the first European settlers of the southeast.
Publication Forest Ecology and Management
Volume 47
Issue 1-4
Pages 195-210
Date January 1992
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/0378-1127(92)90274-D
ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/B6T6X-491598R-BR/2/abad7379a7188e1f9a1a221f64d0bd30

Date Added Tue Aug 16 01:55:44 2011
Modified Wed Aug 31 01:41:19 2011

Fire regimes in different regional ecosystems and their management implications

Type Presentation
Presenter Robert G. Bailey
Abstract The majority of American forest and grassland ecosystems are adapted to fire of varying frequencies and magnitudes. Fire is critical in maintaining ecological processes and biodiversity. Fire-excluded systems are prone to changes in composition and density, and are susceptible to catastrophic fire and invasion by non-native species. The cause of the problem in many areas includes more than a century of fire prevention and suppression along with increased human development at the wildland-urban interface. To correct this problem, planning for fire and land management must incorporate an improved understanding of fire regimes. This paper discusses fire regimes of different ecosystems at the scale of ecoregion, and goes on to explore how understanding fire regimes at this scale can abate the threat of fire exclusion and restore fire-adapted ecosystems.
Type Geography and Sustainability
Date April 5-9, 2005
Place Denver, CO
Meeting Name The Annual Meeting of the Association of American Geographers (AAG)
URL http://www.fs.fed.us/rm/ecoregions/publications/papers-presentations/
Date Added Mon Sep 5 01:03:18 2011
Modified Mon Sep 5 01:03:18 2011

Related

- Fire regimes and ecoregions (Chapter 2)

Fire regimes in southeastern ecosystems

Type Conference Paper
Author Norman L. Christensen
Date June 1981
Proceedings Title Fire Regimes and Ecosystem Properties Proceedings of the Conference
Conference Name Fire Regimes and Ecosystem Properties Proceedings of the Conference : December 11-15, 1978, Honolulu, Hawaii
Place Washington, D.C.
Publisher U.S. Department of Agriculture, Forest Service
Pages 112-136
Series General technical report WO-26
URL http://www.npwrc.usgs.gov/resource/literatr/firewild/bib/040.htm
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:35 2011

Notes:

Citation:

Christensen, Norman L. 1981. Fire regimes in southeastern ecosystems. In: Mooney, H. A.; Bonnicksen, T. M.; Christensen, N. L.; Lotan J. E.; Reiners W. A., editors. Fire regimes and ecosystem properties: Proceedings of the conference; 1978 December 11-15; Honolulu, HI.General Technical Report WO-26. Washington, DC: U.S. Department of Agriculture, Forest Service: 112-136.

Fire regimes in the interior Columbia River basin: Past and present

Type	Report
Author	Penelope Morgan
Author	Stephen C. Bunting
Author	Anne E. Black
Author	Troy Merrill
Author	Steven Barrett
Abstract	We mapped and compared historical (circa 1900) and current (circa 1990) fire regimes for the Interior Columbia River Basin. Fiie regime classes were based upon fire frequency (the mean number of years between successive tires) and severity (the fires' effects on the dominant overstory species) of fires. Fiie regimes were assigned to all forest, woodland, shrubland, and grassland vegetation types within the Interior Columbia River Basin. Fire regime classes were assigned based upon dominant vegetation types for each of four diierent biophysicai settings: cold & dry, cold & wet, warm & dry, and warm & wet. One set of decision rules was developed for historical vegetation. A separate set of decision rules was developed for current fire regimes to reflect the influence of fire suppression, invasion of exotic plant species, and other human activities. Decision rules were developed based upon published literature, a fire history data base and expert opinion. The coarse-scale maps (1:250,000 map scale. 1 km2 resolution) were produced in ARC/INFO format. The maps were judged reasonably accurate when compared to fire history data and when they were evaluated by local experts, but accuracy varied geographically. Current fires occur less frequently and are more severe than historical fires. Nonlethal fires are currently much less common than they were historically (32% vs. 20% of alI pixels). Mixed fire regimes were historically less extensive (16% of all pixels) than they are currently (30% of all pixels) extensive. Stand-replacing fires dominate the landscape, both historically (5 1% of all pixels) and currently (48% of all pixels). For alI severity classes combined, very frequent fires (those occurring every O-25 years) were more common historically than currently (28% and 6% of all pixels, respectively). Frequent fires (those occurring every 26-75 years) are also less common now than historically (42% and 18% of all pixels, respectively). Fire frequency has not changed where fires occurred very infrequently (every 15 l-300 years), extremely infrequently (every 300 years or more) or rarely, but this occurs on less than 10% of the pixels in the entire Interior'Columbia River Basin.
Report Number	RJVA-INT-94913
Place	Missoula, MT.
Institution	USDA Forest Service Intermountain Fire Sciences Laboratory, Rocky Mountain Research Station, Missoula
Date	April 1996
Pages	37 p.
Short Title	Fire regimes in the interior Columbia River Basin
URL	www.icbemp.gov/science/morgan.pdf
Archive	http://www.icbemp.gov/
Loc. in Archive	the Archive of the Interior Columbia Basin Ecosystem Management Project (ICBEMP)
Extra	Final report for RJVA-INT-949413: Coarse scale classification and mapping of disturbance regimes in the Columbia River basin
Date Added	Tue Aug 30 14:35:38 2011
Modified	Tue Aug 30 14:35:38 2011

Notes:

Citation:

Morgan, P., S. C. Bunting, A. E. Black, T. Merrill, and S. Barrett. (1995). Fire regimes in the interior Columbia River basin: past and present. Final report for RJVA-INT-949413: Coarse scale classification and mapping of disturbance regimes in the Columbia River basin. On file at the USDA Forest Service Intermountain Fire Sciences Laboratory, Rocky Mountain Research Station, Missoula, Montana, USA.

Fire regimes, forest change, and self-organization in an old-growth mixed-conifer forest, Yosemite National Park, USA

Type Journal Article
Author Andrew E. Scholl
Author Alan H. Taylor
Abstract Fire is recognized as a keystone process in dry mixed-conifer forests that have been altered by decades of fire suppression. Restoration of fire disturbance to these forests is a guiding principle of resource management in the U.S. National Park Service. Policy implementation is often hindered by a poor understanding of forest conditions before fire exclusion, the characteristics of forest changes since excluding fire, and the influence of topographic or self-organizing controls on forest structure. In this study the spatial and temporal characteristics of fire regimes and forest structure are reconstructed in a 2125-ha mixed-conifer forest. Forests were multi-aged, burned frequently at low severity and fire-return interval, and forest structure did not vary with slope aspect, elevation, or slope position. Fire exclusion has caused an increase in forest density and basal area and a compositional shift to shade-tolerant and fire-intolerant species. The median point fire-return interval and extent of a fire was 10 yr and 115 ha, respectively. The pre-Euro-American settlement fire rotation of 13 yr increased to 378 yr after 1905. The position of fire scars within tree rings indicates that 79% of fires burned in the midsummer to fall period. The spatial pattern of burns exhibited self-organizing behavior. Area burned was 10-fold greater when an area had not been burned by the previous fire. Fires were frequent and widespread, but patches of similar aged trees were <0.2 ha, suggesting small fire-caused canopy openings. Managers need to apply multiple burns at short intervals for a sustained period to reduce surface fuels and create small canopy openings characteristic of the reference forest. By coupling explicit reference conditions with consideration of current conditions and projected climate change, management activities can balance restoration and risk management.
Publication Ecological Applications
Volume 20
Issue 2
Pages 362–380
Date March 2010
Journal Abbr Ecol. Appl.
DOI 10.1890/08-2324.1
ISSN 1051-0761
URL http://www.esajournals.org/doi/full/10.1890/08-2324.1
Extra Keywords: climate change; dendroecology; ecological restoration; fire regimes; forest age structure; prefire suppression reference conditions; spatial patterns.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:26:18 2011

Fire regimes, past and present (Chapter 38)

Type Book Section
Author Carl N. Skinner
Author Chiru Chang
Abstract Fire has been an important ecosystem process in the Sierra Nevada for thousands of years. Before the area was settled in the 1850s, fires were generally frequent throughout much of the range. The frequency and severity of these fires varied spatially and temporally depending upon climate, elevation, topography, vegetation, edaphic conditions, and human cultural practices. Current management strategies and those of the immediate past have contributed to forest conditions that encourage high-severity fires. The policy of excluding all fires has been successful in generally eliminating fires of low to moderate severity as a significant ecological process.

However, current technology is not capable of eliminating the high-severity fires. Thus, the fires that affect significant portions of the landscape, which once varied considerably in severity, are now almost exclusively high-severity, large, stand replacing fires. The resulting landscape patterns are much coarser in grain. Many gaps still exist in our knowledge of fire as an ecological process in the Sierra Nevada.

Book Title Sierra Nevada Ecosystem Project: Final report to Congress. Vol. II. Assessments and Scientific Basis for Management Options. Wildland Resources Center Report No. 37
Volume 2
Place Davis, CA.
Publisher Centers for Water and Wildland Resources, University of California
Date 1996
Pages 1041-1070
URL http://www.treesearch.fs.fed.us/pubs/36570
Extra Keywords: fire ecology; fire history; fire regimes; Sierra Nevada; California.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:27 2011

Notes:

Citation:

Skinner, Carl N.; Chang, Chiru 1996. Fire regimes, past and present. In: Sierra Nevada Ecosystem Project: Final report to Congress. Vol. II. Assessments and Scientific Basis for Management Options. Wildland Resources Center Report No. 37. Centers for Water and Wildland Resources, University of California, Davis. 1041-1069.

Fire return intervals and fire cycles for historic fire regimes in the Great Lakes Region: A synthesis of the literature (Draft)

Type Report
Author Donald I. Dickmann
Author David T. Cleland
Abstract no abstract
Report Type Great Lakes Ecological Assessment
Place St. Paul, MN
Institution US Forest Service, North Central Research Station
Date August 2002
Pages 21 p.
Short Title Fire return intervals and fire cycles for historic fire regimes in the Great Lakes Region
URL http://frames.nacse.org/0/590.html
Archive http://www.ncrs.fs.fed.us/gla/reports.htm
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:40:14 2011

Notes:

Citation:

Dickmann, Donald I.; Cleland, David T. Draft 2002. Fire return intervals and fire cycles for historic fire regimes in the Great Lakes Region: a synthesis of the literature. Great Lakes Ecological Assessment. 21 p.

Fire severity, changing scales, and how things hang together

Type Journal Article
Author A. J. Simard
Abstract The paper describes attributes of space, time, and process in terms of their relations to wildland fire. It then presents a generic framework, based on eight interrelated scale classes for space, time, and process. The effects of changing scales are discussed in a wildland fire context. A five-layered (society, management, systems, fire, and weather), three-dimensional structure for wildland fire is presented. The paper also discusses inefficiencies and inadequacies inherent in systems with inconsistent scales. It then focuses on the effects of scale differences between fire behavior and fire danger and on an acceptable scale range suggested by the natural evolution of these two systems. The paper then defines fire severity and proposes two types of severity models — situation and extended. Finally, it discusses fundamental differences between situational and extended severity and appropriate space, time, and process attributes for both types of severity models.
Publication International Journal of Wildland Fire
Volume 1
Issue 1
Pages 23-34
Date 1991
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF9910023
ISSN 1049-8001
URL http://www.publish.csiro.au/?paper=WF9910023
Date Added Sun Aug 28 17:26:09 2011
Modified Sun Aug 28 17:31:07 2011

Fire weather and fire climate

Type Journal Article
Author George W. Alexander
Abstract no abstract
Publication Monthly Weather Review
Volume 58
Issue 9
Pages 370-372
Date September 1930
Journal Abbr Mon. Wea. Rev.
DOI 10.1175/1520-0493(1930)58<370:FWAFC>2.0.CO;2
ISSN 1520-0493
URL http://dx.doi.org/10.1175%2F1520-0493%281930%2958%3C370%3AFWAFC%3E2.0.CO%3B2
Date Added Mon Aug 15 23:00:05 2011
Modified Mon Aug 15 23:00:16 2011

Fire weather index system componenets for large fires in the Canadian boreal forest

Type Journal Article
Author Brian D. Amiro
Author Kimberley A. Logan
Author B. Mike Wotton
Author Michael D. Flannigan
Author J. Bernie Todd

Author Brian J. Stocks
Author David L. Martell

Abstract Canadian Fire Weather Index (FWI) System components and head fire intensities were calculated for fires greater than 2 km² in size for the boreal and taiga ecozones of Canada from 1959 to 1999. The highest noon-hour values were analysed that occurred during the first 21 days of each of 9333 fires. Depending on ecozone, the means of the FWI System parameters ranged from: fine fuel moisture code (FFMC), 90 to 92 (82 to 96 for individual fires); duff moisture code (DMC), 38 to 78 (10 to 140 for individual fires); drought code (DC), 210 to 372 (50 to 600 for individual fires); and fire weather index, 20 to 33 (5 to 60 for individual fires). Fine fuel moisture code decreased, DMC had a mid-season peak, and DC increased through the fire season. Mean head fire intensities ranged from 10 to 28 MW m^{-1} in the boreal spruce fuel type, showing that most large fires exhibit crown fire behaviour. Intensities of individual fires can exceed 60 MW m^{-1}. Most FWI System parameters did not show trends over the 41-year period because of large inter-annual variability. A changing climate is expected to create future weather conditions more conducive to fire throughout much of Canada but clear changes have not yet occurred.

Publication International Journal of Wildland Fire
Volume 13
Issue 4
Pages 391-400
Date December 2004
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF03066
ISSN 1448-5516
URL http://www.publish.csiro.au/?paper=WF03066
Extra Keywords: drought; duff moisture; fire intensity; forest fire; seasonality; taiga; trends.
Date Added Mon Aug 15 23:19:20 2011
Modified Tue Aug 16 05:36:39 2011

Fire weather: A guide for application of meteorological information to forest fire control operations

Type Book

Author Mark J. Schroeder
Author Charles C. Buck

Abstract INTRODUCTION: What is WEATHER? Simply defined, it is the state of the atmosphere surrounding the earth. But the atmosphere is not static-it is constantly changing. So we can say that weather is concerned with the changing nature of the atmosphere. Familiar terms used to describe weather are Temperature Pressure Wind speed Wind direction Humidity Visibility Clouds Precipitation The atmosphere is a gaseous mantle encasing the earth and rotating with it in space. Heat from the sun causes continual changes in each of the above elements. These variations are interdependent; affecting all elements in such a manner that weather is ever changing in both time and space. Because weather is the state of the atmosphere, it follows that if there were no atmosphere there would be no weather. Such is the case on the moon. At high altitudes, where the earth's atmosphere becomes extremely thin, the type of weather familiar to us, with its clouds and precipitation, does not exist. The varying moods of the ever-changing weather found in the lower, denser atmosphere affect all of us. Sometimes it is violent, causing death and destruction in hurricanes, tornadoes, and blizzards. Sometimes it becomes balmy with sunny days and mild temperatures. And sometimes it is oppressive with high humidities and high temperatures. As the weather changes, we change our activities, sometimes taking advantage of it and at other times protecting ourselves and our property from it. A farmer needs to understand only that part of the shifting weather pattern affecting the earth's surface-and the crop he grows. The launcher of a space missile must know, from hour to hour, the interrelated changes in weather in the total height of the atmosphere, as far out as it is known to exist, in order to make his decisions for action. But the man whose interest is wildland fire is neither limited to the surface nor concerned with the whole of the earth's atmosphere. T he action he takes is guided by understanding and interpreting weather variations in the air layer up to 5 or 10 miles above the land. These variations, when described in ways related to their influences on wildland fire, constitute FIRE WEATHER. When fire weather is combined with the two other factors influencing fire behavior-topography

and fuel – a basis for judgment is formed.

Publisher	U.S. Department of Agriculture Forest Service; Agriculture Handbook 360
Date	May 1970
# of Pages	288 p.
URL	http://digitalcommons.usu.edu/barkbeetles/14/
Date Added	Sun Aug 28 17:26:09 2011
Modified	Sun Aug 28 22:34:20 2011

Notes:

Citation:

Schroeder, M. and Buck, C. (1970). Fire weather : a guide for application of meteorological information to forest fire control operations. USDA Forest Service, Agriculture Handbook 360.

Fire-climate interactions in forests of the American Pacific coast

Type	Journal Article
Author	Valérie Trouet
Author	Alan H. Taylor
Author	Andrew M. Carleton
Author	Carl N. Skinner
Abstract	We investigate relationships between climate and wildfire activity between 1929 and 2004 in Pacific coast forests of the United States. Self-Organizing Mapping (SOM) of annual area burned in National Forests (NF) in California, Oregon, and Washington identifies three contiguous NF groups and a fourth group of NF traversed by major highways. Large fire years in all groups are dry compared to small fire years. A sub-hemispheric circulation pattern of a strong trough over the North Pacific and a ridge over the West Coast is characteristic of large fire years in all groups. This pattern resembles the Pacific North American (PNA) teleconnection and positive phase of the Pacific Decadal Oscillation (PDO). A reverse PNA and negative PDO phase characterizes small fire years. Despite the effect of fire suppression management between 1929 and 2004, forest area burned is linked to climatic variations related to large-scale atmospheric circulation patterns.
Publication	Geophysical Research Letters
Volume	33
Issue	18
Pages	L18704 (5 p.)
Date	September 2006
Journal Abbr	Geophys. Res. Lett.
DOI	10.1029/2006GL027502
ISSN	0094–8276
URL	http://www.agu.org/journals/gl/gl0618/2006GL027502/
Date Added	Sat Aug 27 06:05:17 2011
Modified	Sat Aug 27 15:52:27 2011

Fire-fuel-climate linkages in the northwestern USA during the Holocene

Type	Journal Article
Author	Jennifer R. Marlon
Author	Patrick J. Bartlein

Author Cathy Whitlock

Abstract Variations in fire regimes can be inferred from changes in the abundance of sedimentary charcoal found in lake and bog sediments. When analysed with pollen data, inferences can be made about past vegetation dynamics and climate as well. The analysis of high-resolution charcoal records generally involves the decomposition of charcoal influx into (a) a slowly varying 'background' component that provides information about long-term changes in regional fire activity, biomass and/or depositional processes, and (b) a 'peaks' component that represents local fire events. In this study, 15 high-resolution charcoal records from the northwestern USA and associated pollen data were examined to describe the variations and controls of charcoal influx and background trends. Late-Holocene charcoal influx levels at each site were compared with late-Holocene sedimentation rates, vegetation and fire frequency, and with modern climate and physical site characteristics to better understand the spatial variability in charcoal abundance. Charcoal abundance was largely determined by physical site characteristics (eg, lake and watershed size) and the proportion of woody taxa. Background trends displayed regional similarities, and the subcontinental scale trend based on all records correlated closely with woody taxa proportions in the pollen spectra. Background charcoal and woody taxa proportions increased together from minima in the Late Glacial to maxima in the late Holocene. The strong similarity in these trends suggests that background charcoal influx is a function of fuel characteristics, which in turn are governed by climate and vegetation. Variations in sedimentation rate and fire frequency had little influence on background charcoal trends.

Publication The Holocene

Volume 16

Issue 8

Pages 1059-1071

Date December 2006

Journal Abbr Holocene

DOI 10.1177/0959683606069396

ISSN 0959-6836 (print) 1477-0911 (online)

URL http://hol.sagepub.com/content/16/8/1059.abstract

Extra Keywords: fire history; fire frequency; fuel; climate; palaeofire; charcoal analysis; background charcoal; pollen; northwestern USA; Holocene.

Date Added Tue Aug 30 14:35:38 2011

Modified Wed Aug 31 21:05:18 2011

Fire-induced erosion and millennial-scale climate change in northern ponderosa pine forests

Type Journal Article

Author Jennifer L. Pierce

Author Grant A. Meyer

Author A. J. Timothy Jull

Abstract Western US ponderosa pine forests have recently suffered extensive stand-replacing fires followed by hillslope erosion and sedimentation. These fires are usually attributed to increased stand density as a result of fire suppression, grazing and other land use, and are often considered uncharacteristic or unprecedented. Tree-ring records from the past 500 years indicate that before Euro-American settlement, frequent, lowseverity fires maintained open stands. However, the pre-settlement period between about AD 1500 and AD 1900 was also generally colder than present, raising the possibility that rapid twentieth-century warming promoted recent catastrophic fires. Here we date fire-related sediment deposits in alluvial fans in central Idaho to reconstruct Holocene fire history in xeric ponderosa pine forests and examine links to climate.We find that colder periods experienced frequent low-severity fires, probably fuelled by increased understory growth.Warmer periods experienced severe droughts, stand-replacing fires and large debrisflow events that comprise a large component of long-term erosion and coincide with similar events in sub-alpine forests of Yellowstone National Park. Our results suggest that given the powerful influence of climate, restoration of processes typical of pre-settlement times may be difficult in a warmer future that promotes severe fires.

Publication Nature

Volume 432

Issue 7013

Pages 87-90
Date 4 November 2004
Journal Abbr Nature
DOI 10.1038/nature03058
ISSN 1476-4687
URL http://www.nature.com/doifinder/10.1038/nature03058
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:30:42 2011

Fire, climate change, and forest resilience in interior Alaska

Type Journal Article
Author Jill F. Johnstone
Author F. Stuart Chapin III
Author Teresa N. Hollingsworth
Author Michelle C. Mack
Author Vladimir Romanovsky
Author Merritt Turetsky
Abstract In the boreal forests of interior Alaska, feedbacks that link forest soils, fire characteristics, and plant traits have supported stable cycles of forest succession for the past 6000 years. This high resilience of forest stands to fire disturbance is supported by two interrelated feedback cycles: (i) interactions among disturbance regime and plant–soil–microbial feedbacks that regulate soil organic layer thickness and the cycling of energy and materials, and (ii) interactions among soil conditions, plant regeneration traits, and plant effects on the environment that maintain stable cycles of forest community composition. Unusual fire events can disrupt these cycles and trigger a regime shift of forest stands from one stability domain to another (e.g., from conifer to deciduous forest dominance). This may lead to abrupt shifts in forest cover in response to changing climate and fire regime, particularly at sites with intermediate levels of moisture availability where stand-scale feedback cycles are only weakly constrained by environmental conditions. However, the loss of resilience in individual stands may foster resilience at the landscape scale, if changes in the landscape configuration of forest cover types feedback to stabilize regional patterns of fire behavior and climate conditions.
Publication Canadian Journal of Forest Research
Volume 40
Issue 7
Pages 1302-1312
Date July 2010
Journal Abbr Can. J. For. Res.
DOI 10.1139/X10-061
ISSN 0045-5067
URL http://www.nrcresearchpress.com/doi/abs/10.1139/X10-061
Call Number 0010
Extra This article is one of a selection of papers from The Dynamics of Change in Alaska's Boreal Forests: Resilience and Vulnerability in Response to Climate Warming.
Date Added Sun Sep 4 03:31:41 2011
Modified Mon Sep 5 10:11:24 2011

Fire, native peoples, and the natural landscape

Type Book
Editor Thomas R. Vale
Abstract no abstract

Edition	1st edition
Place	Washington, D.C.
Publisher	Island Press
Date	February 2002
# of Pages	315 p.
ISBN	9781559638890, 1-55963-888-5, 1-55963-889-3
URL	http://islandpress.org/bookstore/details5f0e.html?prod_id=928#toc
Date Added	Sat Aug 27 02:07:29 2011
Modified	Sat Aug 27 15:53:27 2011

Notes:

Table Of Contents:

Fires and climate in forested landscapes of the US Rocky Mountains (Chapter 5)

Type	Book Section
Author	William L. Baker
Abstract	no abstract
Book Title	Fire and Climatic Change in Temperate Ecosystems of the Western Americas
Series	Ecological Studies
Volume	160
Edition	1st edition
Place	New York, NY
Publisher	Springer-Verlag
Date	2003
Pages	120–157
ISBN	978-0-387-95455-4
URL	http://www.springerlink.com/content/n112363k1wh83lg3/
Date Added	Tue Aug 23 01:40:21 2011
Modified	Wed Aug 24 04:42:48 2011

Fires and forest succession in the Bitterroot Mountains of northern Idaho

Type Journal Article
Author Julius A. Larsen
Abstract no abstract
Publication Ecology
Volume 10
Issue 1
Pages 67–76
Date January 1929
Journal Abbr Ecology
DOI 10.2307/1940513
ISSN 0012-9658
URL http://www.jstor.org/stable/1940513
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:41:27 2011

Firestick history

Type Journal Article
Author Stephen J. Pyne
Abstract no abstract
Publication The Journal of American History
Volume 76
Issue 4
Pages 1132-1141
Date March 1990
Journal Abbr J. Am. Hist.
ISSN 1936-0967
URL http://www.jstor.org/stable/2936591
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:31:35 2011

Flammable Australia: The fire regimes and biodiversity of a continent

Type Book
Editor Ross Andrew Bradstock
Editor Jann E. Williams
Editor Malcolm A. Gill
Abstract Fire is pivotal to the functioning of ecosystems in Australia, affecting the distribution and abundance of the continentās unique and highly diverse range of plants and animals. Conservation of this natural biodiversity therefore requires a good understanding of scientific processes involved in the action of fire on the landscape. This book provides a synthesis of current knowledge in this area and its application in contemporary land management. Central to the discussion is an exploration of the concept of the fire regime - the cumulative pattern of fires and their individual characteristics (fire type, frequency, intensity and season) - and its interactions with biodiversity. Contributions by thirty two leading experts cover a broad sweep of topics, including pre-history, future climate change, fire behaviour, modelling of temporal and spatial patterns, plant and animal life-cycles, case studies of major ecosystems, and management policies and systems.
Edition illustrated
Place Cambridge, United Kingdom
Publisher Cambridge University Press

Date 2002
# of Pages 462 p.
ISBN 0521805910
Short Title Flammable Australia
URL http://catalogue.nla.gov.au/Record/1570054
Date Added Wed Aug 24 12:11:35 2011
Modified Fri Aug 26 20:33:46 2011

Notes:

Contents:

Florida wildfire activity and atmospheric teleconnections

Type Journal Article
Author Scott L. Goodrick
Author Deborah E. Hanley
Abstract Since 1991, the Florida Division of Forestry has been making seasonal fire severity forecasts based on a relationship between area burned in Florida and El Niño–Southern Oscillation (ENSO). The present study extends the original analysis on which these forecasts are based and attempts to augment it with the addition of other patterns of climate variability. Two atmospheric teleconnection patterns, the North Atlantic Oscillation and Pacific–North American pattern, are examined as potential indicators of seasonal and monthly area burned in Florida. Although ENSO was the only climate index to show a significant correlation to area burned in Florida, the Pacific–North American pattern (PNA) is shown to be a factor influencing fire season severity although the relationship is not monotonic and therefore not revealed by correlation analysis.
Publication International Journal of Wildland Fire
Volume 18
Issue 4
Pages 476-482
Date June 2009
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07034

ISSN 1448-5516
URL http://dx.doi.org/10.1071/WF07034
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:30 2011

Forecasting resource-allocation decisions under climate uncertainty: Fire suppression with assessment of net benefits of research

Type Journal Article
Author Jeffrey P. Prestemon
Author Geoffrey H. Donovan
Abstract Making input decisions under climate uncertainty often involves two-stage methods that use expensive and opaque transfer functions. This article describes an alternative, single-stage approach to such decisions using forecasting methods. The example shown is for preseason fire suppression resource contracting decisions faced by the United States Forest Service. Two-stage decision tools have been developed for these decisions, and we compare the expected gains to the agency, in terms of reduced personnel costs, of the single-stage model over the two-stage model, existing hiring decisions, and decisions that would have been made given perfect foresight about wildfire activity. Our analysis demonstrates the potential gains to versions of our single-stage model over existing hiring decisions, equivalent to a benefit-cost ratio of 22. The research also identified additional gains accruing from imposing biases on the single-stage model, associated with asymmetric penalties from contracting decisions.
Publication American Journal of Agricultural Economics
Volume 90
Issue 4
Pages 1118–1129
Date November 2008
Journal Abbr Am. J. Agr. Econ.
DOI 10.1111/j.1467-8276.2008.01152.x
ISSN 1467-8276
Short Title Forecasting resource-allocation decisions under climate uncertainty
URL http://ajae.oxfordjournals.org/content/90/4/1118.full
Extra Keywords: climate; forecast; forest service; Poisson; returns to research; wildfire suppression.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:31:27 2011

Forest expansion and climate change in the Mountain Hemlock (Tsuga mertensiana) Zone, Lassen Volcanic National Park, California, USA

Type Journal Article
Author Alan H. Taylor
Abstract The relationship between climate change and the dynamics of ecotonal populations of mountain hemlock (Tsuga mertensiana [Bong.] Carr.) was determined by comparing climate and the age structure of trees from 24 plots and seedlings from 13 plots in the subalpine zone of Lassen Volcanic National Park, California. Tree establishment was greatest during periods with above normal annual and summer temperatures, and normal or above normal precipitation. Seedling establishment was positively correlated with above normal annual and summer temperatures and negatively correlated with April snowpack depth. The different responses of trees and seedlings to precipitation variation is probably related to site soil moisture conditions. Mountain hemlock populations began to expand in 1842 and establishment increased dramatically after 1880 and peaked during a warm mesic period between 1895 and 1910. The onset of forest expansion coincides with warming that began at the end of the Little Ice Age (1850-1880). These data indicate that stability of the mountain hemlock ecotone is strongly influenced by climate. If warming induced by greenhouse gases does occur as climate models

predict, then the structure and dynamics of near timberline forests in the Pacific Northwest will change.

Publication Arctic and Alpine Research
Volume 27
Issue 3
Pages 207–216
Date August 1995
Journal Abbr Arct. Alp. Res.
ISSN 0004-0851
URL http://www.jstor.org/stable/1551951
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:15 2011

Forest fire and climate change in western North America: Insights from sediment charcoal records

Type Journal Article
Author Daniel G. Gavin
Author Douglas J. Hallett
Author Feng Sheng Hu
Author Kenneth P. Lertzman
Author Susan J. Prichard
Author Kendrick J. Brown
Author Jason A. Lynch
Author Patrick Bartlein
Author David L. Peterson
Abstract Millennial-scale records of forest fire provide important baseline information for ecosystem management, especially in regions with too few recent fires to describe the historical range of variability. Charcoal records from lake sediments and soil profiles are well suited for reconstructing the incidence of past fire and its relationship to changing climate and vegetation. We highlight several records from western North America and their relevance in reconstructing historical forest dynamics, fire–climate relationships, and feedbacks between vegetation and fire under climate change. Climatic effects on fire regimes are evident in many regions, but comparisons of paleofire records sometimes show a lack of synchrony, indicating that local factors substantially affect fire occurrence, even over long periods. Furthermore, the specific impacts of vegetation change on fire regimes vary among regions with different vegetation histories. By documenting the effects on fire patterns of major changes in climate and vegetation, paleo-fire records can be used to test the mechanistic models required for the prediction of future variations in fire.
Publication Frontiers in Ecology and the Environment
Volume 5
Issue 9
Pages 499-506
Date November 2007
Journal Abbr Front. Ecol. Environ.
DOI 10.1890/060161
ISSN 1540-9295
Short Title Forest fire and climate change in western North America
URL http://www.esajournals.org/doi/abs/10.1890/060161
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:25 2011

Forest fire causes and extent on United States Forest Service lands

Type Journal Article

Author Scott L. Stephens

Abstract Nationally, the causes and extent of fire on lands administrated by the United States Forest Service varied significantly from 1940 to 2000, with California experiencing the largest relative annual burned areas. The south-east and California experienced the largest relative area burned by fires from human ignitions. No significant differences were detected in the relative area burned by lightning in California, the upper and central Rocky Mountains, and the south-west, which all experienced the highest levels. The north-west and Rocky Mountains have experienced significant increases in the relative total area burned; the north-east, south-east, California, and coastal Alaska all remained unchanged. The northern Rocky Mountains, south-west, and north-east have all experienced significant increases in the amount of area burned by lightning without significant increases in lightning ignitions. Increasing fuel hazards in these areas probably contributed to the increasing area burned by lightning fires; changing climate could have also contributed to the increase in wildfire area from 1940 to 2000. To be effective across the diverse forest types and conditions in the USA, fire policy should better recognize and respond to the diversity of US forests and how they have burned in the past. This analysis determined that there is high geographical diversity on wildfire occurrence and causes. Local input is therefore important in designing diverse, ground-based solutions to address fire management challenges in the United States.

Publication International Journal of Wildland Fire

Volume 14

Issue 3

Pages 213-222

Date September 2005

Journal Abbr Int. J. Wildland Fire

DOI 10.1071/WF04006

ISSN 1448-5516

URL http://dx.doi.org/10.1071/WF04006

Extra Keywords: fire policy; fire statistics; fire suppression; forest policy; wildfire.

Date Added Sun Aug 28 17:26:59 2011

Modified Sun Aug 28 17:32:08 2011

Forest fire cycles and life tables: A case study from interior Alaska

Type Journal Article

Author John Yarie

Abstract The negative exponential and Wiebull distributions were used to estimate stand survivorship curves for forested sites in the Porcupine River drainage of interior Alaska. The survivorship curve of Piceaglauca (Moench) Voss sites was best described by a Wiebull function, while both functions adequately described the Piceamariana (Mill.) Britton, Sterns & Poggenburg hardwood and all sites stand survivorship curve. Fire cycles calculated from the Wiebull distribution were 43, 113, 36, and 26 years for the entire study area, P. glauca, P. mariana, and hardwood sites, respectively. Fire frequencies estimated from a life table analysis were 48, 105, 43, and 30 years, respectively. The relationship between fire cycle and fire frequency calculations is discussed and various management implications are given.

Publication Canadian Journal of Forest Research

Volume 11

Issue 3

Pages 554–562

Date September 1981

Journal Abbr Can. J. For. Res.

DOI 10.1139/x81-076

ISSN 0045-5067

Short Title Forest fire cycles and life tables

URL http://www.nrcresearchpress.com/doi/abs/10.1139/x81-076

Date Added Wed Aug 24 05:39:09 2011
Modified Fri Aug 26 20:27:34 2011

Forest fire history in the northern Rockies

Type Journal Article
Author Stephen F. Arno
Abstract Recent fire-scar studies in the northern Rocky Mountains have documented forest fire history over the past few centuries. They reveal that in some forest types fire maintained many-aged open stands of seral trees. In other types, major fires caused replacement of the stands. Often, however, fires burned at variable intensities, creating a mosaic of stands differing in composition and structure.
Publication Journal of Forestry
Volume 78
Issue 8
Pages 460-465
Date 1 August 1980
Journal Abbr J. Forest
ISSN 0022-1201
URL http://www.ingentaconnect.com/content/saf/jof/1980/00000078/00000008/art00008
Date Added Tue Aug 16 00:02:06 2011
Modified Tue Aug 16 05:36:27 2011

Forest fire occurrence and climate change in Canada

Type Journal Article
Author B. Mike Wotton
Author Charles A. Nock
Author Michael D. Flannigan
Abstract The structure and function of the boreal forest are significantly influenced by forest fires. The ignition and growth of fires depend quite strongly on weather; thus, climate change can be expected to have a considerable impact on forest fire activity and hence the structure of the boreal forest. Forest fire occurrence is an extremely important element of fire activity as it defines the load on suppression resources a fire management agency will face. We used two general circulation models (GCMs) to develop projections of future fire occurrence across Canada. While fire numbers are projected to increase across all forested regions studied, the relative increase in number of fires varies regionally. Overall across Canada, our results from the Canadian Climate Centre GCM scenarios suggest an increase in fire occurrence of 25% by 2030 and 75% by the end of the 21st century. Results projected from fire climate scenarios derived from the Hadley Centre GCM suggest fire occurrence will increase by 140% by the end of this century. These general increases in fire occurrence across Canada agree with other regional and national studies of the impacts of climate change on fire activity. Thus, in the absence of large changes to current climatic trends, significant fire regime induced changes in the boreal forest ecosystem are likely.
Publication International Journal of Wildland Fire
Volume 19
Issue 3
Pages 253-271
Date May 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09002
ISSN 1448-5516
URL http://dx.doi.org/10.1071/WF09002

Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:26:39 2011

Forest fire protection (CRS Report for Congress)

Type Report
Author Ross W. Gorte
Abstract no abstract
Report Type CRS Report for Congress
Place Washington, DC
Institution Congressional Research Service
Date December 2000
Pages 29 p.
URL www.cnie.org/nle/crsreports/forests/for-34.pdf
Archive http://www.cnie.org/nle/crsreports/forests/
Extra CRS Code #: RL30755
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:01 2011

Forest fire weather in the southern Appalachians

Type Journal Article
Author Edwin F. McCarthy
Abstract no abstract
Publication Monthly Weather Review
Volume 51
Issue 4
Pages 182-185
Date April 1923
Journal Abbr Mon. Wea. Rev.
DOI 10.1175/1520-0493(1923)51<182:FFWITS>2.0.CO;2
ISSN 1520-0493
URL http://dx.doi.org/10.1175%2F1520-0493%281923%2951%3C182%3AFFWITS%3E2.0.CO%3B2
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:45:08 2011

Forest fires and climate change in the 21st century

Type Journal Article
Author Michael D. Flannigan
Author Brian D. Amiro
Author Kimberley A. Logan
Author Brian J. Stocks
Author B. Mike Wotton
Abstract Fire is the major stand-renewing disturbance in the circumboreal forest. Weather and climate are the most important factors influencing fire activity and these factors are changing due to human-caused climate change. This paper discusses and synthesises the current state of fire and climate change research and the potential

direction for future studies on fire and climate change. In the future, under a warmer climate, we expect more severe fire weather, more area burned, more ignitions and a longer fire season. Although there will be large spatial and temporal variation in the fire activity response to climate change. This field of research allows us to better understand the interactions and feedbacks between fire, climate, vegetation and humans and to identify vulnerable regions. Lastly, projections of fire activity for this century can be used to explore options for mitigation and adaptation.

Publication Mitigation and Adaptation Strategies for Global Change
Volume 11
Issue 4
Pages 847-859
Date July 2006
Journal Abbr Mitig. Adapt. Strat. Glob. Change
DOI 10.1007/s11027-005-9020-7
ISSN 1381-2386
URL http://www.springerlink.com/content/w21m250qh45675w0/
Extra Keywords: climate change; carbon; forest fires; GCMs; area burned.
Date Added Mon Aug 29 05:19:52 2011
Modified Mon Aug 29 05:26:43 2011

Forest fires: Their destructive work, causes and prevention

Type Book
Author William Willard Ashe
Abstract no abstract
Series North Carolina Geological survey, 1891-1925.: Bulletin
Series Number Bulletin No. 7
Publisher Raleigh, J. Daniels, State Printer and Binder
Date 1895
# of Pages 66 p.
Short Title Forest fires
URL http://www.archive.org/details/forestfiresthei00ashegoog
Date Added Tue Aug 16 00:55:50 2011
Modified Tue Aug 16 00:55:50 2011

Forest floor fuel consumption and carbon emissions in Canadian boreal forest fires

Type Journal Article
Author William J. de Groot
Author Janet M. Pritchard
Author Timothy J. Lynham
Abstract In many forest types, over half of the total stand biomass is located in the forest floor. Carbon emissions during wildland fire are directly related to biomass (fuel) consumption. Consumption of forest floor fuel varies widely and is the greatest source of uncertainty in estimating total carbon emissions during fire. We used experimental burn data (59 burns, four fuel types) and wildfire data (69 plots, four fuel types) to develop a model of forest floor fuel consumption and carbon emissions in nonpeatland standing-timber fuel types. The experimental burn and wildfire data sets were analyzed separately and combined by regression to provide fuel consumption models. Model variables differed among fuel types, but preburn fuel load, duff depth, bulk density, and Canadian Forest Fire Weather Index System components at the time of burning were common significant variables. The regression R^2 values ranged from 0.206 to 0.980 ($P < 0.001$). The log–log model for all data combined explained 79.5% of the regression variation and is now being used to estimate annual carbon

emissions from wildland fire. Forest floor carbon content at the wildfires ranged from 40.9% to 53.9%, and the carbon emission rate ranged from 0.29 to 2.43 kg·m^{-2}

Publication Canadian Journal of Forest Research
Volume 39
Issue 2
Pages 367–382
Date February 2009
Journal Abbr Can. J. For. Res.
DOI 10.1139/X08-192
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/X08-192
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:32 2011

Forest management solutions for mitigating climate change in the United States

Type Journal Article
Author Robert W. Malmsheimer
Author Patrick Heffernan
Author Steve Brink
Author Douglas Crandall
Author Fred Deneke
Author Christopher Galik
Author Edmund Gee
Author John A. Helms
Author Nathan McClure
Author Michael Mortimer
Author Steve Ruddell
Author Matthew Smith
Author John Stewart
Abstract Summary: [...] the Intergovernmental Panel on Climate Change (Nabuurs et al. 2007, 543), the preeminent international body charged with periodically assessing technical knowledge or climate change, has stated, Forestry can make a very significant contribution to a low-cost mitigation portfolio that provides synergies with adaptation and sustainable development. Society at large, the US Congress, state legislators, and policy analysts at international, federal, and state levels must not only appreciate this fact but also recognize that the sustainable management of forests can, to a substantial degree, mitigate the dire effects of atmospheric pollution and global climate change.
Publication Journal of Forestry
Volume 106
Issue 3
Pages 115–173 + 2 p.
Date April/May 2008
Journal Abbr J. Forest
ISSN 0022-1201
URL http://www.ingentaconnect.com/content/saf/jof/2008/00000106/00000003/art00002
Archive http://ddr.nal.usda.gov/handle/10113/21386
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:43:34 2011

Forest processes and global environmental change: Predicting the effects of individual and multiple stressors

Type	Journal Article
Author	John Aber
Author	Ronald P. Neilson
Author	Steve McNulty
Author	James M. Lenihan
Author	Dominique Bachelet
Author	Raymond J. Drapek
Abstract	We review the effects of several rapidly changing environmental drivers on ecosystem function, discuss interactions among them, and predicted changes in productivity, carbon storage, and water balance
Publication	BioScience
Volume	51
Issue	9
Pages	735-751
Date	September 2001
DOI	10.1641/0006-3568(2001)051[0735:FPAGEC]2.0.CO;2
ISSN	0006-3568
Short Title	Forest Processes and Global Environmental Change
URL	http://www.bioone.org/doi/full/10.1641/0006-3568%282001%29051%5B0735%3Afpagec%5D2.0.co%3B2
Date Added	Tue Jul 12 10:25:28 2011
Modified	Tue Aug 16 05:36:52 2011

Forest resources of the United States, 1992

Type	Report
Author	Douglas S. Powell
Author	Joanne L. Faulkner
Author	David R. Darr
Author	Zhiliang Zhu
Author	Douglas W. MacCleery
Abstract	The 1987 Resources Planning Act (RPA) Assessment forest resources statistics are updated to 1992, to provide current information on the Nation's forests. Resource tables present estimates of forest area, volume, mortality, growth, removals, and timber products output. Resource data are analyzed, and trends since 1987 are noted. A forest type map produced from satellite imagery is included to provide a visual display of the location of forest land.
Report Number	GTR-RM-234
Report Type	General Technical Report
Place	Fort Collins, CO
Institution	U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station
Date	September 1993
Pages	132 p. + map
URL	http://www.treesearch.fs.fed.us/pubs/6241
Loc. in Archive	http://www.fs.fed.us/rm/pubs_rm/rm_gtr234.html
Extra	Keywords: RPA; assessment; inventory; forest statistics; area; volume; forest history; AVHRR; map.
Date Added	Sun Aug 28 00:27:26 2011
Modified	Sun Aug 28 00:27:26 2011

Notes:

Citation:

Powell, Douglas S.; Faulkner, Joanne L.; Darr, David R.; Zhu, Zhiliang; MacCleery,l Douglas W. 1993. Forest resources of the United States, 1992. Gen. Tech. Rep. RM-234. Fort Collins, CO: U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station. 132 p. + map. [Revised, June 1994].

Forest responses to increasing aridity and warmth in the southwestern United States

Type	Journal Article
Author	A. Park Williams
Author	Craig D. Allen
Author	Constance I. Millar
Author	Thomas W. Swetnam
Author	Joel Michaelsen
Author	Christopher J. Still
Author	Steven W. Leavitt
Abstract	In recent decades, intense droughts, insect outbreaks, and wildfires have led to decreasing tree growth and increasing mortality in many temperate forests. We compared annual tree-ring width data from 1,097 populations in the coterminous United States to climate data and evaluated site-specific tree responses to climate variations throughout the 20th century. For each population, we developed a climate-driven growth equation by using climate records to predict annual ring widths. Forests within the southwestern United States appear particularly sensitive to drought and warmth. We input 21st century climate projections to the equations to predict growth responses. Our results suggest that if temperature and aridity rise as they are projected to, southwestern trees will experience substantially reduced growth during this century. As tree growth declines, mortality rates may increase at many sites. Increases in wildfires and bark-beetle outbreaks in the most recent decade are likely related to extreme drought and high temperatures during this period. Using satellite imagery and aerial survey data, we conservatively calculate that ≈2.7% of southwestern forest and woodland area experienced substantial mortality due to wildfires from 1984 to 2006, and ≈7.6% experienced mortality associated with bark beetles from 1997 to 2008. We estimate that up to ≈18% of southwestern forest area (excluding woodlands) experienced mortality due to bark beetles or wildfire during this period. Expected climatic changes will alter future forest productivity, disturbance regimes, and species ranges throughout the Southwest. Emerging knowledge of these impending transitions informs efforts to adaptively manage southwestern forests.
Publication	Proceedings of the National Academy of Sciences
Volume	107
Issue	50
Pages	21289 -21294
Date	December 14 , 2010
Journal Abbr	PNAS
DOI	10.1073/pnas.0914211107
ISSN	0027-8424
URL	http://www.pnas.org/content/107/50/21289.abstract
Extra	Keywords: forest mortality; climate change; drought; fire; tree rings.
Date Added	Sat Aug 27 00:55:16 2011
Modified	Wed Aug 31 00:27:06 2011

Forest Service large fire area burned and suppression expenditure trends, 1970-2002

Type	Journal Article

Author David E. Calkin
Author Krista M. Gebert
Author J. Greg Jones
Author Ronald P. Neilson
Abstract Extreme fire seasons in recent years and associated high suppression expenditures have brought about a chorus of calls for reform of federal firefighting structure and policy. Given the political nature of the topic, a critical review of past trends in area burned, size of fires, and suppression expenditures is warranted. We examined data relating to emergency wildland fire suppression expenditures, number of fires, and acres burned and developed statistical models to estimate area burned using drought indices for the USDA Forest Service from 1970–2002.
Publication Journal of Forestry
Volume 103
Issue 4
Pages 179–183
Date June 2005
Journal Abbr J. Forest
ISSN 0022-1201
URL http://www.treesearch.fs.fed.us/pubs/24526
Extra Keywords: wildland fire; Forest Service suppression expenditure trends; Palmer Drought Severity Index (PDSI).
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:33:52 2011

Forest understory fire in the Brazilian Amazon in ENSO and non-ENSO years: Area burned and committed carbon emissions

Type Journal Article
Author Ane Alencar
Author Daniel Nepstad
Author Maria del Carmen Vera Diaz
Abstract Understory fires, which burn the floor of standing forests, are one of the most important types of forest impoverishment in the Amazon, especially during the severe droughts of El Niño–Southern Oscillation (ENSO) episodes. However, the authors are aware of no estimates of the areal extent of these fires for the Brazilian Amazon and, hence, of their contribution to Amazon carbon fluxes to the atmosphere. In this paper, the area of forest understory fires for the Brazilian Amazon region is calculated during an El Niño (1998) and a non–El Niño (1995) year based on forest fire scars mapped with satellite images for three locations in eastern and southern Amazonia, where deforestation is concentrated. The three study sites represented a gradient of both forest types and dry season severity. The burning scar maps were used to determine how the percentage of forest that burned varied with distance from agricultural clearings. These spatial functions were then applied to similar forest/climate combinations outside of the study sites to derive an initial estimate for the Brazilian Amazon. Ninety-one percent of the forest area that burned in the study sites was within the first kilometer of a clearing for the non-ENSO year and within the first four kilometers for the ENSO year. The area of forest burned by understory forest fire during the severe drought (ENSO) year (3.9×10^6 ha) was 13 times greater than the area burned during the average rainfall year (0.2×10^6 ha), and twice the area of annual deforestation. Dense forest was, proportionally, the forest type most affected by understory fires during the El Niño year, while understory fires were concentrated in transitional forests during the year of average rainfall. The estimate here of aboveground tree biomass killed by fire ranged from 0.049 to 0.329 Pg during the ENSO and from 0.003 to 0.021 Pg during the non-ENSO year.
Publication Earth Interactions
Volume 10
Issue 6
Pages 1–17

Date February 2006
Journal Abbr Earth Interact.
DOI 10.1175/EI150.1
ISSN 1087-3562
Short Title Forest understory fire in the Brazilian Amazon in ENSO and non-ENSO years
URL http://journals.ametsoc.org/doi/full/10.1175/EI150.1
Extra Keywords: understory fires; carbon emissions; ENSO.
Date Added Mon Aug 15 22:58:21 2011
Modified Wed Aug 31 01:13:44 2011

Forests and climate change: Forcings, feedbacks, and the climate benefits of forests

Type Journal Article
Author Gordon B. Bonan
Abstract The world’s forests influence climate through physical, chemical, and biological processes that affect planetary energetics, the hydrologic cycle, and atmospheric composition. These complex and nonlinear forest-atmosphere interactions can dampen or amplify anthropogenic climate change. Tropical, temperate, and boreal reforestation and afforestation attenuate global warming through carbon sequestration. Biogeophysical feedbacks can enhance or diminish this negative climate forcing. Tropical forests mitigate warming through evaporative cooling, but the low albedo of boreal forests is a positive climate forcing. The evaporative effect of temperate forests is unclear. The net climate forcing from these and other processes is not known. Forests are under tremendous pressure from global change. Interdisciplinary science that integrates knowledge of the many interacting climate services of forests with the impacts of global change is necessary to identify and understand as yet unexplored feedbacks in the Earth system and the potential of forests to mitigate climate change.
Publication Science
Volume 320
Issue 5882
Pages 1444-1449
Date 13 June 2008
Journal Abbr Science
DOI 10.1126/science.1155121
ISSN 0036-8075 (print), 1095-9203 (online)
Short Title Forests and climate change
URL http://www.sciencemag.org/content/320/5882/1444.full
Date Added Tue Aug 23 02:53:38 2011
Modified Wed Aug 24 04:39:52 2011

Forests of the past: A window to future changes

Type Journal Article
Author Rémy J. Petit
Author Feng Sheng Hu
Author Christopher W. Dick
Abstract The study of past forest change provides a necessary historical context for evaluating the outcome of human-induced climate change and biological invasions. Retrospective analyses based on fossil and genetic data greatly advance our understanding of tree colonization, adaptation, and extinction in response to past climatic change. For instance, these analyses reveal cryptic refugia near or north of continental ice sheets, leading to reevaluation of postglacial tree migration rates. Species extinctions appear to have occurred primarily during periods of high climatic variability. Transoceanic dispersal and colonization in the tropics were widespread at geological time scales, inconsistent with the idea that tropical forests are particularly resistant to biological

invasions.

Publication Science
Volume 320
Issue 5882
Pages 1450-1452
Date 13 June 2008
Journal Abbr Science
DOI 10.1126/science.1155457
ISSN 0036-8075 (print), 1095-9203 (online)
Short Title Forests of the past
URL http://www.sciencemag.org/content/320/5882/1450.full
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:27:26 2011

Fossil charcoal, its recognition and palaeoatmospheric significance

Type Journal Article

Author Timothy P. Jones
Author William G. Chaloner

Abstract Charcoal is produced by pyrolysis of plant material and its occurrence in the fossil record can be broadly equated with the incidence of palaeowildfire. The past record of such naturally occurring fire, and tha availability of the biomass which represents its fuel, put two constraints on oxygen levels. For combustion of plant material to occur at all requires that the atmospheric oxygen did not drop below a threshold of 13%. Increasing inflammability of plant material at higher oxygen levels suggests that 35% would be a ceiling above which plant biomass would ignite and burn so readily as to be incompatible with sustained forest growth. As we have more or less continuous fossil evidence of forest trees from the Late Devonian onwards, and a similarly sustained record of fossil charcoal from that time to the present (Cope, 1984), this constraints oxygen levels between 13% and 35% over that period (Rabash and Langford, 1968; Watson et al., 1978). However, further experimental work is required to establish the validity of these oxygen values under appropriate conditions and also to sharpen the certainty by which we can discriminate between fusain produced by pyrolysis, and inert wood degradation products produced by other (? biogenic) means. We discuss experiments directed at attempting to establish the validity of physical parameters by which pyrolytically produced fusain can be characterized. The most convincing evidence of pyrolysis hitherto recognised is the apparent homogenization of xylem cell walls, as seen under SEM. Work on charcoal from both wildfires and laboratory wood charring under controlled conditions confirms the homogenization as seen under both SEM and TEM. Controlled temperature experiments show that a further rise in temperature causes the cell walls, initially homogenized, to crack and separate along the site of the middle lamella, giving the charcoal a characteristic fibrous texture. Both of these distinctive phases of response to pyrolysis can be observed in fossil charcoals.

Publication Palaeogeography, Palaeoclimatology, Palaeoecology
Volume 97
Issue 1-2
Pages 39–50
Date December 1991
Journal Abbr PALAEO
DOI 10.1016/0031-0182(91)90180-Y
ISSN 0031-0182
URL http://www.sciencedirect.com/science/article/pii/003101829190180Y
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:12:21 2011

Four degrees and beyond: The potential for a global temperature increase of four degrees and its implications

Type Journal Article
Author Mark New
Author Diana Liverman
Author Heike Schroeder
Author Kevin Anderson
Abstract The 1992 UN Framework Convention on Climate Change commits signatories to preventing ‘dangerous anthropogenic interference with the climate system’, leaving unspecified the level of global warming that is dangerous. In the late 1990s, a limit of 2°C global warming above preindustrial temperature was proposed as a ‘guard rail’ below which most of the dangerous climate impacts could be avoided. The 2009 Copenhagen Accord recognized the scientific view ‘that the increase in global temperature should be below 2 degrees Celsius’ despite growing views that this might be too high. At the same time, the continued rise in greenhouse gas emissions in the past decade and the delays in a comprehensive global emissions reduction agreement have made achieving this target extremely difficult, arguably impossible, raising the likelihood of global temperature rises of 3°C or 4°C within this century. Yet, there are few studies that assess the potential impacts and consequences of a warming of 4°C or greater in a systematic manner. Papers in this themed issue provide an initial picture of the challenges facing a world that warms by 4°C or more, and the difficulties ahead if warming is to be limited to 2°C with any reasonable certainty. Across many sectors—coastal cities, agriculture, water stress, ecosystems, migration—the impacts and adaptation challenges at 4°C will be larger than at 2°C. In some cases, such as farming in sub-Saharan Africa, a +4°C warming could result in the collapse of systems or require transformational adaptation out of systems, as we understand them today. The potential severity of impacts and the behavioural, institutional, societal and economic challenges involved in coping with these impacts argue for renewed efforts to reduce emissions, using all available mechanisms, to minimize the chances of high-end climate change. Yet at the same time, there is a need for accelerated and focused research that improves understanding of how the climate system might behave under a +4°C warming, what the impacts of such changes might be and how best to adapt to what would be unprecedented changes in the world we live in.
Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences
Volume 369
Issue 1934
Pages 6-19
Date 13 January 2011
Journal Abbr Phil. Trans. R. Soc. A
DOI 10.1098/rsta.2010.0303
ISSN 1364-503X
URL http://rsta.royalsocietypublishing.org/cgi/doi/10.1098/rsta.2010.0303
Extra Keywords: climate change; global warming; impacts; adaptation; dangerous climate change; policy.
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:37:20 2011

Frequency of drought and severe fire weather in north-eastern Wisconsin

Type Journal Article
Author Craig G. Lorimer
Author William R. Gough
Abstract A daily record of drought was calculated with the Keetch-Byram drought index from temperature and rainfall data for the period 1864-1979. Historic fire records indicate that most fires greater than 120 ha in size have occurred at levels exceeding the 80th percentile of 10-day mean drought index observations. Unusually large conflagrations, such as the Peshtigo Fire of 1871, occurred at levels at or exceeding, the 95th percentile on days with <= 40% relative humidity. Days with moisture conditions conducive to the spread of large fires in slash, windfall, and pine forest fuels are common; 36% of the years had at least 15 days with suitable conditions.

Weather conditions similar to those at the time of historic conflagrations are much less frequent, but years with at least 10 days of extreme burning conditions have occurred at average intervals of 18 years. A comparison of drought severity in each year suggests that 1976 had by far the most severe drought conditions in the 116-year period, and that many droughts in recent decades were as severe as those at the time of post-settlement conflagrations. Lightning fires frequency is highest during drought years, apparently because of higher ignition probability during dry periods.

Publication	Journal of Environmental Management
Volume	26
Issue	3
Pages	203–219
Date	1988
Journal Abbr	J. Environ. Manage.
ISSN	0301-4797
URL	http://md1.csa.com/partners/viewrecord.php?requester=gs&collection=ENV&…
Extra	Keywords: drought; fire weather; forest fire; Keetch-Byram drought index.
Date Added	Tue Aug 30 14:37:58 2011
Modified	Wed Aug 31 00:20:56 2011

Frequent fires in ancient shrub tundra: Implications of paleorecords for Arctic environmental change

Type	Journal Article
Author	Philip E. Higuera
Author	Linda B. Brubaker
Author	Patricia M. Anderson
Author	Thomas A. Brown
Author	Alison T. Kennedy
Author	Feng Sheng Hu
Editor	Jerome Chave

Abstract Understanding feedbacks between terrestrial and atmospheric systems is vital for predicting the consequences of global change, particularly in the rapidly changing Arctic. Fire is a key process in this context, but the consequences of altered fire regimes in tundra ecosystems are rarely considered, largely because tundra fires occur infrequently on the modern landscape. We present paleoecological data that indicate frequent tundra fires in northcentral Alaska between 14,000 and 10,000 years ago. Charcoal and pollen from lake sediments reveal that ancient birch-dominated shrub tundra burned as often as modern boreal forests in the region, every 144 years on average (+/− 90 s.d.; n = 44). Although paleoclimate interpretations and data from modern tundra fires suggest that increased burning was aided by low effective moisture, vegetation cover clearly played a critical role in facilitating the paleofires by creating an abundance of fine fuels. These records suggest that greater fire activity will likely accompany temperature-related increases in shrub-dominated tundra predicted for the 21st century and beyond. Increased tundra burning will have broad impacts on physical and biological systems as well as on land-atmosphere interactions in the Arctic, including the potential to release stored organic carbon to the atmosphere.

Publication	PLoS ONE
Volume	3
Issue	3
Pages	e0001744 (7 p.)
Date	March 2008
Journal Abbr	PLoS ONE
DOI	10.1371/journal.pone.0001744
ISSN	1932-6203
Short Title	Frequent Fires in Ancient Shrub Tundra
URL	http://dx.plos.org/10.1371/journal.pone.0001744

Call Number 0000
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:15 2011

From coastal wilderness to fruited plain: A history of environmental change in temperate North America, 1500 to the present

Type Book
Author Gordon G. Whitney
Abstract Description From Coastal Wilderness to Fruited Plain is an account of the making of a large part of the American landscape following European settlement. Drawing upon land survey records and early travelers' accounts, Dr Whitney reconstructs the 'virgin' forests and grasslands of the northeastern and central United States during the presettlement period. He then documents successively the clearance and fragmentation of the region's woodlands, the harvest of the forest and its game, the ploughing of the prairies, and the draining of wetlands. The degree to which these activities altered the soil, climate, plant and animal communities, and water cycle are evaluated, and the sustainability of present-day ecosystems is brought into question in this unique account. (from: Cambridge University Press http://assets.cambridge.org/052157/658X/description/052157658X_description.htm)
Edition reprint, illustrated
Place Cambridge, United Kingdom
Publisher Cambridge University Press
Date September 1996 (1994: first published)
# of Pages 451 p.
ISBN 9780521576581 or 052139452X
Short Title From coastal wilderness to fruited plain
URL http://assets.cambridge.org/assets/bookpageresult.jsf?conversationId=10557638
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:19 2011

Fuel moisture, forest type, and lightning-caused fire in Yellowstone National Park

Type Journal Article
Author Roy A. Renkin
Author Don G. Despain
Abstract The occurrence and behavior of lightning-caused fires in Yellowstone National Park were summarized for 17 years (1972–1988) during a prescribed natural fire program. Both ignition (occurrence) and spread (stand replacing fire activity) of fires were strongly influenced by fuel moisture and forest cover type. Fuel moisture estimates of 13% for large (>7.6 cm) dead and downed fuels indicated a threshold below which proportionately more fire starts and increased stand replacing fire activity were observed. During periods of suitable fuel moisture conditions, fire occurrence and activity were significantly greater than expected in old-growth, mixed-canopy lodgepole pine (Pinuscontorta Dougl. var. latifolia) and Engelmann spruce–subalpine fir (Piceaengelmannii Parry–Abieslasiocarpa (Hook.) Nutt.) forest types, and significantly less than expected in the successional lodgepole pine forest types. During periods of extended low fuel moisture conditions (drought), sustained high winds significantly reduced the influence of forest cover type on stand replacing fire activity. These extreme weather conditions were observed during the later stages of the 1988 fire season, and to a lesser extent, for a short duration during the 1981 fire season. The Douglas-fir (Pseudotsugamenziesii (Mirb.) Franco) forest type typically supported little stand replacing fire activity, even though a preponderance of fire starts was observed.
Publication Canadian Journal of Forest Research
Volume 22

Issue 1
Pages 37–45
Date January 1992
Journal Abbr Can. J. For. Res.
DOI 10.1139/x92-005
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x92-005
Date Added Mon Aug 29 00:48:23 2011
Modified Mon Aug 29 00:48:23 2011

Functional approaches to predicting the ecological effects of global change

Type Journal Article
Author F. Ian Woodward
Author A. D. Diament
Abstract no abstract
Publication Functional Ecology
Volume 5
Issue 2
Pages 202-212
Date 1991
Journal Abbr Funct. Ecol.
DOI 10.2307/2389258
ISSN 0269-8463
URL http://www.jstor.org/stable/2389258
Extra Keywords: climate change; fire; forest; grassland; microwave backscatter; saline soils; scaling; soil water; sound; transpiration.
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:26:43 2011

Fundamentals of physical geography

Type Book
Author Glenn T. Trewartha
Author Arthur H. Robinson
Author Edwin H. Hammond
Abstract Introduction: The surface of the earth is a complicated combination of a great many things. Some of these are the natural features, such as the land, air, vegetation, soil, and water. Man lives within this complex natural environment, and, according to his interests and his knowledge, he takes it into account in planning and carrying out his activities. If a person travels over the earth, he will observe that the various physical features change from place to place: it is warmer here; it rains more often there; the land sur- face is relatively smooth in one place, mountainous in another; and so on. To appreciate and understand the character of the differences and similarities of the earth's surface from place to place, he must turn to the study of physical geography, the body of knowledge that deals with the description and interpretation of the physical features of the surface zone of the earth. In general, the description and interpretation of the myriad interrelationships among the physical elements of the earth is properly called earth science. Earth science includes many fields of systematic investigation. Physical geography is the segment which studies the elements that man finds significant in his use of the earth; in this respect, physical geography is the study of man's natural environment. In particular it concentrates upon the manner in which the environment differs from place to place and upon the reasons for the differences. Man studying the earth has been likened to a curious ant upon a patterned rug. Because of the

ant's diminutive size and limited range of vision it cannot easily comprehend the broad arrangements of the different colors. To develop a clear description and interpretation of the general pattern, the ant would need to employ several scientific techniques, such as careful observation, data reduction, the development of systematic classifications, and mapping. The physical earth is like a patterned rug, albeit a relatively large and complex one. But rather than being simply a uniform surface on which the only thing that changes from place to place is the color of the fibers, the earth's surface zone is made up of many different elements, ranging from air temperatures to the flatness of the land, each with its own more or less complex pattern. Through the scientific study of physical geography the student will become aware that there are both striking similarities and fundamental differences in the physical environment from place to place. He will learn of the great and important variations in the surface forms of the land, from the broad patterns of the continents to the smaller irregularities that complicate the local scene. He will come to appreciate the general character and movements of the great mass of water that not only floods the great depressions of the earth but also exists on and beneath the surface of the land. He will become acquainted with the nature and behavior of the atmospheric film which envelops the earth and acts as a transporting and distributing agent for life-giving energy and water. He will find also that the materials and forms of the earth's solid crust and the behavior of the gaseous envelope are all interrelated, and that they, together with organic life, combine to produce yet other patterns such as those of soils and natural vegetation. In fact he will find that the patterns of the several physical elements are all interrelated and that their spatial relationships are at once simple and complex. To study scientifically the elements of the physical environment, one must consider the physical processes involved in their interaction in place; this is necessary background for an understanding of the place to place variation of each physical element. One of the purposes of this book is, however, to focus attention, as much as is possible in a survey treatment, on the areal distributions and functional interrelationships of the physical elements over the earth's surface. In this it strives to emphasize the basic locational aspects of these matters. Thus the broad earth patterns of variation and their interrelationships are stressed, with less emphasis placed upon the mechanics of process independent of place. It is hoped that this will enable the student to obtain in a direct manner that appreciation of the earth as a physical environment without which he cannot be considered properly informed as a tenant. Although this briefer book has been organized and written afresh, much of its content is based upon materials in the more comprehensive Physical Elements of Geography by Finch, Trewartha, Robinson, and Hammond. The selection of materials has been made to fit a one-semester, one-quarter, or two-quarter introductory college survey course in the fundamentals of physical geography. In every case the degree of generalization has been kept at a high level, with the focus on general world patterns and their interrelationships. In some sections of this book a completely different approach has been taken from that in the earlier book, and recent materials have been included. A number of new illustrations have been prepared and procured, but many are taken from the larger book. The student and the instructor will note that there are no chapter outlines or review questions. It is the authors' opinion, and they feel it to be the judgment of many instructors, that to include such materials is to subvert an important part of the learning process. The good student finds them useless, and the mediocre student is likely to grasp them as straws without going through the essential learning process of formulating them for himself. For the student who wishes to range further, brief bibliographies are appended at appropriate places. The authors acknowledge a debt to both their colleagues and their former students. At the University of Wisconsin most of the physical science departments, among them the Department of Geography, offer one-semester survey courses as well as year-length courses. Each of the authors has taught the survey course in physical geography and by contact with the students has become familiar with the capabilities of those who take such a course with little or no background in the subject. Colleagues in the Department of Geography and in other departments of the earth sciences have been helpful in many ways.

Series	Mcgraw-Hill Series in Geography
Edition	2nd edition
Place	New York, Toronto, London
Publisher	McGraw-Hill Education
Date	December 1968
# of Pages	xii, 384 p.
ISBN	9780070651838, 0070651833
URL	http://www.archive.org/details/fundamentalsofph032793mbp
Extra	1st ed., 1961, 2nd ed., 1968, 3rd ed., 1977.
Date Added	Sat Aug 27 15:10:11 2011
Modified	Wed Aug 31 00:28:00 2011

Fungal virulence at the time of the end-Permian biosphere crisis?

Type Journal Article
Author Henk Visscher
Author Mark A. Sephton
Author Cindy V. Looy
Abstract Throughout the world, latest Permian records of organic-walled microfossils are characterized by the common presence of remains of filamentous organisms, usually referred to the palynomorph genus Reduviasporonites. Although generally regarded as indicators of global ecological crisis, fundamental controversy still exists over the biological and ecological identity of the remains. Both fungal and algal affinities have been proposed. We seek to resolve this enigma by demonstrating close morphological similarity of the microfossils to resting structures (monilioid hyphae, sclerotia) of Rhizoctonia, a modern complex of soil-borne filamentous fungi that includes ubiquitous plant pathogens. By analogy with present-day forest decline, these findings suggest that fungal virulence may have been a significant contributing factor to widespread devastation of arboreal vegetation at the close of the Permian Period.
Publication Geology
Volume 39
Issue 9
Pages 883-886
Date September 2011
Journal Abbr Geology
DOI 10.1130/G32178.1
ISSN 0091-7613
URL http://geology.gsapubs.org/cgi/doi/10.1130/G32178.1
Call Number 0000
Date Added Sat Aug 27 02:07:29 2011
Modified Mon Aug 29 23:48:42 2011

Future area burned in Canada

Type Journal Article
Author Mike D. Flannigan
Author Kimberley A. Logan
Author Brian D. Amiro
Author Walter R. Skinner
Author Brian J. Stocks
Abstract Historical relationships between weather, the Canadian fire weather index (FWI) system components and area burned in Canadian ecozones were analysed on a monthly basis in tandem with output from the Canadian and the Hadley Centre GCMs to project future area burned. Temperature and fuel moisture were the variables best related to historical monthly area burned with 36–64% of the variance explained depending on ecozone. Our results suggest significant increases in future area burned although there are large regional variations in fire activity. This was especially true for the Canadian GCM where some ecozones show little change in area burned, however area burned was not projected to decrease in any of the ecozones modelled. On average, area burned in Canada is projected to increase by 74–118% by the end of this century in a 3 × CO_2 scenario. These estimates do not explicitly take into account any changes in vegetation, ignitions, fire season length, and human activity (fire management and land use activities) that may influence area burned. However, the estimated increases in area burned would have significant ecological, economic and social impacts for Canada.
Publication Climatic Change
Volume 72
Issue 1-2
Pages 1–16

Date September 2005
Journal Abbr Climatic Change
DOI 10.1007/s10584-005-5935-y
ISSN 0165-0009
URL http://www.springerlink.com/content/3161071122103227/
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:51 2011

Future changes in climate, ocean circulation, ecosystems, and biogeochemical cycling simulated for a business-as-usual CO_2 emission scenario until year 4000 AD

Type Journal Article
Author Andreas Schmittner
Author Andreas Oschlies
Author H. Damon Matthews
Author Eric D. Galbraith
Abstract A new model of global climate, ocean circulation, ecosystems, and biogeochemical cycling, including a fully coupled carbon cycle, is presented and evaluated. The model is consistent with multiple observational data sets from the past 50 years as well as with the observed warming of global surface air and sea temperatures during the last 150 years. It is applied to a simulation of the coming two millennia following a business-as-usual scenario of anthropogenic CO_2 emissions (SRES A2 until year 2100 and subsequent linear decrease to zero until year 2300, corresponding to a total release of 5100 GtC). Atmospheric CO_2 increases to a peak of more than 2000 ppmv near year 2300 (that is an airborne fraction of 72% of the emissions) followed by a gradual decline to ~1700 ppmv at year 4000 (airborne fraction of 56%). Forty-four percent of the additional atmospheric CO_2 at year 4000 is due to positive carbon cycle–climate feedbacks. Global surface air warms by ~10°C, sea ice melts back to 10% of its current area, and the circulation of the abyssal ocean collapses. Subsurface oxygen concentrations decrease, tripling the volume of suboxic water and quadrupling the global water column denitrification. We estimate 60 ppb increase in atmospheric N_2O concentrations owing to doubling of its oceanic production, leading to a weak positive feedback and contributing about 0.24°C warming at year 4000. Global ocean primary production almost doubles by year 4000. Planktonic biomass increases at high latitudes and in the subtropics whereas it decreases at midlatitudes and in the tropics. In our model, which does not account for possible direct impacts of acidification on ocean biology, production of calcium carbonate in the surface ocean doubles, further increasing surface ocean and atmospheric pCO_2. This represents a new positive feedback mechanism and leads to a strengthening of the positive interaction between climate change and the carbon cycle on a multicentennial to millennial timescale. Changes in ocean biology become important for the ocean carbon uptake after year 2600, and at year 4000 they account for 320 ppmv or 22% of the atmospheric CO_2 increase since the preindustrial era.
Publication Global Biogeochemical Cycles
Volume 22
Pages GB1013 (21 p.)
Date February 2008
Journal Abbr Global Biogeochem. Cy.
DOI 10.1029/2007GB002953
ISSN 0886–6236
URL http://www.agu.org/pubs/crossref/2008/2007GB002953.shtml
Extra Keywords: climate change; biogeochemical cycles; ecosystems.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:26:10 2011

Future changes in daily summer temperature variability: Driving processes and role for temperature

extremes

Type Journal Article

Author Erich M. Fischer

Author Christoph Schär

Abstract Anthropogenic greenhouse gas emissions are expected to lead to more frequent and intense summer temperature extremes, not only due to the mean warming itself, but also due to changes in temperature variability. To test this hypothesis, we analyse daily output of ten PRUDENCE regional climate model scenarios over Europe for the 2071–2100 period. The models project more frequent temperature extremes particularly over the Mediterranean and the transitional climate zone (TCZ, between the Mediterranean to the south and the Baltic Sea to the north). The projected warming of the uppermost percentiles of daily summer temperatures is found to be largest over France (in the region of maximum variability increase) rather than the Mediterranean (where the mean warming is largest). The underlying changes in temperature variability may arise from changes in (1) interannual temperature variability, (2) intraseasonal variability, and (3) the seasonal cycle. We present a methodology to decompose the total daily variability into these three components. Over France and depending upon the model, the total daily summer temperature variability is projected to significantly increase by 20–40% as a result of increases in all three components: interannual variability (30–95%), seasonal variability (35–105%), and intraseasonal variability (10–30%). Variability changes in northern and southern Europe are substantially smaller. Over France and parts of the TCZ, the models simulate a progressive warming within the summer season (corresponding to an increase in seasonal variability), with the projected temperature change in August exceeding that in June by 2–3 K. Thus, the most distinct warming is superimposed upon the maximum of the current seasonal cycle, leading to a higher intensity of extremes and an extension of the summer period (enabling extreme temperatures and heat waves even in September). The processes driving the variability changes are different for the three components but generally relate to enhanced land–atmosphere coupling and/or increased variability of surface net radiation, accompanied by a strong reduction of cloudiness, atmospheric circulation changes and a progressive depletion of soil moisture within the summer season. The relative contribution of these processes differs substantially between models.

Publication Climate Dynamics

Volume 33

Issue 7-8

Pages 917-935

Date December 2009

Journal Abbr Clim. Dyn.

DOI 10.1007/s00382-008-0473-8

ISSN 0930-7575

Short Title Future changes in daily summer temperature variability

URL http://www.springerlink.com/content/92110157jm1t6761/

Extra Keywords: variability; extreme events; heat wave.

Date Added Sun Aug 28 05:42:07 2011

Modified Sun Aug 28 05:46:01 2011

Future climate in the Pacific Northwest

Type Journal Article

Author Philip W. Mote

Author Eric P. Salathé Jr.

Abstract Climate models used in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) on the whole reproduce the observed seasonal cycle and twentieth century warming trend of 0.8°C (1.5°F) in the Pacific Northwest, and point to much greater warming for the next century. These models project increases in annual temperature of, on average, 1.1°C (2.0°F) by the 2020s, 1.8°C (3.2°F) by the 2040s, and 3.0°C (5.3°F) by the 2080s, compared with the average from 1970 to 1999, averaged across all climate models. Rates of warming range from 0.1°C to 0.6°C (0.2°F to 1.0°F) per decade. Projected changes in annual precipitation, averaged over all models, are small (+1% to +2%), but some models project an enhanced seasonal cycle with changes toward wetter autumns and winters and drier summers. Changes in nearshore sea surface temperatures, though smaller than on land, are likely to substantially exceed interannual variability, but coastal upwelling changes little. Rates of twenty-first century sea level rise will depend on poorly known factors like ice sheet instability in Greenland and Antarctica, and could be as low as twentieth century values (20 cm, 8″) or as large as 1.3 m (50″).

Publication Climatic Change
Volume 102
Issue 1-2
Pages 29-50
Date September 2010
Journal Abbr Climatic Change
DOI 10.1007/s10584-010-9848-z
ISSN 0165-0009
URL http://www.springerlink.com/content/1785284724586k85/
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:47:48 2011

Future dryness in the southwest US and the hydrology of the early 21st century drought

Type Journal Article
Author Daniel R. Cayan
Author Tapash Das
Author David W. Pierce
Author Tim P. Barnett
Author Mary Tyree
Author Alexander Gershunov
Abstract Recently the Southwest has experienced a spate of dryness, which presents a challenge to the sustainability of current water use by human and natural systems in the region. In the Colorado River Basin, the early 21st century drought has been the most extreme in over a century of Colorado River flows, and might occur in any given century with probability of only 60%. However, hydrological model runs from downscaled Intergovernmental Panel on Climate Change Fourth Assessment climate change simulations suggest that the region is likely to become drier and experience more severe droughts than this. In the latter half of the 21st century the models produced considerably greater drought activity, particularly in the Colorado River Basin, as judged from soil moisture anomalies and other hydrological measures. As in the historical record, most of the simulated extreme droughts build up and persist over many years. Durations of depleted soil moisture over the historical record ranged from 4 to 10 years, but in the 21st century simulations, some of the dry events persisted for 12 years or more. Summers during the observed early 21st century drought were remarkably warm, a feature also evident in many simulated droughts of the 21st century. These severe future droughts are aggravated by enhanced, globally warmed temperatures that reduce spring snowpack and late spring and summer soil moisture. As the climate continues to warm and soil moisture deficits accumulate beyond historical levels, the model simulations suggest that sustaining water supplies in parts of the Southwest will be a challenge.
Publication Proceedings of the National Academy of Sciences
Volume 107
Issue 50
Pages 21271 -21276
Date December 14, 2010
Journal Abbr PNAS
DOI 10.1073/pnas.0912391107
ISSN 1091-6490
URL http://www.pnas.org/content/107/50/21271.full
Extra Keywords: climate change; regional modeling; sustainability; water resources.
Date Added Tue Aug 30 02:03:25 2011

Modified Wed Aug 31 00:34:20 2011

Genesis and Evolution of the 1997-98 El Niño

Type Journal Article

Author Michael J. McPhaden

Abstract The 1997–98 El Niño was, by some measures, the strongest on record, with major climatic impacts felt around the world. A newly completed tropical Pacific atmosphere-ocean observing system documented this El Niño from its rapid onset to its sudden demise in greater detail than was ever before possible. The unprecedented measurements challenge existing theories about El Niño–related climate swings and suggest why climate forecast models underpredicted the strength of the El Niño before its onset.

Publication Science

Volume 283

Issue 5404

Pages 950-954

Date 12 February 1999

Journal Abbr Science

DOI 10.1126/science.283.5404.950

ISSN 0036-8075

URL http://www.sciencemag.org/content/283/5404/950.full

Date Added Tue Aug 30 14:35:38 2011

Modified Wed Aug 31 00:22:13 2011

Geographic and temporal variations in fire history in boreal ecosystems of Alaska

Type Journal Article

Author Jason A. Lynch

Author James S. Clark

Author Nancy H. F. French

Author Mary E. Edwards

Author Bruce P. Finney

Abstract Charcoal and pollen analyses were used to determine geographic and temporal patterns of fire importance in boreal forests of the Kenai Peninsula and interior Alaska. Sieved, large charcoal particles were measured in continuously sampled cores of Rock, Portage, and Arrow Lakes (Kenai Peninsula) and Dune and Deuce Lakes (interior Alaska) to estimate regional fire importance and fire occurrence. Charcoal accumulation rates have been low for the past 1000 years in both regions with slightly higher values in interior Alaska than on the Kenai Peninsula. An exception to this general pattern was the period of post-European settlement on the Kenai Peninsula, where charcoal accumulation rates increased by 10-fold. This increase most likely reflected increased fire occurrence due to human ignition. The Holocene charcoal and pollen records from Dune Lake indicate low fire occurrence during the early (9000 to 5500 calibrated year before present (yr BP)) birch-white spruce-alder (Betula-Picea glauca-Alnus) communities and high fire occurrence as black spruce (Picea mariana) became established after 5500 yr BP. Increased fires probably resulted from a change to fire-prone black spruce forests. For the past 5500 yr BP, two distinct fire regimes occurred. Frequent fires, with an average fire return interval of 98 years, characterized the period from 5500-2400 yr BP. Fewer fires, with an average fire interval of 198 years, characterized the period after 2400 yr BP. Fuel accumulation, stand structure, and vegetation species contributed to the natural variability in fire regimes during past changes in climate.

Publication Journal of Geophysical Research

Volume 108

Issue D1

Pages 8152 (17 p.)

Date Decembe 2002

Journal Abbr J. Geophys. Res.
DOI 10.1029/2001JD000332
ISSN 0148–0227
URL http://www.agu.org/pubs/crossref/2002/2001JD000332.shtml
Call Number 0000
Extra Keywords: charcoal; pollen; fire; boreal.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:21:06 2011

Geological Society of London - Climate change: Evidence from the geological record

Type Web Page
Author Geological Society of London
Abstract The Geological Society has prepared a position statement on climate change, focusing specifically on the geological evidence. A drafting group was convened, with the aim of producing a clear and concise summation, accessible to a general audience, of the scientific certainties and uncertainties; as well as including references to further sources of information.
Website Title The Geological Society - Climate Change
Date 2010
URL http://www.geolsoc.org.uk/climatechange
Rights The Geological Society of London
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:17:09 2011

Getting a better estimate of an atmospheric radical

Type Journal Article
Author Ivar S. A. Isaksen
Author Stig B. Dalsøren
Abstract Better measures of how global levels of OH vary from year to year will improve climate science.
Publication Science
Volume 331
Issue 6013
Pages 38-39
Date 7 January 2011
Journal Abbr Science
DOI 10.1126/science.1199773
ISSN 0036-8075 (print), 1095-9203 (online)
URL http://www.sciencemag.org/content/331/6013/38.full
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:05:14 2011

Global and regional drivers of accelerating CO_2 emissions

Type Journal Article
Author Michael R. Raupach
Author Gregg Marland

Author Philippe Ciais
Author Corinne Le Quere
Author Josep G. Canadell
Author Gernot Klepper
Author Christopher B. Field

Abstract CO_2 emissions from fossil-fuel burning and industrial processes have been accelerating at a global scale, with their growth rate increasing from 1.1% y^{-1} for 1990–1999 to >3% y^{-1} for 2000–2004. The emissions growth rate since 2000 was greater than for the most fossil-fuel intensive of the Intergovernmental Panel on Climate Change emissions scenarios developed in the late 1990s. Global emissions growth since 2000 was driven by a cessation or reversal of earlier declining trends in the energy intensity of gross domestic product (GDP) (energy/GDP) and the carbon intensity of energy (emissions/energy), coupled with continuing increases in population and per-capita GDP. Nearly constant or slightly increasing trends in the carbon intensity of energy have been recently observed in both developed and developing regions. No region is decarbonizing its energy supply. The growth rate in emissions is strongest in rapidly developing economies, particularly China. Together, the developing and least-developed economies (forming 80% of the world's population) accounted for 73% of global emissions growth in 2004 but only 41% of global emissions and only 23% of global cumulative emissions since the mid-18th century. The results have implications for global equity.

Publication Proceedings of the National Academy of Sciences
Volume 104
Issue 24
Pages 10288-10293
Date June 12, 2007
Journal Abbr PNAS
DOI 10.1073/pnas.0700609104
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.0700609104
Extra Keywords: carbon intensity of economy; carbon intensity of energy; emissions scenarios; fossil fuels; Kaya identity.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:24:50 2011

Global biodiversity scenarios for the Year 2100

Type Journal Article

Author Osvaldo E. Sala
Author F. Stuart Chapin III
Author Juan J. Armesto
Author Eric Berlow
Author Janine Bloomfield
Author Rodolfo Dirzo
Author Elisabeth Huber-Sanwald
Author Laura F. Huenneke
Author Robert B. Jackson
Author Ann Kinzig
Author Rik Leemans
Author David M. Lodge
Author Harold A. Mooney
Author Martín Oesterheld
Author N. LeRoy Poff
Author Martin T. Sykes
Author Brian H. Walker

Author Marilyn Walker
Author Diana H. Wall
Abstract Scenarios of changes in biodiversity for the year 2100 can now be developed based on scenarios of changes in atmospheric carbon dioxide, climate, vegetation, and land use and the known sensitivity of biodiversity to these changes. This study identified a ranking of the importance of drivers of change, a ranking of the biomes with respect to expected changes, and the major sources of uncertainties. For terrestrial ecosystems, land-use change probably will have the largest effect, followed by climate change, nitrogen deposition, biotic exchange, and elevated carbon dioxide concentration. For freshwater ecosystems, biotic exchange is much more important. Mediterranean climate and grassland ecosystems likely will experience the greatest proportional change in biodiversity because of the substantial influence of all drivers of biodiversity change. Northern temperate ecosystems are estimated to experience the least biodiversity change because major land-use change has already occurred. Plausible changes in biodiversity in other biomes depend on interactions among the causes of biodiversity change. These interactions represent one of the largest uncertainties in projections of future biodiversity change.
Publication Science
Volume 287
Issue 5459
Pages 1770-1774
Date 10 March 2000
Journal Abbr Science
DOI 10.1126/science.287.5459.1770
ISSN 1095-9203
URL http://www.sciencemag.org/cgi/doi/10.1126/science.287.5459.1770
Date Added Sun Aug 28 17:20:22 2011
Modified Sun Aug 28 17:20:22 2011

Global change: Indirect feedbacks to rising CO_2

Type Journal Article
Author Alexander Knohl
Author Edzo Veldkamp
Abstract There have been many studies on the effects of enriched levels of atmospheric carbon dioxide on soils. A meta-analysis shows that emissions of other greenhouse gases increase under high-CO_2 conditions.
Publication Nature
Volume 475
Issue 7355
Pages 177-178
Date 14 July 2011
Journal Abbr Nature
DOI 10.1038/475177a
ISSN 1476-4687
Short Title Global change
URL http://www.nature.com/doifinder/10.1038/475177a
Call Number 0000
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:16:29 2011

Global climate change impacts in the United States

Type Book

Editor Thomas R. Karl
Editor Jerry M. Melillo
Editor Thomas C. Peterson
Abstract Overview This book is the most comprehensive report to date on the wide range of impacts of climate change in the United States. It is written in plain language to better inform members of the public and policymakers. The report finds that global warming is unequivocal, primarily human-induced, and its impacts are already apparent in transportation, agriculture, health, and water and energy supplies. These impacts are expected to grow with continued climate change – the higher the levels of greenhouse gas emissions, the greater the impacts. The report illustrates how these impacts can be kept to a minimum if greenhouse gas emissions are reduced. The choices we make now will determine the severity of climate change impacts in the future. This book will help citizens, business leaders, and policymakers at all levels to make informed decisions about responding to climate change and its impacts. • Likely to set the policy agenda across the US for the next few years • Features examples of actions currently being pursued in various regions to address climate change • Summarises in one place the current and projected affects of climate change in the United States
Edition 1st edition
Place Cambridge (England); New York
Publisher Cambridge University Press
Date 2009
# of Pages 188 p.
ISBN 0521144078, 9780521144070
URL http://www.globalchange.gov/what-we-do/assessment/previous-assessments/global-climate-change-impacts-in-the-us-2009
Call Number 0153
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 07:18:12 2011

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Contents & Citation:

Contents:

Executive summary; 1. National climate change; 2. Climate change impacts by sector; 3. Regional climate impacts; 4. An agenda for climate impacts science; 5. Concluding thoughts; Author team biographies; Primary sources of information; Acronyms; References; Photography credits.

Citation:

Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009.

Global climate models and 'dynamic' vegetation changes

Type Journal Article
Author Ann Henderson-Sellers
Author Kendal McGuffie
Abstract Models of global change must come to incorporate changes in terrestrial vegetation. Here we choose a 1- year meshing (coupling) period to link a global climate model to a well-known biophysical representation of the continental surface by means of eleven vegetation functional types. This coupled model is used to answer two questions: Can a 'standard' GCM 'cope' with sudden switches in continental characteristics?' and Does the climate 'care' about the changing underlying vegetation? We find affirmative answers to both questions. Our results also suggest that those content to generate vegetation post facto from climate output have incomplete results.

Publication Global Change Biology
Volume 1
Issue 1
Pages 63–75
Date February 1995
Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1365-2486.1995.tb00007.x
ISSN 1365-2486
URL http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.1995.tb00007.x/abstract
Extra Keywords: vegetation models; coupling to climate; global change; GCM; Holdridge.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:22 2011

Global climate projections: Climate Change 2007: The physical science basis (Chapter 10) (the fourth assessment report)

Type Journal Article
Author Gerald A. Meehl
Author Thomas F. Stocker
Author William D. Collins
Author Pierre Friedlingstein
Author Amadou T. Gaye
Author Jonathan M. Gregory
Author Akio Kitoh
Author Reto Knutti
Author James M. Murphy
Author Akira Noda
Author Sarah C.B. Raper
Author Ian G. Watterson
Author Andrew J. Weaver
Author Zong-Ci Zhao
Abstract The future climate change results assessed in this chapter are based on a hierarchy of models, ranging from Atmosphere-Ocean General Circulation Models (AOGCMs) and Earth System Models of Intermediate Complexity (EMICs) to Simple Climate Models (SCMs). These models are forced with concentrations of greenhouse gases and other constituents derived from various emissions scenarios ranging from nonmitigation scenarios to idealised long-term scenarios. In general, we assess non-mitigated projections of future climate change at scales from global to hundreds of kilometres. Further assessments of regional and local climate changes are provided in Chapter 11. Due to an unprecedented, joint effort by many modelling groups worldwide, climate change projections are now based on multi-model means, differences between models can be assessed quantitatively and in some instances, estimates of the probability of change of important climate system parameters complement expert judgement. New results corroborate those given in the Third Assessment Report (TAR). Continued greenhouse gas emissions at or above current rates will cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century.....
Publication Cambridge University Press, New York
Pages 747–845
Date 2007
ISSN 9780521705967, 9780521880091
Short Title Global climate projections Climate Change 2007
URL http://www.cambridge.org/features/earth_environmental/climatechange/wg1.htm

Archive http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm
Library Catalog IPCC
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:35:38 2011

Notes:

Citation:

Meehl, G.A., T.F. Stocker, W.D. Collins, P. Friedlingstein, A.T. Gaye, J.M. Gregory, A. Kitoh, R. Knutti, J.M. Murphy, A. Noda, S.C.B. Raper, I.G. Watterson, A.J. Weaver and Z.-C. Zhao, 2007: Global Climate Projections. In: Climate Change 2007: The Physical Science Basis.
Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United
Kingdom and New York, NY, USA.

Global CO_2 rise leads to reduced maximum stomatal conductance in Florida vegetation

Type Journal Article
Author Emmy I. Lammertsma
Author Hugo Jan de Boer
Author Stefan C. Dekker
Author David L. Dilcher
Author André F. Lotter
Author Friederike Wagner-Cremer
Abstract A principle response of C3 plants to increasing concentrations of atmospheric CO_2 (CO_2) is to reduce transpirational water loss by decreasing stomatal conductance (gs) and simultaneously increase assimilation rates. Via this adaptation, vegetation has the ability to alter hydrology and climate. Therefore, it is important to determine the adaptation of vegetation to the expected anthropogenic rise in CO_2. Short-term stomatal opening–closing responses of vegetation to increasing CO_2 are described by free-air carbon enrichments growth experiments, and evolutionary adaptations are known from the geological record. However, to date the effects of decadal to centennial CO_2 perturbations on stomatal conductance are still largely unknown. Here we reconstruct a 34% (±12%) reduction in maximum stomatal conductance (gsmax) per 100 ppm CO_2 increase as a result of the adaptation in stomatal density (D) and pore size at maximal stomatal opening (amax) of nine common species from Florida over the past 150 y. The species-specific gsmax values are determined by different evolutionary development, whereby the angiosperms sampled generally have numerous small stomata and high gsmax, and the conifers and fern have few large stomata and lower gsmax. Although angiosperms and conifers use different D and amax adaptation strategies, our data show a coherent response in gsmax to CO_2 rise of the past century. Understanding these adaptations of C3 plants to rising CO_2 after decadal to centennial environmental changes is essential for quantification of plant physiological forcing at timescales relevant for global warming, and they are likely to continue until the limits of their phenotypic plasticity are reached.
Publication Proceedings of the National Academy of Sciences
Volume 108
Issue 10
Pages 4035-4040
Date March 8, 2011
Journal Abbr PNAS
DOI 10.1073/pnas.1100371108
ISSN 0027-8424
URL http://www.pnas.org/content/108/10/4035.full
Extra Keywords: cuticular analysis; subtropical vegetation.

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Modified	Tue Aug 30 14:37:58 2011

Global demographic trends and future carbon emissions

Type	Journal Article
Author	Brian C. O'Neill
Author	Michael Dalton
Author	Regina Fuchs
Author	Leiwen Jiang
Author	Shonali Pachauri
Author	Katarina Zigova
Abstract	Substantial changes in population size, age structure, and urbanization are expected in many parts of the world this century. Although such changes can affect energy use and greenhouse gas emissions, emissions scenario analyses have either left them out or treated them in a fragmentary or overly simplified manner. We carry out a comprehensive assessment of the implications of demographic change for global emissions of carbon dioxide. Using an energy–economic growth model that accounts for a range of demographic dynamics, we show that slowing population growth could provide 16–29% of the emissions reductions suggested to be necessary by 2050 to avoid dangerous climate change. We also find that aging and urbanization can substantially influence emissions in particular world regions.
Publication	Proceedings of the National Academy of Sciences
Volume	107
Issue	41
Pages	17521-17526
Date	October 12, 2010
Journal Abbr	PNAS
DOI	10.1073/pnas.1004581107
ISSN	0027-8424
URL	http://www.pnas.org/content/107/41/17521.full
Extra	Keywords: climate change; energy; integrated assessment; population; households.
Date Added	Sat Aug 27 18:47:16 2011
Modified	Sat Aug 27 18:47:16 2011

Global distribution and seasonality of active fires as observed with the Terra and Aqua Moderate Resolution Imaging Spectroradiometer (MODIS) sensors

Type	Journal Article
Author	Louis Giglio
Author	Ivan Csiszar
Author	Christopher O. Justice
Abstract	We describe a new global multiyear satellite fire product designed to meet the needs of the global modeling community. We use the new data set to analyze the global distribution of biomass burning using five different temporal metrics derived from 5 years of high-quality satellite data acquired with the Moderate Resolution Imaging Spectroradiometer (MODIS), on board NASA's Terra satellite. The global distributions of fire pixel density, peak month, season length, and annual periodicity are described. As part of our analysis we show, for the first time, the global distribution of the fire radiative power (FRP), a relatively new remotely sensed quantity. We find that low FRP tends to be associated with areas of cropland burning. In the tropics and much of the subtropics, low FRP is also associated with more heavily forested areas, while higher FRP tends to occur in areas of grassland burning. In boreal forests this trend is reversed, with higher FRP occurring in areas of greater tree cover. We next combine 3 years of Terra and Aqua MODIS observations to show that a strong diurnal fire cycle is prevalent at tropical and subtropical latitudes. We also consider the consistency of the fire

time series recorded by the two MODIS instruments, and find the month of peak burning and fire season length observed by each to be in good agreement in most areas. However, significant discrepancies with respect to seasonality do occur in some relatively small areas, and are most pronounced in tropical rain forest.

Publication Journal of Geophysical Research
Volume 111
Issue G2
Pages G02016 (12 p.)
Date June 2006
Journal Abbr J. Geophys. Res.
DOI 10.1029/2005JG000142
ISSN 2156-2202
URL http://www.agu.org/journals/ABS/2006/2005JG000142.shtml
Extra Keywords: MODIS; biomass burning; fire climatology; fire regime; fire radiative power.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:21 2011

Global frequency and distribution of lightning as observed from space by the Optical Transient Detector

Type Journal Article
Author Hugh J. Christian
Author Richard J. Blakeslee
Author Dennis J. Boccippio
Author William L. Boeck
Author Dennis E. Buechler
Author Kevin T. Driscoll
Author Steven J. Goodman
Author John M. Hall
Author William J. Koshak
Author Douglas M. Mach
Author Michael F. Stewart
Abstract The Optical Transient Detector (OTD) is a space-based instrument specifically designed to detect and locate lightning discharges as it orbits the Earth. This instrument is a scientific payload on the MicroLab-1 satellite that was launched into a 70° inclination low Earth orbit in April 1995. Given the orbital trajectory of the satellite, most regions of the Earth are observed by the OTD instrument more than 400 times during a 1 year period, and the average duration of each observation is 2 min. The OTD instrument optically detects lightning flashes that occur within its 1300×1300 km² field of view during both day and night conditions. A statistical examination of OTD lightning data reveals that nearly 1.4 billion flashes occur annually over the entire Earth. This annual flash count translates to an average of 44 ± 5 lightning flashes (intracloud and cloud-to-ground combined) occurring around the globe every second, which is well below the traditional estimate of 100 fl s^{-1} that was derived in 1925 from world thunder day records. The range of uncertainty for the OTD global totals represents primarily the uncertainty (and variability) in the flash detection efficiency of the instrument. The OTD measurements have been used to construct lightning climatology maps that demonstrate the geographical and seasonal distribution of lightning activity for the globe. An analysis of this annual lightning distribution confirms that lightning occurs mainly over land areas, with an average land/ocean ratio of ~10:1. The Congo basin, which stands out year-round, shows a peak mean annual flash density of 80 fl $km^{-2}yr^{-1}$ in Rwanda, and includes an area of over 3 million km² exhibiting flash densities greater than 30 fl $km^{-2}yr^{-1}$ (the flash density of central Florida). Lightning is predominant in the northern Atlantic and western Pacific Ocean basins year-round where instability is produced from cold air passing over warm ocean water. Lightning is less frequent in the eastern tropical Pacific and Indian Ocean basins where the air mass is warmer. A dominant Northern Hemisphere summer peak occurs in the annual cycle, and evidence is found for a tropically driven semiannual cycle.

Publication Journal of Geophysical Research
Volume 108
Issue D1
Pages 4005 (15 p.)
Date January 2003
Journal Abbr J. Geophys. Res.
DOI 10.1029/2002JD002347
ISSN 2156-2202
URL http://www.agu.org/pubs/crossref/2003/2002JD002347.shtml
Call Number 0000
Extra Keywords: lightning; thunderstorm; atmospheric electricity; convection; climatology; remote sensing.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:18 2011

Global patterns in the vulnerability of ecosystems to vegetation shifts due to climate change

Type Journal Article
Author Patrick Gonzalez
Author Ronald P. Neilson
Author James M. Lenihan
Author Raymond J. Drapek
Abstract • Aim: Climate change threatens to shift vegetation, disrupting ecosystems and damaging human well-being. Field observations in boreal, temperate and tropical ecosystems have detected biome changes in the 20th century, yet a lack of spatial data on vulnerability hinders organizations that manage natural resources from identifying priority areas for adaptation measures. We explore potential methods to identify areas vulnerable to vegetation shifts and potential refugia. • Location: Global vegetation biomes. • Methods: We examined nine combinations of three sets of potential indicators of the vulnerability of ecosystems to biome change: (1) observed changes of 20th-century climate, (2) projected 21st-century vegetation changes using the MC1 dynamic global vegetation model under three Intergovernmental Panel on Climate Change (IPCC) emissions scenarios, and (3) overlap of results from (1) and (2). Estimating probability density functions for climate observations and confidence levels for vegetation projections, we classified areas into vulnerability classes based on IPCC treatment of uncertainty. • Results: One-tenth to one-half of global land may be highly (confidence 0.8020130.95) to very highly (confidence 2265 0.95) vulnerable. Temperate mixed forest, boreal conifer and tundra and alpine biomes show the highest vulnerability, often due to potential changes in wildfire. Tropical evergreen broadleaf forest and desert biomes show the lowest vulnerability. • Main conclusions: Spatial analyses of observed climate and projected vegetation indicate widespread vulnerability of ecosystems to biome change. A mismatch between vulnerability patterns and the geographic priorities of natural resource organizations suggests the need to adapt management plans. Approximately a billion people live in the areas classified as vulnerable.
Publication Global Ecology and Biogeography
Volume 19
Issue 6
Pages 755–768
Date November 2010
Journal Abbr Global Ecol. Biogeogr.
DOI 10.1111/j.1466-8238.2010.00558.x
ISSN 1466-8238
URL http://onlinelibrary.wiley.com/doi/10.1111/j.1466-8238.2010.00558.x/full
Extra Keywords: adaptation; biome change; climate change; dynamic global vegetation model; natural resource management; vegetation shifts; vulnerability.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:36 2011

Global patterns of vegetation response to millennial-scale variability and rapid climate change during the last glacial period

Type Journal Article
Author Sandy P. Harrison
Author Maria Fernanda Sanchez Goñi
Abstract Ninety-four sites worldwide have sufficient resolution and dating to document the impact of millennial-scale climate variability on vegetation and fire regimes during the last glacial period. Although Dansgaard-Oeschger (D-O) cycles all show a basically similar gross structure, they vary in the magnitude and the length of the warm and cool intervals. We illustrate the geographic patterns in the climate-induced changes in vegetation by comparing D-O 6, D-O 8 and D-O 19. There is a strong response to both D-O warming events and subsequent cooling, most marked in the northern extratropics. Pollen records from marine cores from the northern extratropics confirm that there is no lag between the change in climate and the vegetation response, within the limits of the dating resolution (50-100 years). However, the magnitude of the change in vegetation is regionally specific and is not a simple function of either the magnitude or the duration of the change in climate as registered in Greenland ice cores. Fire regimes also show an initial immediate response to climate changes, but during cooling intervals there is a slow recovery of biomass burning after the initial reduction, suggesting a secondary control through the recovery of vegetation productivity. In the extratropics, vegetation changes are largely determined by winter temperatures while in the tropics they are largely determined by changes in plant-available water. Tropical vegetation records show changes corresponding to Heinrich Stadials but the response to D-O warming events is less marked than in the northern extratropics. There are very few high-resolution records from the Southern Hemisphere extratropics, but these records also show both a vegetation and fire response to millennial-scale climate variability. It is not yet possible to determine unequivocally whether terrestrial records reflect the asynchroneity apparent in the ice-core records.
Publication Quaternary Science Reviews
Volume 29
Issue 21-22
Pages 2957-2980
Date October 2010
Journal Abbr Quaternary Sci. Rev.
DOI 10.1016/j.quascirev.2010.07.016
ISSN 0277-3791
URL http://www.sciencedirect.com/science/article/pii/S0277379110002787
Call Number 0000
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:50 2011

Global pyrogeography: Macro-scaled models of fire-climate relationships for understanding current and future conditions

Type Conference Paper
Author Max A. Moritz
Author Meg A. Krawchuk
Abstract no abstract
Date 2008
Proceedings Title Geophysical Research Abstracts
Publisher EGU General Assembly Geophysical Research Abstracts 10: EGU2008-A-11511.
Volume 10
Pages 2 p.
Short Title Global pyrogeography
URL http://nature.berkeley.edu/moritzlab/publications.html

Archive http://meetings.copernicus.org/www.cosis.net/members/meetings/sessions/oral_programmeb855.html?p_id=322&s_id=5252
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:44 2011

Global pyrogeography: The current and future distribution of wildfire

Type Journal Article
Author Meg A. Krawchuk
Author Max A. Moritz
Author Marc-Andre´ Parisien
Author Jeff Van Dorn
Author Katharine Hayhoe
Abstract Climate change is expected to alter the geographic distribution of wildfire, a complex abiotic process that responds to a variety of spatial and environmental gradients. How future climate change may alter global wildfire activity, however, is still largely unknown. As a first step to quantifying potential change in global wildfire, we present a multivariate quantification of environmental drivers for the observed, current distribution of vegetation fires using statistical models of the relationship between fire activity and resources to burn, climate conditions, human influence, and lightning flash rates at a coarse spatiotemporal resolution (100 km, over one decade). We then demonstrate how these statistical models can be used to project future changes in global fire patterns, highlighting regional hotspots of change in fire probabilities under future climate conditions as simulated by a global climate model. Based on current conditions, our results illustrate how the availability of resources to burn and climate conditions conducive to combustion jointly determine why some parts of the world are fire-prone and others are fire-free. In contrast to any expectation that global warming should necessarily result in more fire, we find that regional increases in fire probabilities may be counter-balanced by decreases at other locations, due to the interplay of temperature and precipitation variables. Despite this net balance, our models predict substantial invasion and retreat of fire across large portions of the globe. These changes could have important effects on terrestrial ecosystems since alteration in fire activity may occur quite rapidly, generating ever more complex environmental challenges for species dispersing and adjusting to new climate conditions. Our findings highlight the potential for widespread impacts of climate change on wildfire, suggesting severely altered fire regimes and the need for more explicit inclusion of fire in research on global vegetation-climate change dynamics and conservation planning.
Publication PLoS ONE
Volume 4
Issue 4
Pages e5102 (12 p.)
Date April 2009
Journal Abbr PLoS ONE
DOI 10.1371/journal.pone.0005102
ISSN 1932-6203
Short Title Global Pyrogeography
URL http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2662419/
Loc. in Archive www.plosone.org
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:37:15 2011

Global signatures and dynamical origins of the Little Ice Age and Medieval Climate Anomaly

Type Journal Article
Author Michael E. Mann
Author Zhihua Zhang

Author Scott Rutherford
Author Raymond S. Bradley
Author Malcolm K. Hughes
Author Drew Shindell
Author Caspar Ammann
Author Greg Faluvegi
Author Fenbiao Ni

Abstract Global temperatures are known to have varied over the past 1500 years, but the spatial patterns have remained poorly defined. We used a global climate proxy network to reconstruct surface temperature patterns over this interval. The Medieval period is found to display warmth that matches or exceeds that of the past decade in some regions, but which falls well below recent levels globally. This period is marked by a tendency for La Niña–like conditions in the tropical Pacific. The coldest temperatures of the Little Ice Age are observed over the interval 1400 to 1700 C.E., with greatest cooling over the extratropical Northern Hemisphere continents. The patterns of temperature change imply dynamical responses of climate to natural radiative forcing changes involving El Niño and the North Atlantic Oscillation–Arctic Oscillation.

Publication Science
Volume 326
Issue 5957
Pages 1256-1260
Date 27 November 2009
Journal Abbr Science
DOI 10.1126/science.1177303
ISSN 1095-9203
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1177303
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:35:38 2011

Global surface temperature change

Type Journal Article

Author James Hansen
Author Reto Ruedy
Author Makiko Sato
Author Ken Lo

Abstract We update the Goddard Institute for Space Studies (GISS) analysis of global surface temperature change, compare alternative analyses, and address questions about perception and reality of global warming. Satellite-observed night lights are used to identify measurement stations located in extreme darkness and adjust temperature trends of urban and periurban stations for nonclimatic factors, verifying that urban effects on analyzed global change are small. Because the GISS analysis combines available sea surface temperature records with meteorological station measurements, we test alternative choices for the ocean data, showing that global temperature change is sensitive to estimated temperature change in polar regions where observations are limited. We use simple 12 month (and n × 12) running means to improve the information content in our temperature graphs. Contrary to a popular misconception, the rate of warming has not declined. Global temperature is rising as fast in the past decade as in the prior 2 decades, despite year-to-year fluctuations associated with the El Niño-La Niña cycle of tropical ocean temperature. Record high global 12 month running mean temperature for the period with instrumental data was reached in 2010.

Publication Reviews of Geophysics
Volume 48
Issue 4
Pages RG4004 (29 p.)
Date December 2010
Journal Abbr Rev. Geophys.

DOI 10.1029/2010RG000345
ISSN 8755-1209
URL http://www.agu.org/pubs/crossref/2010/2010RG000345.shtml
Archive http://westcoastclimateequity.org/2010/06/02/dr-james-hansen-global-surface-temperature-change-summary/
Extra Keywords: global temperature; temperature analysis; climate change; global change; El Niño-La Niña.
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:33:18 2011

Global variations in droughts and wet spells: 1900-1995

Type Journal Article
Author Aiguo Dai
Author Kevin E. Trenberth
Author Thomas R. Karl
Abstract The Palmer Drought Severity Index (PDSI) was calculated globally using gridded monthly air temperature and precipitation. From 1900 to 1995, there are large multi- year to decadal variations in the percentage areas in severe drought (PDSI< 3.0) and severe moisture surplus (PDSI > +3.0) over many land areas while secular trends are small. Since the late 1970s, however, there have been some in- creases in the combined percentage areas in severe drought and severe moisture surplus, resulting from increases in ei- ther the drought area (e.g., over the Sahel, eastern Asia and southern Africa) or both the drought and wet areas (e.g., over the U.S. and Europe). Although the high per- centages of the dry and wet areas in the recent decades are not unprecedented during this century (except the Sahel), the recent changes are closely relate to the shift in El Ni~ no - Southern Oscillation (ENSO) towards more warm events since the late 1970s and coincide with record high global mean temperatures. Moreover, for any given value of ENSO indices, the PDSI anomalies tend to be larger than would be expected from previous records. These changes are qualita- tively consistent with those expected from increased green- house gases in the atmosphere.
Publication Geophysical Research Letters
Volume 25
Issue 17
Pages 3367–3370
Date September 1998
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/98GL52511
ISSN 0094–8276
Short Title Global variations in droughts and wet spells
URL http://www.agu.org/journals/ABS/1998/98GL52511.shtml
Extra Keywords: global change: water cycles, hydrology: drought, hydrology: floods.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:35:55 2011

Global warming pattern formation: Sea surface temperature and rainfall

Type Journal Article
Author Shang-Ping Xie
Author Clara Deser
Author Gabriel A. Vecchi
Author Jian Ma
Author Haiyan Teng
Author Andrew T. Wittenberg

Abstract Spatial variations in sea surface temperature (SST) and rainfall changes over the tropics are investigated based on ensemble simulations for the first half of the twenty-first century under the greenhouse gas (GHG) emission scenario A1B with coupled ocean–atmosphere general circulation models of the Geophysical Fluid Dynamics Laboratory (GFDL) and National Center for Atmospheric Research (NCAR). Despite a GHG increase that is nearly uniform in space, pronounced patterns emerge in both SST and precipitation. Regional differences in SST warming can be as large as the tropical-mean warming. Specifically, the tropical Pacific warming features a conspicuous maximum along the equator and a minimum in the southeast subtropics. The former is associated with westerly wind anomalies whereas the latter is linked to intensified southeast trade winds, suggestive of wind–evaporation–SST feedback. There is a tendency for a greater warming in the northern subtropics than in the southern subtropics in accordance with asymmetries in trade wind changes. Over the equatorial Indian Ocean, surface wind anomalies are easterly, the thermocline shoals, and the warming is reduced in the east, indicative of Bjerknes feedback. In the midlatitudes, ocean circulation changes generate narrow banded structures in SST warming. The warming is negatively correlated with wind speed change over the tropics and positively correlated with ocean heat transport change in the northern extratropics. A diagnostic method based on the ocean mixed layer heat budget is developed to investigate mechanisms for SST pattern formation. Tropical precipitation changes are positively correlated with spatial deviations of SST warming from the tropical mean. In particular, the equatorial maximum in SST warming over the Pacific anchors a band of pronounced rainfall increase. The gross moist instability follows closely relative SST change as equatorial wave adjustments flatten upper-tropospheric warming. The comparison with atmospheric simulations in response to a spatially uniform SST warming illustrates the importance of SST patterns for rainfall change, an effect overlooked in current discussion of precipitation response to global warming. Implications for the global and regional response of tropical cyclones are discussed.

Publication Journal of Climate
Volume 23
Issue 4
Pages 966-986
Date February 2010
Journal Abbr J. Climate
DOI 10.1175/2009JCLI3329.1
ISSN 0894-8755
Short Title Global Warming Pattern Formation
URL http://journals.ametsoc.org/doi/abs/10.1175/2009JCLI3329.1
Extra Keywords: rainfall; sea surface temperature; tropics; ensembles; coupled models; greenhouse gases.
Date Added Tue Aug 16 01:41:20 2011
Modified Tue Aug 16 01:41:28 2011

Global-scale temperature patterns and climate forcing over the past six centuries

Type Journal Article
Author Michael E. Mann
Author Raymond S. Bradley
Author Malcolm K. Hughes
Abstract Spatially resolved global reconstructions of annual surface temperature patterns over the past six centuries are based on the multivariate calibration of widely distributed high-resolution proxy climate indicators. Time-dependent correlations of the reconstructions with time-series records representing changes in greenhouse-gas concentrations, solar irradiance, and volcanic aerosols suggest that each of these factors has contributed to the climate variability of the past 400 years, with greenhouse gases emerging as the dominant forcing during the twentieth century. Northern Hemisphere mean annual temperatures for three of the past eight years are warmer than any other year since (at least) AD 1400.
Publication Nature
Volume 392
Issue 6678
Pages 779–787

Date 23 April 1998
Journal Abbr Nature
DOI 10.1038/33859
ISSN 1476-4687
URL http://www.nature.com/nature/journal/v392/n6678/full/392779a0.html
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:21:39 2011

Global, regional, and national fossil-fuel CO_2 emissions

Type Journal Article
Author Thomas A. Boden
Author Gregg Marland
Author Robert J. Andres
Abstract Publications containing historical energy statistics make it possible to estimate fossil fuel CO_2 emissions back to 1751. Etemad et al. (1991) published a summary compilation that tabulates coal, brown coal, peat, and crude oil production by nation and year. Footnotes in the Etemad et al.(1991) publication extend the energy statistics time series back to 1751. Summary compilations of fossil fuel trade were published by Mitchell (1983, 1992, 1993, 1995). Mitchell's work tabulates solid and liquid fuel imports and exports by nation and year. These pre-1950 production and trade data were digitized and CO_2 emission calculations were made following the procedures discussed in Marland and Rotty (1984) and Boden et al. (1995). Further details on the contents and processing of the historical energy statistics are provided in Andres et al. (1999). The 1950 to present CO_2 emission estimates are derived primarily from energy statistics published by the United Nations (2008), using the methods of Marland and Rotty (1984). The energy statistics were compiled primarily from annual questionnaires distributed by the U.N. Statistical Office and supplemented by official national statistical publications. As stated in the introduction of the Statistical Yearbook, "in a few cases, official sources are supplemented by other sources and estimates, where these have been subjected to professional scrutiny and debate and are consistent with other independent sources." Data from the U.S. Department of Interior's Geological Survey (USGS 2008) were used to estimate CO_2 emitted during cement production. Values for emissions from gas flaring were derived primarily from U.N. data but were supplemented with data from the U.S. Department of Energy's Energy Information Administration (1994), Rotty (1974), and data provided by G. Marland. Greater details about these methods are provided in Marland and Rotty (1984), Boden et al. (1995), and Andres et al. (1999).
Publication Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, USA. Oak Ridge, TN: Department of Energy
Date 2009
DOI 10.3334/CDIAC/00001
URL http://cdiac.ornl.gov/trends/emis/overview_2006.html
Date Added Tue Aug 23 02:52:50 2011
Modified Wed Aug 24 04:39:55 2011

Notes:

Methods

Publications containing historical energy statistics make it possible to estimate fossil fuel CO_2 emissions back to 1751. Etemad et al. (1991) published a summary compilation that tabulates coal, brown coal, peat, and crude oil production by nation and year. Footnotes in the Etemad et al.(1991) publication extend the energy statistics time series back to 1751. Summary compilations of fossil fuel trade were published by Mitchell (1983, 1992, 1993, 1995). Mitchell's work tabulates solid and liquid fuel imports and exports by nation and year. These pre-1950 production and trade data were digitized and CO_2 emission calculations were made following the procedures discussed in Marland and Rotty (1984) and Boden et al. (1995). Further details on the contents and processing of the historical energy statistics are provided in Andres et al. (1999).

The 1950 to present CO_2 emission estimates are derived primarily from energy statistics published by the United Nations (2008), using the methods of Marland and Rotty (1984). The energy statistics were compiled primarily from annual questionnaires distributed by the U.N. Statistical Office and supplemented by official national statistical publications. As stated in the introduction of the *Statistical Yearbook*, "in a few cases, official sources are supplemented by other sources and estimates, where these have been subjected to professional scrutiny and debate and are consistent with other independent sources." Data from the U.S. Department of Interior's Geological Survey (USGS 2008) were used to estimate CO_2 emitted during cement production. Values for emissions from gas flaring were derived primarily from U.N. data but were supplemented with data from the U.S. Department of Energy's Energy Information Administration (1994), Rotty (1974), and data provided by G. Marland. Greater details about these methods are provided in Marland and Rotty (1984), Boden et al. (1995), and Andres et al. (1999).

Citation:

Boden, T.A., G. Marland, and R.J. Andres. 2009. Global, Regional, and National Fossil-Fuel CO_2 Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001

Glossary of Wildland Fire Terminology

Type Document
Contributor National Wildfire Coordinating Group
Abstract no abstract
Publisher National Wildfire Coordinating Group
Date May 2011
URL http://www.nwcg.gov/pms/pubs/glossary/index.htm
Rights National Wildfire Coordinating Group (NWCG)
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

Grass response to seasonal burns in experimental plantings

Type Journal Article
Author Henry F. Howe
Abstract A 6-year experiment examined the effects of spring and summer tires on grasses in southern Wisconsin. Synthetic communities of C_3 and C_4 grasses were seeded (100 seeds m^{-2} $species^{-1}$) in 1992 and subjected to prescribed burns in May and August of 1995 and 1997, or left unburned. By 1994 all plots were virtual monocultures of the C_3 reed canary grass (Phalaris arundinacea L.). By the second post-season sample in 1998, total productivity of plots burned in May was higher (781 ± 212 se g m^{-2} $year^{-1}$) than those burned in August (362 ± 28 g m^{-2} $year^{-1}$) or left unburned (262 ± 43 g m^{-2} $year^{-1}$) due to the incursions of either the C_4 grasses big bluestem (Andropogon gerardii Vitman), switichgrass (Panicum virgatum L), or both. These large late-season grasses are much more productive per area covered than P. arundinacea or the other two C_3 grasses present, Elymus virginicus L. and Poa pratensis L. Even at this early stage of succession, C_4 production in plots burned in May was 5 to 6 times that in the other 2 treatments. August burns produced a mix of C_3 and C_4 grasses but did not strongly favor the pre-treatment C_3 dominant P. arundinacea. Unburned plots most resembled those burned in August in species composition, but differed in having 4 times the accumulated litter, perhaps foretelling divergence in C_3 and C_4 composition as succession proceeds.
Publication Journal of Range Management
Volume 53
Issue 4
Pages 437–441
Date July 2000
Journal Abbr J. Range Manage.
DOI 10.2307/4003757

ISSN 0022-409X
URL http://www.jstor.org/stable/4003757
Extra Keywords: C_3 grass; C_4 grass; fire season; ecological restoration; tallgrass prairie.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:30:56 2011

Grasstrees reveal contrasting fire regimes in eucalypt forest before and after European settlement of southwestern Australia

Type Journal Article
Author David J. Ward
Author Byron B. Lamont
Author Chantal L. Burrows
Abstract We have developed a convenient new method of ageing grasstrees (Xanthorrhoea) and determining their fire history over the last 250 years or more. Grinding off the charred leafbases reveals alternating cream and brown bands that we equate with annual growth cycles and occasional black bands that we equate with the passage of fire. The new method was employed on 159 grasstrees at 50 sites distributed throughout the dry eucalypt forest region of southwestern Australia. In the 80 years prior to European settlement in 1829, and for the next 40 years, fires were recorded on grasstrees at 3-5 year intervals. The ensuing decline in mean fire frequencies and increased variability corresponded with demise of the aboriginal inhabitants and onset of intense wildfires associated with unrestrained logging. Our data show that from 1920 attempts at fire exclusion followed later by prescribed burning programs were only partly successful. Currently recorded intervals on individual trees of 10-20 years are consistent with further changes in fire management practices. Both extremes would have had significant impacts on the biota.
Publication Forest Ecology and Management
Volume 150
Issue 3
Pages 323-329
Date 15 September 2001
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/S0378-1127(00)00584-3
ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/B6T6X-43N7DJ7-B/2/8215cdeee5b56f8fb197f55c347bcd46
Extra Keywords: aboriginal burning practices; dendrochronology; eucalypt forest; fire regimes; forestry; grasstrees; nutrient uptake patterns; species conservation; Xanthorrhoea.
Date Added Tue Aug 16 02:06:38 2011
Modified Tue Aug 16 02:06:49 2011

Greenhouse warming and the 21st century hydroclimate of southwestern North America

Type Journal Article
Author Richard Seager
Author Gabriel A. Vecchi
Abstract Climate models robustly predict that the climate of southwestern North America, defined as the area from the western Great Plains to the Pacific Ocean and from the Oregon border to southern Mexico, will dry throughout the current century as a consequence of rising greenhouse gases. This regional drying is part of a general drying of the subtropics and poleward expansion of the subtropical dry zones. Through an analysis of 15 coupled climate models it is shown here that the drying is driven by a reduction of winter season precipitation associated with increased moisture divergence by the mean flow and reduced moisture convergence by transient eddies. Due to the presence of large amplitude decadal variations of presumed natural origin, observations to date cannot confirm that this transition to a drier climate is already underway, but it is

anticipated that the anthropogenic drying will reach the amplitude of natural decadal variability by midcentury. In addition to this drop in total precipitation, warming is already causing a decline in mountain snow mass and an advance in the timing of spring snow melt disrupting the natural water storage systems that are part of the region's water supply system. Uncertainties in how radiative forcing will impact the tropical Pacific climate system create uncertainties in the amplitude of drying in southwest North America with a La Niña-like response creating a worst case scenario of greater drying.

Publication Proceedings of the National Academy of Sciences
Volume 107
Issue 50
Pages 21277 -21282
Date December 14, 2010
Journal Abbr PNAS
DOI 10.1073/pnas.0910856107
ISSN 1091-6490
URL http://www.pnas.org/content/107/50/21277.full
Extra Keywords: climate change; decadal variability; hydrological cycle; southwest drying; drought.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:06 2011

Greenhouse-gas emission targets for limiting global warming to 2 °C

Type Journal Article
Author Malte Meinshausen
Author Nicolai Meinshausen
Author William Hare
Author Sarah C. B. Raper
Author Katja Frieler
Author Reto Knutti
Author David J. Frame
Author Myles R. Allen
Abstract More than 100 countries have adopted a global warming limit of 2 °C or below (relative to pre-industrial levels) as a guiding principle for mitigation efforts to reduce climate change risks, impacts and damages. However, the greenhouse gas (GHG) emissions corresponding to a specified maximum warming are poorly known owing to uncertainties in the carbon cycle and the climate response. Here we provide a comprehensive probabilistic analysis aimed at quantifying GHG emission budgets for the 2000–50 period that would limit warming throughout the twenty-first century to below 2 °C, based on a combination of published distributions of climate system properties and observational constraints. We show that, for the chosen class of emission scenarios, both cumulative emissions up to 2050 and emission levels in 2050 are robust indicators of the probability that twenty-first century warming will not exceed 2 °C relative to pre-industrial temperatures. Limiting cumulative CO_2 emissions over 2000–50 to 1,000 Gt CO_2 yields a 25% probability of warming exceeding 2 °C—and a limit of 1,440 Gt CO_2 yields a 50% probability—given a representative estimate of the distribution of climate system properties. As known 2000–06 CO_2 emissions were ~234 Gt CO_2, less than half the proven economically recoverable oil, gas and coal reserves can still be emitted up to 2050 to achieve such a goal. Recent G8 Communiqués envisage halved global GHG emissions by 2050, for which we estimate a 12–45% probability of exceeding 2 °C — assuming 1990 as emission base year and a range of published climate sensitivity distributions. Emissions levels in 2020 are a less robust indicator, but for the scenarios considered, the probability of exceeding 2 °C rises to 53–87% if global GHG emissions are still more than 25% above 2000 levels in 2020.
Publication Nature
Volume 458
Issue 7242
Pages 1158-1162

Date 30 April 2009
Journal Abbr Nature
DOI 10.1038/nature08017
ISSN 1476-4687
URL http://www.nature.com/doifinder/10.1038/nature08017
Extra Accompanying datasets are available at http://www.primap.org
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Modified Wed Aug 31 00:22:28 2011

Grundriss der klimakunde

Type Book
Author Wladimir Peter von Köppen
Edition 2nd edition, 28 illustrations
Place Berlin
Publisher Walter de Gruyter
Date 1931
# of Pages 388 p.
Language German
URL http://shop.meteorologie-buecher.de/catalog/popup_image.php?pID=317
Call Number 0000
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:54:04 2011

Haines Index climatology for the western United States

Type Magazine Article
Author John Werth
Author Paul Werth
Abstract In 1988, Donald Haines developed a Lower Atmospheric Severity Index (LASI), now called the Haines Index, for wildland fires based on the stability and moisture content of the lower atmosphere. In the high-elevation, western region of the United States, the index uses the 70-50 kPa lapse rate and the temperature-dew point spread at 70 kPa. The index varies between 2 and 6 with a category 6 indicating dry, unstable air, and category 2 moist, stable air. The potential for large fire growth and/or extreme fire behavior is very low when the index is 2, but high when the index is 6. Haines developed a rudimentary Haines Index climatology for his study using radiosonde data from Winslow, Arizona and Salem, Illinois for the year 1981. His priliminary results indicated 6 % of all fire season days should fall with the high-index category and 62 % in the very low-index category. This study establishes a more detailed, high-elevation Haines Index climatology for the western United States based on 1990-1995 upper air data from 20 radiosonde sited. Maps and frequency tables are constructed for June through October for the morning (1200 UTC) and afternoon (0000 UTC) upper air soundings.
Publication Fire Management Notes
Volume 58
Issue 3
Date Summer 1998
Pages 8–17
URL http://www.fs.fed.us/fire/fmt/volumes_authors.html
Extra Fire Management Notes: Current title is Fire Management Today.
Date Added Tue Aug 16 23:26:31 2011

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Handbuch der Klimatologie in Fünf Bänden

Type Book
Editor Wladimir Peter von Köppen
Editor Rudolf Geiger
Volume 2
Place Berlin
Publisher Verlag von Gerbrüder Borntraeger
Date 1930
Language German
URL http://books.google.com/books?id=ysjaAAAAMAAJ&…
Call Number 0000
Date Added Sat Aug 27 02:07:29 2011
Modified Wed Aug 31 00:27:56 2011

Have southern Texas savannas been converted to woodlands in recent history?

Type Journal Article
Author Steve Archer
Abstract At savanna woodland sites in southern Texas, discrete clusters of woody plants form in herbaceous clearings following the invasion of mesquite (Prosopis glandulosa var. glandulosa), an arborescent legume. The growth rate of these clusters has been shown to vary with precipitation and size. Based on field data and a knowledge of mechanisms of woody-plant successional processes, a simulation model was developed to estimate the rates of growth and development of these woody-plant assemblages on sandy-loam uplands under different precipitation regimes. In the simulation, the establishment of other woody species beneath invading Prosopis occurred within 10-15 yr. As a cluster developed around the Prosopis nucleus, species richness increased rapidly for 35-45 yr and became asymptotic at 10 species per cluster. The estimated age of the oldest Prosopis plant found in clusters was 172-217 yr. However, model-derived size-age relationships predicted that most (90%) clusters and mesquite plants at the site are less than 100 yr old. A lack of field evidence of mortality among large clusters and Prosopis plants suggests that populations are young and expanding geometrically. There was no evidence of density-dependent restrictions on recruitment or expansion. Thus, as new clusters are initiated and existing clusters expand, coalescence to continuous canopy woodlands may eventually occur. Predicted long-term mean radial trunk growth of Prosopis (0.8-1.9 mm/yr) was reasonable in comparison with short-term field measurements on Prosopis in other, more-mesic systems (2-4 mm/yr). Model output was also consistent with historical observations suggesting that the conversion of savannas to woodlands in the Rio Grande Plains has been recent and coincident with both heavy grazing by livestock and seasonal shifts in precipitation that began in the late 1800s. This is in agreement with woody-plant invasions documented in other North American arid and semiarid systems by the direct aging of woody plants.
Publication The American naturalist
Volume 134
Issue 4
Pages 545–561
Date October 1989
Journal Abbr Am. Nat.
ISSN 0003-0147
URL http://www.jstor.org/stable/2462059
Date Added Wed Aug 24 05:55:44 2011
Modified Fri Aug 26 20:28:44 2011

Heat wave changes in the eastern Mediterranean since 1960

Type Journal Article
Author Franz G. Kuglitsch
Author Andrea Toreti
Author Elena Xoplaki
Author Paul M. Della-Marta
Author Christos S. Zerefos
Author Murat Türkeş
Author Jürg Luterbacher
Abstract A new data set of high-quality homogenized daily maximum and minimum summer air temperature series from 246 stations in the eastern Mediterranean region (including Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Greece, Israel, Romania, Serbia, Slovenia, Turkey) is developed and used to quantify changes in heat wave number, length and intensity between 1960 and 2006. Daily temperature homogeneity analyses suggest that many instrumental measurements in the 1960s are warm-biased, correcting for these biases regionally averaged heat wave trends are up to 8% higher. We find significant changes across the western Balkans, southwestern and western Turkey, and along the southern Black Sea coastline. Since the 1960s, the mean heat wave intensity, heat wave length and heat wave number across the eastern Mediterranean region have increased by a factor of 7.6 ± 1.3, 7.5 ± 1.3 and 6.2 ± 1.1, respectively. These findings suggest that the heat wave increase in this region is higher than previously reported.
Publication Geophysical Research Letters
Volume 37
Issue 4
Pages L04802 (5 p.)
Date February 2010
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2009GL041841
ISSN 0094-8276
URL http://www.agu.org/pubs/crossref/2010/2009GL041841.shtml
Extra Keywords: heat waves; Mediterranean; data homogenization.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:17:23 2011

Heatwaves in Europe: Areas of homogeneous variability and links with the regional to large-scale atmospheric and SSTs anomalies

Type Journal Article
Author Andrea F. Carril
Author Silvio Gualdi
Author Annalisa Cherchi
Author Antonio Navarra
Abstract This work presents a methodology to study the interannual variability associated with summertime months in which extremely hot temperatures are frequent. Daily time series of maximum and minimum temperature fields (T max and T min, respectively) are used to define indexes of extreme months based on the number of days crossing thresholds. An empirical orthogonal function (EOF) analysis is applied to the monthly indexes. EOF loadings give information about the geographical areas where the number of days per month with extreme temperatures has the largest variability. Correlations between the EOF principal components and the time series of other fields allow plotting maps highlighting the anomalies in the large scale circulation and in the SSTs that are associated with the occurrence of extreme events. The methodology is used to construct the "climatology" of the extremely hot summertime months over Europe. In terms of both interannual and intraseasonal variability, there are three regions in which the frequency of the extremely hot days per month homogeneously

varies: north-west Europe, Euro-Mediterranean and Eurasia region. Although extremes over those regions occur during the whole summer (June to August), the anomalous climatic conditions associated with frequent heatwaves present some intraseasonal variability. Extreme climate events over the north-west Europe and Eurasia are typically related to the occurrence of blocking situations. The intraseasonal variability of those patterns is related to the amplitude of the blocking, the relative location of the action centre and the wavetrain of anomalies downstream or upstream of the blocking. During June and July, blocking situations which give extremely hot climate conditions over north-west Europe are also associated with cold conditions over the eastern Mediterranean sector. The Euro-Mediterranean region is a transition area in which extratropical and tropical systems compete, influencing the occurrence of climate events: blockings tend to be related to extremely hot months during June while baroclinic anomalies dominate the variability of the climate events in July and August. We highlight that our method could be easily applied to other regions of the world, to other fields as well as to model outputs to assess, e.g. the potential change of extreme climate events in a warmer climate.

Publication Climate Dynamics
Volume 30
Issue 1
Pages 77-98
Date January 2008
Journal Abbr Clim. Dyn.
DOI 10.1007/s00382-007-0274-5
ISSN 0930-7575
Short Title Heatwaves in Europe
URL http://www.springerlink.com/content/f83t613298637557/
Call Number 0000
Extra Keywords: extreme events; heatwaves; temperature variability; climate variability.
Date Added Wed Sep 21 23:14:13 2011
Modified Wed Sep 28 17:54:00 2011

Heterogeneous response of circumboreal wildfire risk to climate change since the early 1900s

Type Journal Article
Author Martin P. Girardin
Author Adam A. Ali
Author Christopher Carcaillet
Author Manfred Mudelsee
Author Igor Drobyshev
Author Christelle Hély
Author Yves Bergeron
Abstract We investigated changes in wildfire risk over the 1901−2002 (ad) period with an analysis of broad-scale patterns of July monthly drought code (MDC) variability on 28 forested ecoregions of the North American and Eurasian continents. The MDC is an estimate of the net effect of changes in evapotranspiration and precipitation on cumulative moisture depletion in soils, and is well correlated with annual fire statistics across the circumboreal (explaining 25–61% of the variance in regional area burned). We used linear trend and regime shift analyses to investigate (multi-) decadal changes in MDC and percentage area affected by drought, and kernel function for analysis of temporal changes in the occurrence rates of extreme drought years. Our analyses did not reveal widespread patterns of linear increases in dryness through time as a response to rising Northern Hemisphere land temperatures. Instead, we found heterogeneous patterns of drought severity changes that were inherent to the nonuniformly distributed impacts of climate change on dryness. Notably, significant trends toward increasing summer moisture in southeastern and southwestern boreal Canada were detected. The diminishing wildfire risk in these regions is coherent with widely reported decreases in area burned since about 1850, as reconstructed by dendrochronological dating of forest stands. Conversely, we found evidence for increasing percentage area affected by extreme droughts in Eurasia (+0.57% per decade; $P<0.05$) and occurrence rates of extreme drought years in Eurasian taiga (centered principally on the Okhotsk–Manchurian

taiga, P=0.07). Although not statistically significant, temporal changes in occurrence rates are sufficiently important spatially to be paid further attention. The absence of a linear trend in MDC severity, in conjunction with the presence of an increase in the occurrence rate of extreme drought years, suggest that fire disturbance regimes in the Eurasian taiga could be shifting toward being increasingly pulse dependent.

Publication Global Change Biology
Volume 15
Issue 11
Pages 2751-2769
Date November 2009
Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1365-2486.2009.01869.x
ISSN 1354-1013
URL http://doi.wiley.com/10.1111/j.1365-2486.2009.01869.x
Extra Keywords: area burned; climate change; drought code; evapotranspiration; extreme; fire; forest; kernel function.
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:19:58 2011

High-resolution Greenland ice core data show abrupt climate change happens in few years

Type Journal Article
Author Jørgen Peder Steffensen
Author Katrine K. Andersen
Author Matthias Bigler
Author Henrik B. Clausen
Author Dorthe Dahl-Jensen
Author Hubertus Fischer
Author Kumiko Goto-Azuma
Author Margareta Hansson
Author Sigfús J. Johnsen
Author Jean Jouzel
Author Valérie Masson-Delmotte
Author Trevor Popp
Author Sune O. Rasmussen
Author Regine Röthlisberger
Author Urs Ruth
Author Bernhard Stauffer
Author Marie-Louise Siggaard-Andersen
Author Árný E. Sveinbjörnsdóttir
Author Anders Svensson
Author James W. C. White
Abstract The last two abrupt warmings at the onset of our present warm interglacial period, interrupted by the Younger Dryas cooling event, were investigated at high temporal resolution from the North Greenland Ice Core Project ice core. The deuterium excess, a proxy of Greenland precipitation moisture source, switched mode within 1 to 3 years over these transitions and initiated a more gradual change (over 50 years) of the Greenland air temperature, as recorded by stable water isotopes. The onsets of both abrupt Greenland warmings were slightly preceded by decreasing Greenland dust deposition, reflecting the wetting of Asian deserts. A northern shift of the Intertropical Convergence Zone could be the trigger of these abrupt shifts of Northern Hemisphere atmospheric circulation, resulting in changes of 2 to 4 kelvin in Greenland moisture source temperature from one year to the next.
Publication Science

Volume 321
Issue 5889
Pages 680-684
Date 1 August 2008
Journal Abbr Science
DOI 10.1126/science.1157707
ISSN 1095-9203
URL http://www.sciencemag.org/content/321/5889/680.full
Date Added Sun Aug 28 17:26:59 2011
Modified Sun Aug 28 17:26:59 2011

Historic fire regime dynamics and forcing factors in the Boston Mountains, Arkansas, USA

Type Journal Article
Author Richard P. Guyette
Author Martin A. Spetich
Author Michael C. Stambaugh
Abstract We used dendrochronological methods to construct three fire history chronologies in the interior of the Boston Mountains of Arkansas from 281 dated fire scars identified on 86 shortleaf pine (Pinus echinata) remnants and trees. We describe and contrast these interior sites with sites on the southern perimeter of Boston Mountains that were documented in an earlier study and examine human, topographic and climatic spatial and temporal controls on these fire regimes. Fire frequency and human population density at the interior sites were positively correlated during an early period (1680–1880) of low levels of population, but were negatively correlated during a later period (1881–2000) as human population levels increased to a much higher level. Wide spread fire occurred more often during drought years in the 1700s with fires likely achieving sizes unprecedented during the last century. The early (before 1810) fire scar record showed that fire intervals were about three times longer (MFI = 35 years) at the interior sites than at the perimeter sites. Early transitional (1810–1830) settlement by Cherokees at population densities under 0.26 humans/km² was highly correlated ($r = 0.90$) with the number of fires per decade in the interior region of the Boston Mountains. Multiple regression analyses further implicated humans as well as short- and long-term climate variability such as forced by the El Niño/Southern Oscillation (ENSO) and Atlantic Multidecadal Oscillation (AMO).
Publication Forest Ecology and Management
Volume 234
Issue 1-3
Pages 293–304
Date 1 October 2006
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/j.foreco.2006.07.016
ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/pii/S0378112706004877
Archive http://treesearch.fs.fed.us/pubs/24566
Extra Keywords: Ozarks; dendrochronology; human population; fire scar; climate; drought; ENSO; AMO.
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:21:30 2011

Historic fire regime in southern California shrublands

Type Journal Article
Author Jon E. Keeley
Author Connie J. Fotheringham

Abstract Historical variability in fire regime is a conservative indicator of ecosystem sustainability, and thus understanding the natural role of fire in chaparral ecosystems is necessary for proper fire management. It has been suggested that the "natural" fire regime was one of frequent small fires that fragmented the landscape into a fine-grained mixture of age classes that precluded large, catastrophic fires. Some researchers claim that this regime was lost because of highly effective fire suppression and conclude that if fire managers could "restore" a regime of frequent fires with widespread prescription burning, they could eliminate the hazard of catastrophic fires. The primary evidence in support of this model is a study that compared contemporary burning patterns in southern California, U.S.A., a region subject to fire suppression, with patterns in northern Baja California, Mexico, where there is less effective fire suppression. We found that differences in fire regime between these two regions are inconclusive and could not be ascribed conclusively to differences in fire suppression. Historical records suggest that the natural fire regime in southern California shrublands was rather coarse-grained and not substantively different from the contemporary regime. There is no evidence that fire-management policies have created the contemporary fire regime dominated by massive Santa Ana wind-driven fires. Increased expenditures on fire suppression and increased loss of property and lives are the result of human demographic patterns that place increasing demand on fire-suppression forces.

Publication Conservation Biology
Volume 15
Issue 6
Pages 1536–1548
Date December 2001
Journal Abbr Conserv. Biol.
DOI 10.1046/j.1523-1739.2001.00097.x
ISSN 1523-1739
URL http://www.jstor.org/stable/3061253
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:18:29 2011

Historic fire regimes and their relation to vegetation patterns in the Monterey Bay Area of California

Type Journal Article
Author Jason M. Greenlee
Author Jean H. Langenheim

Abstract A study of historic fire regimes in the Monterey Bay area, with emphasis on the coastal redwood (Sequoia sempervirens) community is described. Five distinct historic fire regimes were initially distinguished from the literature on land-use history. Fire scar dating, historical research and fire behavior modeling were used to create maps, or "scenarios," representing fire coverage during each regime. Although effects of ignition and moisture gradient apparently influenced the vegetation pattern in each of the five fire regimes, only three regimes were particularly significant to the vegetation of the area. Prior to human habitation, a lightning fire regime existed which, along with the vegetation, was disturbed by the arrival of humans around 11,000 BP. After adjusting to a series of three burning regimes under different human occupations, the vegetation was again disturbed when fire suppression became effective in the 20th century. The present regime is similar in several respects to that which existed prior to the arrival of humans. We propose that computer modeling of fire behavior combined with historic lightning fire incidence may provide useful information on prehuman fire regimes here and elsewhere.

Publication American Midland Naturalist
Volume 124
Issue 2
Pages 239-253
Date October 1990
Journal Abbr Am. Midl. Nat.
DOI 10.2307/2426173
ISSN 1938-4238
URL http://www.jstor.org/stable/2426173

Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:46 2011

Historic forest fires in Maine

Type Journal Article
Author Charles B. Fobes
Abstract no abstract
Publication Economic Geography
Volume 24
Issue 4
Pages 269-273
Date October 1948
Journal Abbr Econ. Geogr.
ISSN 0013-0095
URL http://www.jstor.org/stable/141307
Date Added Mon Aug 29 05:19:52 2011
Modified Mon Aug 29 05:27:39 2011

Historic prairies in the Piedmont of North and South Carolina, USA

Type Journal Article
Author Lawrence S. Barden
Abstract From 1540 to 1750, European explorers and traders in the Piedmont region of North and South Carolina reported many prairie-like openings ranging in size up to 40 km across. However, historical evidence of Piedmont prairies has been inacces¬sible to most restorationists and land managers. This review summarizes historical information on prairie landscapes of the Carolina Piedmont region at the time of European-American exploration and settlement. Historical and meteorological evidence suggests that these prairies were primarily the products of Native American burning and agriculture.
Publication Natural Areas Journal
Volume 17
Issue 2
Pages 149–152
Date April 1997
Journal Abbr Nat. Areas J.
ISSN 0885-8608
URL http://www.mendeley.com/research/historic-prairies-piedmont-north-south-carolina-usa-3/
Extra Keywords: burning by Native Americans; North Carolina; South Carolina; Piedmont; prairie.
Date Added Tue Aug 23 01:52:51 2011
Modified Wed Aug 24 04:42:33 2011

Historical and modern roles of fire in pinyon-juniper

Type Conference Paper
Author G.E. Gruell
Abstract Fire history investigations were carried out in three widely separated Great Basin pinyon-juniper woodlands in eastcentral Nevada, southeastern Oregon and northwestern Nevada, and western Nevada. Study results suggested frequent fires on deep soils that produced an abundance offine fuels and infrequent fires on shallow

soils and rocky sites where fuels were sparse. Decades of intensive livestock grazing and successful fire suppression in pinyon-juniper woodlands have resulted in a shift from low intensity fires to high intensity fires. This shift has been the result ofl arge increases in woody fuels and introduction of exotic grasses. Considering the extent of fuel buildup, severe wildfires in the Great Basin will continue and perhaps become more frequent.

Date 1999
Publisher USDA Forest Service, Rocky Mountain Research Station
Volume RMRS-P-9
Pages 24-28
Library Catalog Google Scholar
Call Number 0032
Date Added Mon Oct 10 11:08:17 2011
Modified Mon Oct 10 11:08:17 2011

Historical burn area in western Canadian peatlands and its relationship to fire weather indices

Type Journal Article
Author Merritt R. Turetsky
Author Brian D. Amiro
Author Erin M. Bosch
Author Jagtar S. Bhatti
Abstract Peatlands store the majority of soil carbon in many northern regions, yet their vulnerability to fire remains poorly understood. We used large-scale mapping of fire and peatland distributions to explore patterns of burning at two spatial scales. On a landscape scale in central Alberta, we used spatially explicit distributions of peatlands and 50 years of fire perimeter maps to determine whether uplands burn more preferentially than peatlands. Burn area and ignition localities in central Alberta did not occur preferentially in uplands relative to bogs and fens. Extrapolating this result at a regional scale, we used the Peatlands of Canada database and 20 years of historical fire records to estimate annual burn areas for Alberta, British Columbia, Northwest Territories, and Saskatchewan peatlands. Peatland burn areas varied tremendously over time, with high fire activity in the early 1980s and mid-1990s. On average, fires impacted 1850 km^2 of peatland annually across this region of western Canada. Positive relationships between the area of peatland burned and weather variables calculated for each fire event using the Canadian Fire Weather Index, including maximum air temperatures and the duff moisture code, suggest that drier and/or warmer conditions likely would increase the burning of peatlands in western Canada.
Publication Global Biogeochemical Cycles
Volume 18
Issue 4
Pages GB4014 (9 p.)
Date November 2004
Journal Abbr Global Biogeochem. Cy.
DOI 10.1029/2004GB002222
ISSN 0886–6236
URL http://www.agu.org/pubs/crossref/2004/2004GB002222.shtml
Extra Keywords: fire; peatlands; wetlands; boreal; carbon; climate change.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:34 2011

Historical change in vegetation and disturbance on the Georgia Piedmont

Type Journal Article
Author C. Mark Cowell

Abstract Due to the extensive removal of the forest cover of the southeastern piedmont during the 19th century and to the lack of systematic presettlement records for most of this region, there has been little basis for relating the piedmont's maturing postsettlement secondary forest to its pre-European condition. This study compares species composition patterns between pre-European and present periods for a portion of the Georgia piedmont that had a systematic presettlement land survey. Detrended correspondence analysis of presettlement, immature postsettlement, and mature postsettlement forests identifies a primary gradient that distinguishes between the vegetation of these periods on the basis of habitat moisture preferences and fire tolerance of species. A secondary gradient emphasizes life history characteristics of species that typically differentiate immature and mature postsettlement forests; presettlement forests were not dominated by the late successional species typical of mature postsettlement forests, but had abundant disturbance-favored taxa. Changes in the abundance of individual species from presettlement to mature postsettlement forests occurred across all habitat types. The xerophytic, fire-tolerant taxa that dominated presettlement forests (e.g., Pinus species, Quercus stellata, Q. velutina) are less important in mature postsettlement forests. Dominants of mature postsettlement forests (e.g., Q. alba, Liriodendron tulipifera, Carya species) are primarily mesophytic, fire-intolerant species that were far less prominent in presettlement forests. Marked contrasts in composition between presettlement and mature postsettlement forests of the piedmont have been produced by changes in the prevalent disturbance regime from fire-dominated dynamics to gap-phase processes.

Publication The American Midland Naturalist

Volume 140

Issue 1

Pages 78–89

Date 1998

Journal Abbr Am. Midl. Nat.

DOI 10.1674/0003-0031(1998)140[0078:HCIVAD]2.0.CO;2

ISSN 0003-0031

URL http://www.bioone.org/doi/full/10.1674/0003-0031%281998%29140%5B0078%3AHCIVAD%5D2.0.CO%3B2

Date Added Tue Aug 30 02:03:25 2011

Modified Tue Aug 30 02:09:49 2011

Historical fire regime patterns in the southwestern United States since AD 1700

Type Conference Paper

Author Thomas W. Swetnam

Author Christopher H. Baisan

Abstract Fire-scar chronologies from a network of 63 sites in the South-western Unites States are listed and described. These data characterize the natural range and variability of fire regimes from low elevation pine forests to higher elevation mixed-conifer forests since AD 1700. A general pattern of increasing length of intervals between low intensity surface fires was observed along gradients of low to high elevations, and from the relatively drier pine sites to the wetter mixed-conifer sites. However, large variability in the measures of central tendency and higher moments of the fire interval distributions suggest that elevation and forest type were often weak determinants of fire frequensy. Some of the variation in fire interval distributions between similar elevation or forest types were probably due to unique site characteristics, such as landscape connectivity (i.e., ability of fires to spread into the sites), and land-use history. Differences in the sizes of sampled areas and fire-scar collections among the sites also limited our ability to compare and interpret fire interval summary statistics. Comparison of both the fire-scar network data (1700 to 1900) and documentary records of area burned on all Southwestern Region National Forests (1920 to 1978) with a Palmer Drought Severity Index time series clearly shows the association between severe droughts and large fire years, and wet periods and small fire years. Moreover, important lagging relations between climate and fire occurrence are also revealed. In particular, large fire years in ponderosa pine dominated forests were typically preceded by wet conditions in the prior one to three years. In contrast, large fire years in mixed-conifer forests were associated with extreme drought years, but no consistent lagging relations were observed. We hypothesize that both fuel prodution (especially grasses and pine needles) and fuel moisture were important climate-linked factors in ponderosa pine fire regimes, while fuel moisture was the primary factor controlling mixed-conifer fire regimes. These results provide two important types of information for management: (1) Baselines of fire regime ranges and variations

are documented across the most economically important and widespread forest types in the Southwest. These data will be useful for guiding, developing, and justifying ecosystem management plans, particularly for the restoration of fire regimes and forest structures to improve forest health and sustainability. (2) The fire-climate relations suggest that a long-range fire hazard forecasting model could be developed that would be a valuable tool for planning and implementing both prescribed fire and fire suppression programs in the Southwest.

Date 1996

Proceedings Title Proceedings Fire Effects in Southwestern Fortest

Conference Name Proceedings of the 2nd La Mesa Fire Symposium, Los Alamos, New Mexico, March 29-31, 1994.

Place Fort Collins, CO

Publisher U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station

Pages 11–32

Series General Technical Report RM-GTR-286

URL http://www.fort.usgs.gov/Products/Publications/pub_abstract.asp?PubId=3199

Date Added Sun Aug 28 17:26:59 2011

Modified Mon Aug 29 23:19:44 2011

Notes:

Citation:

Swetnam, T. and Baisan, C. (1996). Historical fire regime patterns in the southwestern United States since AD 1700. In: CD Allen (ed) Fire Effects in Southwestern Fortest : Proceedings of the 2nd La Mesa Fire Symposium, pp. 11-32. USDA Forest Service, Rocky Mountain Research Station, General Technical Report RM-GTR-286.

Historical fire regime shifts related to climate teleconnections in the Waswanipi area, central Quebec, Canada

Type Journal Article

Author Héloïse Le Goff

Author Mike D. Flannigan

Author Yves Bergeron

Author Martin P. Girardin

Abstract The synchrony of regional fire regime shifts across the Quebec boreal forest, eastern Canada, suggests that regional fire regimes are influenced by large-scale climate variability. The present study investigated the relationship of the forest-age distribution, reflecting the regional fire activity, to large-scale climate variations. The interdecadal variation in forest fire activity in the Waswanipi area, north-eastern Canada, was reconstructed over 1720–2000. Next, the 1880–2000 reconstructed fire activity was analysed using different proxies of the Pacific Decadal Oscillation (PDO) and the North Atlantic Oscillation (NAO) and the Atlantic Multidecadal Oscillation (AMO). We estimated the global fire cycle around 132–153 years, with a major lengthening of the fire cycle from 99 years before 1940, to 282 years after 1940. Correlations between decadal fire activity and climate indices indicated a positive influence of the PDO. The positive influence of PDO on regional fire activity was also validated using t-tests between fire years and non-fire years between 1899 and 1996. Our results confirmed recent findings on the positive influence of the PDO on the fire activity over northern Quebec and the reinforcing role of the NAO in this relationship.

Publication International Journal of Wildland Fire

Volume 16

Issue 5

Pages 607

Date October 2007

Journal Abbr Int. J. Wildland Fire

DOI 10.1071/WF06151

ISSN 1049-8001
URL http://www.publish.csiro.au/?paper=WF06151
Extra Keywords: bootstrapped Pearson correlations; fire history; Multidecadal Oscillation; North Atlantic Oscillation; Pacific Decadal Oscillation.
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:41:37 2011

Historical surface fire frequency in ponderosa pine stands in research natural areas, central Rocky Mountains and Black Hills, USA

Type Journal Article
Author Peter M. Brown
Author Michael G. Ryan
Author Thomas G. Andrews
Abstract "Historical range of variability" and "reference conditions" are two concepts that attempt to characterize ecosystem conditions as they may exist in the absence of pervasive human impacts. However, to define reference conditions from reference landscapes, such as U.S. Forest Service Research Natural Areas, requires a long-term perspective by which to assess whether existing ecosystem conditions are driven by predominately natural rather than human factors. We used fire-scarred trees to reconstruct centuries-long chronologies of surface fires in four research natural areas (three established and one proposed) that contain ponderosa pine (Pinus ponderosa Laws.) forests in South Dakota, Wyoming, and Colorado. Fire frequency was variable among research natural areas, but recent fire-free periods in three of the four areas were up to approximately 2.5 times longer than any presettlement intervals. Loss of surface fires most likely is related indirectly to recent land and resource use in areas outside of the research natural areas and related directly to fire suppression and livestock grazing in the research natural areas themselves. Studies that attempt to define reference conditions for ponderosa pine ecosystems from existing conditions in these Research Natural Areas will need to consider changes that may have occurred in these areas as the result of loss of historical fire patterns. Determination of historical fire frequency also should provide useful information for the management or restoration of ecosystem processes and conditions in these or similar natural areas.
Publication Natural Areas Journal
Volume 20
Issue 2
Pages 133–139
Date April 2000
Journal Abbr Nat. Areas J.
ISSN 0885-8608
URL http://md1.csa.com/partners/viewrecord.php?requester=gs&collection=ENV&…
Date Added Wed Aug 24 12:33:16 2011
Modified Fri Aug 26 20:34:38 2011

Historical variation in fire, oak recruitment, and post-logging accelerated succession in central Pennsylvania

Type Journal Article
Author Marc D. Abrams
Author Gregory J. Nowacki
Abstract Composition, structure and radial growth patterns were studied in relatively undisturbed, mature mixed-oak (Quercus), valley floor forests and in similar forests extensively logged between 1936-1946 in central Pennsylvania. These data were analyzed in relation to presettlement forest composition and historical fire

records to investigate temporal variation in Quercus recruitment versus accelerated succession of more shade tolerant species following logging. Presettlement valley floor forests in the study area were dominated by Quercus alba and Pinus strobus. Recurring logging and fire between 1780-1900 associated with charcoal iron furnace activity increased Quercus and decreased Pinus dominance in second-growth forests established during that period. Between 1908-1989 the total area burned by wildfire throughout Pennsylvania decreased by >99% (from >400,000 ha to <3500 ha per year). The decreased influence of logging and fire this century facilitated recruitment of later successional Acer and Prunus species in Quercus forest understories. Logging of forests in this condition rapidly accelerated the rate of obtaining canopy dominance for A. rubrum, A. saccharum and P. serotina in area forests. This form of disturbance-mediated accelerated succession should be anticipated in a wide variety of forest types with an overstory dominated by early successional species and an understory comprised mainly of later successional species.

Publication Bulletin of the Torrey Botanical Club

Volume 119

Issue 1

Pages 19-28

Date January - March 1992

Journal Abbr B. Torrey Bot. Club

DOI 10.2307/2996916

ISSN 0040-9618

URL http://www.jstor.org/stable/2996916

Extra Keywords: disturbance; presettlement forests; charcoal production; radial growth analysis; Acer; Prunus; Pinus; oak replacement.

Date Added Mon Aug 15 22:28:12 2011

Modified Mon Aug 15 22:51:22 2011

Historically significant wildland fires

Type Web Page

Author National Interagency Fire Center

Abstract This is a list of some of the most serious wildland fires in U.S. history. Some were significant because of their size, others because of the value of the resources lost. Some small, but very intense, fires were important because of the loss of lives and property. There have been larger fires than some of those included on this list, but few or none with greater impact on lives and resources.

Website Title National Interagency Fire Center - Fire Information - Wildland Fire Statistics

Website Type Fire Information - Statistics

URL http://www.nifc.gov/fireInfo/fireInfo_stats_histSigFires.html

Extra http://www.nifc.gov/fireInfo/fireInfo_statistics.html

Date Added Sat Aug 27 22:34:48 2011

Modified Sat Aug 27 22:34:48 2011

History and status of Table Mountain pine- pitch pine forests of the southern Appalachian Mountains

Type Journal Article

Author Charles E. Williams

Abstract Pine forests dominated by Table Mountain pine, Pinus pungens Lam., and pitch pine, P. rigida Mill., commonly occur on xeric ridgetops and southwest-facing slopes at mid-elevations in the southern Appalachian Mountains of North America. Table Mountain pine - pitch pine forests are fire-dependent, requiring fire at frequent intervals to ensure optimal regeneration and maintenance. Distribution and abundance of Table Mountain pine - pitch pine forests in the southern Appalachians have changed considerably since European settlement. Presettlement pine forests were primarily restricted to xeric ridgetops and rock outcrops, but they periodically spread into other parts of the landscape following fire generated by lightning or set by Native Americans and intensified by extended drought. Postsettlement clearing and burning of forests of the region, especially extensive from the late 1800s to the early 1900s, led to conditions conducive to pine forest regeneration and allowed their increase in importance in southern Appalachian landscapes. Beginning in the 1930s, changes in land use and effective fire suppression programs slowed or reversed pine forest expansion, with remaining stands on more mesic sites becoming reproductively stagnant and eventually succeeding to oak dominance. Thus, the general trend in abundance and distribution of Table Mountain pine - pitch pine forests in the southern Appalachians has been one of expansion followed by retreat, triggered by natural and anthropic disturbance. The distribution and abundance of these forests are likely to change again in the future with active management and restoration, the invasion of alien organisms, and the impact of forest decline agents.

Publication Natural Areas Journal

Volume 18

Issue 1

Pages 81–90

Date January 1998

Journal Abbr Nat. Areas J.

ISSN 0885-8608

URL http://md1.csa.com/partners/viewrecord.php?requester=gs&collection=ENV&…

Date Added Sat Aug 27 00:55:16 2011

Modified Wed Aug 31 00:27:00 2011

History of climate modeling

Type Journal Article

Author Paul N. Edwards

Abstract The history of climate modeling begins with conceptual models, followed in the 19th century by mathematical models of energy balance and radiative transfer, as well as simple analog models. Since the 1950s, the principal tools of climate science have been computer simulation models of the global general circulation. From the 1990s to the present, a trend toward increasingly comprehensive coupled models of the entire climate system has dominated the field. Climate model evaluation and intercomparison is changing modeling into a more standardized, modular process, presenting the potential for unifying research and operational aspects of climate science.

Publication Wiley Interdisciplinary Reviews: Climate Change

Volume 2

Issue 1

Pages 128-139

Date January/February 2011

Journal Abbr WIREs Clim. Change

DOI 10.1002/wcc.95

ISSN 1757-7780

URL http://wires.wiley.com/WileyCDA/WiresArticle/wisId-WCC95.html

Date Added Sun Aug 28 05:42:07 2011

Modified Sun Aug 28 05:44:37 2011

History, uses, and effects of fire in the Appalachians

Type Report

Author David H. van Lear

Author Thomas A. Waldrop

Abstract Description: History of Fire in the Southern Appalachians Ecological and meteorological evidence suggests that lightning-caused fires were a major environmental force shaping the vegetation of the Southeastern United States for millions of years before Indians arrived in America. Lightning served as a mutagenic agent and as a factor in natural selection which forced species to adapt or perish. Before man, fires caused by lightning created and maintained the pine-grasslands of the Southeast, as well as influenced the broad, adjacent ecotones which included hard-wood vegetation (Komarek 1965, 1974)

Report Number GTR-SE-054
Report Type General Technical Report
Place Asheville, NC
Institution U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station
Date April 1989
Pages 20 p.
URL http://www.srs.fs.usda.gov/pubs/191
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:53:38 2011

Notes:

Citation:

van Lear, David H.; Waldrop, Thomas A. 1989. History, Uses, and Effects of Fire in the Appalachians. Gen. Tech. Rep. SE-54. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 20 p.

Holocene biomass burning and global dynamics of the carbon cycle

Type Journal Article
Author Christopher Carcaillet
Author Heather Almquist
Author Hans Asnong
Author Richard H. W. Bradshaw
Author José S. Carrión
Author Marie-Jose Gaillard
Author Konrad Gajewski
Author Jean N. Haas
Author Simon G. Haberle
Author Philippe Hadorn
Author Serge D. Müller
Author Pierre J. H. Richard
Author Isabelle Richoz
Author M. Rösch
Author Maria F. Sánchez Goñi
Author Henrik von Stedingk
Author A. C. Stevenson
Author B. Talon
Author Christophe Tardy
Author Willy Tinner
Author Elling Tryterud
Author Lucia Wick
Author Katherine J. Willis

Abstract Fire regimes have changed during the Holocene due to changes in climate, vegetation, and in human practices. Here, we hypothesise that changes in fire regime may have affected the global CO_2 concentration in the atmosphere through the Holocene. Our data are based on quantitative reconstructions of biomass burning deduced from stratified charcoal records from Europe, and South-, Central- and North America, and Oceania to test the fire-carbon release hypothesis. In Europe the significant increase of fire activity is dated ≈ 6000 cal. yr ago. In north-eastern North America burning activity was greatest before 7500 years ago, very low between 7500–3000 years, and has been increasing since 3000 years ago. In tropical America, the pattern is more complex and apparently latitudinally zonal. Maximum burning occurred in the southern Amazon basin and in Central America during the middle Holocene, and during the last 2000 years in the northern Amazon basin. In Oceania, biomass burning has decreased since a maximum 5000 years ago. Biomass burning has broadly increased in the Northern and Southern hemispheres throughout the second half of the Holocene associated with changes in climate and human practices. Global fire indices parallel the increase of atmospheric CO_2 concentration recorded in Antarctic ice cores. Future issues on carbon dynamics relatively to biomass burning are discussed to improve the quantitative reconstructions.

Publication Chemosphere
Volume 49
Issue 8
Pages 845-863
Date December 2002
Journal Abbr Chemosphere
DOI 10.1016/S0045-6535(02)00385-5
ISSN 0045-6535
URL http://linkinghub.elsevier.com/retrieve/pii/S0045653502003855
Extra Keywords: fire; atmospheric carbon dynamics; Europe; North America; South America; Southeast Asia.
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:07:50 2011

Holocene carbon emissions as a result of anthropogenic land cover change

Type Journal Article
Author Jed O. Kaplan
Author Kristen M. Krumhardt
Author Erle C. Ellis
Author William F. Ruddiman
Author Carsten Lemmen
Author Kees Klein Goldewijk

Abstract Humans have altered the Earth's land surface since the Paleolithic mainly by clearing woody vegetation first to improve hunting and gathering opportunities, and later to provide agricultural cropland. In the Holocene, agriculture was established on nearly all continents and led to widespread modification of terrestrial ecosystems. To quantify the role that humans played in the global carbon cycle over the Holocene, we developed a new, annually resolved inventory of anthropogenic land cover change from 8000 years ago to the beginning of large-scale industrialization (ad 1850). This inventory is based on a simple relationship between population and land use observed in several European countries over preindustrial time. Using this data set, and an alternative scenario based on the HYDE 3.1 land use data base, we forced the LPJ dynamic global vegetation model in a series of continuous simulations to evaluate the impacts of humans on terrestrial carbon storage during the preindustrial Holocene. Our model setup allowed us to quantify the importance of land degradation caused by repeated episodes of land use followed by abandonment. By 3 ka BP, cumulative carbon emissions caused by anthropogenic land cover change in our new scenario ranged between 84 and 102 Pg, translating to c. 7 ppm of atmospheric CO_2. By ad 1850, emissions were 325–357 Pg in the new scenario, in contrast to 137–189 Pg when driven by HYDE. Regional events that resulted in local emissions or uptake of carbon were often balanced by contrasting patterns in other parts of the world. While we cannot close the carbon budget in the current study, simulated cumulative anthropogenic emissions over the preindustrial Holocene are consistent with the ice core record of atmospheric $\delta^{13}CO_2$ and support the hypothesis that anthropogenic activities led to the stabilization of atmospheric CO_2 concentrations at a level that made the

world substantially warmer than it otherwise would be.

Publication The Holocene
Volume 21
Issue 5
Pages 775-791
Date August 2011
Journal Abbr Holocene
DOI 10.1177/0959683610386983
ISSN 0959-6836
URL http://hol.sagepub.com/cgi/doi/10.1177/0959683610386983
Extra Keywords: agricultural intensification; anthropogenic land cover change; dynamic global vegetation model; global carbon cycle; Holocene CO_2; prehistory.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 01:00:18 2011

Holocene changes in semiarid pinyon-juniper woodlands: Response to climate, fire, and human activities in the US Great Basin

Type Journal Article
Author Richard F. Miller
Author Peter E. Wigand
Abstract no abstract
Publication BioScience
Volume 44
Issue 7
Pages 465-474
Date July-August 1994
Journal Abbr BioScience
DOI 10.2307/1312298
ISSN 1525-3244
Short Title Holocene changes in semiarid pinyon-juniper woodlands
URL http://www.jstor.org/stable/1312298
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 21:27:19 2011

Holocene climatic instability: A prominent, widespread event 8200 yr ago

Type Journal Article
Author Richard B. Alley
Author Paul A. Mayewski
Author Todd Sowers
Author Minze Stuiver
Author Kendrick C. Taylor
Author Peter U. Clark
Abstract The most prominent Holocene climatic event in Greenland ice-core proxies, with approximately half the amplitude of the Younger Dryas, occurred ~8000 to 8400 yr ago. This Holocene event affected regions well beyond the North Atlantic basin, as shown by synchronous increases in windblown chemical indicators together with a significant decrease in methane. Widespread proxy records from the tropics to the north polar

regions show a short-lived cool, dry, or windy event of similar age. The spatial pattern of terrestrial and marine changes is similar to that of the Younger Dryas event, suggesting a role for North Atlantic thermohaline circulation. Possible forcings identified thus far for this Holocene event are small, consistent with recent model results indicating high sensitivity and strong linkages in the climatic system.

Publication Geology
Volume 25
Issue 6
Pages 483–486
Date June 1997
Journal Abbr Geology
DOI 10.1130/0091-7613(1997)025<0483:HCIAPW>2.3.CO;2
ISSN 0091-7613
URL http://geology.gsapubs.org/cgi/doi/10.1130/0091-7613(1997)025<0483:HCIAPW>2.3.CO;2
Date Added Mon Aug 15 23:04:08 2011
Modified Mon Aug 15 23:04:16 2011

Holocene development of Boreal forests and fire regimes on the Kenai Lowlands of Alaska

Type Journal Article
Author R. Scott Anderson
Author Douglas J. Hallett
Author Edward E. Berg
Author Renata B. Jass
Author Jaime L. Toney
Author Christian S. de Fontaine
Author Andrew DeVolder
Abstract Several studies have noted a relationship between vegetation type and fire frequency, yet despite the importance of ecosystem processes such as fire the long-term relationships between disturbance, climate and vegetation type are incompletely understood. We analysed pollen, plant macrofossils and sedimentary charcoal from three lakes within the Kenai lowlands to determine postglacial relationships between disturbance, climate and vegetation for the Boreal forest of southwest Alaska. An herb tundra was established in the lowlands following deglaciation by 13 000 cal. BP. Salix, Alnus and probably Betula kenaica, expanded in the area after 10 700 cal. BP, followed by Picea glauca by 8500 cal. BP. Picea mariana became established by 4600 cal. BP. The early Holocene was probably the driest time during the postglacial, as determined by aquatic plant macrofossils and climate models. Lake levels reached near-modern conditions by at least 8000 cal. BP. Mean Fire Intervals (MFI) were longest during the shrub-herb tundra phase (138±65 yr), decreased after expansion of B. kenaica, Salix and Populus (77±49 yr) and Picea glauca (81±41 yr), and increased again with the arrival of P. mariana (130±66 yr). Unlike previous studies, our data demonstrate the highest fire frequencies during the early to mid-Holocene and less frequent fire during the late Holocene when P. mariana forests dominated the lowlands. Early Holocene forests of P. glauca and B. kenaica existed in summers that were longer and drier than today, while the increasingly wetter and cooler climates of the late Holocene probably hindered forest fire around Paradox Lake, perhaps because of less frequent summer drought.
Publication The Holocene
Volume 16
Issue 6
Pages 791–803
Date September 2006
Journal Abbr Holocene
DOI 10.1191/0959683606hol966rp
ISSN 0959-6836
URL http://hol.sagepub.com/content/16/6/791
Call Number 0019

Extra Keywords: Boreal forest; charcoal analysis; climate change; fire history; vegetation history; Holocene; Alaska.
Date Added Sun Sep 4 00:36:50 2011
Modified Mon Sep 5 10:11:32 2011

Holocene fire activity as a record of past environmental change

Type Journal Article
Author Cathy Whitlock
Author Patrick J. Bartlein
Abstract Introduction: Fire is the dominant form of natural disturbance in temperate forests, and, as such, it serves as a process that modulates forest susceptibility to climate change, disease, and other forms of disturbance. Fire has been identified as an important catalyst of vegetation change during rapid climate shifts in the past (e.g. T. Clark et al., 1996; Swetnam&Betancourt, 1998), and it has been implicated as the primary agent of ecosystem change in the future (e.g. Overpeck et al., 1990, 2003; Watson et al., 2000). At the global scale, biomass burning is considered an important but poorly understood process in the global carbon cycle, one that releases greenhouse gases, aerosols, and particulates to the atmosphere but also sequesters carbon as inert charred matter and ash (Cofer et al., 1997; Watson et al., 2000). At the regional scale, fire plays an essential role in maintaining the integrity of forest ecosystems (MacNeil,2000; Mills & Lugo, 2001; Nature, 2000). Because of fire's importance as an ecosystem process at large and small scales, it is necessary to understand: (1) the response of fires to past, present, and future climate change for global change assessments; and (2) the role of fire in maintaining forest health and promoting ecosystem change for better forest management. Like many types of paleoenvironmental data, information on past fires can be interpreted in climatic terms as well as used as an indicator of how particular ecosystems respond to known climate changes. The ultimate objective of paleoenvironmental research is to do both – understand the cause and ecological consequences of climate change. Two sources of paleoecological data provide information on fire-climate interactions. One source, dendrochronological data, includes records of fire-scarred tree-rings and maps showing the distribution of forest-stand ages following fire (see Agee, 1993; Johnson & Gutsell, 1994, for information on methods). Dendrochronological methods provide highly resolved spatial reconstructions of past fire activity, but they are limited by the age of living trees, which spans only the last few centuries in most places. This relatively short duration makes it difficult to examine the role of fire during periods of major climate change. Moreover, tree-ring records are best suited to reconstruct low-intensity ground fires that do not kill trees and often offer little information on the frequency of stand-replacing crown fires, which have become more widespread in western forests in the last two decades. The second data source is the record of particulate charcoal deposited in lakes and wetlands during and shortly after a fire (see Whitlock & Anderson, 2003; Whitlock & Larsen, 2002, for information on methods). Fire occurrence is identified by sedimentary layers with abundant or above-background levels of charcoal particles. The size and exact location of fires cannot be resolved with the specificity of dendrochronological studies, but charcoal records have the advantage of providing a fire reconstruction that spans thousands of years and encompasses periods of major climate change and vegetation reorganization. Annually resolved fire reconstructions are possible, but in most cases fire history is described in terms of fire episodes (one or more fires) during a time span of years to a few decades. Fire was recognized as a past and present link between climate change and vegetation response in one chapter (Davis, 1965) of the review volume for the VII Congress of the International Association for Quaternary Research (Wright & Frey, 1965). Since 1965, research in fire history has undergone a renaissance that has improved the use of fire data as both a paleoclimatic and paleoecologic tool. Recent studies consider fire as a proximal cause of vegetation changes and also recognize that vegetation patterns (both spatially and temporally) help shape fire regimes. The role of climate as the ultimate control of both vegetation composition and fire regimes is also widely recognized. In this chapter, we discuss some of the recent advances, including efforts to: (1) better understand the processes that introduce charcoal into lakes and wetlands; (2) refine the methods to interpret these deposits; and (3) evaluate the response of fire to climate and vegetation controls operating on different time scales based on paleoecological evidence, paleoclimate simulations, and modern assessments. We focus this review on research in North America.
Publication Developments in Quaternary Science
Volume 1
Pages 479-490
Date 2003
Journal Abbr Developments in Quaternary Science

DOI 10.1016/S1571-0866(03)01022-4
ISSN 1571-0866
URL http://linkinghub.elsevier.com/retrieve/pii/S1571086603010224
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:45 2011

Holocene fire and vegetation along environmental gradients in the Northern Rocky Mountains

Type Journal Article
Author Andrea Brunelle
Author Cathy Whitlock
Author Patrick Bartlein
Author Kurt Kipfmueller
Abstract Holocene records of fire, vegetation, and climate were reconstructed from four sites in the Bitterroot Range region of the Northern Rocky Mountains in order to examine the vegetation and fire histories and evaluate the hypothesis proposed by Whitlock and Bartlein (1993) regarding the effects of increased summer insolation on precipitation patterns. Vegetation history in the series of sites was broadly similar. In the late-glacial period, the pollen data suggest open parkland dominated by Picea or alpine meadow, which reflect conditions cooler and drier than present. These open forests were replaced in the early to middle Holocene by forests composed mainly of Pinus and Pseudotsuga, which suggest conditions warmer than present. Modern forest compositions were in place by ca 3000 cal yr BP, and small variations in the timing of the vegetation shifts reflect local differences among sites. The long-term trends in fire occurrence support the hypothesis proposed by Whitlock and Bartlein (1993) that precipitation regimes were sharpened during the early Holocene summer insolation maximum but their location has remained unchanged as a result of topographic constraints. Sites located in areas currently summer-dry were drier-than-present during the early Holocene and fires were more frequent. Conversely, sites located in the areas that are summer-wet at present were wetter-than-present in the early Holocene, and fires were less frequent. On millennial time scales it appears that the climate boundary is controlled by topography and does not shift.
Publication Quaternary Science Reviews
Volume 24
Issue 20-21
Pages 2281-2300
Date November 2005
Journal Abbr Quaternary Sci. Rev.
DOI 10.1016/j.quascirev.2004.11.010
ISSN 02773791
URL http://linkinghub.elsevier.com/retrieve/pii/S0277379105000211
Date Added Thu Aug 25 10:47:25 2011
Modified Wed Aug 31 00:34:08 2011

Holocene fire history of a coastal temperate rain forest based on soil charcoal radiocarbon dates

Type Journal Article
Author Daniel G. Gavin
Author Linda B. Brubaker
Author Kenneth P. Lertzman
Abstract The long-term role of fire in coastal temperate rain forest is poorly understood. To determine the historical role of fire on western Vancouver Island (British Columbia, Canada), we constructed a long-term spatially explicit fire history and examined the spatial and temporal distribution of fire during the Holocene. Two fire-history parameters (time-since-fire [TSF] and fire extent) were related to three landscape parameters (landform [hill slope or terrace], aspect, and forest composition) at 83 sites in a 730-ha low-elevation (less than ~200 m) area

of a mountainous watershed. We dated fires using tree rings (18 sites) and 120 soil-charcoal radiocarbon dates (65 sites). Comparisons among multiple radiocarbon dates indicated a high probability that the charcoal dated at each site represented the most recent fire, though we expect greater error in TSF estimates at sites where charcoal was very old (>6000 yr) and was restricted to mineral soil horizons. TSF estimates ranged from 64 to ~12 220 yr; 45% of the sites have burned in the last 1000 yr, whereas 20% of the sites have not burned for over 6000 yr. Differences in median TSF were more significant between landform types or across aspects than among forest types. Median TSF was significantly greater on terraces (4410 yr) than on hill slopes (740 yr). On hill slopes, all south-facing and southwest-facing sites have burned within the last 1000 yr compared to only 27% of north- and east-facing sites burning over the same period. Comparison of fire dates among neighboring sites indicated that fires rarely extended >250 m. During the late Holocene, landform controls have been strong, resulting in the bias of fires to south-facing hillslopes and thus allowing late-successional forest structure to persist for thousands of years in a large portion of the watershed. In contrast, the early Holocene regional climate and forest composition likely resulted in larger landscape fires that were not strongly controlled by landform factors. The millennial-scale TSF detected in this study supports the distinction of coastal temperate rain forest as being under a fundamentally different disturbance regime than other Pacific Northwest forests to the east and south.

Publication Ecology

Volume 84

Issue 1

Pages 186-201

Date January 2003

Journal Abbr Ecology

DOI 10.1890/0012-9658(2003)084[0186:HFHOAC]2.0.CO;2

ISSN 0012-9658

URL http://www.esajournals.org/doi/abs/10.1890/0012-9658(2003)084%5B0186%3AHFHOAC%5D2.0.CO%3B2?journalCode=ecol

Extra Keywords: British Columbia, Canada; climate–terrain–fire interaction; climate change; coastal temperate rain forest; disturbance, long-term role; fire history; Holocene fire history; Pacific Northwest forests; paleoecology; radiocarbon dating; soil charcoal.

Date Added Mon Aug 29 06:17:09 2011

Modified Wed Aug 31 00:33:19 2011

Holocene fire-related alluvial-fan deposition and climate in ponderosa pine and mixed-conifer forests, Sacramento Mountains, New Mexico, USA

Type Journal Article

Author Jedediah D. Frechette

Author Grant A. Meyer

Abstract We employed ^{14}C dating of alluvial-fan deposits in ponderosa pine and mixed-conifer forests of the Sacramento Mountains, New Mexico to document Holocene fires and related geomorphic impacts. Rapid aggradation by charcoal-rich debris flows occurred in the middle Holocene (5800–4200 cal. yr BP), indicating episodic sedimentation following severe fires. Fire-related deposition virtually ceased ~4200 cal. yr BP, with most fan deposits indicating slower aggradation with cumulic soil development until 1800 cal. yr BP. From 1800 to 500 cal. yr BP, fire-related sedimentation increased again, although not to middle Holocene levels. A peak in fire-related sedimentation c. 650 cal. yr BP corresponds to widespread severe drought in the southwestern USA. Limited fire-related sedimentation is evident from 500 to 100 cal. yr BP, consistent with 'Little Ice Age' climate and tree-ring records indicating frequent low-severity fires, although at least one severe fire burned in this interval. Increased fire-related sedimentation corresponds to generally warmer conditions. We infer that higher climate variability was also involved, including multidecadal wet periods that limited surface fires and allowed stand densities to increase, promoting severe fires in subsequent severe droughts. Fire has contributed significantly to Holocene valley aggradation. Local fan channel incision followed recent fires, but major nineteenth–twentieth century arroyo cutting appears unprecedented during the Holocene.

Publication The Holocene

Volume 19

Issue 4
Pages 639-651
Date June 2009
Journal Abbr Holocene
DOI 10.1177/0959683609104031
ISSN 0959-6836
URL http://hol.sagepub.com/content/19/4/639.abstract
Extra Keywords: paleofire; alluvial fans; sedimentary charcoal; erosion; geomorphology radiocarbon; fire history; ponderosa pine; New Mexico.
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:31 2011

Holocene history of cedar and Native Indian cultures of the North American Pacific Coast

Type Journal Article
Author Richard J. Hebda
Author Rolf W. Mathewes
Abstract A comparison of paleobotanical records with archeological and ethnographic evidence from the Pacific Northwest shows a strong correlation between the expansion of Western red cedar (Thuja plicata) in coastal forests between 5000 and 2500 years ago and the evolution of a massive woodworking technology by native cultures. This suggests that an important component of cultural development was environmentally constrained until large cedar trees, the basic resource for canoe-building and plank-house construction, had become available in late Holocene time.
Publication Science
Volume 225
Issue 4663
Pages 711 -713
Date 17 August 1984
Journal Abbr Science
DOI 10.1126/science.225.4663.711
ISSN 1095-9203
URL http://www.sciencemag.org/content/225/4663/711.abstract
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:30:07 2011

Holocene paleoenvironments in southeastern Minnesota chasing the prairie-forest ecotone

Type Journal Article
Author Richard G. Baker
Author E. Arthur Bettis III
Author Rhawn F. Denniston
Author Luis A. Gonzalez
Author Laura E. Strickland
Author Joseph R. Krieg
Abstract This paper uses a multi-proxy approach involving pollen, plant macrofossils, speleothem isotopes, and alluvial history of streams to reconstruct the history of prairie expansion and contraction along the prairie-forest border of southeastern Minnesota, USA. Early Holocene forests were replaced by prairie along this border, but eastward expansion of prairie stalled for 2000 yr when the prairie-forest ecotone stabilized. Prairie invaded the area from the west 8000–9000 yr B.P., but mesic forest remained less than 100 km to the east until about 6000 yr B.P. Changes in $\delta^{13}C$ values in speleothem calcite, that reflect the rise of C_4 grasses, correlate well with the

presence of C_4 grass species identified in the plant macrofossil record. Periods of large floods correlate with speleothem evidence of dry summers, increased cool-season precipitation (both resulting in less plant cover to absorb moisture), and change to prairie vegetation.

Publication Palaeogeography, Palaeoclimatology, Palaeoecology
Volume 177
Issue 1-2
Pages 103-122
Date 5 January 2002
Journal Abbr PALAEO
DOI 10.1016/S0031-0182(01)00354-6
ISSN 0031-0182
URL http://www.sciencedirect.com/science/article/pii/S0031018201003546
Call Number 0000
Extra Keywords: grasslands; paleoenvironment; pollen; plant macrofossils; speleothems; alluvial history.
Date Added Sun Sep 4 01:21:41 2011
Modified Mon Sep 5 10:11:14 2011

Homogenization of northern U.S. Great Lakes forests due to land use

Type Journal Article
Author Lisa A. Schulte
Author David J. Mladenoff
Author Thomas R. Crow
Author Laura C. Merrick
Author David T. Cleland
Abstract Human land use of forested regions has intensified worldwide in recent decades, threatening long-term sustainability. Primary effects include conversion of land cover or reversion to an earlier stage of successional development. Both types of change can have cascading effects through ecosystems; however, the long-term effects where forests are allowed to regrow are poorly understood. We quantify the regional-scale consequences of a century of Euro-American land use in the northern U.S. Great Lakes region using a combination of historical Public Land Survey records and current forest inventory and land cover data. Our analysis shows a distinct and rapid trajectory of vegetation change toward historically unprecedented and simplified conditions. In addition to overall loss of forestland, current forests are marked by lower species diversity, functional diversity, and structural complexity compared to pre-Euro-American forests. Today's forest is marked by dominance of broadleaf deciduous species—all 55 ecoregions that comprise the region exhibit a lower relative dominance of conifers in comparison to the pre-Euro-American period. Aspen (Populus grandidentata and P. tremuloides) and maple (Acer saccharum and A. rubrum) species comprise the primary deciduous species that have replaced conifers. These changes reflect the cumulative effects of local forest alterations over the region and they affect future ecosystem conditions as well as the ecosystem services they provide.
Publication Landscape Ecology
Volume 22
Issue 7
Pages 1089-1103
Date August 2007
Journal Abbr Landscape Ecol.
DOI 10.1007/s10980-007-9095-5
ISSN 0921-2973 (Print) 1572-9761 (Online)
URL http://www.springerlink.com/content/806kj6l83408076m/
Extra Keywords: sustainability; land use/land cover change; ecosystem simplification; pre-Euro-American settlement.
Date Added Sun Aug 28 17:26:09 2011

Modified Wed Aug 31 00:30:28 2011

How climate and vegetation influence the fire regime of the Alaskan boreal biome: The Holocene perspective

Type Journal Article
Author Feng Sheng Hu
Author Linda B. Brubaker
Author Daniel G. Gavin
Author Philip E. Higuera
Author Jason A. Lynch
Author T. Scott Rupp
Author Willy Tinner
Abstract We synthesize recent results from lake-sediment studies of Holocene fire-climatevegetation interactions in Alaskan boreal ecosystems. At the millennial time scale, the most robust feature of these records is an increase in fire occurrence with the establishment of boreal forests dominated by Picea mariana: estimated mean fire-return intervals decreased from ≥300 yrs to as low as ~80 yrs. This fire-vegetation relationship occurred at all sites in interior Alaska with charcoal-based fire reconstructions, regardless of the specific time of P. mariana arrival during the Holocene. The establishment of P. mariana forests was associated with a regional climatic trend toward cooler/wetter conditions. Because such climatic change should not directly enhance fire occurrence, the increase in fire frequency most likely reflects the influence of highly flammable P. mariana forests, which are more conducive to fire ignition and spread than the preceding vegetation types (tundra, and woodlands/forests dominated by Populus or Picea glauca). Increased lightning associated with altered atmospheric circulation may have also played a role in certain areas where fire frequency increased around 4000 calibrated years before present (BP) without an apparent increase in the abundance of P. mariana. When viewed together, the paleo-fire records reveal that fire histories differed among sites in the same modern fire regime and that the fire regime and plant community similar to those of today became established at different times. Thus the spatial array of regional fire regimes was non-static through the Holocene. However, the patterns and causes of the spatial variation remain largely unknown. Advancing our understanding of climate-fire-vegetation interactions in the Alaskan boreal biome will require a network of charcoal records across various ecoregions, quantitative paleoclimate reconstructions, and improved knowledge of how sedimentary charcoal records fire events.
Publication Mitigation and Adaptation Strategies for Global Change
Volume 11
Issue 4
Pages 829–846
Date July 2006
Journal Abbr Mitig. Adapt. Strat. Glob. Change
DOI 10.1007/s11027-005-9015-4
ISSN 1381-2386 (print) 1573-1596 (online)
Short Title How climate and vegetation influence the fire regime of the Alaskan boreal biome
URL http://www.springerlink.com/content/m1j7211402833287/
Extra Keywords: Alaska; boreal forests; charcoal records; climate change; fire regime; Holocene.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:30:47 2011

How close are we to a predictive science of the biosphere?

Type Journal Article
Author Paul R. Moorcroft

Abstract In just 20 years, the field of biosphere–atmosphere interactions has gone from a nascent discipline to a central area of modern climate change research. The development of terrestrial biosphere models that predict the responses of ecosystems to climate and increasing CO_2 levels has highlighted several mechanisms by which changes in ecosystem composition and function might alter regional and global climate. However, results from empirical studies suggest that ecosystem responses can differ markedly from the predictions of terrestrial biosphere models. As I discuss here, the challenge now is to connect terrestrial biosphere models to empirical ecosystem measurements. Only by systematically evaluating the predictions of terrestrial biosphere models against suites of ecosystem observations and experiments measurements will a true predictive science of the biosphere be achieved.

Publication Trends in Ecology & Evolution
Volume 21
Issue 7
Pages 400-407
Date July 2006
Journal Abbr Trends Ecol. Evol.
DOI 10.1016/j.tree.2006.04.009
ISSN 0169-5347
URL http://linkinghub.elsevier.com/retrieve/pii/S0169534706001509
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:27 2011

How far could a squirrel travel in the treetops?: A prehistory of the southern forest

Type Conference Paper
Author Paul B. Hamel
Author Edward R. Buckner
Abstract no abstract
Date 1998 March 20-25
Proceedings Title Prehistory of the Southern Forest
Conference Name Transactions of the 63rd North American Wildlife and Natural Resources conference
Place Orlando, FL.
Publisher Washington, DC: Wildlife Management Institute
Volume 63
Pages 309–315
Short Title How far could a squirrel travel in the treetops?
URL http://westinstenv.org/histwl/2010/02/21/how-far-could-a-squirrel-travel-in-the-treetops-a-prehistory-of-the-southern-forest/
Archive http://www.srs.fs.usda.gov/pubs/453
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:45 2011

How fast and far might tree species migrate in the eastern United States due to climate change?

Type Journal Article
Author Louis R. Iverson
Author Mark W. Schwartz
Author Anantha M. Prasad
Abstract • Aim: We describe and use a model, SHIFT, to estimate potential migration due to climate change over the next 100 years. • Location: Eastern United States. • Methods: Five species, currently confined to the eastern half of the United States and not extending into Canada, were used to assess migration potential: Diospyros

virginiana (persimmon), Liquidambar styraciflua (sweetgum), Oxydendrum arboreum (sourwood), Pinus taeda (loblolly pine), and Quercus falcata var. falcata (southern red oak). SHIFT is a matrix simulation model using simple inverse power functions to provide a distance decay of seed dispersal and is driven primarily by the abundance of the species near the boundary, the forest density within and beyond the boundary, and the distance between cells. For each cell outside the current boundary, the model creates an estimate of the probability that each unoccupied cell will become colonized over a period of 100 years. SHIFT is a 'fat-tailed' migration model that allows rare very long distance dispersal events and colonization could occur up to 500 km beyond the current distribution boundary. Model outputs were analysed using transects through sections showing relatively low and high colonization probabilities as a result of low and high densities of target trees (high source strength) as well as high densities of forest (high sink strength). We also assess migration potential for species by concentric rings around the current boundary. • Results: Model outputs show the generally limited nature of migration for all five species over 100 years. There is a relatively high probability of colonization within a zone of 10–20 km (depending on habitat quality and species abundance) from the current boundary, but a small probability of colonization where the distance from the current boundary exceeds about 20 km. Whether biologically plausible or not, rare very long distance migration events are not sufficient to rescue migration. Species abundance (the source strength of migration) near the range boundary carried relatively more influence than percentage forest cover (sink strength) in determining migration rates. • Main conclusion: The transect evaluation revealed the importance of abundance of the species near the boundary, indicating that rare species may have much more difficulty in unassisted northward migration due to climate change. The concentric rings analysis of the model outputs showed that only the first 10–20 km of area would have a reasonably high probability of colonization. Rare, long-distance events permit colonization of remote outliers, but much more needs to be understood about the likelihood of these rare events to predict the frequency of outlier establishment.

Publication Global Ecology and Biogeography
Volume 13
Issue 3
Pages 209–219
Date May 2004
Journal Abbr Global Ecol. Biogeogr.
DOI 10.1111/j.1466-822X.2004.00093.x
ISSN 1466-822X
URL http://onlinelibrary.wiley.com/doi/10.1111/j.1466-822X.2004.00093.x/full
Archive http://www.treesearch.fs.fed.us/pubs/9410
Extra Keywords: climate change; Diospyros virginiana; fragmented habitat; global warming; Liquidambar styraciflua; migration; Oxydendrum arboreum; Pinus taeda; Quercus falcata; United States.
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:11:54 2011

How increasing CO_2 and climate change affect forests

Type Journal Article
Author Robin Lambert Graham
Author Monica G. Turner
Author Virginia H. Dale
Abstract no abstract
Publication BioScience
Volume 40
Issue 8
Pages 575-587
Date September 1990
Journal Abbr BioScience
DOI 10.2307/1311298
ISSN 00063568

URL http://www.jstor.org/stable/1311298
Extra How increasing CO_2 and climate change affect forests: At many spatial and temporal scales, there will be forest responses that will be affected by human activities
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:03 2011

How to predict the spread and intensity of forest and range fires

Type Report
Author Richard C. Rothermel
Abstract Research Summary: This manual documents the procedures for estimating the rate of forward spread, intensity, flame length, and size of fires burning in forests and rangelands. It contains instructions for obtaining fuel and weather data, calculating fire behavior, and interpreting the results for application to actual fire problems. Potential uses include fire prediction, fire planning, dispatching, prescribed fires, and monitoring managed fires. Included are sections that deal with fuel model selection, fuel mOisture, wind, slope, calculations with nomograms, TI-59 calculations, point source, line fire, interpretations of outputs, and growth predictions.
Report Number GTR-INT-143
Report Type General Technical Report
Place Ogden, UT
Institution U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station
Date June 1983
Pages 161 p.
URL http://www.treesearch.fs.fed.us/pubs/24635
Extra Keywords: fire behavior prediction; fire spread; fire intensity; fire growth.
Date Added Mon Aug 29 00:48:23 2011
Modified Thu Sep 1 05:23:24 2011

Notes:

Citation:

Rothermel, Richard C. 1983. How to predict the spread and intensity of forest and range fires. Gen. Tech. Rep. INT-143. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 161 p.

How will Earth's surface temperature change in future decades?

Type Journal Article
Author Judith L. Lean
Author David H. Rind
Abstract Reliable forecasts of climate change in the immediate future are difficult, especially on regional scales, where natural climate variations may amplify or mitigate anthropogenic warming in ways that numerical models capture poorly. By decomposing recent observed surface temperatures into components associated with ENSO, volcanic and solar activity, and anthropogenic influences, we anticipate global and regional changes in the next two decades. From 2009 to 2014, projected rises in anthropogenic influences and solar irradiance will increase global surface temperature 0.15 ± 0.03°C, at a rate 50% greater than predicted by IPCC. But as a result of declining solar activity in the subsequent five years, average temperature in 2019 is only 0.03 ± 0.01°C warmer than in 2014. This lack of overall warming is analogous to the period from 2002 to 2008 when decreasing solar irradiance also countered much of the anthropogenic warming. We further illustrate how a major volcanic eruption and a super ENSO would modify our global and regional temperature projections.
Publication Geophysical Research Letters
Volume 36

Issue 15
Pages L15708 (5 p.)
Date August 2009
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2009GL038932
ISSN 0094-8276
URL http://www.agu.org/pubs/crossref/2009/2009GL038932.shtml
Extra Keywords: climate forecast.
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:41:46 2011

Human contribution to more-intense precipitation extremes

Type Journal Article
Author Seung-Ki Min
Author Xuebin Zhang
Author Francis W. Zwiers
Author Gabriele C. Hegerl
Abstract Extremes of weather and climate can have devastating effects on human society and the environment. Understanding past changes in the characteristics of such events, including recent increases in the intensity of heavy precipitation events over a large part of the Northern Hemisphere land area, is critical for reliable projections of future changes. Given that atmospheric water-holding capacity is expected to increase roughly exponentially with temperature—and that atmospheric water content is increasing in accord with this theoretical expectation—it has been suggested that human-influenced global warming may be partly responsible for increases in heavy precipitation. Because of the limited availability of daily observations, however, most previous studies have examined only the potential detectability of changes in extreme precipitation through model–model comparisons. Here we show that human-induced increases in greenhouse gases have contributed to the observed intensification of heavy precipitation events found over approximately two-thirds of data-covered parts of Northern Hemisphere land areas. These results are based on a comparison of observed and multi-model simulated changes in extreme precipitation over the latter half of the twentieth century analysed with an optimal fingerprinting technique. Changes in extreme precipitation projected by models, and thus the impacts of future changes in extreme precipitation, may be underestimated because models seem to underestimate the observed increase in heavy precipitation with warming.
Publication Nature
Volume 470
Issue 7334
Pages 378-381
Date 17 February 2011
Journal Abbr Nature
DOI 10.1038/nature09763
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature09763
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:07 2011

Human domination of Earth's Ecosystems

Type Journal Article
Author Peter M. Vitousek
Author Harold A. Mooney

Author Jane Lubchenco
Author Jerry M. Melillo
Abstract Human alteration of Earth is substantial and growing. Between one-third and one-half of the land surface has been transformed by human action; the carbon dioxide concentration in the atmosphere has increased by nearly 30 percent since the beginning of the Industrial Revolution; more atmospheric nitrogen is fixed by humanity than by all natural terrestrial sources combined; more than half of all accessible surface fresh water is put to use by humanity; and about one-quarter of the bird species on Earth have been driven to extinction. By these and other standards, it is clear that we live on a human-dominated planet.
Publication Science
Volume 277
Issue 5325
Pages 494 -499
Date 25 July 1997
Journal Abbr Science
DOI 10.1126/science.277.5325.494
ISSN 1095-9203
URL http://www.sciencemag.org/content/277/5325/494.abstract
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:54:02 2011

Human-induced changes in wind, temperature and relative humidity during Santa Ana events

Type Document
Author Mimi Hughes
Author Alex Hall
Author Jinwon Kim
Abstract The frequency and character of Southern California's Santa Ana wind events are investigated within a 12-km-resolution downscaling of late-20th and mid-21st century time periods of the National Center for Atmospheric Research Community Climate System Model global climate change scenario run. The number of Santa Ana days per winter season is approximately 20% fewer in the mid-21st century compared to the late-20th century. Since the only systematic and sustained difference between these two periods is the level of anthropogenic forcing, this effect is anthropogenic in origin. In both time periods, Santa Ana winds are partly katabatically-driven by a temperature difference between the cold wintertime air pooling in the desert against coastal mountains and the adjacent warm air over the ocean. However, this katabatic mechanism is significantly weaker during the mid-21st century time period. This occurs because of the well-documented differential warming associated with transient climate change, with more warming in the desert interior than over the ocean. Thus the mechanism responsible for the decrease in Santa Ana frequency originates from a well-known aspect of the climate response to increasing greenhouse gases, but cannot be understood or simulated without mesoscale atmospheric dynamics. In addition to the change in Santa Ana frequency, we investigate changes during Santa Anas in two other meteorological variables known to be relevant to fire weather conditions -- relative humidity and temperature. We find a decrease in the relative humidity and an increase in temperature. Both these changes would favor fire. A fire behavior model accounting for changes in wind, temperature, and relative humidity simultaneously is necessary to draw firm conclusions about future fire risk and growth associated with Santa Ana events.
Publisher Submitted to PIER Climate change special issue of Climatic Change
Date 2010
URL http://www.atmos.ucla.edu/csrl/spotlight-01-2010.html
Loc. in Archive UCLA Department of Atmospheric and Oceanic Sciences
Call Number 0000
Extra Keywords: regional climate; climate change; downslope winds; fire weather.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:30:49 2011

Human-modified temperatures induce species changes: Joint attribution

Type Journal Article
Author Terry L. Root
Author Dena P. MacMynowski
Author Michael D. Mastrandrea
Author Stephen H. Schneider
Abstract Average global surface-air temperature is increasing. Contention exists over relative contributions by natural and anthropogenic forcings. Ecological studies attribute plant and animal changes to observed warming. Until now, temperature–species connections have not been statistically attributed directly to anthropogenic climatic change. Using modeled climatic variables and observed species data, which are independent of thermometer records and paleoclimatic proxies, we demonstrate statistically significant “joint attribution,” a two-step linkage: human activities contribute significantly to temperature changes and human-changed temperatures are associated with discernible changes in plant and animal traits. Additionally, our analyses provide independent testing of grid-box-scale temperature projections from a general circulation model (HadCM3).
Publication Proceedings of the National Academy of Sciences
Volume 102
Issue 21
Pages 7465-7469
Date May 24, 2005
Journal Abbr PNAS
DOI 10.1073/pnas.0502286102
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.0502286102
Extra Keywords: climate change; double attribution; global warming; plant animal impacts; regional climate change.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:23 2011

Humans, topography, and wildland fire: The ingredients for long-term patterns in ecosystems

Type Conference Paper
Author Richard P. Guyette
Author Daniel C. Dey
Abstract Three factors, human population density, topography, and culture interact to create temporal and spatial differences in the frequency of fire at the landscape level. These factors can be quantitatively related to fire frequency. The fire model can be used to reconstruct historic and to predict future frequency of fire in ecosystems, as well as to identify long-term changes in anthropogenic fire regimes. Topographic roughness is positively related by a regression equation to the length of mean fire intervals indicating that fires are less frequent in rough than in flat terrain during periods of low human population density. The strength and direction of this relationship diminishes as the frequency of anthropogenic ignitions increases to the point that the fuel environment is pyro-saturated. Human population density is a master variable in understanding anthropogenic fire regimes and topographic effects. The interactions of these factors through time creates at least two stages in anthropogenic fire regimes: an Ignition Limited Stage in which fire frequency is function of human population density, and a Fuel Limited Stage during which fire frequency is limited by fuel production and is independent of increases in human population density.
Date September 2000
Proceedings Title Proceedings: Workshop on Fire, People, and the Central Hardwoods Landscape
Conference Name Workshop on Fire, People, and the Central Hardwoods Landscape. Richmond, Kentucky, March 12-14, 2000
Place Newtown Square, PA
Publisher United States Department of Agriculture, Forest Service, Northeastern Research Station
Pages 28–35

Series General Technical Report NE-274
Short Title Humans, topography, and wildland fire
URL http://www.treesearch.fs.fed.us/pubs/12120
Archive http://www.treesearch.fs.fed.us/pubs/3762
Extra Keywords: population density; Fuel Limited Stage; anthropogenic; topography; spatial differences; wildland fire; ecosystems.
Date Added Mon Aug 29 06:17:09 2011
Modified Sat Sep 3 23:44:33 2011

Notes:

Citation:

Guyette, Richard P.; Dey, Daniel C. 2000. Humans, Topograpghy, and Wildland Fire: The Ingredients for Long-term Patterns in Ecosystems. Proceeding: Workshop on Fire, Peopel, and the Central Hardwoods Landscape. p. 28-35. (2000).

Related

- Fire on the edge: Prehistoric fire along the escarpment zone of the Cumberland Plateau
- Fire and the ecological history of oak forests in the eastern United States

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Identification of anthropogenic burning in the paleoecological record of the northern Prairies: A new approach

Type Journal Article
Author Matthew Boyd
Abstract Despite recent interest in the North American fire record, paleoecological evidence for the deliberate burning of grassland by hunter-gatherers has not previously been sought. Through the analysis of grass phytoliths preserved in a sequence of buried soil horizons in the Lauder Sandhills, southwestern Manitoba, Canada, this article reconstructs a local grassland fire record for the past 5,000 years. I propose that an apparent peak in fire frequency shortly after 2,500 ^{14}C years B.P. corresponds to the deliberate burning of prairie by Sonota-Besant (Plains Woodland) hunter-gatherers, rather than climatic "forcing." This practice, which is clearly documented in the historic record, may have functioned as a means of making bison-herd movements more predictable and may have enabled higher human carrying capacities in the Plains Woodland period. This hypothesis is meant to stimulate multidisciplinary discussion on a significant, but neglected, topic.
Publication Annals of the Association of American Geographers
Volume 92
Issue 3
Pages 471-487
Date September 2002
Journal Abbr Ann. Assoc. Am. Geogr.
DOI 10.1111/1467-8306.00300
ISSN 0004-5608
Short Title Identification of Anthropogenic Burning in the Paleoecological Record of the Northern Prairies
URL http://www.jstor.org/stable/1515472
Call Number 0021
Extra Keywords: anthropogenic burning; Holocene fire history; Northern Prairies; phytoliths.
Date Added Sun Sep 4 01:33:17 2011
Modified Mon Sep 5 10:11:17 2011

Identifying ecoregion boundaries

Type Journal Article
Author Robert G. Bailey
Abstract This article summarizes the rationale I used in identifying ecoregion boundaries on maps of the United States, North America, and the world's continents, published from 1976 to 1998. The geographic reasoning used in drawing boundaries involves 20 principles, which are presented to stimulate discussion and further understanding. Brief background and references are provided for the principles.
Publication Environmental Management
Volume 34
Issue Supplement 1
Pages 14–26
Date April 2004
Journal Abbr Environ. Manage.
DOI 10.1007/s00267-003-0163-6
ISSN 0364-152X
URL http://www.springerlink.com/content/h74827n2m714087j/
Extra Keywords: ecosystem geography; ecoregions; mapping; boundaries; United States; North America; world.
Date Added Tue Aug 16 11:54:28 2011
Modified Tue Aug 16 11:54:41 2011

Impact of antecedent climate on fire regimes in coastal California

Type Journal Article
Author Jon E. Keeley
Abstract Severe fire weather is a major determinant of fire size in coastal California; however, it is unclear to what extent antecedent climate also controls fire activity. This study investigates the relationship between fire activity and climate in central coastal and southern California. Climate variables included the Palmer Drought Severity Index (PDSI), total monthly precipitation, mean monthly maximum temperature and the autumn and winter Southern Oscillation Indices (SOI). For both the central coast and the south coast regions there was no significant relationship between growing season PDSI, precipitation or temperature and number of fires. When examined by season, summer temperatures were positively correlated with number of fires in the central coast and autumn PDSI and precipitation were negatively correlated with fire occurrence in the south coast region. Area burned was not correlated with any current year climate variables in southern California although, in the central coast, drought during spring and autumn were correlated, but explained less than 10% of the variation in the area burned. Although there was a modest relationship between the Southern Oscillation Index (SOI) and local climate parameters, there was only a relatively weak relationship with fire activity. The importance of autumn foehn winds is illustrated by the observation that large fires occur most commonly during the autumn, regardless of PDSI. Antecedent climate, however, does appear to play some role in determining the length of the fire season on these landscape as PDSI is consistently related to the occurrence of large fires that occur before or after the autumn months.
Publication International Journal of Wildland Fire
Volume 13
Issue 2
Pages 173–182
Date June 2004
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF03037
ISSN 1448-5516
URL http://www.publish.csiro.au/?paper=WF03037
Extra Keywords: ENSO; drought; foehn winds.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:18:22 2011

Impact of fire suppression on a mixed-conifer forest

Type Journal Article
Author David J. Parsons
Author Steven H. DeBenedetti
Abstract One hundred years of fire suppression in a mixed-conifer forest which evolved with frequent natural fires has shifted successional patterns, increased the density of small trees, produced an unnatural accumulation of ground fuels. Analysis of species composition, vegetation structure and age distribution in each of four forest types within the mixed-conifer zone of Sequoia and Kings Canyon National Parks, California, has documented a substantial increase in young, shade tolerant white fir in each type. The original dominant species have decreased in relative abundance in most cases. The sequioa type has been most affected by the fire suppression policy. Giant sequioa show poor reproduction in the absence of fire. The sequoia type also exhibits the greatest accumulation of ground fuels. The ponderosa pine, white fir and mixed forest types also show successional changes as well as significant accumulations of flammable ground fuels following a century of fire exclusion. The management implications of these findings are discussed.
Publication Forest Ecology and Management
Volume 2
Pages 21–33
Date 1979
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/0378-1127(79)90034-3
ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/pii/0378112779900343
Date Added Sun Aug 28 00:27:26 2011
Modified Wed Aug 31 01:41:10 2011

Impact of multiple fires on stand structure and tree regeneration in central Appalachian oak forests

Type Journal Article
Author Stephen A. Signell
Author Marc D. Abrams
Author Joseph C. Hovis
Author Shannon W. Henry
Abstract The National Guard Training Center at Fort Indiantown Gap (NGTC-FIG) near Harrisburg, PA, has experienced frequent fires since the 1950s on the ridges and 1980s in the valleys as a result of military training exercises. This represented a unique opportunity to investigate the role of recent and repeated fire in oak (Quercus) forests in the eastern USA. We investigated four frequently burned and two unburned sites replicated in ridge and valley ecosystems. Burned sites generally had lower tree density and a higher proportion of overstory oak species (64–92% relative importance value) than unburned stands (47–49% importance). Oak saplings averaged 875 ha^{-1} in burned forests and 31 ha^{-1} in unburned forests. Red maple (Acer rubrum, L.), the most aggressive oak replacement species in the eastern USA, had overstory importance of 7% and 24% in burned and unburned stands, respectively. Oak saplings ranged from 824 to 1545 ha^{-1} in three of the four burned stands and 0–62 ha^{-1} in the unburned stands. Oak sapling density was only 62 ha^{-1} one recently (2002) burned stand where fire had not resulted in reduced tree density; this stand had the highest tree density of all sampled stands. There were no red maple saplings in three of the four burned stands. Oak saplings were most abundant when overstory density was less than 400 trees/ha and understory tree density was less than 200 trees/ha. When overstory or understory tree density exceeded 400 and 200 trees/ha, respectively, oak regeneration was virtually absent. The results of this study suggest that periodic fire often reduces overstory and understory stand density and promotes successful regeneration of relatively shade intolerant oak species in the eastern USA. However, high tree density in forests will retard the development of oak understories and subsequent recruitment, even if periodic burning occurs.
Publication Forest Ecology and Management
Volume 218

Issue 1-3
Pages 146-158
Date 24 October 2005
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/j.foreco.2005.07.006
ISSN 03781127
URL http://www.sciencedirect.com/science/article/pii/S0378112705004585
Extra Keywords: fire; oak recruitment; red maple; canopy density; Pennsylvania.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:29:54 2011

Impacts of climate change from 2000 to 2050 on wildfire activity and carbonaceous aerosol concentrations in the western United States

Type Journal Article
Author Dominick V. Spracklen
Author Loretta J. Mickley
Author Jennifer A. Logan
Author Rynda C. Hudman
Author Rosemarie Yevich
Author Michael D. Flannigan
Author Anthony L. Westerling
Abstract We investigate the impact of climate change on wildfire activity and carbonaceous aerosol concentrations in the western United States. We regress observed area burned onto observed meteorological fields and fire indices from the Canadian Fire Weather Index system and find that May–October mean temperature and fuel moisture explain 24–57% of the variance in annual area burned in this region. Applying meteorological fields calculated by a general circulation model (GCM) to our regression model, we show that increases in temperature cause annual mean area burned in the western United States to increase by 54% by the 2050s relative to the present day. Changes in area burned are ecosystem dependent, with the forests of the Pacific Northwest and Rocky Mountains experiencing the greatest increases of 78 and 175%, respectively. Increased area burned results in near doubling of wildfire carbonaceous aerosol emissions by midcentury. Using a chemical transport model driven by meteorology from the same GCM, we calculate that climate change will increase summertime organic carbon (OC) aerosol concentrations over the western United States by 40% and elemental carbon (EC) concentrations by 20% from 2000 to 2050. Most of this increase (75% for OC and 95% for EC) is caused by larger wildfire emissions with the rest caused by changes in meteorology and for OC by increased monoterpene emissions in a warmer climate. Such an increase in carbonaceous aerosol would have important consequences for western U.S. air quality and visibility.
Publication Journal of Geophysical Research
Volume 114
Issue 20
Pages D20301 (17 p.)
Date October 2009
Journal Abbr J. Geophys. Res.
DOI 10.1029/2008JD010966
ISSN 0148–0227
URL http://www.agu.org/pubs/crossref/2009/2008JD010966.shtml
Extra Keywords: biomass burning; climate change; aerosol.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:14 2011

Impacts of climate change on fire activity and fire management in the circumboreal forest

Type Journal Article
Author Mike Flannigan
Author Brian Stocks
Author Merritt Turetsky
Author Mike Wotton
Abstract Forest fires are a significant and natural element of the circumboreal forest. Fire activity is strongly linked to weather, and increased fire activity due to climate change is anticipated or arguably has already occurred. Recent studies suggest a doubling of area burned along with a 50% increase in fire occurrence in parts of the circumboreal by the end of this century. Fire management agencies' ability to cope with these increases in fire activity is limited, as these organizations operate with a narrow margin between success and failure; a disproportionate number of fires may escape initial attack under a warmer climate, resulting in an increase in area burned that will be much greater than the corresponding increase in fire weather severity. There may be only a decade or two before increased fire activity means fire management agencies cannot maintain their current levels of effectiveness.
Publication Global Change Biology
Volume 15
Issue 3
Pages 549-560
Date March 2009
Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1365-2486.2008.01660.x
ISSN 1365-2486
URL http://dx.doi.org/10.1111/j.1365-2486.2008.01660.x
Extra Keywords: carbon balance; circumboreal forest; climate change; fire management; forest fires; peatlands.
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:49 2011

Impacts of large-scale atmospheric-ocean variability on Alaskan fire season severity

Type Journal Article
Author Paul A. Duffy
Author John E. Walsh
Author Jonathan M. Graham
Author Daniel H. Mann
Author T. Scott Rupp
Abstract Fire is the keystone disturbance in the Alaskan boreal forest and is highly influenced by summer weather patterns. Records from the last 53 years reveal high variability in the annual area burned in Alaska and corresponding high variability in weather occurring at multiple spatial and temporal scales. Here we use multiple linear regression (MLR) to systematically explore the relationships between weather variables and the annual area burned in Alaska. Variation in the seasonality of the atmospheric circulation-fire linkage is addressed through an evaluation of both the East Pacific teleconnection field and a Pacific Decadal Oscillation index keyed to an annual fire index. In the MLR, seven explanatory variables and an interaction term collectively explain 79% of the variability in the natural logarithm of the number of hectares burned annually by lightning-caused fires in Alaska from 1950 to 2003. Average June temperature alone explains one-third of the variability in the logarithm of annual area burned. The results of this work suggest that the Pacific Decadal Oscillation and the East Pacific teleconnection indices can be useful in determining a priori an estimate of the number of hectares that will burn in an upcoming season. This information also provides insight into the link between ocean-atmosphere interactions and the fire disturbance regime in Alaska.
Publication Ecological Applications
Volume 15

Issue 4
Pages 1317–1330
Date August 2005
Journal Abbr Ecol. Appl.
DOI 10.1890/04-0739
ISSN 1051-0761
URL http://www.jstor.org/stable/4543440
Extra Keywords: Alaska boreal forest; East Pacific teleconnection; ecological disturbance regimes; fire regimes; multiple linear regression; Pacific Decadal Oscillation; teleconnections.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:55 2011

Implications of changing climate for global wildland fire

Type Journal Article

Author Mike D Flannigan
Author Meg A Krawchuk
Author William J de Groot
Author B. Mike Wotton
Author Lynn M Gowman

Abstract Wildland fire is a global phenomenon, and a result of interactions between climate–weather, fuels and people. Our climate is changing rapidly primarily through the release of greenhouse gases that may have profound and possibly unexpected impacts on global fire activity. The present paper reviews the current understanding of what the future may bring with respect to wildland fire and discusses future options for research and management. To date, research suggests a general increase in area burned and fire occurrence but there is a lot of spatial variability, with some areas of no change or even decreases in area burned and occurrence. Fire seasons are lengthening for temperate and boreal regions and this trend should continue in a warmer world. Future trends of fire severity and intensity are difficult to determine owing to the complex and non-linear interactions between weather, vegetation and people. Improved fire data are required along with continued global studies that dynamically include weather, vegetation, people, and other disturbances. Lastly, we need more research on the role of policy, practices and human behaviour because most of the global fire activity is directly attributable to people.

Publication International Journal of Wildland Fire
Volume 18
Issue 5
Pages 483-507
Date August 2009
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF08187
ISSN 1049-8001
URL http://www.publish.csiro.au/paper/WF08187.htm
Extra Keywords: area burned; carbon; emissions; fire activity; forest fire; intensity; management; modelling; occurrence; review; season; severity; weather.
Date Added Mon Aug 29 05:19:52 2011
Modified Mon Aug 29 05:26:52 2011

Increased atmospheric CO_2 during the Middle Eocene

Type Journal Article

Author Paul N. Pearson

Abstract Even without humans, there are many processes that can change the concentration of carbon dioxide (CO_2) in Earth's atmosphere and affect global climate. On page 819 of this issue, Bijl et al. (1) provide the first direct evidence that very high CO_2 levels occurred about 40 million years ago during the Middle Eocene Climatic Optimum (MECO), one of the hottest intervals in Earth's climate history. The hunt is now on for a geological cause for this event—and fingers are pointing at the Himalayan mountain belt.

Publication Science
Volume 330
Issue 6005
Pages 763-764
Date 5 November 2010
Journal Abbr Science
DOI 10.1126/science.1197894
ISSN 0036-8075 (print), 1095-9203 (online)
URL http://www.sciencemag.org/content/330/6005/763
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 01:43:34 2011

Increased El Niño frequency in a climate model forced by future greenhouse warming

Type Journal Article
Author Axel Timmermann
Author Josef Oberhuber
Author Andreas Bacher
Author Monika Esch
Author Mojib Latif
Author Erich Roeckner

Abstract The El Niño/Southern Oscillation (ENSO) phenomenon is the strongest natural interannual climate fluctuation. ENSO originates in the tropical Pacific Ocean and has large effects on the ecology of the region, but it also influences the entire global climate system and affects the societies and economies of manycountries. ENSO can be understood as an irregular low-frequency oscillation between a warm (El Niño) and a cold (La Niña) state. The strong El Niños of 1982/1983 and 1997/1998, along with the more frequent occurrences of El Niños during the past few decades, raise the question of whether human-induced 'greenhouse' warming affects, or will affect, ENSO. Several global climate models have been applied to transient greenhouse-gas-induced warming simulations to address this question, but the results have been debated owing to the inability of the models to fully simulate ENSO (because of their coarse equatorial resolution). Here we present results from a global climate model with sufficient resolution in the tropics to adequately represent the narrow equatorial upwelling and low-frequency waves. When the model is forced by a realistic future scenario of increasing greenhouse-gas concentrations, more frequent El-Niño-like conditions and stronger cold events in the tropical Pacific Ocean result.

Publication Nature
Volume 398
Issue 6729
Pages 694–697
Date 22 April 1999
Journal Abbr Nature
DOI 10.1038/19505
ISSN 0028-0836
URL www.nature.com/nature/journal/v398/n6729/full/398694a0.html
Call Number 0000
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:54 2011

Increased fire activity at the Triassic/Jurassic boundary in Greenland due to climate-driven floral change

Type Journal Article
Author Claire M. Belcher
Author Luke Mander
Author Guillermo Rein
Author Freddy X. Jervis
Author Matthew Haworth
Author Stephen P. Hesselbo
Author Ian J. Glasspool
Author Jennifer C. McElwain
Abstract One of the largest mass extinctions of the past 600 million years (Myr) occurred 200 Myr ago, at the Triassic/Jurassic boundary. The major floral and faunal turnovers have been linked to a marked increase in atmospheric carbon dioxide levels, probably resulting from massive volcanism in the Central Atlantic Magmatic Province. Future climate change predictions suggest that fire activity may increase, in part because higher global temperatures are thought to increase storminess. Here we use palaeontological reconstructions of the fossil flora from East Greenland to assess forest flammability along with records of fossil charcoal preserved in the rocks to show that fire activity increased markedly across the Triassic/Jurassic boundary. We find a fivefold increase in the abundance of fossil charcoal in the earliest Jurassic, which we attribute to a climate-driven shift from a prevalence of broad-leaved taxa to a predominantly narrow-leaved assemblage. Our fire calorimetry experiments show that narrow leaf morphologies are more flammable than broad-leaved morphologies. We suggest that the warming associated with increased atmospheric carbon dioxide levels favoured a dominance of narrow-leaved plants, which, coupled with more frequent lightening strikes, led to an increase in fire activity at the Triassic/Jurassic boundary.
Publication Nature Geoscience
Volume 3
Issue 6
Pages 426-429
Date June 2010
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo871
ISSN 1752-0894
URL http://dx.doi.org/10.1038/ngeo871
Date Added Tue Aug 23 02:10:36 2011
Modified Wed Aug 24 04:41:26 2011

Increased soil emissions of potent greenhouse gases under increased atmospheric CO_2

Type Journal Article
Author Kees Jan van Groenigen
Author Craig W. Osenberg
Author Bruce A. Hungate
Abstract Increasing concentrations of atmospheric carbon dioxide (CO_2) can affect biotic and abiotic conditions in soil, such as microbial activity and water content. In turn, these changes might be expected to alter the production and consumption of the important greenhouse gases nitrous oxide (N_2O) and methane (CH_4). However, studies on fluxes of N_2O and CH_4 from soil under increased atmospheric CO_2 have not been quantitatively synthesized. Here we show, using meta-analysis, that increased CO_2 (ranging from 463 to 780 parts per million by volume) stimulates both N_2O emissions from upland soils and CH_4 emissions from rice paddies and natural wetlands. Because enhanced greenhouse-gas emissions add to the radiative forcing of terrestrial ecosystems, these emissions are expected to negate at least 16.6 per cent of the climate change mitigation potential

previously predicted froman increase in the terrestrial carbon sink under increased atmospheric CO_2 concentrations. Our results therefore suggest that the capacity of land ecosystems to slow climate warming has been overestimated.

Publication Nature
Volume 475
Issue 7355
Pages 214-216
Date 14 July 2011
Journal Abbr Nature
DOI 10.1038/nature10176
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature10176
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:53:36 2011

Increasing intensity of El Niño in the central-equatorial Pacific

Type Journal Article
Author Tong Lee
Author Michael J. McPhaden
Abstract Satellite observations suggest that the intensity of El Niño events in the central equatorial Pacific (CP) has almost doubled in the past three decades, with the strongest warming occurring in 2009–10. This is related to the increasing intensity as well as occurrence frequency of the so-called CP El Niño events since the 1990s. While sea surface temperature (SST) in the CP region during El Niño years has been increasing, those during neutral and La Niña years have not. Therefore, the well-documented warming trend of the warm pool in the CP region is primarily a result of more intense El Niño events rather than a general rise of background SST.
Publication Geophysical Research Letters
Volume 37
Issue 14
Pages L14603 (5 p.)
Date July 2010
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2010GL044007
ISSN 0094-8276
URL http://www.agu.org/pubs/crossref/2010/2010GL044007.shtml
Extra Keywords: El Niño.
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:41:53 2011

Indian fires as an ecological influence in the Northern Rockies

Type Journal Article
Author Stephen W. Barrett
Author Stephen F. Arno
Abstract The importance of fire as an ecological disturbance in the Northern Rockies is well accepted. Lightning is generally thought to have been the main source of ignition prior to settlement by Europeans. But writings of explorers and pioneers mention deliberate burning by Indians frequently enough to warrant an investigation of its importance. Interviews with descendants of Native Americans and of pioneer settlers in western Montana suggest that Indian burning was widespread, had many purposes, but was generally unsystematic. Fire chronologies based upon scars on old-growth trees indicate that fire intervals within similar forest types were

shortest near Indian-use zones. Comparisons of presettlement fire intervals with those calculated from modern lightning-fire records suggest that Indian-caused fires substantially augmented lightning fires over large areas. As dependence on lightning fires alone may not create or perpetuate certain desirable plant communities or stand conditions, prescribed burning may be needed.

Publication	Journal of Forestry
Volume	80
Issue	10
Pages	647-651
Date	October 1982
Journal Abbr	J. Forest
ISSN	0022-1201
URL	http://www.ingentaconnect.com/content/saf/jof/1982/00000080/00000010/art00011
Date Added	Tue Aug 23 01:53:42 2011
Modified	Wed Aug 24 04:42:31 2011

Indian use of fire and land clearance in the southern Appalachians

Type	Conference Paper
Author	Michael S. DeVivo
Abstract	The myth of an unbroken primeval forest, extending across eastern North America at the dawn of European settlement, has been perpetuated in the writings of both laymen and scholars throughout the present century. Accounts of sixteenth, seventeenth, and eighteenth century explorers, however, document vast amounts of cleared land held by aboriginal inhabitants, who likely populated the continent in much higher numbers than have been traditionally accepted. Fire was the principal tool used by the Indians to clear vegetation. Despite frequent historical reference to the Indian use of iire and the documentation of Indian old fields, the role of lire has been largely underplayed. Fire was implemented for forest management, driving game, and preparing land for agriculture. This paper examines the impact of tire and related anthropogenic disturbances on the southern Appalachian landscape before white settlement.
Date	August 1991
Proceedings Title	Fire and the Environment: Ecological and Cultural Perspectives. Proceedings of an International Symposium
Conference Name	Fire and the Environment: Ecological and Cultural Perspectives: Proceedings of an International Symposium; 1990 March 20-24; Knoxville, TN
Place	Asheville, NC
Publisher	U.S. Dept. of Agriculture, Forest Service, Southeastern Forest Experiment Station, Gen. Tech. Rep. SE-69
Pages	306–310
URL	http://www.srs.fs.usda.gov/pubs/gtr/gtr_se069/gtr_se069.htm
Archive	http://www.srs.fs.usda.gov/pubs/gtr/gtr_se069/uncaptured/gtr_se069.pdf
Date Added	Tue Aug 30 04:16:19 2011
Modified	Wed Aug 31 00:39:41 2011

Notes:

Citation:

DeVivo, M.S. 1991. Indian use of fire and land clearance in the southern Appalachians. In: S.C. Nodvin and T.A. Waldrop (eds.). Fire and the Environment: ecological and cultural perspectives. Proceedings of an International symposium. USDA For. Serv. Gen. Tech. Rep. SE-69. Asheville, NC. pp. 306-310.

Source:

Nodvin, Stephen C.; Waldrop, Thomas A., eds. 1991. Fire and the environment: ecological and cultural perspectives: Proceedings of an international symposium; 1990 March 20-24; Knoxville, TN. Gen. Tech. Rep. SE-69. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 429 pp.

Indian-set fires in the forests of the northeastern United States

Type Journal Article
Author Emily W. B. Russell
Abstract The historical evidence for the Indians' burning the forests of the northeastern United States is reevaluated. Of 35 documents that describe vegetation or Indian life in the 16th or 17th centuries, only half mention any use of fire except for cooking. Only six purportedly first-hand accounts might refer to purposeful, widespread, and frequent use of fire. These six are all consistent with use of fire only locally near camps or villages, or with accidentally escaped fires. It is concluded that the frequent use of fires by the Indians to burn the forests was probably at most a local occurrence. The Indians' presence in the region and their use of fire for many purposes did, however, increase the frequency of fires above the low levels caused by lightning, and thus had some effect on the vegetation; for example, grasses characterized the ground cover at small, local, frequently burned sites.
Publication Ecology
Volume 64
Issue 1
Pages 78–88
Date February 1983
Journal Abbr Ecology
DOI 10.2307/1937331
ISSN 0012-9658
URL http://www.jstor.org/stable/1937331
Extra Keywords: Amerinds; fire; Indians; northeastern United States; precolonial vegetation.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:46 2011

Industrial production of carbon dioxide from fossil fuels and limestone

Type Journal Article
Author Charles D. Keeling
Abstract The release of carbon dioxide into the atmosphere by the burning of fossil fuels is significantly altering the carbon cycle by adding to the amount of carbon in the atmosphere and in the more rapidly interacting portions of the biosphere and oceans. In order better to assess these changes, the basis for calculating global CO_2 emissions is reviewed and new annual values are computed for the period 1800 through 1969. The world average fractions of carbon in coal and lignite, estimated from calorific data, are found to be lower than previously assumed. When account is taken of handling losses and partial diversion to produce petrochemicals, road asphalt, and other non-fuels, the calculated CO_2 emissions are further reduced by several percent even after allowing that most unburned materials eventually oxidize to CO_2 in the environment. On the other hand, the production of CO_2 by kilning of limestone adds 1 to 2% to the annual totals. The cumulative increase in carbon in the short term carbon cycle, owing to man's industrial and domestic activities up to 1970, is estimated to be 1.12 + 0.14 times 10^{17} g (4.1 + 0.5 times 10^{17}g CO_2), or about 18% of the amount of CO_2 in the atmosphere during the late nineteenth century.
Publication Tellus
Volume 25
Issue 2
Pages 174–198
Date April 1973
Journal Abbr Tellus
DOI 10.1111/j.2153-3490.1973.tb01604.x
ISSN 2153-3490 (online)
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Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:39:54 2011

Influence of human and natural forcing on European seasonal temperatures

Type Journal Article
Author Gabriele Hegerl
Author Juerg Luterbacher
Author Fidel González-Rouco
Author Simon F. B. Tett
Author Thomas Crowley
Author Elena Xoplaki
Abstract It is the regional and seasonal expression of climate change that determines the effect of greenhouse warming on ecosystems and society. Whereas anthropogenic influences on European temperatures have been detected over the twentieth century, it has been suggested that the impact of external influences on European temperatures before 1900 is negligible. Here we use reconstructions of seasonal European land temperature and simulations with three global climate models to show that external influences on climate—such as the concentrations of stratospheric volcanic aerosols or greenhouse gases, other anthropogenic effects and possibly changes in total solar irradiance—have had a discernible influence on European temperatures throughout the past five centuries. In particular, we find that external forcing contributes significantly (ρ<5%) to the reconstructed long-term variability of winter and spring temperatures and that it is responsible for a best guess of 75% of the observed winter warming since the late seventeenth century. This warming is largely attributable to greenhouse-gas forcing. Summer temperatures show detectable (ρ<5%) interdecadal variations in response to external forcing before 1900 only. Finally, throughout the record we detect highly significant summer cooling and significant winter warming following volcanic eruptions.
Publication Nature Geoscience
Volume 4
Issue 2
Pages 99–103
Date February 2011
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo1057
ISSN 1752-0894
URL http://www.nature.com/doifinder/10.1038/ngeo1057
Extra Keywords: climate science; palaeoclimate and palaeoceanography.
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:33:47 2011

Influence of humans and climate on the fire history of a ponderosa pine-mixed conifer forest in the southeastern Klamath Mountains, California

Type Journal Article
Author Danny L. Fry
Author Scott L. Stephens
Abstract Fire history of a ponderosa pine-mixed conifer forest was investigated in the Whiskeytown National Recreation Area, southeastern Klamath Mountains, California. Fire return intervals were found to be frequent and similar to other comparable forests in California. Median fire interval for the six sample plots (1.4–1.7 ha) ranged from 2 to 4 years (mean range, 4.8–7.4 years). Most fires (93%) occurred late in the growing season or after growth for the season had stopped. Early fire activity was frequent and heterogeneous; however, this trend dramatically changed ca. 1850 to a less frequent and more homogeneous fire pattern. Euro-American settlement, which was active in this area, most likely caused this change by the elimination of Native American ignitions and by

introducing logging, gold mining, grazing, and early fire suppression. For the period of record (1750–2002), years when fires were widespread within the study area were not correlated with drought conditions represented by reconstructed climate indices: palmer drought severity index (PDSI) and southern oscillation index. After 1850 when Euro-American settlement began, widespread fire years were associated with wetter than average conditions 3 years preceding the fire year (PDSI, gridpoint #5). Although several recent fire history studies have identified fire–climate relationships with these indices in the Pacific Northwest, additional research is needed in the southern portion of the region. Possible future extensions from the fire–climate relationships identified include: anticipating wildfire extent for future fire seasons, understanding potential alterations in Klamath fire regimes forced by climate change or by cultural land use practices, as well as planning fire management activities (fuels reduction, prescribed fire, etc.).

Publication Forest Ecology and Management

Volume 223

Issue 1-3

Pages 428–438

Date 1 March 2006

Journal Abbr Forest Ecol. Manag.

DOI 10.1016/j.foreco.2005.12.021

ISSN 0378-1127

URL http://www.sciencedirect.com/science/article/pii/S0378112705007620

Extra Keywords: climate indices; dendrochronology; fire return interval; fire suppression; seasonality; settlement; superposed epoch analysis; Whiskeytown National Recreation Area.

Date Added Mon Aug 29 05:19:52 2011

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Influence of long-distance climate teleconnection on seasonality of water temperature in the world's largest lake - Lake Baikal, Siberia

Type Journal Article

Author Stephen L. Katz

Author Stephanie E. Hampton

Author Lyubov R. Izmest'eva

Author Marianne V. Moore

Editor Stuart A. Sandin

Abstract Large-scale climate change is superimposed on interacting patterns of climate variability that fluctuate on numerous temporal and spatial scales—elements of which, such as seasonal timing, may have important impacts on local and regional ecosystem forcing. Lake Baikal in Siberia is not only the world's largest and most biologically diverse lake, but it has exceptionally strong seasonal structure in ecosystem dynamics that may be dramatically affected by fluctuations in seasonal timing. We applied time-frequency analysis to a near-continuous, 58-year record of water temperature from Lake Baikal to examine how seasonality in the lake has fluctuated over the past half century and to infer underlying mechanisms. On decadal scales, the timing of seasonal onset strongly corresponds with deviation in the zonal wind intensity as described by length of day (LOD); on shorter scales, these temperature patterns shift in concert with the El Nino-Southern Oscillation (ENSO). Importantly, the connection between ENSO and Lake Baikal is gated by the cool and warm periods of the Pacific Decadal Oscillation (PDO). Large-scale climatic phenomena affecting Siberia are apparent in Lake Baikal surface water temperature data, dynamics resulting from jet stream and storm track variability in central Asia and across the Northern Hemisphere.

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Volume 6

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Pages e14688 (10 p.)

Date February 2011

Journal Abbr PLoS ONE

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ISSN 1932-6203
URL http://dx.plos.org/10.1371/journal.pone.0014688
Call Number 0000
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:18:09 2011

Influence of the El Niño Southern Oscillation on fire regimes in the Florida Everglades

Type Journal Article
Author Brian Beckage
Author William J. Platt
Author Matthew G. Slocum
Author Bob Panko
Abstract Disturbances that are strongly linked to global climatic cycles may occur in a regular, predictable manner that affects composition and distribution of ecological communities. The El Niño Southern Oscillation (ENSO) influences worldwide precipitation patterns and has occurred with regular periodicity over the last 130000 years. We hypothesized that ENSO, through effects on local weather conditions, has influenced frequency and extent of fires within Everglades National Park (Florida, USA). Using data from 1948 to 1999, we found that the La Niña phase of ENSO was associated with decreased dryseason rainfall, lowered surface water levels, increased lightning strikes, more fires, and larger areas burned. In contrast, the El Niño phase was associated with increased dry-season rainfall, raised surface water levels, decreased lightning strikes, fewer fires, and smaller areas burned. Shifts between ENSO phases every few years have likely influenced vegetation through periodic large-scale fires, resulting in a prevalence of fire-influenced communities in the Everglades landscape.
Publication Ecology
Volume 84
Issue 12
Pages 3124-3130
Date December 2003
Journal Abbr Ecology
DOI 10.1890/02-0183
ISSN 0012-9658
URL http://www.esajournals.org/doi/abs/10.1890/02-0183
Extra Keywords: area burned; El Niño; ENSO; Everglades; fire; Florida; global warming; La Niña; lightning; savannas; SOI; wet/dry season.
Date Added Tue Aug 23 02:08:26 2011
Modified Wed Aug 24 04:41:32 2011

Influences of fire history and topography on the pattern of a severe wind blowdown in a Colorado subalpine forest

Type Journal Article
Author Dominik Kulakowski
Author Thomas T. Veblen
Abstract Summary 1. In 1997, a major windstorm blew down over 10 000 hectares of subalpine forest in Routt National Forest in north-western Colorado. We tested whether fire history and topographic variation, across the landscape, determined subsequent susceptibility to damage from this windstorm. 2. We combined dendrochronological techniques with a geographical information system (GIS) to examine the relationship between the effects of the blowdown and the spatial heterogeneity of the vegetation. We reconstructed the spatial fire history in a c. 4400 ha area by first identifying distinct patches in the landscape on aerial

photographs, and then in the field by determining the disturbance history of each patch by dating fire scars, ages of post-fire cohorts and releases of remnant trees. 3. Both topographic position and fire history contribute to susceptibility to wind damage. Stands at higher elevations, on easterly slopes and closer to ridges were most affected. Younger stands (i.e. more recently affected by stand-initiating fires) were less affected particularly in areas affected by low–moderate severity blowdown (< 80% damage). The ecological effects of the very severe 1997 windstorm were mediated by the legacies of fires which occurred several centuries ago. Interactions between natural disturbances, such as fire and blowdown, lead to synergistic effects on forest dynamics, even when disturbance is infrequent.

Publication Journal of Ecology

Volume 90

Issue 5

Pages 806–819

Date October 2002

Journal Abbr J. Ecol.

DOI 10.1046/j.1365-2745.2002.00722.x

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Extra Keywords: dendrochronology; disturbance; interactions; legacies; Rocky Mountain forests.

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Integrating climatic and fuels information into national fire risk decision support tools

Type Conference Paper

Author William Cooke

Author Valentine Anantharaj

Author Charles Wax

Author Jinmu Choi

Author Katarzyna Grala

Author Matthew Jolly

Author Grady P. Dixon

Author Jamie Dyer

Author David L. Evans

Author Gregory B. Goodrich

Abstract The Wildland Fire Assessment System (WFAS) is a component of the U.S. Department of Agriculture, Forest Service Decision Support Systems (DSS) that support fire potential modeling. Fire potential models for Mississippi and for Eastern fire environments have been developed as part of a National Aeronautic and Space Agency-funded study aimed at demonstrating the utility of NASA assets in fire potential decision support systems. Climate, fuels, topography and ignition are recognized as important components for modeling fire potential in Eastern forests and grasslands. We produced temporal and spatial water budget estimates using daily assessments of precipitation and evaporation (P-E) in a Geographic Information System. Precipitation values are derived from Doppler radar-based estimates of hourly rainfall accumulation, published on the Hydrologic Rainfall Analysis Project (HRAP) grid. Precipitation data are routinely available, but evaporation data are not. Regional estimates of evaporation have been produced to fill this void. Regression models that estimate daily evaporation in the Southern region of the United States were developed from readily available weather station observations. Evaporation estimates were combined with precipitation to compute the cumulative water budget. Improvement of these estimates when compared to Keetch-Byrum Drought Index (KBDI) was demonstrated using fire location data in Mississippi. Evapotranspiration (ET) from the NASA Land Information System (LIS), is currently being evaluated as a landscape moisture variable. We have implemented a hierarchical modeling methodology that combines information derived from ICESat (GLAS) data and MODIS Enhanced Vegetation Indices (EVI) to describe fuels structure. A graphical user interface (GUI) has been developed using Visual Basic (VB) that accesses an ESRI geospatial database that integrates water budget and fuels. The ignition component is derived from gravity models that assess the interaction of

population density and forest areal size.

Date 2007

Proceedings Title The Fire Environment--Innovations, Management, and Policy: Conference Proceedings

Conference Name The Fire Environment--Innovations, Management, and Policy; Conference Proceedings, Destin, FL. 26-30 March 2007

Place Fort Collins, CO

Publisher U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station

Pages 555-569

Series USDA Forest Service Proceedings RMRS-P-46CD

URL http://www.treesearch.fs.fed.us/pubs/28600

Archive http://www.gri.msstate.edu/publications/docs/2007/03/6207Cooke_et_al_FireRisk_DSS.pdf

Extra Keywords: wildland fire management; Wildland Fire Assessment System (WFAS); Decision Support Systems (DSS); models; dlimate; fuels; topography; ignition.

Date Added Tue Aug 30 02:03:25 2011

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Notes:

Citation:

Cooke, W.; Anantharaj, V.; Wax, C.; Choi, J.; Grala, K.; Jolly, M.; Dixon, G.P.; Dyer, J.; Evans, D.L.; Goodrich, G.B. 2007. Integrating climatic and fuels information into National Fire Risk Decision Support Tools. In: Butler, Bret W.; Cook, Wayne, comps. The fire environment--innovations, management, and policy; conference proceedings. 26-30 March 2007; Destin, FL. Proceedings RMRS-P-46CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. CD-ROM. p. 555-569.

Source:

Butler, Bret W.; Cook, Wayne, comps. 2007. The fire environment—innovations, management, and policy; conference proceedings. 26-30 March 2007; Destin, FL. Proceedings RMRS-P-46CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 662 p. CD-ROM.

Intensification of hot extremes in the United States

Type Journal Article

Author Noah S. Diffenbaugh

Author Moetasim Ashfaq

Abstract Governments are currently considering policies that will limit greenhouse gas concentrations, including negotiation of an international treaty to replace the expiring Kyoto Protocol. Existing mitigation targets have arisen primarily from political negotiations, and the ability of such policies to avoid dangerous impacts is still uncertain. Using a large suite of climate model experiments, we find that substantial intensification of hot extremes could occur within the next 3 decades, below the 2 °C global warming target currently being considered by policy makers. We also find that the intensification of hot extremes is associated with a shift towards more anticyclonic atmospheric circulation during the warm season, along with warmseason drying over much of the U.S. The possibility that intensification of hot extremes could result from relatively small increases in greenhouse gas concentrations suggests that constraining global warming to 2 °C may not be sufficient to avoid dangerous climate change.

Publication Geophysical Research Letters

Volume 37

Issue 15

Pages L15701 (5 p.)

Date August 2010

Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2010GL043888
ISSN 0094–8276
URL http://www.agu.org/pubs/crossref/2010/2010GL043888.shtml
Extra Keywords: climate change; CMIP3; RegCM3; extremes; regional climate model.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:40:16 2011

Inter-hemispheric synchrony of forest fires and the El Niño-Southern Oscillation

Type Journal Article
Author Thomas Kitzberger
Author Thomas W. Swetnam
Author Thomas T. Veblen
Abstract Fire histories were compared between the south-western United States and northern Patagonia, Argentina using both documentary records (1914–87 and 1938–96, respectively) and tree-ring reconstructions over the past several centuries. The two regions share similar fire–climate relationships and similar relationships of climatic anomalies to the El Niño–Southern Oscillation (ENSO). In both regions, El Niño events coincide with above-average cool season precipitation and increased moisture availability to plants during the growing season. Conversely, La Niña events correspond with drought conditions. Monthly patterns of ENSO indicators (southern oscillation indices and tropical Pacific sea surface temperatures) preceding years of exceptionally widespread fires are highly similar in both regions during the 20th century. Major fire years tend to follow the switching from El Niño to La Niña conditions. El Niño conditions enhance the production of fine fuels, which when desiccated by La Niña conditions create conditions for widespread wildfires. Decadal-scale patterns of fire occurrence since the mid-17th century are highly similar in both regions. A period of decreased fire occurrence in both regions from c. 1780–1830 coincides with decreased amplitude and/or frequency of ENSO events. The interhemispheric synchrony of fire regimes in these two distant regions is tentatively interpreted to be a response to decadal-scale changes in ENSO activity. The ENSO–fire relationships of the south-western USA and northern Patagonia document the importance of high-frequency climatic variation to fire hazard. Thus, in addition to long-term trends in mean climatic conditions, multi-decadal scale changes in year-to-year variability need to be considered in assessments of the potential influence of climatic change on fire regimes.
Publication Global Ecology and Biogeography
Volume 10
Issue 3
Pages 315–326
Date May 2001
Journal Abbr Global Ecol. Biogeogr.
DOI 10.1046/j.1466-822X.2001.00234.x
ISSN 1466-8238
URL http://onlinelibrary.wiley.com/doi/10.1046/j.1466-822X.2001.00234.x/full
Extra Keywords: climate-induced disturbance; El Niño–Southern Oscillation; fire synchrony; Northern Patagonia; south-western United States; tree-ring reconstructions.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:15:42 2011

Interaction of fire, climate and vegetation change at a large landscape scale in the Big Woods of Minnesota, USA

Type Journal Article
Author Charles E. Umbanhowar Jr.

Abstract The Big Woods region of Minnesota is on the prairie-forest border and is a much studied model for the interaction of climate, fire and vegetation. The purpose of this study was (a) to document the extent and timing of changes in vegetation and fire over the past 2000 years and (b) to examine the link between charcoal influx and vegetation during the eighteenth and early nineteenth centuries. To reconstruct changes in vegetation, fire and climate, sieve charcoal (120 gm), pollen, environmental magnetism and loss-on-ignition were used. Charcoal deposition at prairie lakes was 3-4 times greater than for woodland or forest lakes, consistent with current understanding of the fire dependence of prairies, but charcoal influxes to forests were considerably higher than reported elsewhere, suggesting that ground fires were more common than assumed. Regionally, charcoal deposition at a subset of 17 lakes began to change at cal. AD 1100, dating to the period of the 'Mediaeval Climate Anomaly' (MCA; cal. AD 900-1250) but preceding the 'Little Ice Age' (LIA; cal. AD 1250). For seven of 14 lakes the MCA was characterized by a significant increase in charcoal deposition. This was followed by a decrease with the onset of the LIA, which for most sites continued into the nineteenth century. Relative timing of changes in charcoal and pollen and the other proxies differed from site to site, suggesting no one single response to climatic change. This variation most likely derives from local differences in fuels and topography, as compounded by strong positive feedbacks between fuels and fire.

Publication The Holocene

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Date July 2004

Journal Abbr Holocene

DOI 10.1191/0959683604hl745rp

ISSN 0959-6836

URL http://hol.sagepub.com/cgi/doi/10.1191/0959683604hl745rp

Extra Keywords: charcoal analysis; fire; climate; vegetation; Little Ice Age; Mediaeval Climate Anomaly; pollen record; prairie-forest border; Big Woods; Minnesota.

Date Added Sat Aug 27 04:08:03 2011

Modified Sat Aug 27 15:53:06 2011

Interactions between antecedent climate and wildfire variability across south-eastern Arizona

Type Journal Article

Author Michael A. Crimmins

Author Andrew C. Comrie

Abstract Long-term antecedent climate conditions are often overlooked as important drivers of wildfire variability. Fuel moisture levels and fine-fuel productivity are controlled by variability in precipitation and temperature at long timescales (months to years) before wildfire events. This study examines relationships between wildfire statistics (total area burned and total number of fires) aggregated for south-eastern Arizona and antecedent climate conditions relative to 29 fire seasons (April–May–June) between 1973 and 2001. High and low elevation fires were examined separately to determine the influence of climate variability on dominant fuel types (low elevation grasslands with fine fuels v. high elevation forests with heavy fuels). Positive correlations between lagged precipitation and total area burned highlight the importance of climate in regulating fine fuel production for both high and low elevation fires. Surprisingly, no significant negative correlations between precipitation and seasonal wildfire statistics were found at any seasonal lag. Drought conditions were not associated with higher area burned or a greater number of fires. Larger low elevation fires were actually associated with wet antecedent conditions until just before the fire season. Larger high elevation fires were associated with wet conditions during seasons up to 3 years before the fire season.

Publication International Journal of Wildland Fire

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Issue 4

Pages 455–466

Date December 2004

Journal Abbr Int. J. Wildland Fire

DOI 10.1071/WF03064
ISSN 1049-8001
URL http://www.publish.csiro.au/?paper=WF03064
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Interactions between fire and spruce beetles in a subalpine Rocky Mountain forest landscape

Type Journal Article
Author P. Bebi
Author D. Kulakowski
Author T.T. Veblen
Abstract Interactions between natural disturbances are widely recognized as important determinants of vegetation patterns in forested landscapes but have only rarely been investigated quantitatively. In a subalpine forest landscape in northwestern Colorado, we quantified spatial associations of fire and spruce beetle (Dendroctonus rufipennis) outbreaks over more than a century and developed a multivariate logistic model of probability of occurrence of spruce beetle outbreaks. The study area, an ;2800 km2 landscape in White River National Forest, was affected by severe widespread fires around 1879 and by a spruce beetle outbreak in the 1940s, which affected most of the forests that were dominated by Picea engelmannii (Engelmann spruce) and Abies lasiocarpa (subalpine fir). The boundaries of the fires ca. 1879 and of the 1940s spruce beetle outbreaks were digitized based on an 1898 vegetation map and modern aerial photograph interpretation, and overlaid in a Geographic Information System. The areas disturbed by the ca. 1879 fires and the 1940s beetle outbreak were also overlaid with 303 fires recorded after 1950 as well as with topographic and forest structural variables. Forests that had burned in 1879 were less affected by the 1940s outbreak than older stands. On the other hand, areas affected by the 1940s spruce beetle outbreak showed no higher susceptibility to subsequent fires. A multivariate logistic model indicated that, although fire history had the greatest effect on stand susceptibility to spruce beetle outbreak, dominance of neighboring stands by spruce as well as elevation were also important predictors of outbreaks. Predictive modeling of spatial interactions between fire and spruce beetle disturbances needs to consider the high degree of variability in the nature of these interactions related to contingencies such as time since last major disturbance, topographic position, and weather during windows of potential interaction. Key words: Abies lasiocarpa; aerial photographs; Dendroctonus rufipennis; disturbance, largescale; forest fire; historical map; modeling, GIS; Picea engelmannii.
Publication The Bark Beetles, Fuels, and Fire Bibliography
Pages 20
Date 2003
Library Catalog Google Scholar
Call Number 0077
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

Interactions of large-scale disturbances: Prior fire regimes and hurricane mortality of savanna pines

Type Journal Article
Author William J. Platt
Author Brian Beckage
Author Robert F. Doren
Author Harold H. Slater
Abstract Differences in initial large-scale disturbances might change effects of subsequent large-scale disturbances. We explored possible effects of prior fire regimes on subsequent hurricane-related mortality of south Florida slash pine (Pinus elliottii var. densa) in remnant Everglades pine savannas that were unburned, burned during the wet (lightning fire) season, or burned during the dry (anthropogenic fire) season in the decade before Hurricane

Andrew (1992). We measured direct mortality during Andrew (snapped trees) and extended mortality over the subsequent 24–30 mo (mainly insect attacks on damaged trees). We used Bayesian model averaging to obtain probabilities of different models of survival based on fire regime and site characteristics (remnant area, distance to the Atlantic Ocean, depth to water table in the dry season, sustained wind speeds, tree sizes). Most likely models for direct and extended mortality included large negative effects of tree size and dry-season fire regime, and positive effects of stand area (direct mortality) and wet-season fire regime (extended mortality). Depth to water table and distance to the ocean had less certain effects. Our results, not predicted from fires or hurricanes alone, suggest that anthropogenic changes to dry-season fires strongly influence the effects of subsequent hurricanes on the mortality of pines in subtropical savannas.

Publication Ecology
Volume 83
Issue 6
Pages 1566–1572
Date June 2002
Journal Abbr Ecology
DOI 10.1890/0012-9658(2002)083[1566:IOLSDP]2.0.CO;2
ISSN 0012-9658
Short Title Interactions of large-scale disturbances
URL http://www.esajournals.org/doi/full/10.1890/0012-9658%282002%29083%5B1566%3AIOLSDP%5D2.0.CO%3B2
Extra Keywords: direct and extended mortality; dry-season fires; fire regimes; hurricanes; multiple disturbances; pine savannas; Pinus elliottii var. densa; south Florida slash pine; wet-season fires.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:30:49 2011

Interactive effects of fire and microhabitat on plants of Florida scrub

Type Journal Article
Author Eric S Menges
Author Christine V Hawkes
Abstract Fire, microhabitat, and their interactions affect Florida scrub ecosystems and their plant species. Concepts of vegetation change in the Florida upland landscape have followed successional theory, with recent models emphasizing the resilience of Florida scrub to fire and the interactive effects of the vegetation and fire regime. We extend these models by incorporating greater complexity in vegetation types and emphasizing that departures from modal fire frequencies may alter vegetation. In particular, fire exclusion leads to structural and compositional changes that, in turn, alter vegetation changes following the reintroduction of fire. Individual species responses to fire can be categorized by the demographic mechanisms of the response (e.g., resprouting, clonal growth, seedling recruitment) and by typical patterns of abundance during fire-free intervals. Various types of scrub differ in these lifehistory traits. For example, xeric rosemary scrub supports more herbs, more endemics, more specialized species, and more seeders increasing in abundance between fires as compared to less xeric scrubby flatwoods. Several of these species are demonstrated specialists for gaps, which are more abundant and persistent in rosemary scrub than in scrubby flatwoods. In scrubby flatwoods, patterns of species abundance are explainable by time since fire and the presence of gaps, and sprouters are more successful than seeders between fires. In rosemary scrub, where gaps remain long after fire, species abundance patterns reflect only gap abundance, and seeders are especially successful between fires. Because fires create or enlarge gaps that are then closed between fires (especially in less xeric habitats), gap specialists may be sensitive to both fire and microhabitat. Alteration of the modal fire regime is hypothesized to affect the proportion of sprouters and seeders, microsite diversity, and the long-term local persistence of species with different specializations for postfire response and between-fire competitive abilities. Metapopulation dynamics in a landscape patterned by edaphic gradients, a patchy and variable disturbance regime, and small-scale gap dynamics produce varied spatial and temporal patterns in species' abundances.
Publication Ecological Applications
Volume 8
Issue 4

Pages 935–946
Date November 1998
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(1998)008[0935:IEOFAM]2.0.CO;2
ISSN 1051-0761
URL http://www.jstor.org/stable/2640953
Extra Keywords: disturbance; fire and microhabitat effects on plants; fire frequency; Florida (USA) scrub ecosystems; gap dynamics; landscape; microhabitat importance; microsite diversity; rosemary scrub; sand pine scrub; scrubby flatwoods; succession, theory and model.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:46:00 2011

Interactive effects of fire, bison (Bison bison) grazing and plant community composition in tallgrass prairie

Type Journal Article
Author Mary Ann Vinton
Author David C. Hartnett
Author Elmer J. Finck
Author John M. Briggs
Abstract Fire and native large herbivore grazing were two important influences on the structure and function of North American grasslands. In 1988 and 1989 the influence of fire regime on grazing patterns of North American bison (Bison bison) was studied on the Konza Prairie in northeastern Kansas. Bison grazing was spatially and temporally nonrandom and was influenced by fire regime and local plant community composition. During the growing season, bison were observed up to 3 x more frequently than expected on watersheds burned in the spring. Summer grazing was concentrated in large watershed areas (79-119 ha) dominated by warm-season, perennial, C_4 grasses. During the autumn and winter, bison grazed both burned and unburned watersheds more uniformly but grazed most intensively in areas with large stands of cool-season, C_3 grasses. On a smaller spatial scale (5-10 m^2), bison selected patches during the growing season with low forb cover dominated by the perennial C_4 grass, Andropogon gerardii. Grazed patches were larger on frequently burned than on infrequently burned watersheds. The importance of fire history in determining patterns of bison grazing over the landscape indicates that interactions between bison grazing and fire regime may be important to the composition and spatial heterogeneity of tallgrass prairie vegetation.
Publication American Midland Naturalist
Volume 129
Issue 1
Pages 10-18
Date January 1993
Journal Abbr Am. Midl. Nat.
DOI 10.2307/2426430
ISSN 0003-0031
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Interagency Fire Regime Condition Class (FRCC) guidebook. Version 3.0

Type Document
Author Stephen W. Barrett
Author Doug Havlina

Author Jeffrey L. Jones
Author Wendel J. Hann
Author Christine K. Frame
Author Dale Hamilton
Author Kathy Schon
Author Thomas E. Demeo
Author Lee C. Hutter
Author James P. Menakis

Abstract An understanding of fire regimes, ecological departure from historical reference conditions, and landscape pattern is an important part of modern land management. Federal initiatives such as the 2001 National Fire Plan continue to emphasize the restoration of fire-adapted ecosystems and maintenance of land health. Developed in 2003, the Fire Regime Condition Class (FRCC) assessment system has provided a vital connection between managers' understanding of fire regimes, ecological departure, and efforts to maintain sustainable landscapes (USDA, USDI 10-Year Comprehensive Strategy and Implementation Plans 2001-2002). The FRCC Standard Landscape assessment system provides tools for fire regime and vegetation assessment at the both the landscape and stand scales. These methods can be used to describe general fire regime and vegetation traits for the historical (reference condition) versus current periods to produce departure estimates. (In this document, the terms "historical," "reference," and "natural" all refer to native ecosystems as they existed prior to EuroAmerican settlement.) Fire Regime Condition Class is defined as follows: FRCC 1 represents ecosystems with low (<33 percent) departure from a defined reference period – that is, landscapes still within the natural or historical range of variation; FRCC 2 indicates ecosystems with moderate (33 to 66 percent) departure; and FRCC 3 indicates ecosystems with high (>66 percent) departure from reference conditions. The Interagency Fire Regime Condition Class Guidebook applies – at a finer scale and with minor refinements – the original FRCC concepts and definitions published in Hardy and others (2001), Hann and Bunnell (2001), and Schmidt and others (2002). FRCC assessment methods were developed and implemented by an interagency working group partnered with The Nature Conservancy, with oversight of the FRCC program provided by the National Interagency Fuels Management Committee. In addition, the FRCC methods, software, website, and associated publications have been developed in parallel with the national LANDFIRE vegetation, wildland fuel, and fire regime mapping project. The FRCC Guidebook includes two procedures for determining FRCC: the FRCC Standard Landscape Worksheet Method and the FRCC Standard Landscape Mapping Method. These methods allow the user to quantify FRCC from the landscape to stand scales. Importantly, the stand-scale outputs can help users satisfy treatment reporting requirements, such as those contained in the National Fire Plan Operations and Reporting System (NFPORS). The FRCC Guidebook provides step-by-step instructions for conducting assessments with the non-spatial FRCC Standard Landscape Worksheet Method (see Chapter 3). In addition, Chapter 4 provides an overview of two custom software tools. First, the FRCC Software Application (FRCCSA) provides a convenient way to quickly calculate and graph FRCC outcomes via the Standard Landscape Worksheet Method. Second, the FRCC Mapping Tool (FRCCMT) is GIS software that uses the Standard Landscape Mapping Method to generate spatial assessments of FRCC. Regarding user support, www.frcc.gov provides biophysical settings models, data entry forms, downloadable software, training opportunities, a helpdesk contact, and other FRCC-related resources (details provided below).

Publisher USDA Forest Service, US Department of the Interior, and The Nature Conservancy
Date September 2010
Short Title Interagency FRCC Guidebook
URL http://www.fire.org/niftt/released/FRCC_Guidebook_2010_final.pdf
Loc. in Archive Fire and Research Management Exchange System (FRAMES)
Call Number 0000
Extra Keywords: FRCC (Fire Regime Condition Class); landscape assessment; NIFTT (National Interagency Fuels Technology Team).
Date Added Tue Aug 23 01:54:38 2011
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Notes:

Citation:

Barrett, S.; Havlina, D.; Jones, J.; Hann, W.; Frame, C.; Hamilton, D.; Schon, K.; Demeo, T.; Hutter, L.; and Menakis, J. 2010.

Interagency Fire Regime Condition Class Guidebook. Version 3.0 [Homepage of the Interagency Fire Regime Condition Class website, USDA Forest Service, US Department of the Interior, and The Nature Conservancy]. [Online], Available: www.frcc.gov.

Interannual extremes in the rate of rise of atmospheric carbon dioxide since 1980

Type Journal Article
Author Charles D. Keeling
Author Timothy P. Whorf
Author Martin Wahlen
Author Johannes van der Plicht
Abstract OBSERVATIONS of atmospheric CO_2 concentrations at Mauna Loa, Hawaii, and at the South Pole over the past four decades show an approximate proportionality between the rising atmospheric concentrations and industrial CO_2 emissions. This proportionality, which is most apparent during the first 20 years of the records, was disturbed in the 1980s by a disproportionately high rate of rise of atmospheric CO_2, followed after 1988 by a pronounced slowing down of the growth rate. To probe the causes of these changes, we examine here the changes expected from the variations in the rates of industrial CO_2 emissions over this time, and also from influences of climate such as El Niño events. We use the $^{13}C/^{12}C$ ratio of atmospheric CO_2 to distinguish the effects of interannual variations in biospheric and oceanic sources and sinks of carbon. We propose that the recent disproportionate rise and fall in CO_2 growth rate were caused mainly by interannual variations in global air temperature (which altered both the terrestrial biospheric and the oceanic carbon sinks), and possibly also by precipitation. We suggest that the anomalous climate-induced rise in CO_2 was partially masked by a slowing down in the growth rate of fossil-fuel combustion, and that the latter then exaggerated the subsequent climate-induced fall.
Publication Nature
Volume 375
Issue 6533
Pages 666–670
Date 22 June 1995
Journal Abbr Nature
DOI 10.1038/375666a0
ISSN 0028-0836
URL http://www.nature.com/nature/journal/v375/n6533/abs/375666a0.html
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:12:23 2011

Interannual variability in primary production in tallgrass prairie: Climate, soil moisture, topographic position, and fire as determinants of aboveground biomass

Type Journal Article
Author John M. Briggs
Author Alan K. Knapp
Abstract From 1975 to 1993, aboveground net primary production (NPP) at the Konza Prairie Research Natural Area in NE Kansas varied from 179 g/m2 to 756 g/m2. Across a variety of sites, NPP was significantly related to precipitation ($r^2 = 0.37$), but much variability was unexplained. Thus, we evaluated the relationship between NPP with meteorological variables and soil moisture measurements in tallgrass prairie sites that varied in fire frequency and topographic position. Annually burned lowland sites had significantly higher NPP than either annually burned upland or unburned sites. NPP in burned sites was more strongly related to meteorological variables and soil moisture when compared to unburned sites. The lack of significant correlation between soil moisture with NPP on unburned sites suggests that factors other than water availability limit production in these sites. When NPP data were analyzed separately by life forms, interannual variability in forb NPP was not correlated with any meteorological variables, but was negatively correlated with grass NPP ($r = -0.49$). The

inability of a single factor, such as precipitation to explain a large portion of the interannual variability in NPP is consistent with the concept that patterns of NPP in tallgrass prairie are a product of spatial and temporal variability in light, water, and nutrients, driven by a combination of topography, fire history, and climate.

Publication American Journal of Botany
Volume 82
Issue 8
Pages 1024-1030
Date August 1995
Journal Abbr Am. J. Bot.
DOI 10.2307/2446232
ISSN 0002-9122
Short Title Interannual Variability in Primary Production in Tallgrass Prairie
URL http://www.jstor.org/stable/2446232
Date Added Mon Aug 29 02:11:01 2011
Modified Mon Aug 29 02:17:43 2011

Interannual variability in the oxygen isotopes of atmospheric CO2 driven by El Niño

Type Journal Article
Author Lisa R. Welp
Author Ralph F. Keeling
Author Harro A. J. Meijer
Author Alane F. Bollenbacher
Author Stephen C. Piper
Author Kei Yoshimura
Author Roger J. Francey
Author Colin E. Allison
Author Martin Wahlen
Abstract The stable isotope ratios of atmospheric CO2 (18O/16O and 13C/12C) have been monitored since 1977 to improve our understanding of the global carbon cycle, because biosphere–atmosphere exchange fluxes affect the different atomic masses in a measurable way1. Interpreting the 18O/16O variability has proved difficult, however, because oxygen isotopes in CO2 are influenced by both the carbon cycle and the water cycle2. Previous attention focused on the decreasing 18O/16O ratio in the 1990s, observed by the global Cooperative Air Sampling Network of the US National Oceanic and Atmospheric Administration Earth System Research Laboratory. This decrease was attributed variously to a number of processes including an increase in Northern Hemisphere soil respiration3; a global increase in C4 crops at the expense of C3 forests4; and environmental conditions, such as atmospheric turbulence5 and solar radiation6, that affect CO2 exchange between leaves and the atmosphere. Here we present 30 years' worth of data on 18O/16O in CO2 from the Scripps Institution of Oceanography global flask network and show that the interannual variability is strongly related to the El Niño/Southern Oscillation. We suggest that the redistribution of moisture and rainfall in the tropics during an El Niño increases the 18O/16O ratio of precipitation and plant water, and that this signal is then passed on to atmospheric CO2 by biosphere–atmosphere gas exchange. We show how the decay time of the El Niño anomaly in this data set can be useful in constraining global gross primary production. Our analysis shows a rapid recovery from El Niño events, implying a shorter cycling time of CO2 with respect to the terrestrial biosphere and oceans than previously estimated. Our analysis suggests that current estimates of global gross primary production, of 120 petagrams of carbon per year7, may be too low, and that a best guess of 150–175 petagrams of carbon per year better reflects the observed rapid cycling of CO2. Although still tentative, such a revision would present a new benchmark by which to evaluate global biospheric carbon cycling models.
Publication Nature
Volume 477
Pages 579-582
Date 2011-9-28

DOI 10.1038/nature10421
ISSN 0028-0836, 1476-4687
URL http://www.nature.com/doifinder/10.1038/nature10421
Accessed Mon Oct 3 19:15:37 2011
Library Catalog CrossRef
Call Number 0001
Date Added Thu Oct 6 11:56:03 2011
Modified Thu Oct 6 11:56:03 2011

Interannual variability of global biomass burning emissions from 1997 to 2004

Type Journal Article
Author Guido R. van der Werf
Author James T. Randerson
Author Louis Giglio
Author G. James Collatz
Author Prasad S. Kasibhatla
Author Avelino F. Arellano Jr.
Abstract Biomass burning represents an important source of atmospheric aerosols and greenhouse gases, yet little is known about its interannual variability or the underlying mechanisms regulating this variability at continental to global scales. Here we investigated fire emissions during the 8 year period from 1997 to 2004 using satellite data and the CASA biogeochemical model. Burned area from 2001–2004 was derived using newly available active fire and 500 m burned area datasets from MODIS following the approach described by Giglio et al. (2005). ATSR and VIRS satellite data were used to extend the burned area time series back in time through 1997. In our analysis we estimated fuel loads, including peatland fuels, and the net flux from terrestrial ecosystems as the balance between net primary production (NPP), heterotrophic respiration (Rh), and biomass burning, using time varying inputs of precipitation (PPT), temperature, solar radiation, and satellite-derived fractional absorbed photosynthetically active radiation (fAPAR). For the 1997–2004 period, we found that on average approximately 58 Pg C year^{-1} was fixed by plants, and approximately 95% of this was returned back to the atmosphere via Rh. Another 4%, or 2.5 Pg C year^{-1} was emitted by biomass burning; the remainder consisted of losses from fuel wood collection and subsequent burning. At a global scale, burned area and total fire emissions were largely decoupled from year to year. Total carbon emissions tracked burning in forested areas (including deforestation fires in the tropics), whereas burned area was largely controlled by savanna fires that responded to different environmental and human factors. Biomass burning emissions showed large interannual variability with a range of more than 1 Pg C year^{-1}, with a maximum in 1998 (3.2 Pg C year^{-1}) and a minimum in 2000 (2.0 Pg C year^{-1}).
Publication Atmospheric Chemistry and Physics
Volume 6
Issue 11
Pages 3423-3441
Date August 2006
Journal Abbr Atmos. Chem. Phys.
DOI 10.5194/acp-6-3423-2006
ISSN 1680-7375
URL http://www.atmos-chem-phys.net/6/3423/2006/acp-6-3423-2006.html
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:53:33 2011

Interannual variations in fire weather, fire extent, and synoptic-scale circulation patterns in northern California and Oregon

Type Journal Article
Author Valérie Trouet
Author Alan H. Taylor
Author Andrew M. Carleton
Author Carl N. Skinner
Abstract The Mediterranean climate region on the west coast of the United States is characterized by wet winters and dry summers, and by high fire activity. The importance of synoptic-scale circulation patterns (ENSO, PDO, PNA) on fire-climate interactions is evident in contemporary fire data sets and in pre-Euroamerican tree-ring-based fire records. We investigated how interannual variability in two fire weather indices, the Haines index (HI) and the Energy Release Component (ERC), in the Mediterranean region of southern Oregon and northern California is related to atmospheric circulation and fire extent. Years with high and low fire weather index values corresponded to years with a high and low annual area burned, respectively. HI combines atmospheric moisture with atmospheric instability and variation in HI was more strongly associated with interannual variation in wildfire extent than ERC, which is based on moisture alone. The association between fire extent and HI was also higher for fires in southern Oregon than in northern California. In terms of synoptic-scale circulation patterns, years of high fire risk (i.e., increased potential for erratic fire behavior, represented by HI and ERC) were associated with positive winter PNA and PDO conditions, characterized by enhanced regional mid-tropospheric ridging and low atmospheric moisture. The time lag we found between fire risk potential and prior winter circulation patterns could contribute to the development of long-lead fire-climate forecasting.
Publication Theoretical and Applied Climatology
Volume 95
Issue 3-4
Pages 349–360
Date March 2009
Journal Abbr Theor. Appl. Climatol.
DOI 10.1007/s00704-008-0012-x
ISSN 0177-798X
URL http://www.springerlink.com/content/041j873107u87064/
Extra Keywords: fire climate; PDO; PNA; ENSO; Haines Index; energy release component.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:29 2011

Interdecadal modulation of El Niño amplitude during the past millennium

Type Journal Article
Author Jinbao Li
Author Shang-Ping Xie
Author Edward R. Cook
Author Gang Huang
Author Rosanne D'Arrigo
Author Fei Liu
Author Jian Ma
Author Xiao-Tong Zheng
Abstract The El Niño/Southern Oscillation (ENSO) is the dominant mode of interannual climate variability on Earth, alternating between anomalously warm (El Niño) and cold (La Niña) conditions in the tropical Pacific at intervals of 2–8 years. The amplitude of ENSO variability affects the occurrence and predictability of climate extremes around the world, but our ability to detect and predict changes in ENSO amplitude is limited by the fact that the instrumental record is too short to characterize its natural variability. Here we use the North American Drought Atlas—a database of drought reconstructions based on tree-ring records—to produce a continuous, annually resolved record of ENSO variability over the past 1,100 years. Our record is in broad agreement with independent, ENSO-sensitive proxy records in the Pacific and surrounding regions. Together,

these records indicate that ENSO amplitude exhibits a quasi-regular cycle of 50–90 years that is closely coupled to the tropical Pacific mean state. Anomalously warm conditions in the eastern Pacific are associated with enhanced ENSO variability, consistent with model simulations. The quasi-periodic ENSO amplitude modulation reported here offers a key observational constraint for improving models and their prediction of ENSO behaviour linked to global warming.

Publication Nature Climate Change
Volume 1
Issue 2
Pages 114-118
Date May 2011
Journal Abbr Nature Climate Change
DOI 10.1038/nclimate1086
ISSN 1758-678X
URL http://www.nature.com/doifinder/10.1038/nclimate1086
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:32 2011

International classification of ecological communities: Terrestrial vegetation of the United States

Type Book
Author Dennis H. Grossman
Author Don Faber-Langendoen
Author Alan S. Weakley
Author Mark Anderson
Author Patrick Bourgeron
Author Ralph Crawford
Author Kathleen Goodin
Author Sally Landaal
Author Kenneth Metzler
Author Karen Patterson
Author Milo Pyne
Author Marion Reid
Author Lesley Sneddon
Abstract no abstract
Volume 1
# of Volumes 2
Place Arlington, Virginia
Publisher The Nature Conservancy
Date 1998
# of Pages 126 p. (Vol. I)
ISBN 0-9624590-1-1
Short Title International classification of ecological communities
URL http://www.natureserve.org/explorer/classeco.htm
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:21 2011

Notes:

Citation:

Grossman, D. H., D. Faber-Langendoen, A. S. Weakley, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, S. Landaal, K. Metzler, K. D. Patterson, M. Pyne, M. Reid, and L. Sneddon. 1998. International classification of ecological communities: terrestrial vegetation of the United States. Volume I. The National Vegetation Classification System: development, status, and applications. The Nature Conservancy, Arlington, Virginia, USA.

Intervals between prescribed fires in Australia: what intrinsic variation should apply?

Type Journal Article
Author A. Malcolm Gill
Author Michael A. McCarthy
Abstract Because of increasing concern over the constancy of intervals between prescribed fires within a vegetation type, we examine various sources of evidence that can be used to determine variation appropriate to the conservation of biodiversity while minimizing the chances of economically destructive fires. Primary juvenile periods of plants (especially of'serotinous seeders') and non-breeding periods of birds (especially poorly dispersed species) suggest extreme lower limits for fire intervals whereas longevity of plant species which usually only reproduce after fire, set the extreme upper limits. Modelling of the behaviour of selected plant and animal species may be used to set 'optimal' mean intervals. Historical fire-interval data might seem a useful way to determine the variation about the mean fire-interval but data are scarce and interpretations are controversial. The Weibull distribution and its special case, the negative exponential distribution, have been the most supported in North American studies of unplanned fires. It has been argued that fire-interval distributions, before European settlement at least, were largely the result of large fires during, or following, extreme weather events (dry in forests, wet in the arid zone). Long weather records are most beneficial when they can be related to the areas burned each year. Practical solutions to the question 'what range of fire intervals should be used at any one site' may be achieved using highly simplified skewed distributions, constructed on the basis of land-management objectives
Publication Biological Conservation
Volume 85
Issue 1-2
Pages 161-169
Date July-August 1998
Journal Abbr Biol. Conserv.
DOI 10.1016/S0006-3207(97)00121-3
ISSN 0006-3207
Short Title Intervals between prescribed fires in Australia
URL http://www.sciencedirect.com/science/article/B6V5X-3TP5RMP-1D/2/cc6190996420d83b4ac29dfc5d4eee1d
Extra Keywords: prescribed fire; fire intervals; fire frequency; conservation; biodiversity; fire suppression.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 16:09:22 2011

Introduction to fire and the palaeoenvironment

Type Journal Article
Author Andrew C. Scott
Author Jenny Moore
Author Barbara Brayshay
Abstract no abstract
Publication Palaeogeography, Palaeoclimatology, Palaeoecology
Volume 164
Issue 1-4
Pages vii-xi

Date December 2000
Journal Abbr PALAEO
DOI 10.1016/S0031-0182(00)00165-6
ISSN 0031-0182
URL http://www.sciencedirect.com/science?_ob=ArticleURL&…
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:12 2011

Introduction to wildland fire

Type Book
Author Stephen J. Pyne
Author Patricia L. Andrews
Author Richard D. Laven
Abstract Introduction to Wildland Fire, Second Edition provides a comprehensive resource for studying the fundamentals of fire behavior, its ecological effects, and its cultural and institutional framework. This new Second Edition expands and updates the coverage of the field and explores the subject of wildfire management in a broad scientific, technical, and social context. Written by recognized authorities on fire management, it presents the fundamental physics and chemistry of fire, fire behavior, wildland fuels, the interaction of fires and weather, the ecological effects of fires, the structure of fire management programs, planning efforts, suppression strategies, prescribed fires, and global fire management. The new edition also includes such current problems as the burning of the Amazon rain forest and the implications of the recent drought-related fires that have plagued urban areas bordering on wilderness land. Throughout the book the authors keep the subject of fire itself central. They begin by identifying, clarifying, and consolidating the basic concepts and literature of fire as a natural occurrence in the environment. General principles are illustrated with reference to specific events, and the natural incidence of fire is related to its cultural causes and effects. Introduction to Wildland Fire, Second Edition provides foresters, range scientists, environmentalists, ecologists, and administrators of federal and state agencies with an authoritative and comprehensive resource.
Edition 2nd edition
Place New York, NY
Publisher John Wiley & Sons Inc.
Date April 1996
# of Pages 808 p.
ISBN 0471549134, 9780471549130
URL http://books.google.com/books?id=yT6bzpUyFIwC&…
Extra Wiley Books: http://www.wiley.com/WileyCDA/WileyTitle/productCd-0471549134.html
Date Added Sun Aug 28 01:18:09 2011
Modified Wed Aug 31 00:43:54 2011

Notes:

Table of Contents:

Topics:

Written by recognized authorities on fire management, Introduction to Wildland Fire, Second Edition offers thorough coverage of the complex subject of wildland fire and its management in a broad scientific, technical, and social context. Topics include:

- The chemistry and physics of fire
- Fire behavior, including the influences of fuel and weather
- The ecological effects of fire
- The cultural and institutional framework of fire management
- Fire management and suppression
- Prescribed fire
- Global fire

Invasive plants and fire in the deserts of North America

Type Conference Paper

Author M.L. Brooks

Author D.A. Pyke

Abstract Invasive plants and fire create substantial challenges for land managers in the deserts of North America. Invasive plants can compete with native plants, alter wildlife habitat, and promote the spread of fire where it was historically infrequent. Increased fire frequency in the Mojave and Sonoran deserts has converted native shrublands to alien annual grasslands. Fire suppression and overgrazing of livestock has allowed native woody shrubs, such as mesquite (Prosopis spp.) and creosotebush (Larrea tridentata), to invade perennial grasslands in the Chihuahuan Desert, and native trees, such as juniper (Juniperus spp.) and pinyon (Pinus spp.), to invade sagebrush (Artemisia spp.) steppe in the Great Basin. The reintroduction of fire can be complicated by the positive effect of fire on alien invasive plants, and the subsequent effects of invasives on post-fire establishment by native species. Invasive alien grasses especially benefit from fire, and promote recurrent fire, in many cases to the point where native species cannot persist and native plant assemblages are converted to alien-invaded annual grasslands. This vegetation type-conversion can affect wildlife ranging from herbivores to carnivores and reduce overall biodiversity. The effective management of many wildlife species can depend on the control of invasive plants and the maintenance of appropriate fire regimes. Fire can be used to either control invasive species or to restore historical fire regimes. However, the decision to use fire as a management tool must consider the potential interrelationships between fire and invasive species. Historical fire regimes did not occur in the presence of many invasive plants that are currently widespread, and the use of fire may not be a feasible or appropriate management action if fire-tolerant invasive plants are present. The management of fire and invasive plants must be closely integrated for each to be managed effectively. keywords: desert, disturbance, fire, invasive plants, land management, North America.

Date 2000

Proceedings Title Proceedings of the invasive species workshop: the role of fire in the control and spread of invasive species. Fire Conference

Pages 1–14

Library Catalog Google Scholar

Call Number 0099

Date Added Mon Oct 10 11:01:14 2011

Modified Mon Oct 10 11:01:14 2011

Investing in the future: Ecological restoration and the USDA Forest Service

Type Journal Article
Author Dale Bosworth
Author Hutch Brown
Abstract no abstract
Publication Journal of Forestry
Volume 105
Issue 4
Pages 208-212
Date June 2007
Journal Abbr J. Forest
ISSN 0022-1201
Short Title Investing in the Future
URL http://ddr.nal.usda.gov/handle/10113/3146
Date Added Tue Aug 23 03:05:13 2011
Modified Wed Aug 24 04:28:29 2011

IPCC Special report on emissions scenarios (SRES)

Type Book
Editor Nebojsa Nakićenović
Editor Rob Swart
Abstract Preface: The Intergovernmental Panel on Climate Change (IPCC) was established jointly by the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) to assess periodically the science, impacts, and socio-economics of climate change and of adaptation and mitigation options. The IPCC provides, on request, scientific and technical advice to the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) and its bodies. In response to a 1994 evaluation of the earlier IPCC IS92 emissions scenarios, the 1996 Plenary of the IPCC requested this Special Report on Emissions Scenarios (SRES) (see Appendix I for the Terms of Reference). This report was accepted by the Working Group III (WGIII) plenary session in March 2000. The long-term nature and uncertainty of climate change and its driving forces require scenarios that extend to the end of the 21st century. This report describes the new scenarios and how they were developed. The SRES scenarios cover a wide range of the main driving forces of future emissions, from demographic to technological and economic developments. As required by the Terms of Reference, none of the scenarios in the set includes any future policies that explicitly address climate change, although all scenarios necessarily encompass various policies of other types. The set of SRES emissions scenarios is based on an extensive assessment of the literature, six alternative modelling approaches, and an "open process" that solicited wide participation and feedback from many groups and individuals. The SRES scenarios include the range of emissions of all relevant species of greenhouse gases (GHGs) and sulfur and their driving forces. The SRES writing team included more than 50 members from 18 countries who represent a broad range of scientific disciplines, regional backgrounds, and non-governmental organizations (see Appendix II). The team, led by Nebojsa Nakicenovic of the International Institute for Applied Systems Analysis (IIASA) in Austria, included representatives of six scenario modeling groups and lead authors from all three earlier IPCC scenario activities - the 1990 and 1992 scenarios and the 1994 scenario evaluation. The SRES preparation included six major steps: • analysis of existing scenarios in the literature; • analysis of major scenario characteristics, driving forces, and their relationships; • formulation of four narrative scenario "storylines" to describe alternative futures; • quantification of each storyline using a variety of modelling approaches; • an "open" review process of the resultant emission scenarios and their assumptions; and • three revisions of the scenarios and the report subsequent to the open review process, i.e., the formal IPCC Expert Review and the final combined IPCC Expert and Government Review. As required by the Terms

of Reference, the SRES preparation process was open with no single "official" model and no exclusive "expert teams." To this end, in 1997 the IPCC advertised in relevant scientific journals and other publications to solicit wide participation in the process. A web site documenting the SRES process and intermediate results was created to facilitate outside input. Members of the writing team also published much of their background research in the peer-reviewed literature and on web sites. In June 1998, the IPCC Bureau agreed to make the unapproved, preliminary scenarios available to climate modelers, who could use the scenarios as a basis for the assessment of climatic changes in time for consideration in the IPCC's Third Assessment Report. We recommend that the new scenarios be used not only in the IPCC's future assessments of climate change, its impacts, and adaptation and mitigation options, but also as the basis for analyses by the wider research and policy community of climate change and other environmental problems.

Place	Cambridge, United Kingdom
Publisher	Cambridge University Press
Date	2000
# of Pages	612 p.
ISBN	92-9169-113-5
URL	http://www.grida.no/publications/other/ipcc_sr/?src=/climate/ipcc/emission/
Library Catalog	IPCC
Extra	http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=0
Date Added	Sat Aug 27 22:34:48 2011
Modified	Sat Aug 27 23:08:26 2011

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Authors:

Nebojsa Nakicenovic, Joseph Alcamo, Gerald Davis, Bert de Vries, Joergen Fenhann, Stuart Gaffin, Kenneth Gregory, Arnulf Grübler, Tae Yong Jung, Tom Kram, Emilio Lebre La Rovere, Laurie Michaelis, Shunsuke Mori, Tsuneyuki Morita, William Pepper, Hugh Pitcher, Lynn Price, Keywan Riahi, Alexander Roehrl, Hans-Holger Rogner, Alexei Sankovski, Michael Schlesinger, Priyadarshi Shukla, Steven Smith, Robert Swart, Sascha van Rooijen, Nadejda Victor, Zhou Dadi

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IPCC: Cherish it, tweak it or scrap it?

Type	Journal Article
Author	Mike Hulme
Author	Eduardo Zorita
Author	Thomas F. Stocker
Author	Jeff Price
Author	John R. Christy
Abstract	As calls for reform intensify following recent furores about e-mails, conflicts of interest, glaciers and extreme weather, five climatologists propose ways forward for the Intergovernmental Panel on Climate Change. Their suggestions range from reaffirming the panel's governing principles to increasing the number and speed of its publications to replacing the volunteer organization with a permanently staffed structure.
Publication	Nature
Volume	463
Issue	7282
Pages	730-732
Date	11 February 2010
Journal Abbr	Nature
DOI	10.1038/463730a
ISSN	0028-0836
Short Title	IPCC

URL http://www.nature.com/nature/journal/v463/n7282/full/463730a.html
Call Number 0000
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:30:52 2011

Irreversible climate change due to carbon dioxide emissions

Type Journal Article
Author Susan Solomon
Author Gian-Kasper Plattner
Author Reto Knutti
Author Pierre Friedlingstein
Abstract The severity of damaging human-induced climate change depends not only on the magnitude of the change but also on the potential for irreversibility. This paper shows that the climate change that takes place due to increases in carbon dioxide concentration is largely irreversible for 1,000 years after emissions stop. Following cessation of emissions, removal of atmospheric carbon dioxide decreases radiative forcing, but is largely compensated by slower loss of heat to the ocean, so that atmospheric temperatures do not drop significantly for at least 1,000 years. Among illustrative irreversible impacts that should be expected if atmospheric carbon dioxide concentrations increase from current levels near 385 parts per million by volume (ppmv) to a peak of 450–600 ppmv over the coming century are irreversible dry-season rainfall reductions in several regions comparable to those of the "dust bowl" era and inexorable sea level rise. Thermal expansion of the warming ocean provides a conservative lower limit to irreversible global average sea level rise of at least 0.4–1.0 m if 21st century CO_2 concentrations exceed 600 ppmv and 0.6–1.9 m for peak CO_2 concentrations exceeding ≈1,000 ppmv. Additional contributions from glaciers and ice sheet contributions to future sea level rise are uncertain but may equal or exceed several meters over the next millennium or longer.
Publication Proceedings of the National Academy of Sciences
Volume 106
Issue 6
Pages 1704-1709
Date February 10, 2009
Journal Abbr PNAS
DOI 10.1073/pnas.0812721106
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.0812721106
Extra Keywords: dangerous interference; precipitation; sea level rise; warming.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:34 2011

Is the climate warming or cooling?

Type Journal Article
Author David R. Easterling
Author Michael F. Wehner
Abstract Numerous websites, blogs and articles in the media have claimed that the climate is no longer warming, and is now cooling. Here we show that periods of no trend or even cooling of the globally averaged surface air temperature are found in the last 34 years of the observed record, and in climate model simulations of the 20th and 21st century forced with increasing greenhouse gases. We show that the climate over the 21st century can and likely will produce periods of a decade or two where the globally averaged surface air temperature shows no trend or even slight cooling in the presence of longer-term warming.
Publication Geophysical Research Letters
Volume 36

Issue	8
Pages	L08706 (3 P.)
Date	April 2009
Journal Abbr	Geophys. Res. Lett.
DOI	10.1029/2009GL037810
ISSN	0094-8276
URL	http://www.agu.org/pubs/crossref/2009/2009GL037810.shtml
Extra	Keywords: global warming; climate change.
Date Added	Sun Aug 28 05:42:07 2011
Modified	Sun Aug 28 05:44:20 2011

Is the longleaf type a climax?

Type	Journal Article
Author	Herman H. Chapman
Abstract	no abstract
Publication	Ecology
Volume	13
Issue	4
Pages	328–334
Date	October 1932
Journal Abbr	Ecology
DOI	10.2307/1932309
ISSN	0012-9658
URL	http://www.jstor.org/stable/1932309
Date Added	Tue Aug 30 02:03:25 2011
Modified	Wed Aug 31 00:34:28 2011

Joseph Fourier, the "greenhouse effect', and the quest for a universal theory of terrestrial temperatures

Type	Journal Article
Author	James R. Fleming
Abstract	The central role that the theory of terrestrial temperatures played in Fourier’s mathematical physics has not received the attention it deserves from historians, although his cryptic allusions to the heating of a greenhouse, taken out of context, have been widely cited by subsequent authors.
Publication	Endeavour
Volume	23
Issue	2
Pages	72–75
Date	1999
Journal Abbr	Endeavour
DOI	10.1016/S0160-9327(99)01210-7
ISSN	0160-9327
URL	http://www.sciencedirect.com/science/article/pii/S0160932799012107
Date Added	Mon Aug 29 05:19:52 2011
Modified	Wed Aug 31 00:41:19 2011

Land management: Forests, fires and climate

Type Journal Article

Author Cathy Whitlock

Abstract A new analysis of the effect of climatic variation on forest fires goes back several thousand years. One take-home message is that a one-size-fits-all forest management strategy is, literally, short-sighted.

Publication Nature

Volume 432

Issue 7013

Pages 28-29

Date 4 November 2004

Journal Abbr Nature

DOI 10.1038/432028a

ISSN 0028-0836

URL http://www.nature.com/doifinder/10.1038/432028a

Date Added Sat Aug 27 00:55:16 2011

Modified Wed Aug 31 00:27:41 2011

Land-use history (1720-1992), composition, and dynamics of oak-pine forests within the Piedmont and Coastal Plain of northern Virginia

Type Journal Article

Author David A. Orwig

Author Marc D. Abrams

Abstract Woody vegetation was surveyed in 58 forest stands in northern Virginia to examine the effects of previous land-use history on past and present-day forest composition and dynamics. Stands were separated using detrended correspondence analysis (DCA) and overstory importance values into three forest groups: (i) white oak (Quercusalba L.)–tulip-poplar (Liriodendrontulipifera L.) (ii) white oak–scarlet oak (Quercuscoccinea Muenchh.) and (iii) Virginia pine (Pinusvirginiana Mill.) The first DCA axis represents a successional continuum from more recently disturbed areas containing young pine forests to less disturbed mature oak stands, and is negatively correlated with stand age and species diversity. White oak and red oak (Quercusrubra L.) dominated presettlement forests in the area. Following European settlement, forests experienced intense logging associated with the charcoal iron industry, large-scale clearing for agriculture, and subsequent land abandonment. By coupling radial growth analysis with age–diameter figures, we evaluated the responses of stands to disturbances associated with various land-use practices. This analysis indicated that many Virginia pine stands resulted from agricultural abandonment during the early 1900s, while a majority of oak stands experienced peak recruitment and radial growth following periodic logging disturbances in the 1800s. Canopy closure, forest protection, and reduced fire and logging disturbance this century led to increases in dogwood (Cornusflorida L.) and blackgum (Nyssasylvatica Marsh.) in area forests. The oldest stands exhibited a lack of tall oak regeneration; however, they also contained a scarcity of potential oak replacement species. Therefore, oak will seemingly share future dominance with several mixed-mesophytic species, although the exact successional status of these stands is unresolved.

Publication Canadian Journal of Forest Research

Volume 24

Issue 6

Pages 1216–1225

Date June 1994

Journal Abbr Can. J. For. Res.

DOI 10.1139/x94-160

ISSN 0045-5067

URL http://www.nrcresearchpress.com/doi/abs/10.1139/x94-160

Date Added Sat Aug 27 18:47:28 2011
Modified Sat Aug 27 18:47:28 2011

Land-use pressure and a transition to forest-cover loss in the eastern United States

Type Journal Article
Author Mark A. Drummond
Author Thomas R. Loveland
Abstract Contemporary land-use pressures have a significant impact on the extent and condition of forests in the eastern United States, causing a regional-scale decline in forest cover. Earlier in the 20th century, land cover was on a trajectory of forest expansion that followed agricultural abandonment. However, the potential for forest regeneration has slowed, and the extent of regional forest cover has declined by more than 4.0%. Using remote-sensing data, statistical sampling, and change-detection methods, this research shows how land conversion varies spatially and temporally across the East from 1973–2000, and how those changes affect regional land-change dynamics. The analysis shows that agricultural land use has continued to decline, and that this enables forest recovery; however, an important land-cover transition has occurred, from a mode of regional forest-cover gain to one of forest-cover loss caused by timber cutting cycles, urbanization, and other land-use demands.
Publication BioScience
Volume 60
Issue 4
Pages 286-298
Date April 2010
Journal Abbr BioScience
DOI 10.1525/bio.2010.60.4.7
ISSN 0006-3568
URL http://www.jstor.org/stable/10.1525/bio.2010.60.4.7
Extra Keywords: forest cover; land-use change; forest transition; eastern United States.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:58 2011

LANDFIRE: A nationally consistent vegetation, wildland fire, and fuel assessment

Type Journal Article
Author Matthew G. Rollins
Abstract LANDFIRE is a 5-year, multipartner project producing consistent and comprehensive maps and data describing vegetation, wildland fuel, fire regimes and ecological departure from historical conditions across the United States. It is a shared project between the wildland fire management and research and development programs of the US Department of Agriculture Forest Service and US Department of the Interior. LANDFIRE meets agency and partner needs for comprehensive, integrated data to support landscape-level fire management planning and prioritization, community and firefighter protection, effective resource allocation, and collaboration between agencies and the public. The LANDFIRE data production framework is interdisciplinary, science-based and fully repeatable, and integrates many geospatial technologies including biophysical gradient analyses, remote sensing, vegetation modelling, ecological simulation, and landscape disturbance and successional modelling. LANDFIRE data products are created as 30-m raster grids and are available over the internet at www.landfire.gov, accessed 22 April 2009. The data products are produced at scales that may be useful for prioritizing and planning individual hazardous fuel reduction and ecosystem restoration projects; however, the applicability of data products varies by location and specific use, and products may need to be adjusted by local users.
Publication International Journal of Wildland Fire
Volume 18
Issue 3

Pages 235–249
Date May 2009
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF08088
ISSN 1448-5516
Short Title LANDFIRE
URL http://www.publish.csiro.au/?paper=WF08088
Date Added Mon Aug 29 00:48:23 2011
Modified Mon Aug 29 00:49:59 2011

Landscape composition influences local pattern of fire size in the eastern Canadian boreal forest: Role of weather and landscape mosaic on fire size distribution in mixedwood boreal forest using the Prescribed Fire Analysis System

Type Journal Article
Author Christelle Hély
Author C. Marie-Josée Fortin
Author Kerry R. Anderson
Author Yves Bergeron
Abstract Wildfire simulations were carried out using the Prescribed Fire Analysis System (PFAS) to study the effect of landscape composition on fire sizes in eastern Canadian boreal forests. We used the Lake Duparquet forest as reference, plus 13 forest mosaic scenarios whose compositions reflected lengths of fire cycle. Three fire weather risks based on duff moisture were used. We performed 100 simulations per risk and mosaic, with topography and hydrology set constant for the reference. Results showed that both weather and landscape composition significantly influenced fire sizes. Weather related to fire propagation explained almost 79% of the variance, while landscape composition and weather conditions for ignition explained ~14 and 2% respectively. In terms of landscape, burned area increased with increasing presence of shade-tolerant species, which are related to long fire cycles. Comparisons among the distributions of cumulated area burned from scenarios plus those from the Société de Protection des Forêts contre le Feu database archives showed that PFAS simulated realistic fire sizes using the 80–100% class of probable fire extent. Future analyses would best be performed on a larger region as the limited size of the study area could not capture fires larger than 11 000 ha, which represent 3% of fires but 65% of the total area burned at the provincial scale.
Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 1099–1109
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09112
ISSN 1448-5516
Short Title Landscape composition influences local pattern of fire size in the eastern Canadian boreal forest
URL http://www.publish.csiro.au/?paper=WF09112
Call Number 0000
Extra Keywords: Canadian Duff Moisture Code; fire cycle; PFAS model; Quebec; scenarios.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:31 2011

Landscape dynamics in crown fire ecosystems

Type Journal Article
Author Monica G. Turner
Author William H. Romme
Abstract Crown fires create broad-scale patterns in vegetation by producing a patch mosaic of stand age classes, but the spread and behavior of crown fires also may be constrained by spatial patterns in terrain and fuels across the landscape. In this review, we address the implications of landscape heterogeneity for crown fire behavior and the ecological effects of crown fires over large areas. We suggest that fine-scale mechanisms of fire spread can be extrapolated to make broad-scale predictions of landscape pattern by coupling the knowledge obtained from mechanistic and empirical fire behavior models with spatially-explicit probabilistic models of fire spread. Climatic conditions exert a dominant control over crown fire behavior and spread, but topographic and physiographic features in the landscape and the spatial arrangement and types of fuels have a strong influence on fire spread, especially when burning conditions (e.g., fuel moisture and wind) are not extreme. General trends in crown fire regimes and stand age class distributions can be observed across continental, latitudinal, and elevational gradients. Crown fires are more frequent in regions having more frequent and/or severe droughts, and younger stands tend to dominate these landscapes. Landscapes dominated by crown fires appear to be nonequilibrium systems. This nonequilibrium condition presents a significant challenge to land managers, particularly when the implications of potential changes in the global climate are considered. Potential changes in the global climate may alter not only the frequency of crown fires but also their severity. Crown fires rarely consume the entire forest, and the spatial heterogeneity of burn severity patterns creates a wide range of local effects and is likely to influence plant reestablishment as well as many other ecological processes. Increased knowledge of ecological processes at regional scales and the effects of landscape pattern on fire dynamics should provide insight into our understanding of the behavior and consequences of crown fires.
Publication Landscape Ecology
Volume 9
Issue 1
Pages 59-77
Date March 1994
Journal Abbr Landscape Ecol.
DOI 10.1007/BF00135079
ISSN 0921-2973 (Print) 1572-9761 (Online)
URL http://dx.doi.org/10.1007/BF00135079
Extra Keywords: crown fire; patch mosaic; fire models; fire regimes.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:53 2011

Landscape ecology

Type Journal Article
Author Dean L. Urban
Author Robert V. O'Neill
Author Herman H. Shugart Jr
Abstract Description: In this paper the authors outline an approach to landscape study that employs a hierarchical paradigm of pattern and behavior. Although emphasis is on forested landscapes, we can generalize a theory of landscape ecology. Attention is focused on the wide range of phenomena in a natural terrestrial landscape by considering the apparent complexity of landscape dynamics and illustrating how a hierarchical paradigm lends itself to simplifying such complexity. This perspective also affords insights into the management of man-dominated landscapes.
Publication BioScience
Volume 37
Issue 2

Pages 119–127
Date February 1987
Journal Abbr BioScience
DOI 10.2307/1310366
ISSN 0006-3568
URL http://www.jstor.org/stable/1310366
Call Number 0000
Extra Landscape ecology: A hierarchical perspective can help scientists understand spatial patterns
Date Added Sat Aug 27 04:08:03 2011
Modified Sat Aug 27 15:53:08 2011

Landscape ecology: What is the state of the science?

Type Journal Article
Author Monica G. Turner
Abstract Landscape ecology focuses on the reciprocal interactions between spatial pattern and ecological processes, and it is well integrated with ecology. The field has grown rapidly over the past 15 years. The persistent influence of land-use history and natural disturbance on contemporary ecosystems has become apparent. Development of pattern metrics has largely stabilized, and they are widely used to relate landscape pattern to ecological responses. Analyses conducted at multiple scales have demonstrated the importance of landscape pattern for many taxa, and spatially mediated interspecific interactions are receiving increased attention. Disturbance remains prominent in landscape studies, and current research is addressing disturbance interactions. Integration of ecosystem and landscape ecology remains challenging but should enhance understanding of landscape function. Landscape ecology should continue to refine knowledge of when spatial heterogeneity is fundamentally important, rigorously test the generality of its concepts, and develop a more mechanistic understanding of the relationships between pattern and process.
Publication Annual Review of Ecology, Evolution, and Systematics
Volume 36
Issue 1
Pages 319-344
Date December 2005
Journal Abbr Annu. Rev. Ecol. Evol. Syst.
DOI 10.1146/annurev.ecolsys.36.102003.152614
ISSN 1543-592X
URL http://arjournals.annualreviews.org/doi/abs/10.1146/annurev.ecolsys.36.102003.152614
Extra Keywords: disturbance; fragmentation; spatial heterogeneity; spatial pattern; succession.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:46 2011

Landscape history and changes in sandhill vegetation in north-central and south-central Florida

Type Journal Article
Author Ronald L. Myers
Author Deborah L. White
Abstract "Southern ridge sandhill" vegetation is distinguished from its more northerly counterparts in Florida by 1) a predominance of south Florida slash pine (Pinus elliottii var. densa) instead of longleaf pine (Pinus palustris), 2) an abundance of scrub hickory (Carya floridana) and evergreen scrub oaks, and 3) stunted, gnarled turkey oaks (Quercus laevis). Vegetation changes were documented in sandhill vegetation in north-central Florida at Welaka using a permanent plot established in 1951 by Albert M. Laessle and in southern ridge sandhill at Archbold Biological Station using records from the Station archives dating from 1929. At both sites the

contiguous vegetation is xeric scrub. Although neither site has burned for 50-60 yr, the northern site has experienced little invasion by xeric hardwoods, yet they dominate the southern site. Climatic, edaphic, and biogeographic influences are addressed, and land use histories point to anthropogenic burning as a possible factor accounting for some of the structural and successional differences. The southern type may possess a community structure reflecting less human alteration of the natural fire regime.

Publication Bulletin of the Torrey Botanical Club
Volume 114
Issue 1
Pages 21-32
Date January - March 1987
Journal Abbr Bull. Torr. Bot. Club
DOI 10.2307/2996386
ISSN 00409618
URL http://www.jstor.org/stable/2996386
Extra Keywords: sandhill vegetation; sand pine scrub; succession; Florida; fire history; land use.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:24:07 2011

Landscape history and ecological change

Type Journal Article
Author Norman L. Christensen
Abstract no abstract
Publication Journal of Forest History
Volume 33
Issue 3
Pages 116-125
Date July 1989
Journal Abbr Journal of Forest History
DOI 10.2307/4005121
ISSN 0094-5080
URL http://www.jstor.org/stable/4005121
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:08:35 2011

Landscape management using historical fire regimes: Blue River, Oregon

Type Journal Article
Author John H. Cissel
Author Frederick J. Swanson
Author Peter J. Weisberg
Abstract Landscapes administered for timber production by the U.S. Forest Service in the Pacific Northwest in the 1950s-1980s were managed with dispersed patch clearcutting, and then briefly in the late 1980s with aggregated patch clear-cutting. In the late 1990s, use of historical landscape patterns and disturbance regimes as a guide for landscape management has emerged as an alternative to the static reserves and standard matrix prescriptions in the Northwest Forest Plan. Use of historical information to guide management recognizes the dynamic and variable character of the landscape and may offer an improved ability to meet ecosystem management objectives. We describe a landscape management plan based in part on interpretations of historical disturbance regimes. The plan contains a reserve system and other landscape areas where three distinct types of timber harvest are prescribed. Timber harvest prescriptions approximate the frequency, severity, and spatial

extent of past fires. Future harvest blocks are mapped and used to project forest patterns 200 yr forward and to map resulting landscape structure. This plan is compared with an alternative plan for the same area based on the extensive reserves and prescriptions for matrix lands in the Northwest Forest Plan. The management approach based on historical patterns produced more late-successional habitat (71% vs. 59%), more overstory structure in young stands (overstory canopy cover of 15-50% vs. 15%), larger patches (mean patch size of 48 vs. 26 ha), and less edge between young and old forest (edge density of 19 vs. 37 m/ha). While landscape structures resulting from both plans are historically unprecedented, we feel that landscape management plans incorporating key aspects-of ecosystem history and variability may pose less risk to native species and ecological processes.

Publication Ecological Applications
Volume 9
Issue 4
Pages 1217–1231
Date November 1999
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(1999)009[1217:LMUHFR]2.0.CO;2
ISSN 1051-0761
Short Title Landscape management using historical fire regimes
URL http://www.esajournals.org/doi/abs/10.1890/1051-0761%281999%29009%5B1217%3ALMUHFR%5D2.0.CO%3B2
Extra Keywords: adaptive management; disturbance ecology; historicalf ire regime; landscapea nalysis; landscape plan; landscape structure; late-successional habitat; Northwest Forest Plan.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:41 2011

Landscape-scale controls over 20th century fire occurrence in two large Rocky Mountain (USA) wilderness areas

Type Journal Article
Author Matthew G. Rollins
Author Penelope Morgan
Author Thomas Swetnam
Abstract Topography, vegetation, and climate act together to determine the spatial patterns of fires at landscape scales. Knowledge of landscape-fire-climate relations at these broad scales (1,000s ha to 100,000s ha) is limited and is largely based on inferences and extrapolations from fire histories reconstructed from finer scales. In this study, we used long time series of fire perimeter data (fire atlases) and data for topography, vegetation, and climate to evaluate relationships between large 20th century fires and landscape characteristics in two contrasting areas: the 486,673-ha Gila/Aldo Leopold Wilderness Complex (GALWC) in New Mexico, USA, and the 785,090-ha Selway-Bitterroot Wilderness Complex (SBWC) in Idaho and Montana, USA. There were important similarities and differences in gradients of topography, vegetation, and climate for areas with different fire frequencies, both within and between study areas.These unique and general relationships, when compared between study areas, highlight important characteristics of fire regimes in the Northern and Southern Rocky Mountains of the Western United States. Results suggest that amount and horizontal continuity of herbaceous fuels limit the frequency and spread of surface fires in the GALWC, while the moisture status of large fuels and crown fuels limits the frequency of moderate-to-high severity fires in the SBWC. These empirically described spatial and temporal relationships between fire, landscape attributes, and climate increase understanding of interactions among broad-scale ecosystem processes. Results also provide a historical baseline for fire management planning over broad spatial and temporal scales in each wilderness complex.
Publication Landscape Ecology
Volume 17
Issue 6
Pages 539-557
Date August 2002

Journal Abbr Landscape Ecol.
DOI 10.1023/A:1021584519109
ISSN 0921-2973 (Print) 1572-9761 (Online)
URL http://dx.doi.org/10.1023/A:1021584519109
Extra Keywords: fire atlases; fire ecology; fire history; fire regimes; pattern-process interactions; Rocky Mountains.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:19 2011

Large fires, fire effects and the fire-regime concept

Type Journal Article
Author A. Malcolm Gill
Author Grant Allan
Abstract 'Large' fires may be declared so because of their absolute or relative area. Huge fires – with areas of more than 10^6 ha (10^4 km²) have occurred across a wide spectrum of Australian environments and are known on other continents. Such large fires are rare whereas fires with much smaller areas are common. Large fires are initiated by single or multiple ignitions and become large because of some combination of: rapid rates of spread; long 'life'; merging, and failure of initial suppression operations. Fires as ecological 'events' occur within a 'regime' – an historical series. Both events and regimes have effects that may be discerned in terms of water, land, air or organisms. What have been regarded as the components of 'regimes' have differed between observers, the main issue being whether or not spatial variables need to be included; 'area' involvement is briefly addressed. The current trend toward fire-regime control through fuel treatment, including management (prescribed) burning, and fire suppression may be expected to continue. These trends, among others, can be expected to change fire regimes. What is regarded as 'large' among fires may change as the planet becomes increasingly human-dominated.
Publication International Journal of Wildland Fire
Volume 17
Issue 6
Pages 688-695
Date December 2008
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07145
ISSN 1049-8001
URL http://dx.doi.org/10.1071/WF07145
Extra Keywords: biodiversity; catchment; interval; probability.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:10 2011

Large forest fires in Canada, 1959–1997

Type Journal Article
Author Brian J. Stocks
Author John A. Mason
Author J. Bernie Todd
Author Erin M. Bosch
Author B. Michael Wotton
Author Brian D. Amiro
Author Michael D. Flannigan
Author Kelvin G. Hirsch
Author Kimberley A. Logan

Author David L. Martell
Author Walter R. Skinner

Abstract A Large Fire Database (LFDB), which includes information on fire location, start date, final size, cause, and suppression action, has been developed for all fires larger than 200 ha in area for Canada for the 1959–1997 period. The LFDB represents only 3.1% of the total number of Canadian fires during this period, the remaining 96.9% of fires being suppressed while <200 ha in size, yet accounts for ~97% of the total area burned, allowing a spatial and temporal analysis of recent Canadian landscape-scale fire impacts. On average ~2 million ha burned annually in these large fires, although more than 7 million ha burned in some years. Ecozones in the boreal and taiga regions experienced the greatest areas burned, with an average of 0.7% of the forested land burning annually. Lightning fires predominate in northern Canada, accounting for 80% of the total LFDB area burned. Large fires, although small in number, contribute substantially to area burned, most particularly in the boreal and taiga regions. The Canadian fire season runs from late April through August, with most of the area burned occurring in June and July due primarily to lightning fire activity in northern Canada. Close to 50% of the area burned in Canada is the result of fires that are not actioned due to their remote location, low values-at-risk, and efforts to accommodate the natural role of fire in these ecosystems. The LFDB is updated annually and is being expanded back in time to permit a more thorough analysis of long-term trends in Canadian fire activity.

Publication Journal of Geophysical Research
Volume 107
Issue D1
Pages 8149 (12 p.)
Date December 2002
Journal Abbr J. Geophys. Res.
DOI 10.1029/2001JD000484
ISSN 2156-2202
URL http://www.agu.org/pubs/crossref/2002/2001JD000484.shtml
Extra Keywords: boreal forest; ecozones; wildfire; distribution; suppression; fire attributes.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:54 2011

Large variations in Southern Hemisphere biomass burning during the last 650 years

Type Journal Article

Author Zhihui Wang
Author Jerome Chappellaz
Author Key Hong Park
Author John E. Mak

Abstract We present a 650-year Antarctic ice core record of concentration and isotopic ratios ($\delta^{13}C$ and $\delta^{18}O$) of atmospheric carbon monoxide. Concentrations decreased by ~25% (14 parts per billion by volume) from the mid-1300s to the 1600s then recovered completely by the late 1800s. $\delta^{13}C$ and $\delta^{18}O$ decreased by about 2 and 4 per mil (‰), respectively, from the mid-1300s to the 1600s then increased by about 2.5 and 4‰ by the late 1800s. These observations and isotope mass balance model results imply that large variations in the degree of biomass burning in the Southern Hemisphere occurred during the last 650 years, with a decrease by about 50% in the 1600s, an increase of about 100% by the late 1800s, and another decrease by about 70% from the late 1800s to present day.

Publication Science
Volume 330
Issue 6011
Pages 1663-1666
Date 17 December 2010
Journal Abbr Science
DOI 10.1126/science.1197257

ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1197257
Date Added Tue Aug 16 02:04:00 2011
Modified Tue Aug 16 02:04:00 2011

Large-scale climatic patterns control large lightning fire occurrence in Canada and Alaska forest regions

Type Journal Article
Author Marc Macias Fauria
Author Edward A. Johnson
Abstract Large lightning wildfires in Canada and Alaska account for most of the area burnt and are main determiners of the age mosaic of the landscape. Such fires occur when positive midtroposphere height anomalies persist > 10 days during the fire season. Midtroposphere anomalies are part of teleconnections which are created by atmospheric and coupled sea/air dynamics. Large lightning fire occurrence and area burnt data were used to define eight centers of large wildfire variability in Canada and Alaska during 1959–1999. Preferred positions of persistent positive midtroposphere anomalies correlated with the Fire Regions during large fire events. Active fire weather showed strong relations with Pacific Decadal Oscillation (PDO) at interdecadal timescales and with El Niño Southern Oscillation (ENSO) and Arctic Oscillation (AO) mostly at interannual (2 to 6 years) timescales. PDO and ENSO (AO) related large fires were more frequent in the western (eastern) regions. The mountain ranges in western Canada play a major role in the large-scale patterns of large fire occurrence through retention of PDO-related Pacific Ocean moisture, causing the dynamics of large fires each side of the ranges to be mostly in antiphase. The PDO/ENSO regime shift of 1976/1977, together with the strong and persistent positive phase of AO during the late 1980s and 1990s contributed to the increase in area burned in the study area except in British Columbia and Alaska. PDO-ENSO-AO interactions with active fire weather provide an explanation for changes in large fire occurrence frequency during the last centuries in the area.
Publication Journal of Geophysical Research
Volume 111
Issue 4
Pages G04008 (17 p.)
Date November 2006
Journal Abbr J. Geophys. Res.
DOI 10.1029/2006JG000181
ISSN 0148-0227
URL http://www.agu.org/pubs/crossref/2006/2006JG000181.shtml
Extra Keywords: forest fires; boreal forest; climate change.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:43:15 2011

Late Glacial and Holocene vegetation history and paleoclimate of the Kaibab Plateau, Arizona

Type Journal Article
Author Chengyu Weng
Author Stephen T. Jackson
Abstract Sediment cores spanning the last 13,500 calendar years (cal yr) were obtained from two lakes (Fracas Lake, 2518 m; Bear Lake, 2778 m) on the Kaibab Plateau in northern Arizona. Pollen and plant macrofossil records indicate that before ~12,900 cal yr B.P., high elevation landscapes of the Kaibab Plateau near Bear Lake were covered by alpine tundra, while lower elevations near Fracas Lake were occupied by Picea woodland. At ~12,900 cal yr B.P., Picea engelmannii and Abies lasiocarpa forest expanded upward to occupy the top of the plateau. Pinus ponderosa arrived near Fracas Lake 11,000 cal yr B.P., replacing Picea forests. Since then, Pinus ponderosa forest has dominated the Fracas Lake area. Pinus ponderosa did not appear at Bear Lake until ~9730

cal yr B.P. Mixed forests of Picea (mainly Picea pungens), Abies lasiocarpa, Pinus ponderosa, and Pseudotsuga (after ~8000 cal yr B.P.) grew near Bear Lake for the remainder of the Holocene. Picea engelmannii populations reexpanded near Bear Lake after 4000 cal yr B.P. Charcoal records indicate that fire probably helped Pinus ponderosa to become established near Bear Lake. Climate changes on the Kaibab Plateau since the Late Glacial were inferred from lake levels and vegetation patterns. The Late Glacial (>11,000 cal yr B.P.) was cold and probably wet. The early Holocene (11,000 to ~8000 cal yr B.P.) was cooler than today and may have been the wettest period. Fracas Lake and Bear Lake were probably deepest then. During this period, a strengthened summer monsoon brought in more moisture from the eastern Pacific Ocean and the Gulf of Mexico. During the dry and warm mid-Holocene, Fracas Lake and Bear Lake experienced water-level declines. The late Holocene was relatively wet and cool again, and aquatic plants were abundant in the two lakes. Increasing effective moisture in the late Holocene was related to decreasing summer insolation.

Publication Palaeogeography, Palaeoclimatology, Palaeoecology
Volume 153
Issue 1-4
Pages 179–201
Date 15 September 1999
Journal Abbr PALAEO
DOI 10.1016/S0031-0182(99)00070-X
ISSN 0031-0182
URL http://www.sciencedirect.com/science/article/pii/S003101829900070X
Extra Keywords: Late Glacial; Holocene; paleoecology; vegetation change; paleoclimate; Colorado Plateau; palynology; Arizona.
Date Added Tue Aug 16 02:15:41 2011
Modified Tue Aug 16 02:15:49 2011

Late Wisconsin paleoecologic record from Swamp Lake, Yosemite National Park, California

Type Journal Article
Author Susan J. Smith
Author R. Scott Anderson
Abstract A 7.86-m sediment core from Swamp Lake in Yosemite National Park, California, provides a continuous record of environmental change over the last ca. 16,000 yr, as inferred from pollen, macrofossil, and microscopic charcoal analyses. The core stratigraphy documents late Wisconsin (Tioga stage) deglaciation between >16,000 and 13,700 yr B.P., approximately 6000-3500 yr earlier than higher-elevation Sierra Nevada records. The core includes five volcanic ash layers, chemically identified as four Mono Craters ashes and the Tsoyawata ash (Mt. Mazama, Oregon). The fossil record shows that herbs and sagebrush dominated the glacial environment at Swamp Lake. By 12,000 yr B.P., a mixed conifer forest composed of high- and mid-elevation conifers grew around the lake, suggesting a cool, wet late-glacial environment. The modern Sierra montane forest did not become established until ca. 10,400 yr B.P., when maximum charcoal concentrations and minimum fir pollen percentages indicate an early Holocene xeric period. The record suggests that a cooling trend began ca. 6500 yr B.P. and persisted until ca. 3700 yr B.P. when the modern climatic regime was established.
Publication Quaternary Research
Volume 38
Issue 1
Pages 91–102
Date July 1992
Journal Abbr Quaternary Res.
DOI 10.1016/0033-5894(92)90032-E
ISSN 0033-5894
URL http://www.sciencedirect.com/science/article/pii/003358949290032E
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:45 2011

Late-glacial and Holocene climatic effects on fire and vegetation dynamics at the prairie–forest ecotone in south-central Minnesota

Type Journal Article
Author Philip Camill
Author Charles E. Umbanhowar Jr.
Author Rebecca Teed
Author Christoph E. Geiss
Author Jessica Aldinger
Author Leah Dvorak
Author Jon Kenning
Author Jacob Limmer
Author Kristina Walkup
Abstract Summary: 1. Treeline ecotones, such as the prairie-forest boundary, represent climatically sensitive regions where the relative abundance of vegetation types is controlled by complex interactions between climate and local factors. Responses of vegetation and fire to climate change may be tightly linked as a result of strong feedbacks among fuel production, vegetation structure and fire frequency/severity, but the importance of these feedbacks for controlling the stability of this ecotone is unclear. 2. In this study, we examined the prairie-forest ecotone in south-central Minnesota using two lake sediment cores to reconstruct independent records of climate, vegetation and fire over the past 12500 years. Using pollen, charcoal, sediment magnetic analyses and LOI properties, we investigated whether fires were controlled directly by climate or indirectly by fuel production. 3. Sediment magnetic and LOI data suggest four broad climatic periods occurring c. 11350-8250 BP (cool/humid), c. 8250-4250 BP (warm/dry), c. 4250-2450 BP (warm/humid), and c. 2450-0 BP (cool/humid), indicating that, since the mid-Holocene, climate has shifted towards wetter conditions favouring greater in-lake production and fuel production on the landscape. 4. The area surrounding both lakes was characterized by boreal forest c. 12500-10000 BP, changing to an Ulmus-Ostrya forest c. 10 000-9000 BP, changing to a community dominated by prairie (Poaceae-Ambrosia-Artemisia) and deciduous forest taxa c. 8000-4250 BP, and finally shifting to a Quercus-dominated woodland/savanna beginning c. 4250-3000 BP. 5. Charcoal influx increased from an average of 0.11–0.62 $mm^2cm^{-2}year^{-1}$ during the early Holocene forest period (c. 11350–8250 BP) to 1.71–3.36 mm^2cm^{-2} $year^{-1}$ during the period of prairie expansion (c. 8250–4250 BP) and again increased to 4.18–4.90 mm^2cm^{-2} $year^{-1}$ at the start of the woodland/savanna period (c. 4250 BP). 6. As a result of the influence of climate on community composition and fuel productivity, changes in fire severity may be the result and not the cause of shifts in vegetation.
Publication Journal of Ecology
Volume 91
Issue 5
Pages 822-836
Date October 2003
Journal Abbr J. Ecol.
DOI 10.1046/j.1365-2745.2003.00812.x
ISSN 0022-0477
URL http://www.jstor.org/stable/3599706
Call Number 0000
Extra Keywords: climate; ecotone; fire; Holocene; prairie–forest border.
Date Added Sun Sep 4 01:45:04 2011
Modified Mon Sep 5 10:11:15 2011

Late-glacial vegetation and climate change in western Oregon

Type Journal Article
Author Laurie D. Grigg

Author Cathy Whitlock

Abstract Pollen records from two sites in western Oregon provide information on late-glacial variations in vegetation and climate and on the extent and character of Younger Dryas cooling in the Pacific Northwest. A subalpine forest was present at Little Lake, central Coast Range, between 15,700 and 14,850 cal yr B.P. A warm period between 14,850 and 14,500 cal yr B.P. is suggested by an increase inPseudotsugapollen and charcoal. The recurrence of subalpine forest at 14,500 cal yr B.P. implies a return to cool conditions. Another warming trend is evidenced by the reestablishment of Pseudotsugaforest at 14,250 cal yr B.P. Increased haploxylonPinuspollen between 12,400 and 11,000 cal yr B.P. indicates cooler winters than before. After 11,000 cal yr B.P. warm dry conditions are implied by the expansion ofPseudotsuga.A subalpine parkland occupied Gordon Lake, western Cascade Range, until 14,500 cal yr B.P., when it was replaced during a warming trend by a montane forest. A rise inPinuspollen from 12,800 to 11,000 cal yr B.P. suggests increased summer aridity. Pseudotsugadominated the vegetation after 11,000 cal yr B.P. Other records from the Pacific Northwest show an expansion ofPinusfrom ca. 13,000 to 11,000 cal yr B.P. This expansion may be a response either to submillennial climate changes of Younger Dryas age or to millennial-scale climatic

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Journal Abbr Quaternary Res.

DOI 10.1006/qres.1998.1966

ISSN 0033-5894

URL http://www.sciencedirect.com/science/article/pii/S0033589498919664

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Late-Holocene vegetation and fire history from Ferry Lake, northwestern Wisconsin, USA

Type Journal Article

Author Elizabeth A. Lynch

Author Randy Calcote

Author Sara C. Hotchkiss

Abstract We used charcoal and fossil pollen to investigate how fire, vegetation and climate have interacted over the past 2300 years at Ferry Lake, located on a sand plain in northwestern Wisconsin. Pollen analysis shows a rapid transition from oak (Quercus spp.)-dominated woodland to a relatively open pine (Pinus spp.) forest at 1450 cal. yr BP, and a more closed-canopy pine forest beginning about 700 cal. yr BP. We calculated accumulation rates of 125-250 ųm charcoal fragments (CHAR) in contiguous 0.5 cm thick sediment samples, each representing 7-10 years. Graminoid charcoal fragments were tallied separately to track the relative abundance of grass charcoal. During the oak period charcoal peaks have relatively weak periodicity and relatively high accumulation rates of grass charcoal. Charcoal peaks are less frequent (with a periodicity of 130-200 years), and larger during the open-canopy pine period, with lower grass CHAR. CHAR of both charcoal types decreases further between 1000 and 850 cal. yr BP and remains low until the period of European settlement. Several hundred years later (700 cal. yr BP) white pine pollen increases and pollen from herbaceous taxa decreases, suggesting a more mesic, closed-canopy forest. Our results demonstrate that the vegetation and fire regime at this sandplain site changed substantially, but apparently not synchronously, during the last 2300 years, a period when millennial-scale regional climate was relatively similar to modern.

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Volume 16

Issue 4

Pages 495-504

Date May 2006

Journal Abbr Holocene

DOI 10.1191/0959683606hl945rp

ISSN 1477-0911
URL http://hol.sagepub.com/content/16/4/495.abstract
Call Number 0007
Extra Keywords: charcoal analysis; climate change; fire history; pollen; palaeoecology; pine barrens; late Holocene; Wisconsin.
Date Added Sun Sep 4 04:54:46 2011
Modified Mon Sep 5 10:11:08 2011

Latitude, elevational climatic zonation and speciation in New World vertebrates

Type Journal Article
Author Carlos Daniel Cadena
Author Kenneth H. Kozak
Author Juan Pablo Gomez
Author Juan Luis Parra
Author Christy M. McCain
Author Rauri C. K. Bowie
Author Ana C. Carnaval
Author Craig Moritz
Author Carsten Rahbek
Author Trina E. Roberts
Author Nathan J. Sanders
Author Christopher J. Schneider
Author Jeremy Van DerWal
Author Kelly R. Zamudio
Author Catherine H. Graham
Abstract Many biodiversity hotspots are located in montane regions, especially in the tropics. A possible explanation for this pattern is that the narrow thermal tolerances of tropical species and greater climatic stratification of tropical mountains create more opportunities for climate-associated parapatric or allopatric speciation in the tropics relative to the temperate zone. However, it is unclear whether a general relationship exists among latitude, climatic zonation and the ecology of speciation. Recent taxon-specific studies obtained different results regarding the role of climate in speciation in tropical versus temperate areas. Here, we quantify overlap in the climatic distributions of 93 pairs of sister species of mammals, birds, amphibians and reptiles restricted to either the New World tropics or to the Northern temperate zone. We show that elevational ranges of tropical- and temperate-zone species do not differ from one another, yet the temperature range experienced by species in the temperate zone is greater than for those in the tropics. Moreover, tropical sister species tend to exhibit greater similarity in their climatic distributions than temperate sister species. This pattern suggests that evolutionary conservatism in the thermal niches of tropical taxa, coupled with the greater thermal zonation of tropical mountains, may result in increased opportunities for allopatric isolation, speciation and the accumulation of species in tropical montane regions. Our study exemplifies the power of combining phylogenetic and spatial datasets of global climatic variation to explore evolutionary (rather than purely ecological) explanations for the high biodiversity of tropical montane regions.
Publication Proceedings of the Royal Society B: Biological Sciences
Volume Published online before print
Date June 1, 2011
Journal Abbr Proc. R. Soc. B
DOI 10.1098/rspb.2011.0720
ISSN 0962-8452
URL http://rspb.royalsocietypublishing.org/cgi/doi/10.1098/rspb.2011.0720
Extra Keywords: allopatric speciation; diversification; ecological speciation; latitudinal diversity gradient; niche conservatism.
Date Added Tue Aug 30 02:03:25 2011

Modified Tue Aug 30 02:07:43 2011

Learning from integrated assessment of climate change

Type Journal Article
Author M. Granger Morgan
Author Hadi Dowlatabadi
Abstract The objective of integrated assessment of climate change is to put available knowledge together in order to evaluate what has been learned, policy implications, and research needs. This paper summarizes insights gained from five years of integrated assessment activity at Carnegie Mellon. After an introduction, in Section 2 we ask: who are the climate decision makers? We conclude that they are a diffuse and often divergent group spread all over the world whose decisions are primarily driven by local non-climate considerations. Insights are illustrated with results from the ICAM-2 model. In Section 3 we ask: what is the climate problem? In addition to the conventional answer, we note that in a democracy the problem is whatever voters and their elected representatives think it is. Results from studies of public understanding are reported. Several other specific issues that define the problem, including the treatment of aerosols and alternative indices for comparing greenhouse gases, are discussed. In Section 4 we discuss studies of climate impacts, focusing on coastal zones, the terrestrial biosphere and human health. Particular attention is placed on the roles of adaptation, value change, and technological innovation. In Section 5 selected policy issues are discussed. We conclude by noting that equity has received too little attention in past work. We argue that many conventional tools for policy analysis are not adequate to deal with climate problems. Values that change, and mixed levels of uncertainty, pose particularly important challenges for the future.
Publication Climatic Change
Volume 34
Issue 3-4
Pages 337-368
Date November 1996
Journal Abbr Climatic Change
DOI 10.1007/BF00139297
ISSN 0165-0009
URL http://dx.doi.org/10.1007/BF00139297
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:47:21 2011

Length of the fire season in a changing climate

Type Journal Article
Author B. Michael Wotton
Author Michael D. Flannigan
Abstract The Canadian Climate Centre's General Circulation Model provides two 10-year data sets of simulated daily weather for a large array of gridpoints across North America. A subset of this data, comprised of only those points within the forested part of Canada, was selected for study. Fire season length was calculated from data sets of both the $1\times CO_2$ and $2\times CO_2$ runs of the model as well as for the actual climate, using observed data from weather stations. A comparison made between the results of the $1\times CO_2$ and $2\times CO_2$ runs indicated a significantly longer fire season across the country under a doubling of atmospheric CO_2 levels. Implications of this result, such as a fall fire season in Canada's east and greater strains on management agencies, are discussed.
Publication The Forestry Chronicle
Volume 69
Issue 2
Pages 187–192
Date April 1993

Journal Abbr Forest Chron.
DOI 10.5558/tfc69187-2
ISSN 0015-7546
URL http://pubs.cif-ifc.org/doi/abs/10.5558/tfc69187-2
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:26:41 2011

Lessons from Earth's past

Type Journal Article
Author Jeffrey Kiehl
Abstract Climate models are invaluable tools for understanding Earth's climate system. But examination of the real world also provides insights into the role of greenhouse gases (carbon dioxide) in determining Earth's climate. Not only can much be learned by looking at the observational evidence from Earth's past, but such know ledge can provide context for future climate change.
Publication Science
Volume 331
Issue 6014
Pages 158-159
Date 14 January 2011
Journal Abbr Science
DOI 10.1126/science.1199380
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1199380
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:37:15 2011

LFM forecast variables related to Santa Ana wind occurrences

Type Journal Article
Author William T Sommers
Abstract Surface weather conditions in the southern California mountains during Santa Ana occurrences are related to LFM forecast variables. The strong downslope winds and low relative humidities during Santa Ana conditions pose a serious fire problem. Synoptic conditions leading to Santa Anas should incorporate subsidence and flow perpendicular to the local mountains, at mid-tropospheric levels, on the windward side of the mountains. Twelve hour LFM 500 mb forecasts of height, wind and omega, in relation to Santa Ana wind occurrence, were examined for 16 cases. A case study illustrates the typical synoptic-scale transition to subsiding, northerly flow that leads to Santa Ana occurrence. A graphic summary shows how the relative strength of the 16 cases was related to LFM v wind component and omega forecasts.
Publication Monthly Weather Review
Volume 106
Issue 9
Pages 1307-1316
Date September 1978
Journal Abbr Mon. Wea. Rev.
ISSN 0027-0644
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0493%281978%29106%3C1307%3ALFVRTS%3E2.0.CO%3B2
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:32 2011

Lightning activity as an indicator of climate change

Type Journal Article

Author N. Reeve
Author Ralf Toumi

Abstract Data from the Optical Transient Detector lightning sensor are analysed to investigate the hypothesis that global lightning activity will increase should the average global temperature increase. It is shown that changes in global monthly land lightning activity are well correlated with changes in global monthly land wet-bulb temperatures. the correlation is strongest in the northern hemisphere and weak in the southern hemisphere. the conclusion is that a high land-area to sea-area ratio is necessary for a good correlation. Contrary to expectation, the tropics show no correlation. the results predict that a change in the average land wet-bulb temperature of the globe of just 1K would result in a change in lightning activity of about 40%.

Publication Quarterly Journal of the Royal Meteorological Society
Volume 125
Issue 555
Pages 893-903
Date April 1999 Part A
Journal Abbr Q. J. Royal Met. Soc.
DOI 10.1002/qj.49712555507
ISSN 00359009
URL http://doi.wiley.com/10.1002/qj.49712555507
Extra Keywords: optical; transient; detector; satellite observation.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 01:09:37 2011

Lightning fires in North Dakota grasslands and in pine-savanna lands of South Dakota and Montana

Type Journal Article

Author Kenneth F. Higgins

Abstract Lightning strike fires which occurred between 1940 and 1981 were studied in mixed-grass prairie grasslands and in pine-savanna lands in the northern Great Plains region. A majority (73%) of ignitions occurred during July and August, while a lesser number was recorded in April, May, June, and September. The April-September period is also the average time of the freeze-free period and approximates the average distribution period for thunderstorm activity in this region. The area burned by each of 293 lightning fires (most of which were suppressed) ranged from 0.004-1158.3 ha (X super(-) = 10.8 ha), The frequency of lightning fires in mixed grass prairie grasslands averaged 6.0/yr per 10,000 km^2 in eastern North Dakota. 22.4/yr per 10,000 km^2 in southcentral North 91.7/yr per 10,000 km^2 in pine-savanna lands in northwestern South Dakota and southeastern Montana. The ecological role of lightning-set fires is discussed relative to the development of resource research and management plans and to the interpretation of historical records of natural fire occurrence in the Northern Great Plains region.

Publication Journal of Range Management
Volume 37
Issue 2
Pages 100–103
Date March 1984
Journal Abbr J. Range Manage.
ISSN 0022-409X
URL http://www.jstor.org/stable/3898892
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:34:37 2011

Lightning strikes and resultant fires from archival (1912-1917) and current (1960-1997) information in Pennsylvania

Type Journal Article
Author Charles M. Ruffner
Author Marc D. Abrams
Abstract Archival information was searched for evidence of lightning strikes and subsequent ignitions in Pennsylvania forests. Between 1912-1917, twentyeight different tree species were struck by lightning 2553 times igniting 77 individual trees. These data probably underestimate the number of ignited fires due to rugged terrain, inefficient fire reporting, and minimal fire control resources of this early era. Lightning strikes occurred most often between June-August, peaking in July with 877 strikes. These data provide direct evidence that lightning strikes and tree ignitions occur relatively frequently in Pennsylvania forests. Recent data provide substantial evidence for large areas burned by lightning ignitions during drought years in the past thirty-seven years
Publication Journal of the Torrey Botanical Society
Volume 125
Issue 3
Pages 249–252
Date July - September 1998
Journal Abbr J. Torrey Bot. Soc.
ISSN 10955674
URL http://www.jstor.org/stable/2997223
Extra Keywords: lightning strikes; forest fires; archival data.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:39 2011

Limiting the magnitude of future climate change

Type Book
Author National Research Council
Abstract no abstract
Place Washington, D.C.
Publisher National Academies Press
Date December 2010
# of Pages 276 p.
ISBN 978-0-309-14597-8
URL http://americasclimatechoices.org/panelmitigation.shtml
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

Linking an ecosystem model and a landscape model to study forest species response to climate warming

Type Journal Article
Author Hong S. He
Author David J. Mladenoff
Author Thomas R. Crow
Abstract No single model can address forest change from single tree to regional scales. We discuss a framework linking an ecosystem process model (linkages) with a spatial landscape model (landis) to examine forest species

responses to climate warming for a large, heterogeneous landscape in northern Wisconsin, USA. Individual species response at the ecosystem scale was simulated with linkages, which integrates soil, climate and species data, stratified by ecoregions. Individual species biomass results, simulated by linkages at year 10, were quantified using an empirical equation as species establishment coefficients (0.0-1.0). These coefficients were used to parameterize landis, thus integrating ecosystem dynamics with large-scale landscape processes such as seed dispersal and fire disturbance. Species response to climate warming at the landscape scale was simulated with landis. landis was parameterized with information derived from a species level, forest classification map, and inventory data. This incorporates spatially-explicit seed source distributions. A standard landis run with natural fire disturbance regime and current climate was conducted for 400 years. To simulate the effects of climate change, the differences in species establishment coefficients from current and warmer climates were linearly interpolated over the first 100 years assuming climate warming will occur gradually over the next century. The model was then run for another 300 years to examine the consequences after warming. Across the landscape, the decline of boreal species and the increases of temperate species were observed in the simulation. The responses of northern temperate hardwood species vary among ecoregions depending on soil nutrient and water regimes. Simulation results indicate that boreal species disappear from the landscape in 200-300 years and approximately same amount of time for a southern species to become common. Warming can accelerate the re-colonization process for current species such as found for eastern hemlock, where moisture does not become limiting. However, the re-colonization is strongly affected by available seed source explicitly described on the landscape. These phenomena cannot be simulated with most gap models, which assume a random seed rain.

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Volume 114

Issue 2-3

Pages 213-233

Date 1 January 1999

Journal Abbr Ecol. Model

DOI 10.1016/S0304-3800(98)00147-1

ISSN 0304-3800

URL http://www.sciencedirect.com/science/article/B6VBS-3VF1HC9-5/2/83ca3d6da4bb39cc2193c06121d8026a

Extra Keywords: gap model; LINKAGES; spatial landscape model; LANDIS; species establishment coefficient; climate warming.

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Linking sediment-charcoal records and ecological modeling to understand causes of fire-regime change in boreal forests

Type Journal Article

Author Linda B. Brubaker

Author Philip E. Higuera

Author T. Scott Rupp

Author Mark A. Olson

Author Patricia M. Anderson

Author Feng Sheng Hu

Abstract Interactions between vegetation and fire have the potential to overshadow direct effects of climate change on fire regimes in boreal forests of North America. We develop methods to compare sediment-charcoal records with fire regimes simulated by an ecological model, ALFRESCO (Alaskan Frame-based Ecosystem Code) and apply these methods to evaluate potential causes of a mid-Holocene fire-regime shift in boreal forests of the south-central Brooks Range, Alaska, USA. Fire-return intervals (FRIs, number of years between fires) are estimated over the past 7000 calibrated ^{14}C years (7–0 kyr BP [before present]) from short-term variations in charcoal accumulation rates (CHARs) at three lakes, and an index of area burned is inferred from long-term CHARs at these sites. ALFRESCO simulations of FRIs and annual area burned are based on prescribed vegetation and climate for 7–5 kyr BP and 5–0 kyr BP, inferred from pollen and stomata records and qualitative paleoclimate proxies. Two sets of experiments examine potential causes of increased burning between 7–5 and

5–0 kyr BP. (1) Static-vegetation scenarios: white spruce dominates with static mean temperature and total precipitation of the growing season for 7–0 kyr BP or with decreased temperature and/or increased precipitation for 5–0 kyr BP. (2) Changed-vegetation scenarios: black spruce dominates 5–0 kyr BP, with static temperature and precipitation or decreased temperature and/or increased precipitation. Median FRIs decreased between 7–5 and 5–0 kyr BP in empirical data and changed-vegetation scenarios but remained relatively constant in static-vegetation scenarios. Median empirical and simulated FRIs are not statistically different for 7–5 kyr BP and for two changed-vegetation scenarios (temperature decrease, precipitation increase) for 5–0 kyr BP. In these scenarios, cooler temperatures or increased precipitation dampened the effect of increased landscape flammability resulting from the increase in black spruce. CHAR records and all changed-vegetation scenarios indicate long-term increases in area burned between 7–5 and 5–0 kyr BP. The similarity of CHAR and ALFRESCO results demonstrates the compatibility of these independent data sets for investigating ecological mechanisms causing past fire-regime changes. The finding that vegetation flammability was a major driver of Holocene fire regimes is consistent with other investigations that suggest that landscape fuel characteristics will mediate the direct effects of future climate change on boreal fire regimes.

Publication Ecology
Volume 90
Issue 7
Pages 1788-1801
Date July 2009
Journal Abbr Ecology
DOI 10.1890/08-0797.1
ISSN 0012-9658
URL http://www.esajournals.org/doi/abs/10.1890/08-0797.1
Extra Keywords: Alaska, USA; Alaska Frame-based Ecosystem Code; ALFRESCO; black spruce; boreal forest; Brooks Range; charcoal records; data-model comparison; fire regime; Picea; white spruce.
Date Added Thu Aug 25 10:47:25 2011
Modified Sat Aug 27 00:08:38 2011

Little evidence for fire-adapted plant traits in Mediterranean climate regions

Type Journal Article
Author S. Don Bradshaw
Author Kingsley W. Dixon
Author Stephen D. Hopper
Author Hans Lambers
Author Shane R. Turner
Abstract As climate change increases vegetation combustibility, humans are impacted by wildfires through loss of lives and property, leading to an increased emphasis on prescribed burning practices to reduce hazards. A key and pervading concept accepted by most environmental managers is that combustible ecosystems have traditionally burnt because plants are fire adapted. In this opinion article, we explore the concept of plant traits adapted to fire in Mediterranean climates. In the light of major threats to biodiversity conservation, we recommend caution in deliberately increasing fire frequencies if ecosystem degradation and plant extinctions are to be averted as a result of the practice.
Publication Trends in Plant Science
Volume 16
Issue 2
Pages 69-76
Date February 2011
Journal Abbr Trends Plant Sci.
DOI 10.1016/j.tplants.2010.10.007
ISSN 1360-1385
URL http://linkinghub.elsevier.com/retrieve/pii/S1360138510002335

Call Number 0000
Date Added Wed Aug 24 12:10:09 2011
Modified Fri Aug 26 20:33:37 2011

Livestock grazing-fire regime interactions within montane forests of Zion National Park, Utah

Type Journal Article
Author Michael H. Madany
Author Niel E. West
Abstract Major differences were found between the vegetation structure of ponderosa pine-dominanted communities on the Horse Pasture Plateau and those on the nearby but isolated Church and Greatheart Mesas in Zion National Park. The Horse Pasture Plateau was heavily grazed by livestock in the late 19th and early 20th centuries, while the mesas were never grazed. Conditions on the mesas now approximate the pre-European situation of the region as described in the earliest written accounts. Pine, oak, and juniper sapling density and cover were much higher on the formerly grazed plateau than on the relict mesas. Herbaceous species dominated the groundlayer in mesa ponderosa pine savanna stands, while grass and forb cover was low on analogous sites of the plateau. Age-class distributions of major tree species further substantiated that major physiognomic changes have occurred on the plateau since the arrival of European man. Analysis of fire scars showed that prior to 1881, the mean fire-free interval for ponderosa pine stands on the plateau was 4 to 7 yr, while the interval for Church Mesa was 69 yr. Since there were no recorded fires on Church Mesa between 1892 and 1964, and yet no corresponding increase in sapling density, the increased understory density of plateau stands should not be attributed primarily to cessation of fires. Instead, heavy grazing by livestock and associated reduction of the herbaceous groundlayer promoted the establishment of less palatable tree and shrub seedlings, Fire, however, played an important secondary role in maintaining savanna and woodland communities.
Publication Ecology
Volume 64
Issue 4
Pages 661-667
Date August 1983
Journal Abbr Ecology
DOI 10.2307/1937186
ISSN 0012-9658
URL http://www.jstor.org/stable/1937186
Extra Keywords: fire history; grazing effects; Pinus ponderosa; Quercus gambelii; relict mesas; savanna; Utah.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:21:25 2011

Local and regional sediment charcoal evidence for fire regimes in presettlement north-eastern North America

Type Journal Article
Author James S. Clark
Author P. Daniel Royall
Abstract Summary: 1. Presettlement fire regimes in north-eastern North America and their dependence on climate, fuels, and cultural patterns are poorly understood due to lack of relevant historic or palaeoecological data. Annual records of sediment charcoal accumulation were compiled from seven sites spanning the last 2000 years and representing important climate, vegetation, and cultural settings. Results were compared across sites and across changes in Indian cultures to determine whether fire patterns might be explained by one or more of these variables. 2. Clearly interpretable fires were restricted to the western (most xeric) portion of our study region in Pine Hardwoods of Minnesota, a single fire in Northern Hardwoods of northern Wisconsin, and cultural burning near an Iroquois village in southern Ontario. Other sites in Northern Hardwoods and Hardwood-

Hemlock forests did not show clear evidence of fire. Spectral analysis suggested instances in which local fire regimes departed from regional ones. 3. Our interpretation suggests substantially longer intervals between fires than reported in previous sediment charcoal studies. We did not find evidence for fire in mixed oak forests, where it has been speculated that fire might be necessary for oak recruitment, suggesting need for further analysis. 4. A single site in northern Wisconsin was the only Algonquin site showing a clear increase in charcoal suggesting local fire. Algonquin use of fire for hunting may not have affected our sites. A single site in Sioux territory experienced such frequent fire that cultural effects were not evident, even when Sioux were replaced by Chippewa (Algonquin) in the 18th century. One of two Iroquois sites showed clear increases in charcoal during occupation. The second site may not have had settlements nearby.

Publication Journal of Ecology
Volume 84
Issue 3
Pages 365-382
Date June 1996
Journal Abbr J. Ecol.
ISSN 0022-0477
URL http://www.jstor.org/stable/2261199
Extra Keywords: charcoal analysis; climate; fire.
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:09:03 2011

Local and synoptic mechanisms causing Southern California's Santa Ana winds

Type Journal Article
Author Mimi Hughes
Author Alex Hall
Abstract The atmospheric conditions that lead to strong offshore surface winds in Southern California, commonly referred to as Santa Ana winds, are investigated using the North American Regional Reanalysis and a 12-year, 6-km resolution regional climate simulation of Southern California. We first construct an index to characterize Santa Ana events based on offshore wind strength. This index is then used to identify the average synoptic conditions associated with Santa Ana events—a high pressure anomaly over the Great Basin. This pressure anomaly causes offshore geostrophic winds roughly perpendicular to the region's mountain ranges, which in turn cause surface flow as the offshore momentum is transferred to the surface. We find, however, that there are large variations in the synoptic conditions during Santa Ana conditions, and that there are many days with strong offshore flow and weak synoptic forcing. This is due to local thermodynamic forcing that also causes strong offshore surface flow: a large temperature gradient between the cold desert surface and the warm ocean air at the same altitude creates an offshore pressure gradient at that altitude, in turn causing katabatic-like offshore flow in a thin layer near the surface. We quantify the contribution of "synoptic" and "local thermodynamic" mechanisms using a bivariate linear regression model, and find that, unless synoptic conditions force strongly onshore winds, the local thermodynamic forcing is the primary control on Santa Ana variability.
Publication Climate Dynamics
Volume 34
Issue 6
Pages 847-857
Date May 2010
Journal Abbr Clim. Dyn.
DOI 10.1007/s00382-009-0650-4
ISSN 0930-7575
URL http://dx.doi.org/10.1007/s00382-009-0650-4
Extra Keywords: Santa Ana winds; katabatic winds; regional climate.
Date Added Mon Aug 29 17:30:07 2011

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Locations and environments of US army training and testing lands: An ecoregional framework for assessment

Type Journal Article
Author William W. Doe III
Author Robert B. Shaw
Author Robert G. Bailey
Author David S. Jones
Author Thomas E. Macia
Abstract The U.S. Army manages over 12 million acres of federal training and testing lands contained within military installations throughout the 50 United States. These lands are a critical national asset for defense readiness, dedicated to providing realistic training and testing environments for army units and equipment. The locations and physiographic diversity of the Army's current land inventory is a function of historical precedent, modern-day land expansions, and requirements for strategic projection of forces. Many Army lands are relatively undeveloped, providing important ecological settings for a variety of flora and fauna, including many threatened and endangered species. As a responsible land steward, the Army is committed to protection and sustainable use of these natural resources, with concurrent benefit to both the army and the public. Army training and testing activities can cause environmental impacts that may be detrimental to the long-term sustainment of ecological functions. These realities pose significant land management challenges to the Army. The application of established ecologicalframeworks for strategically assessing land-use impacts and land management approaches is demonstrated for 31 major Army installations, using Bailey's "ecoregion classification system," developed by the U.S. Forest Service. The Ecoregions framework is used to (1) classify and catalog the ecological diversity of Army lands, (2) provide a comparative framework for assessing land resiliencyfrom Army impacts, and (3) extrapolate knowledge of perturbed ecosystem behavior and response from one army installation to others in similar ecoregions.
Publication Federal Facilities Environmental Journal
Volume 10
Issue 3
Pages 9–26
Date Autumn (Fall) 1999
Journal Abbr Fed. Facil. Environ. J. (FFEJ)
DOI 10.1002/ffej.3330100303
ISSN 1520-6513
Short Title Locations and environments of US army training and testing lands
URL http://onlinelibrary.wiley.com/doi/10.1002/ffej.3330100303/abstract
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 01:01:49 2011

Long lead statistical forecasts of area burned in western U.S. wildfires by ecosystem province

Type Journal Article
Author Anthony L. Westerling
Author Alexander Gershunov
Author Daniel R. Cayan
Author Tim P. Barnett
Abstract A statistical forecast methodology exploits large-scale patterns in monthly U.S. Climatological Division Palmer Drought Severity Index (PDSI) values over a wide region and several seasons to predict area burned in western U.S. wildfires by ecosystem province a season in advance. The forecast model, which is based on canonical correlations, indicates that a few characteristic patterns determine predicted wildfire season area burned. Strong

negative associations between anomalous soil moisture (inferred from PDSI) immediately prior to the fire season and area burned dominate in most higher elevation forested provinces, while strong positive associations between anomalous soil moisture a year prior to the fire season and area burned dominate in desert and shrub and grassland provinces. In much of the western U.S., above- and below-normal fire season forecasts were successful 57% of the time or better, as compared with a 33% skill for a random guess, and with a low probability of being surprised by a fire season at the opposite extreme of that forecast.

Publication International Journal of Wildland Fire
Volume 11
Issue 4
Pages 257-266
Date 2002
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF02009
ISSN 1049-8001
URL http://www.publish.csiro.au/?paper=WF02009
Extra Keywords: climatology.
Date Added Tue Aug 16 23:30:46 2011
Modified Tue Aug 16 23:30:53 2011

Long-term aridity changes in the Western United States

Type Journal Article
Author Edward R. Cook
Author Connie A. Woodhouse
Author C. Mark Eakin
Author David M. Meko
Author David W. Stahle
Abstract The western United States is experiencing a severe multiyear drought that is unprecedented in some hydroclimatic records. Using gridded drought reconstructions that cover most of the western United States over the past 1200 years, we show that this drought pales in comparison to an earlier period of elevated aridity and epic drought in AD 900 to 1300, an interval broadly consistent with the Medieval Warm Period. If elevated aridity in the western United States is a natural response to climate warming, then any trend toward warmer temperatures in the future could lead to a serious long-term increase in aridity over western North America.
Publication Science
Volume 306
Issue 5698
Pages 1015-1018
Date 5 November 2004
Journal Abbr Science
DOI 10.1126/science.1102586
ISSN 1095-9203
URL http://www.sciencemag.org/content/306/5698/1015.full
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:03:25 2011

Long-term fire history from alluvial fan sediments: The role of drought and climate variability, and implications for management of Rocky Mountain forests

Type Journal Article
Author Jennifer Pierce
Author Grant Meyer

Abstract Alluvial fan deposits are widespread and preserve millennial-length records of fire. We used these records to examine changes in fire regimes over the last 2000 years in Yellowstone National Park mixed-conifer forests and drier central Idaho ponderosa pine forests. In Idaho, frequent, small, fire-related erosional events occurred within the Little Ice Age (~1450–1800 AD), when greater effective moisture probably promoted grass growth and low-severity fires. This regime is consistent with tree-ring records showing generally wetter conditions and frequent fires before European settlement. At higher elevations in Yellowstone, cool conditions limited overall fire activity. Conversely, both Idaho and Yellowstone experienced a peak in fire-related debris flows between ~950 and 1150 AD. During this generally warmer time, severe multidecadal droughts were interspersed with unusually wet intervals that probably increased forest densities, producing stand-replacing fires. Thus, severe fires are clearly within the natural range of variability in Idaho ponderosa pine forests over longer timescales. Historical records indicate that large burn areas in Idaho correspond with drought intervals within the past 100 years and that burn area has increased markedly since ~1985. Recent stand-replacing fires in ponderosa pine forests are likely related to both changes in management and increasing temperatures and drought severity during the 20th century.

Publication International Journal of Wildland Fire
Volume 17
Issue 1
Pages 84-95
Date February 2008
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07027
ISSN 1049-8001
Short Title Long-term fire history from alluvial fan sediments
URL http://www.publish.csiro.au/paper/WF07027.htm
Extra Keywords: debris flows; Idaho; ponderosa pine; Yellowstone.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:30:38 2011

Long-term fire history in Great Basin sagebrush reconstructed from macroscopic charcoal in spring sediments, Newark Valley, Nevada

Type Journal Article
Author Scott Mensing
Author Stephanie Livingston
Author Pat Barker

Abstract We use macroscopic charcoal analysis to reconstruct fire history in sagebrush (Artemisia tridentata var. wyomingensis and A. tridentata var. tridentate), in Newark Valley, Nevada. We analyzed charcoal at continuous 1-cm intervals (~7-127 years), and pollen at 2- to 10-cm intervals (~70-263 years) in a core spanning the last 5500 cal yr BP (calendar years before present). A charcoal peak in the historic period was associated with a >1400-ha fire dated to 1986 that burned in the watershed. We reconstructed the prehistoric fire history by inferring fires from similar charcoal peaks that were significantly greater than the background charcoal accumulation. Our results suggest the fire regime is climate and fuel driven. During periods of wetter climate, sagebrush increased and fires were more abundant, and during extended dry periods when sagebrush decreased, fires were less frequent. Our method does not allow calculation of a fire-return interval; however, our results support models that estimate a mean fire-return interval of up to a century in Artemisia tridentata var. wyomingensis. The charcoal record indicates that fires have increased within the historic period. This contrasts with pinyon/juniper studies that indicate an expansion of woodland associated with fewer fires in the historic period. We suggest that in the central Great Basin, a regime of frequent fires in sagebrush that limits woodland expansion is true for the sagebrush-woodland ecotone, but in sagebrush-dominated valleys with lower fuel loads, fires have always been less frequent. Protecting sagebrush-dominated valleys from frequent fire would

appear to be consistent with the prehistoric fire regime.

Publication Western North American Naturalist
Volume 66
Issue 1
Pages 64-77
Date January 2006
Journal Abbr West N. Am. Naturalist
DOI 10.3398/1527-0904(2006)66[64:LFHIGB]2.0.CO;2
ISSN 1527-0904
URL http://www.bioone.org/doi/abs/10.3398/1527-0904(2006)66%5B64:LFHIGB%5D2.0.CO%3B2
Archive https://ojs.lib.byu.edu/wnan/index.php/wnan/article/view/1475
Extra Keywords: sagebrush; fire history; charcoal; Nevada; Great Basin; Artemisia tridentata var. wyomingensis.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:46:02 2011

Long-term fire regime estimated from soil charcoal in coastal temperate rainforests

Type Journal Article

Author Ken Lertzman
Author Daniel Gavin
Author Douglas Hallett
Author Linda Brubaker
Author Dana Lepofsky
Author Rolf Mathewes

Abstract Coastal temperate rainforests from southeast Alaska through to southern Oregon are ecologically distinct from forests of neighboring regions, which have a drier, or more continental, climate and disturbance regimes dominated by fires. The long-term role of fire remains one of the key outstanding sources of uncertainty in the historical dynamics of the wetter and less seasonal forests that dominate the northerly two thirds of the rainforest region in British Columbia and Alaska. Here, we describe the long-term fire regime in two forests on the south coast of British Columbia by means of 244 AMS radiocarbon dates of charcoal buried in forest soils. In both forests, some sites have experienced no fire over the last 6000 years and many other sites have experienced only one or two fires during that time. Intervals between fires vary from a few centuries to several thousand years. In contrast to other conifer forests, this supports a model of forest dynamics where fires are of minor ecological importance. Instead, forest history is dominated by fine-scale processes of disturbance and recovery that maintain an ubiquitous late-successional character over the forest landscape. This has significant implications for ecosystem-based forest management and our understanding of carbon storage in forest soils.

Publication Conservation Ecology
Volume 6
Issue 2
Pages 1-13
Date December 2002
Journal Abbr Conserv. Ecol.
ISSN 1708-3087
URL http://www.consecol.org/vol6/iss2/art5
Extra Keywords: Clayoquot Sound; Fraser Valley; coastal temperate rainforests; fire intervals; long-term fire regime; soil carbon storage; soil charcoal; sub-alpine forest; time-since-fire.
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:37:58 2011

Long-term forest dynamics of the temperate zone: A case study of late-Quaternary forests in eastern North America

Type Book
Author Paul A. Delcourt
Author Hazel R. Delcourt
Abstract Description: This study represents a comprehensive and quantitative examination of the paleoecological evidence for forest community development in the Temperate Zone of Eastern North America since the last glacial maximum 20,000 years ago. A computerized fossil-pollen data set, compiled from 162 radiocarbon-dated paleoecological sites were used. Their fossil pollen spectra were transformed into an estimate of past dominance for 19 major tree taxa. Ecological ordination of the data allowed evaluation of the degree of persistence. Measurement of the rates of spread along major migration routes give new insights into the biogeography of temperate and boreal trees. These extensive studies are of interest to graduate students and researchers in all fields of ecology, as well as biogeography.
Series Ecological Studies
Volume 63
Edition 1st edition
Place New York; Berlin
Publisher Springer-Verlag
Date August 1987
# of Pages xiii, 439 p.
ISBN 0387964959
URL http://www.amazon.com/Long-Term-Forest-Dynamics-Temperate-Zone/dp/0387964959
Extra Subjects: pollen, fossil; paleoecology; paleobotany; forest dynamics; quaternary; North America.
Date Added Tue Aug 30 04:16:19 2011
Modified Thu Sep 1 04:09:35 2011

Long-term history of vegetation and fire in pitch pine-oak forests on Cape Cod, Massachusetts

Type Journal Article
Author Tim Parshall
Author David R. Foster
Author Edward Faison
Author D. MacDonald
Author Barbara C. S. Hansen
Abstract Human disturbance in northeastern North America over the past four centuries has led to dramatic change in vegetation composition and ecosystem processes, obscuring the influence of climate and edaphic factors on vegetation patterns. We use a paleoecological approach on Cape Cod, Massachusetts, to assess landscape-scale variation in pitch pine–oak vegetation and fire occurrence on the pre-European landscape and to determine changes resulting from European land use. Fossil pollen and charcoal preserved in seven lakes confirm a close link between landform and the pre-European distribution of vegetation. Pine forests, dominated by Pinus rigida, were closely associated with xeric outwash deposits, whereas oak–hardwood forests were associated with landforms having finer grained soils and variable topography. In general, fire was much more abundant on Cape Cod than most other areas in New England, but its occurrence varied geographically at two scales. On the western end of Cape Cod, fires were more prevalent in pine forests (outwash) than in oak–hardwood forests (moraines). In contrast, fires were less common on the narrow and north–south trending eastern Cape, perhaps because of physical limits on fire spread. The most rapid and substantial changes during the past 2000 years were initiated by European settlement, which produced a vegetation mosaic that today is less clearly tied to landform. Quercus and other hardwood trees declined in abundance in the early settlement period in association with land clearance, whereas Pinus has increased, especially during the past century, through natural reforestation and planting of abandoned fields and pastures. An increase in fossil charcoal following European settlement suggests that fire occurrence has risen substantially as a result of forest clearance and other land

uses, reaching levels greater than at any time over the past 2000 years. Although fire was undoubtedly used by Native Americans and may have been locally important, we find no clear evidence that humans extensively modified fire regimes or vegetation before European settlement. Instead, climate change over the past several thousand years and European land use over the past 300 years have been the most important agents of change on this landscape.

Publication Ecology
Volume 84
Issue 3
Pages 736–748
Date March 2003
Journal Abbr Ecology
DOI 10.1890/0012-9658(2003)084[0736:LTHOVA]2.0.CO;2
ISSN 0012-9658
URL http://www.jstor.org/stable/3107867
Extra Keywords: Cape Cod; Massachusetts (USA); charcoal; land use; paleoecology; pitch pine–oak forest; pollen.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:29:41 2011

Long-term relations among fire, fuel, and climate in the north-western US based on lake-sediment studies

Type Journal Article
Author Cathy Whitlock
Author Jennifer Marlon
Author Christy Briles
Author Andrea Brunelle
Author Long Colin
Author Patrick Gonzalez
Abstract Pollen and high-resolution charcoal records from the north-western USA provide an opportunity to examine the linkages among fire, climate, and fuels on multiple temporal and spatial scales. The data suggest that general charcoal levels were low in the late-glacial period and increased steadily through the last 11 000 years with increasing fuel biomass. At local scales, fire occurrence is governed by the interaction of site controls, including vegetation, local climate and fire weather, and topography. At subregional scales, patterns in the long term fire-episode frequency data are apparent: The Coast Range had relatively few fires in the Holocene, whereas the Klamath–Siskiyou region experienced frequent fire episodes. Fire regimes in the northern Rocky Mountains have been strongly governed by millennial- and centennial-scale climate variability and regional differences in summer moisture. At regional scales, sites in present-day summer-dry areas show a period of protracted high fire activity within the early Holocene that is attributed to intensified summer drought in the summer-dry region. Sites in summer-wet areas show the opposite pattern, that fire was lower in frequency than present in the early Holocene as result of strengthened monsoonal circulation then. Higher fire-episode frequency at many sites in the last 2000 years is attributed to greater drought during the Medieval Climate Anomaly and possibly anthropogenic burning. The association between drought, increased fire occurrence, and available fuels evident on several time scales suggests that long-term fire history patterns should be considered in current assessments of historical fire regimes and fuel conditions.
Publication International Journal of Wildland Fire
Volume 17
Issue 1
Pages 72–83
Date February 2008
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07025
ISSN 1049-8001

URL http://www.publish.csiro.au/paper/WF07025.htm
Call Number 0000
Extra Keywords: charcoal data; fire history; Holocene; pollen data; western US.
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:30 2011

Long-term trend in global CO2 emissions; 2011 report - PBL Netherlands Environmental Assessment Agency

Type Report
Author J.G.J. Olivier
Author G. Janssens-Maenhout
Author J.A.H.W. Peters
Author J. Wilson
Abstract After a 1 percent decline in 2009, global carbon dioxide (CO2) emissions increased by more than 5 percent in 2010, which is unprecedented in the last two decades. The industrialised countries that ratified the Kyoto Protocol, together with the non-ratifying USA emitted approximately 7.5 percent less CO2 in 2010 than in 1990 and collectively remain on target to meet the original Kyoto Protocol objective of a 5.2 percent reduction. However their efforts are increasingly hidden in the global picture as their share of CO2 emissions has dropped from two-thirds to less than half.
Report Number PBL publication number 500253004 JRC Technical Note number JRC65918
Date 2011
URL http://www.pbl.nl/en/publications/2011/long-term-trend-in-global-co2-emissions-2011-report
Accessed Thu Sep 29 10:08:10 2011
Call Number 0000
Date Added Thu Oct 6 11:54:41 2011
Modified Thu Oct 6 11:54:41 2011

Long-term, landscape patterns of past fire events in a montane ponderosa pine forest of central Colorado

Type Journal Article
Author Peter M. Brown
Author Merrill R. Kaufmann
Author Wayne D. Shepperd
Abstract Parameters of fire regimes, including fire frequency, spatial extent of burned areas, fire severity, and season of fire occurrence, influence vegetation patterns over multiple scales. In this study, centuries-long patterns of fire events in a montane ponderosa pine – Douglas-fir forest landscape surrounding Cheesman Lake in central Colorado were reconstructed from fire-scarred trees and inferences from forest stand ages. We crossdated 153 fire-scarred trees from an approximately 4000 ha study area that recorded 77 total fire years from 1197 to the present. Spatial extent of burned areas during fire years varied from the scale of single trees or small clusters of trees to fires that burned across the entire landscape. Intervals between fire years varied from 1 to 29 years across the entire landscape to 3 to 58 years in one stand, to over 100 years in other stands. Large portions of the landscape did not record any fire for a 128 year-long period from 1723 to 1851. Fire severity varied from low-intensity surface fires to large-scale, stand-destroying fires, especially during the 1851 fire year but also possibly during other years. Fires occurred throughout tree growing seasons and both before and after growing seasons. These results suggest that the fire regime has varied considerably across the study area during the past several centuries. Since fires influence plant establishment and mortality on the landscape, these results further suggest that vegetation patterns changed at multiple scales during this period. The fire history from Cheesman Lake documents a greater range in fire behavior in ponderosa pine forests than generally has been found in previous studies.

Publication Landscape Ecology
Volume 14
Issue 6
Pages 513–532
Date December 1999
Journal Abbr Landscape Ecol.
DOI 10.1023/A:1008137005355
ISSN 0921-2973
URL http://www.springerlink.com/content/l664451m04614674/
Extra Keywords: crossdating; dendrochronology; fire chronology; fire extent; fire frequency; fire scars; fire regimes; fire seasonality; fire severity.
Date Added Wed Aug 24 06:41:10 2011
Modified Fri Aug 26 20:34:33 2011

Major Mesoamerican droughts of the past millennium

Type Journal Article
Author David W. Stahle
Author Jose Villanueva-Diaz
Author Dorian J. Burnette
Author Julian Cerano-Paredes
Author Richard R. Heim Jr.
Author Falko K. Fye
Author Rodolfo Acuña-Soto
Author Matthew D. Therrell
Author Malcolm K. Cleaveland
Author Daniel K. Stahle
Abstract Ancient Montezuma baldcypress (Taxodium mucronatum) trees found in Barranca de Amealco, Queretaro, have been used to develop a 1,238-year tree-ring chronology that is correlated with precipitation, temperature, drought indices, and crop yields in central Mexico. This chronology has been used to reconstruct the spring-early summer soil moisture balance over the heartland of the Mesoamerican cultural province, and is the first exactly dated, annually resolved paleoclimatic record for Mesoamerica spanning the Late Classic, Post Classic, Colonial, and modern eras. The reconstruction indicates that the Terminal Classic drought extended into central Mexico, supporting other sedimentary and speleothem evidence for this early 10th century drought in Mesoamerica. The reconstruction also documents severe and sustained drought during the decline of the Toltec state (1149–1167) and during the Spanish conquest of the Aztec state (1514–1539), providing a new precisely dated climate framework for Mesoamerican cultural change.
Publication Geophysical Research Letters
Volume 38
Issue 5
Pages L05703 (4 p.)
Date March 2011
Journal Abbr Geophys. Res. Lett.
DOI 201110.1029/2010GL046472
ISSN 0094–8276
URL http://www.agu.org/pubs/crossref/2011/2010GL046472.shtml
Call Number 0000
Extra Keywords: drought; Mesoameric; tree rings.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:04 2011

Man and fire in the central North American grassland, 1535-1890: A documentary historical geography

Type Thesis

Author Conrad Taylor Moore

Abstract Numerous scholars have raised questions and drawn conclusions concerning the causes and ecological effects of fires and their seasons of occurrence in the Central North American Grassland prior to permanent white settlement. These have consisted of either generalized discussions or more precise local analyses. None have examined the issues in detail for the entire region or attempted to point out geographical patterns pertaining to them. In the present study these issues are considered in the light of information contained in historical documents. Over six hendred diaries, journals and memoirs left by whites who visited or resided in the area during the period 1535-1890 were examined. Four hudred and eighteen dated fires and brns were used for regionalization of the area on the basis of seasons of fire occurrence. Four distinct regions were delimited-Northeast, Northwest, Central, and Southern. Data pertaining to Indian tribes and white occupational groups responsible for fires, the reasons for their occurrence, and effects on plants, animals, and man were analyzed for each of the regions. Lighting was not considered as a significant causal factor since only one specific historical reference was recorded. Privious investigators have stressed the importance of spring and fall fires, but the frequent occurrence of winter fires in the Southern Region and summer fires on the other three regions seems to have gone largely unrecoginized. No attempts have been made to determine responsibility for fires started by members of the various Indian tribes residing in the area. Historical data indicate that the Sioux and Apache were responsible for fires well in excess of what would have been expectable in relation to tribal populations. Soldiers, tourists, explorers, and emigrants accounted for two-thirds of the cases in which white occupational groups were mentioned. Hunting, pasturage improvement, and acciedent have been regarded as the most important reasons for fires started by Indians. Present findings suggest that although hunting was of major significance, it was generally of lesser importance than grass fires set for signalling purposes or those related to warfare. Pasturage improvement and accident, as well as horse stealing, were secondary causes. Fires started by whites both accidentally and to improve pasturage conditons have been mentioned as important factors. While this is supported by early accounts, fires were also frequently set for communication and pleasure. More sophisticated recent studies of the effects of fire on vegetation are in general agreement with data contained in the historical record, but discrepancies are significant with respect to effects on animals. Deaths of both native and domesticated animals appear to have occurred much more frequntly than has been recently recognized. Little attentions has been directed toward the problem of the effects of fire on man. Historical citations pertaining to human deaths and injuries, and insufficient forage for transportation animals accounted for forty percent of the cases mentioned. Other travel-related problems such as obstacles created by fire-felled trees, lack of fuel for cooking, and the obscuring of trails were also frequently cited.

Type Ph.D. Dissertation

University University of California, Los Angeles

Place Los Angeles, CA.

Date 1972

# of Pages 169 p.

Short Title Man and fire in the central North American grassland, 1535-1890

URL http://proquest.umi.com/pqdweb?did=759633331&…

Date Added Tue Aug 30 14:35:38 2011

Modified Wed Aug 31 00:23:29 2011

Man and the land : An ecological history of fire and grazing on eastern Oregon rangelands

Type Thesis

Author Dean Allison Shinn

Abstract Ecological and historical information are combined in examining the environmental influence of fire and grazing on rangelands in eastern Oregon through time. Competitive relationships between herbaceous and woody flora in the northern Great Basin are discussed, focusing broadly on the shrubsteppe regions 'of Franklin and Dyrness (1973) but with special reference to the Artemisia/Agropyron association. Impacts of native and domestic grazing animals and of cultural burning are traced from the distant past into recent history. During the Pleistocene Epoch North America supported a wide diversity of large mammals. Toward the end of the Pleistocene, many of these fauna became extinct, perhaps as a result of post-glacial climatic change, perhaps also under the influence of incoming primitive hunting cultures and their broadcast burning practices. Some question exists about the intensity of native grazing in the northern Great Basin during the last few thousand years. Actual levels of bison populations and the duration of their residence in the study area have not been determined. The character of indigenous vegetations, however, indicates that native grazing was relatively light for an extended period primevally. Twenty-four references to native cultural burning at the time of European contact were found in historical journals. Though the antiquity of these customs is uncertain, an analysis of Native American fire myths demonstrates the depth of native cultural perceptions of the relationship between man and fire, and supports the likelihood that fire was used primevally in the northern Great Basin as it was used by aboriginal peoples elsewhere in North America. With the influx of European culture during the 19th century, misapprehensions about fire among whites distorted the influence of native cultural burning. Exotic flora and fauna were introduced, and ecosystems began to change. Large herds of livestock depleted native herbaceous populations. Early irresponsible burning by whites became associated with declining rangeland resources, and efforts toward total fire suppression became incorporated in developing conservation policies. Native woody flora and exotics began to invade open rangeland communities. Climatic flux during the period of European settlement in the northern Great Basin may have exacerbated the impacts of intensified grazing and elimination of burning. Early photographs of rangelands in east-central Oregon were gathered; their dates range from 1880 to the early 1930's. Sites represented in these pictures were re-photographed in 1976. Photo-set comparisons show expansion of western juniper (Juniperus occidentalis) populations into rangeland ecosystems, demonstrating the consequences of cultural disturbances during the last 150 to 200 years.

Type M.A. Thesis
University Oregon Sate University
Place Corvallis, OR
Date 1977 (Graduation: 1978)
# of Pages 101 p.
Short Title Man and the land
URL http://ir.library.oregonstate.edu/jspui/handle/1957/6737
Date Added Sun Aug 28 17:26:09 2011
Modified Sun Aug 28 17:26:09 2011

Management of fire regime, fuels, and fire effects in southern California chaparral: Lessons from the past and thoughts for the future

Type Conference Paper
Author Susan G. Conard
Author David R. Weise
Abstract Chaparral is an intermediate fire-return interval (FRI) system, which typically burns with high-intensity crown fires. Although it covers only perhaps 10% of the state of California, and smaller areas in neighboring states, its importance in terms of fire management is disproportionately large, primarily because it occurs in the wildland-urban interface through much of its range. Historic fire regimes for chaparral are not well-documented, partly due to lack of dendrochronological information, but it appears that infrequent large fires with FRI of 50-100+ years dominated. While there are concerns over effects of fire suppression on chaparral fire regimes, there is little evidence of changes in area burned per year or size of large fires over this century. There have been increases in ignitions and in the number of smaller fires, but these fires represent a very small proportion of the burned area. Fires in chaparral seem to have always burned the largest areas under severe fire weather conditions (major heat waves or high winds). Patterns of fuel development and evidence on the effectiveness of age-class boundaries at stopping fires suggest that, while fire in young stands is more amenable to control than that in older stands, chaparral of all ages will burn under severe conditions. We recommend a two-part strategy of: 1) establishment of strategically placed dynamic fuel management zones in wildland areas to provide access and opportunities for fire control, and; 2) intensive fire risk management zones (managed and developed cooperatively with local agencies and landowners) to protect values in the wildland-urban interface.
Date 1998

Proceedings Title Proceedings Fire In Ecosystem Management: Shifting the Paradigm from Suppression to Prescription
Conference Name Tall Timbers Fire Ecology Conference 20th Proceedings Fire In Ecosystem Management: Shifting the Paradigm from Suppression to Prescription, Boise, Idaho, May 7–10, 1996
Place Tallahassee, Florida
Publisher Tall Timbers Research, Inc.
Pages 342-350
ISBN 0082-1527
Short Title Management of fire regime, fuels, and fire effects in southern California chaparral
URL http://ddr.nal.usda.gov/handle/10113/34404
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:04 2011

Notes:

Citation:

Conard, Susan G., and David R. Weise. 1998. Management of fire regime, fuels, and fire effects in southern California chaparral: lessons from the past and thoughts for the future. Pages 342-350 in Teresa L. Pruden and Leonard A. Brennan (eds.). Fire in ecosystem management: shifting the paradigm from suppression to prescription. Tall Timbers Fire

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Managing fire-prone forests in the western United States

Type Journal Article
Author R.F. Noss
Author J.F. Franklin
Author W.L. Baker
Author T. Schoennagel
Author P.B. Moyle
Abstract The management of fire-prone forests is one of the most controversial natural resource issues in the US today, particularly in the west of the country. Although vegetation and wildlife in these forests are adapted to fire, the historical range of fire frequency and severity was huge. When fire regimes are altered by human activity, major effects on biodiversity and ecosystem function are unavoidable. We review the ecological science relevant to developing and implementing fire and fuel management policies for forests before, during, and after wildfires. Fire exclusion led to major deviations from historical variability in many dry, low-elevation forests, but not in other forests, such as those characterized by high severity fires recurring at intervals longer than the period of active fire exclusion. Restoration and management of fire-prone forests should be precautionary, allow or mimic natural fire regimes as much as possible, and generally avoid intensive practices such as post-fire logging and planting.
Publication Frontiers in Ecology and the Environment
Volume 4
Issue 9
Pages 481–487
Date 2006
Library Catalog Google Scholar
Call Number 0077
Date Added Thu Oct 6 11:54:25 2011
Modified Thu Oct 6 11:59:47 2011

Managing fire-prone forests in the western United States

Type Journal Article
Author Reed F. Noss
Author Jerry F. Franklin
Author William L. Baker
Author Tania Schoennagel
Author Peter B. Moyle
Abstract The management of fire-prone forests is one of the most controversial natural resource issues in the US today, particularly in the west of the country. Although vegetation and wildlife in these forests are adapted to fire, the historical range of fire frequency and severity was huge. When fire regimes are altered by human activity, major effects on biodiversity and ecosystem function are unavoidable. We review the ecological science relevant to developing and implementing fire and fuel management policies for forests before, during, and after wildfires. Fire exclusion led to major deviations from historical variability in many dry, low-elevation forests, but not in other forests, such as those characterized by high severity fires recurring at intervals longer than the period of active fire exclusion. Restoration and management of fire-prone forests should be precautionary, allow or mimic natural fire regimes as much as possible, and generally avoid intensive practices such as post-fire logging and planting.
Publication Frontiers in Ecology and the Environment
Volume 4
Issue 9
Pages 481–487
Date November 2006
Journal Abbr Front. Ecol. Environ.
DOI 10.1890/1540-9295(2006)4[481:MFFITW]2.0.CO;2
ISSN 1540-9295
URL http://www.jstor.org/stable/3868822
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:36:58 2011

Managing for multiple resources under climate change: National forests

Type Journal Article
Author Linda A. Joyce
Author Geoffrey M. Blate
Author Steven G. McNulty
Author Constance I. Millar
Author Susanne Moser
Author Ronald P. Neilson
Author David L. White
Abstract This study explores potential adaptation approaches in planning and management that the United States Forest Service might adopt to help achieve its goals and objectives in the face of climate change. Availability of information, vulnerability of ecological and socio-economic systems, and uncertainties associated with climate change, as well as the interacting non-climatic changes, influence selection of the adaptation approach. Resource assessments are opportunities to develop strategic information that could be used to identify and link adaptation strategies across planning levels. Within a National Forest, planning must incorporate the opportunity to identify vulnerabilities to climate change as well as incorporate approaches that allow management adjustments as the effects of climate change become apparent. The nature of environmental variability, the inevitability of novelty and surprise, and the range of management objectives and situations across the National Forest System implies that no single approach will fit all situations. A toolbox of management options would include practices focused on forestalling climate change effects by building resistance and resilience into current ecosystems, and on managing for change by enabling plants, animals, and ecosystems to adapt to climate change. Better and more widespread implementation of already known practices that reduce the impact of existing stressors represents an important “no regrets” strategy. These management opportunities will require agency consideration of its adaptive capacity, and ways to overcome potential

barriers to these adaptation options.

Publication Environmental Management
Volume 44
Issue 6
Pages 1022–1032
Date December 2009
Journal Abbr Environ. Manage.
DOI 10.1007/s00267-009-9324-6
ISSN 0364-152X
Short Title Managing for multiple resources under climate change
URL http://www.springerlink.com/content/b5715tl4840506n5/
Extra Keywords: resilience; resistance; anticipatory management; planning; assessments; adaptation.
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:12:36 2011

Mapping eastern North American vegetation change of the past 18 ka: No-analogs and the future

Type Journal Article
Author Jonathan T. Overpeck
Author Robert S. Webb
Author Thompson Webb III
Abstract The method of modern analogs and an extensive data base of modern and fossil pollen data were used to generate a new series of paleovegetation maps for eastern North America spanning the past 18 ka. The maps illustrate the continuous nature of climate-induced vegetation change and the development, after about 10 ka, of modern regional vegetation patterns. Before the Holocene, vegetation biomes without modern analogs were widespread in response to climate conditions without modern analogs and, to a lesser extent, to the rapidity of climate change over the last glacial-interglacial transition. This geological perspective suggests that possible future climate changes could force similarly complex changes in natural vegetation, including the development of biomes without modern analogs.
Publication Geology
Volume 20
Issue 12
Pages 1071–1074
Date December 1992
Journal Abbr Geology
DOI 10.1130/0091-7613(1992)020<1071:MENAVC>2.3.CO;2
ISSN 1943-2682
Short Title Mapping eastern North American vegetation change of the past 18 ka
URL http://geology.geoscienceworld.org/cgi/content/abstract/20/12/1071
Date Added Sat Aug 27 18:47:36 2011
Modified Sat Aug 27 18:47:36 2011

Mapping environments at risk under different global climate change scenarios

Type Journal Article
Author Earl Saxon
Author Barry Baker
Author William Hargrove
Author Forrest Hoffman

Author Chris Zganjar

Abstract All global circulation models based on Intergovernmental Panel on Climate Change (IPCC) scenarios project profound changes, but there is no consensus on how to map their environmental consequences. Our multivariate representation of environmental space combines stable topographic and edaphic attributes with dynamic climatic attributes. We divide that environmental space into 500 unique domains and map their current locations and their projected locations in 2100 under contrasting emissions scenarios. The environmental domains found across half the study area today disappear under the higher emissions scenario, but persist somewhere in it under the lower emissions scenario. Locations affected least and those affected most under each scenario are mapped. This provides an explicit framework for designing conservation networks to include both areas at least risk (potential refugia) and areas at greatest risk, where novel communities may form and where sentinel ecosystems can be monitored for signs of stress.

Publication Ecology Letters

Volume 8

Issue 1

Pages 53–60

Date January 2005

Journal Abbr Ecol. Lett.

DOI 10.1111/j.1461-0248.2004.00694.x

ISSN 1461-0248

URL http://onlinelibrary.wiley/doi/10.1111/j.1461-0248.2004.00694.x/abstract

Extra Keywords: biodiversity conservation; climate change; domains;mecoregions; mapping; multivariate cluster analysis; scenarios.

Date Added Sun Aug 28 17:26:09 2011

Modified Wed Aug 31 00:25:58 2011

Mapping fire regimes across time and space: Understanding coarse and fine-scale fire patterns

Type Journal Article

Author Penelope Morgan

Author Colin C. Hardy

Author Thomas W. Swetnam

Author Matthew G. Rollins

Author Donald G. Long

Abstract Maps of fire frequency, severity, size, and pattern are useful for strategically planning fire and natural resource management, assessing risk and ecological conditions, illustrating change in disturbance regimes through time, identifying knowledge gaps, and learning how climate, topography, vegetation, and land use influence fire regimes. We review and compare alternative data sources and approaches for mapping fire regimes at national, regional, and local spatial scales. Fire regimes, defined here as the nature of fires occurring over an extended period of time, are closely related to local site productivity and topography, but climate variability entrains fire regimes at regional to national scales. In response to fire exclusion policies, land use, and invasion of exotic plants over the last century, fire regimes have changed greatly, especially in dry forests, woodlands, and grasslands. Comparing among and within geographic regions, and across time, is a powerful way to understand the factors determining and constraining fire patterns. Assembling spatial databases of fire information using consistent protocols and standards will aid comparison between studies, and speed and strengthen analyses. Combining multiple types of data will increase the power and reliability of interpretations. Testing hypotheses about relationships between fire, climate, vegetation, land use, and topography will help to identify what determines fire regimes at multiple scales.

Publication International Journal of Wildland Fire

Volume 10

Issue 4

Pages 329-342

Date January 2001

Journal Abbr Int. J. Wildland Fire

DOI 10.1071/WF01032
ISSN 1049-8001
Short Title Mapping fire regimes across time and space
URL http://www.publish.csiro.au/paper/WF01032
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:47:26 2011

Mapping fuels and fire regimes using remote sensing, ecosystem simulation, and gradient modeling

Type Journal Article
Author Matthew G. Rollins
Author Robert E. Keane
Author Russell A. Parsons
Abstract Maps of fuels and fire regimes are essential for understanding ecological relationships between wildland fire and landscape structure, composition, and function, and for managing wildland fire hazard and risk with an ecosystem perspective. While critical for successful wildland fire management, there are no standard methods for creating these maps, and spatial data representing these important characteristics of wildland fire are lacking in many areas. We present an integrated approach for mapping fuels and fire regimes using extensive field sampling, remote sensing, ecosystem simulation, and biophysical gradient modeling to create predictive landscape maps of fuels and fire regimes. A main objective was to develop a standardized, repeatable system for creating these maps using spatial data describing important landscape gradients along with straightforward statistical methods. We developed a hierarchical approach to stratifying field sampling to ensure that samples represented variability in a wide variety of ecosystem processes. We used existing and derived spatial layers to develop a modeling database within a Geographic Information System that included 38 mapped variables describing gradients of physiography, spectral characteristics, weather, and biogeochemical cycles for a 5830-km2 study area in northwestern Montana. Using general linear models, discriminant analysis, classification and regression trees, and logistic regression, we created maps of fuel load, fuel model, fire interval, and fire severity based on spatial predictive variables and response variables measured in the field. Independently evaluated accuracies ranged from 51 to 80%. Direct gradient modeling improved map accuracy significantly compared to maps based solely on indirect gradients. By focusing efforts on direct as opposed to indirect gradient modeling, our approach is easily adaptable to mapping potential future conditions under a range of possible management actions or climate scenarios. Our methods are an example of a standard yet flexible approach for mapping fuels and fire regimes over broad areas and at multiple scales. The resulting maps provide fine-grained, broad-scale information to spatially assess both ecosystem integrity and the hazards and risks of wildland fire when making decisions about how best to restore forests of the western United States to within historical ranges and variability.
Publication Ecological Applications
Volume 14
Issue 1
Pages 75-95
Date January 2004
Journal Abbr Ecol. Appl.
DOI 10.1890/02-5145
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/02-5145
Extra Keywords: ecosystem simulation; fire ecology; fire regimes; fuels; Geographic Information Systems; gradient modeling; predictive mapping; remote sensing.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:16 2011

Mapping historic fire regimes for the western United States: Integrating remote sensing and

biophysical data

Type Conference Paper
Author Colin C. Hardy
Author James P. Menakis
Author Donald G. Long
Author James K. Brown
Author David L. Bunnell
Abstract We have developed a spatial database of historic natural fire regimes for the eleven western States to provide information in support of expected national increases in prescribed burning. Fire regimes are described in terms both of frequency and severity, and we have classified five distinct lire regimes: <35 years/non-lethal (mostly forested land); <35 years/stand replacement (grasslands and shrublands); 35-100+ years/mixed severity; 35-100+ years/stand replacement; 200+ years/stand replacement. The base-layer spatial data we used was a 159-class Land Cover Characterization database derived from seasonal NDVI profiles by USGS EROS Data Center. To assign fire regimes to the Land Cover Characterization database, we integrated four additional sources of biophysical data, including a 500 meter digital elevation model, Kuchler's Potential Natural Vegetation, 4th-Code hydrologic units, and ecological subregions (Bailey's sections). The resulting knowledge will help decision-makers determine what level of fire activity may be required. For example, can initial entry fire be used for maintenance; can fire be used to achieve restoration objectives, or is supplemental mechanical treatment required as a precursor to prescribed fire?
Date 1998
Proceedings Title Natural Resources Management Using Remote Sensing and Gis: Proceedings of the 7th Forest Service Remote Sensing Applications Conference
Conference Name Proceedings of the 7th Biennial Forest Service Remote Sensing Applications Conference, Nassau Bay, Texas, April 6-10, 1998
Place Bethesda, Md.
Publisher American Society for Photogrammetry and Remote Sensing (Jerry Dean Greer, editor)
Pages 288-300
ISBN 1570830576, 978-1570830570
Short Title Mapping historic fire regimes for the western United States
URL http://www.fs.fed.us/eng/rsac/rs98/final_program3.html
Archive http://ddr.nal.usda.gov/handle/10113/39961
Extra Keywords: forest fires; fire regime; cartography; remote sensing; wildfires; geospatial data processing; geospatial technology; vegetation types; forests; grasslands; shrublands; western United States.
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:30:07 2011

Notes:

Citation:

Hardy CC, Menakis JP, Long DG, Brown JK, Bunnell DL (1998) Mapping historic fire regimes for the western United States: integrating remote sensing and biophysical data. In Greer, J. D. (editor), Natural Resources Management Using Remote Sensing and GIS: Proceedings of the seventh Forest Service Remote Sensing Applications Conference April 6-10, 1998,. American Society for Photogrammetry and Remote Sensing, Bethesda, Maryland. P. 288-300.

Marked decline in atmospheric carbon dioxide concentrations during the Paleogene

Type Journal Article
Author Mark Pagani
Author James C. Zachos
Author Katherine H. Freeman
Author Brett Tipple

Author Stephen Bohaty

Abstract The relation between the partial pressure of atmospheric carbon dioxide (ρCO_2) and Paleogene climate is poorly resolved. We used stable carbon isotopic values of di-unsaturated alkenones extracted from deep sea cores to reconstruct ρCO_2 fromthe middle Eocene to the late Oligocene (~45 to 25 million years ago). Our results demonstrate that ρCO_2 ranged between 1000 to 1500 parts per million by volume in the middle to late Eocene, then decreased in several steps during the Oligocene, and reached modern levels by the latest Oligocene. The fall in ρCO_2 likely allowed for a critical expansion of ice sheets on Antarctica and promoted conditions that forced the onset of terrestrial C_4 photosynthesis.

Publication Science
Volume 309
Issue 5734
Pages 600-603
Date 22 July 2005
Journal Abbr Science
DOI 10.1126/science.1110063
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1110063
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:27:26 2011

Medieval Climate Anomaly

Type Journal Article
Editor Elena Xoplaki
Editor Dominik Fleitmann
Editor Henry Diaz
Editor Lucien von Gunten
Editor Thorsten Kiefer

Abstract This newsletter issue compiles the latest information on climate and impacts during the Medieval Climate Anomaly (MCA) at global and regional scales. It also provides information on recently held meetings and upcoming events.

Publication PAGES Newsletter
Volume 19
Issue 1
Pages 2-40
Date March 2011
Journal Abbr PAGES News
ISSN 1811-1602
URL http://www.pages-igbp.org/products/2011-03-28-16-23-06/249-pages-news-vol-19-no-1
Loc. in Archive PAGES

Date Added Tue Aug 16 01:39:39 2011
Modified Tue Aug 16 21:24:26 2011

Merger of three modeling approaches to assess potential effects of climate change on trees in the eastern United States

Type Conference Paper
Author Louis R. Iverson

Author Anantha M. Prasad
Author Stephen N. Matthews
Author Matthew P. Peters
Abstract Climate change will likely cause impacts that are species specific and significant; modeling is critical to better understand potential changes in suitable habitat. We use empirical, abundance-based habitat models utilizing decision tree-based ensemble methods to explore potential changes of 134 tree species habitats in the eastern United States (http://www.nrs.fs.fed.us/atlas).To help interpret and add value to these outputs, we assigned and calculated Modification Factors for disturbance and biological factors that cannot be specifically assessed with the empirical RandomForest approach. We also use a spatially explicit cellular model, SHIFT, to calculate colonization potentials, based on the abundance of the species, the distances between occupied and unoccupied cells and the fragmented nature of the landscape. By combining results from the three efforts, we are estimating potential impacts that can be used to aid in management decisions under climate change. These tools are demonstrated for one species, black oak (Quercus velutina), in northern Wisconsin.
Date 2010
Proceedings Title Forest landscapes and global change: New frontiers in management, conservation and restoration: Proceedings
Conference Name The IUFRO Landscape Ecology Working Group International Conference: Forest Landscapes and Global Change - New frontiers in management, conservation and restoration, September 21-27, 2010. Bragança, Portugal
Place Bragança, Portugal
Publisher Institute of Politecnico de Braganca Portugal
Pages 135-140
ISBN 978-972-745-110-4
URL http://www.treesearch.fs.fed.us/pubs/36584
Archive http://bibliotecadigital.ipb.pt/handle/10198/2692
Loc. in Archive http://www.ipb.pt/iufro2010/
Extra Keywords: climate change; randomforest; species distribution modeling; eastern United States; trees.
Date Added Sun Aug 28 03:05:14 2011
Modified Mon Aug 29 22:02:26 2011

Notes:

Citation:

Iverson, Louis R.; Prasad, Anantha M.; Matthews, Stephen N.; Peters, Matthew P. 2010. Merger of three modeling approaches to assess potential effects of climate change on trees in the eastern United States. In: Azevedo, Joao Carlos; Feliciano, Manuel; Castro, Jose; Pinto, Maria Alice, eds. Forest landscapes and global change-new frontiers in management, conservation and restoration. Proceedings of the IUFRO Landscape Ecology Working Group International Conference; 2010 September 21-27; Bragança, Portugal: 135-140.

Mesoscale disturbance and ecological response to decadal climatic variability in the American Southwest

Type Journal Article
Author Thomas W. Swetnam
Author Julio L. Betancourt
Abstract Ecological responses to climatic variability in the Southwest include regionally synchronized fires, insect outbreaks, and pulses in tree demography (births and deaths). Multicentury, tree-ring reconstructions of drought, disturbance history, and tree demography reveal climatic effects across scales, from annual to decadal, and from local (<10^2 km²) to mesoscale (10^4–10^6 km²). Climate–disturbance relations are more variable and complex than previously assumed. During the past three centuries, mesoscale outbreaks of the western spruce budworm (Choristoneura occidentalis) were associated with wet, not dry episodes, contrary to conventional wisdom. Regional fires occur during extreme droughts but, in some ecosystems, antecedent wet conditions play a secondary role by regulating accumulation of fuels. Interdecadal changes in fire–climate associations parallel

other evidence for shifts in the frequency or amplitude of the Southern Oscillation (SO) during the past three centuries. High interannual, fire–climate correlations (r = 0.7 to 0.9) during specific decades (i.e., circa 1740–80 and 1830–60) reflect periods of high amplitude in the SO and rapid switching from extreme wet to dry years in the Southwest, thereby entraining fire occurrence across the region. Weak correlations from 1780 to 1830 correspond with a decrease in SO frequency or amplitude inferred from independent tree-ring width, ice core, and coral isotope reconstructions. Episodic dry and wet episodes have altered age structures and species composition of woodland and conifer forests. The scarcity of old, living conifers established before circa 1600 suggests that the extreme drought of 1575–95 had pervasive effects on tree populations. The most extreme drought of the past 400 years occurred in the mid–twentieth century (1942–57). This drought resulted in broadscale plant dieoffs in shrublands, woodlands, and forests and accelerated shrub invasion of grasslands. Drought conditions were broken by the post-1976 shift to the negative SO phase and wetter cool seasons in the Southwest. The post-1976 period shows up as an unprecedented surge in tree-ring growth within millennia-length chronologies. This unusual episode may have produced a pulse in tree recruitment and improved rangeland conditions (e.g., higher grass production), though additional study is needed to disentangle the interacting roles of land use and climate. The 1950s drought and the post-1976 wet period and their aftermaths offer natural experiments to study long-term ecosystem response to interdecadal climate variability.

Publication Journal of Climate
Volume 11
Issue 12
Pages 3128-3147
Date December 1998
Journal Abbr J. Climate
DOI 10.1175/1520-0442(1998)011<3128:MDAERT>2.0.CO;2
ISSN 0894-8755
URL http://dx.doi.org/10.1175%2F1520-0442%281998%29011%3C3128%3AMDAERT%3E2.0.CO%3B2
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:05 2011

Mesoscale synchrony in quaking aspen establishment across the interior western US

Type Journal Article
Author Margot W. Kaye
Abstract Concern and debate about the condition of quaking aspen in the intermountain West of North America have led to many studies examining aspen recruitment at local to landscape scales. Patterns of aspen mortality and recruitment may reflect local conditions, or may show broad synchrony if regional-scale drivers are important. This paper aggregates historical aspen establishment data from 12 case studies from nine locations in a meta-analysis of emergent patterns of aspen dynamics at sub-continental or mesoscales (10^4–10^6 km^2). Aspen establishment data were reported in multiple forms among studies, so the meta-analysis included two approaches (1) a quantitative analysis of percent aspen establishment in decadal time bins for 1820–1999 for six studies that reported data in a format suited for this approach and (2) a qualitative ranking of 19th and 20th century peaks in aspen establishment for all 12 studies. Aspen forests ranging from Wyoming to northern Arizona experienced two peaks in establishment between 1820 and the 1980s. The first peak began in the 1860s, reached its maximum in the 1880s, and gradually declined to an end the 1910s. The second peak began abruptly in the 1970s and continued through the 1980s. I speculate that the late-1800s peak in aspen recruitment was driven primarily by the occurrence of the last historical fires throughout the intermountain West and that the 1970s and 1980s peak was driven by improved moisture conditions brought about by a shift to a positive phase of the Pacific Decadal Oscillation and a persistent negative phase of the Atlantic Multidecadal Oscillation. The overarching implication of large-scale synchrony in aspen dynamics is that current aspen ecosystem condition is not solely the result of local-scale histories of browsing or fire, but is more likely the interwoven legacy of these local factors combined with broad factors such as climate and Euro-American settlement. Highlights ► I analyzed aspen establishment data from 12 studies in the central Rocky Mountains. ► Aspen across the region had two periods of high establishment since the mid-1800s. ► A late-1800s pulse in establishment coincided with Euro-American settlement. ► A 1970–1980 pulse in establishment coincided with a regional shift in climate. ► Aspen population dynamics are the legacy of local and broad-scale influences.

Publication Forest Ecology and Management
Volume 262
Issue 3
Pages 389-397
Date 1 August 2011
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/j.foreco.2011.04.003
ISSN 0378-1127
URL http://linkinghub.elsevier.com/retrieve/pii/S0378112711002180
Call Number 0000
Extra Keywords: meta-analysis; population dynamics; Pacific Decadal Oscillation; Atlantic Multidecadal Oscillation; climate; fire.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:18:13 2011

Model of transient changes in Arctic and boreal vegetation in response to climate and land use change

Type Journal Article
Author Anthony M. Starfield
Author F. Stuart Chapín III
Abstract One of the greatest challenges in global-change research is to predict the future distribution of vegetation. Most models of vegetation change predict either the response of a patch of present vegetation to climatic change or the future equilibrium distribution of vegetation based on the present relationship between climate and vegetation. Here we present a model that is, to our knowledge, the first model of ecosystem change in response to transient changes in climate, disturbance regime, and recruitment over the next 50-500 yr. The frame-based model uses quantitative and qualitative variables to develop scenarios of vegetation change from arctic tundra to boreal forest in response to global changes in climate (as predicted by general circulation models [GCMs]), fire, and land use. Seed availability, tree growth rate, and probability of fire were the model parameters that most strongly influenced the balance between tundra and boreal forest in transitional climates. The rate of climatic warming strongly affected the time lag between the onset of climate change and the simulated ecosystem response but had relatively little effect on the rate or pattern of ecosystem change. The model calculated that, with a gradual ramped change of $3^\circ C$ in the next century (corresponding to average rate of warming predicted by GCMs), any change from tundra to forest would take 150 yr, consistent with pollen records. The model suggested that tundra would first be invaded by conifer forests, but that the proportion of broad-leaved deciduous forest would increase, reflecting increased fire frequency, as climatic warming continued. The change in fire frequency was determined more strongly by climatically driven changes in vegetation than by direct climatic effects on fire probability. The pattern of climatic warming was more important than the rate of warming or change in precipitation in determining the rate of conversion from tundra to forest. Increased climatic variability promoted ecosystem change, particularly when oscillations were long relative to the time required for tree maturation. Management policies related to logging and moose-predator control affected vegetation as much or more than did changes in climate and must be included in future scenarios of global changes in ecosystem distribution. We suggest that frame-based models provide a critical link between patch and equilibrium models in predicting ecosystem change in response to transient changes in climate over the coming decades to centuries.
Publication Ecological Applications
Volume 6
Issue 3
Pages 842–864
Date August 1996
Journal Abbr Ecol. Appl.
DOI doi:10.2307/2269489
ISSN 1051-0761
URL http://www.jstor.org/stable/2269489

Call Number 0000
Extra Keywords: arctic; boreal forest; climatic change; fire; insects; model; transient dynamics; tree line.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:02 2011

Modeling climate changes and wildfire interactions: Effects on whitebark pine (Pinus albicaulis) and implications for restoration, Glacier National Park, Montana, USA

Type Conference Paper
Author Rachel A. Loehman
Author Corrow, Alissa
Author Robert E. Keane
Abstract Climate changes are projected to profoundly influence vegetation patterns and community compositions, either directly through increased species mortality and shifts in species distributions, or indirectly through disturbance dynamics such as increased wildfire activity and extent, shifting fire regimes, and pathogenesis. High-elevation landscapes have been shown to be particularly sensitive to climatic change and are likely to experience significant impacts under predicted future climate change conditions. Whitebark pine (Pinus albicaulis), a keystone and foundation five-needle pine species, is vulnerable to multiple and interacting disturbances that have already caused major changes in species distribution and abundance. We used the mechanistic simulation model FireBGCv2 to assess potential interacting effects of future climate changes and wildfire patterns on the presence and persistence of whitebark pine in a high-elevation watershed in Glacier National Park, Montana, USA. We did not include white pine blister rust and mountain pine beetles as disturbance factors in our simulation so that we could isolate climate-fire impacts, and because these disturbance factors have already so severely reduced whitebark pine populations in the area that few live trees remain. Hence, our results presume the establishment of initial populations of live, rust-resistant trees on the MD-GNP landscape through successful restoration efforts. Our results indicate that climate changes may significantly impact whitebark pines in this region through indirect mechanisms including altered distributions of competing tree species and increased fire frequency and fire size. The sensitivity of the species to a complex suite of interacting disturbance agents suggests that conservation efforts must address and mitigate these multiple threats through a suite of restoration treatments including planting of rust-resistant stock, fuels treatments, and prescribed burning to restore whitebark pine to its current range. In addition, additional simulation modeling experiments should be developed to identify areas suitable for restoration under potential future climate regimes and test efficacy of restoration strategies under these new climate conditions.
Date June 2011
Proceedings Title The Future of High-Elevation, Five-Needle White Pines in Western North America: Proceedings of the High Five Symposium
Conference Name Proceedings of the High Five Symposium. 28-30 June 2010; Missoula, MT.
Place Fort Collins, CO
Publisher U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station
Pages 176-189
Series USDA Forest Service Proceedings RMRS-P-63
URL http://www.treesearch.fs.fed.us/pubs/38218
Archive http://www.treesearch.fs.fed.us/pubs/contents/38187
Call Number 0000
Extra Keywords: high elevation five-needle pines; threats; whitebark; Pinus albicaulis; limber; Pinus flexilis, southwestern white; Pinus strobiformis; foxtail; Pinus balfouriana; Great Basin bristlecone; Pinus longaeva; Rocky Mountain bristlecone pine; Pinus aristata.
Date Added Mon Sep 5 01:35:04 2011
Modified Mon Sep 5 10:11:23 2011

Notes:

Citation:

Loehman, Rachel A.; Corrow, Allissa; Keane, Robert E. 2011. Modeling climate changes and wildfire interactions: Effects on whitebark pine (Pinus albicaulis) and implications for restoration, Glacier National Park, Montana, USA. In: Keane, Robert E.; Tomback, Diana F.; Murray, Michael P.; Smith, Cyndi M., eds. The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium. 28-30 June 2010; Missoula, MT. Proceedings RMRS-P-63. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. pp. 176-189.

Modeling interactive effects of climate change, air pollution, and fire on a California shrubland

Type Journal Article
Author George P. Malanson
Author Walter E. Westman
Abstract A computer simulation model (FINICS) was used to project the interactive effects of CO_2-induced climate change on a drought-deciduous shrubland. FINICS simulates the competitive relations of five dominant shrub species of Californian coastal sage scrub, based on their aboveground growth and reproductive behavior. The model was used to simulate the separate and combined effects of altered precipitation, temperature, ambient ozone levels, and fuel loads and fire intensity, on species composition. Both growth chamber and field data were used to parameterize the model. Projections show that changes attributed to climate variation alone were markedly accentuated when the indirect effects of climate change on fire intensity and ozone pollution were considered. Model results emphasized that change in community composition will result from shifting competitive abilities of individual species under the changed environmental conditions. While neither all of the secondary effects of climate change nor all possible species were included in the model, the projections suggest that inclusion of secondary interactions and species competition will be important in predicting vegetation change realistically.
Publication Climatic Change
Volume 18
Issue 4
Pages 363–376
Date June 1991
Journal Abbr Climatic Change
DOI 10.1007/BF00142967
ISSN 0165-0009
URL http://www.springerlink.com/content/mj2qn16m38106501/
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:43:29 2011

Modeling potential future individual tree-species distributions in the eastern United States under a climate change scenario: A case study with Pinus virginiana

Type Journal Article
Author Louis R. Iverson
Author Anantha M. Prasad
Author Mark W. Schwartz
Abstract We are using a deterministic regression tree analysis model (DISTRIB) and a stochastic migration model (SHIFT) to examine potential distributions of ~66 individual species of eastern US trees under a 2× CO_2 climate change scenario. This process is demonstrated for Virginia pine (Pinus virginiana). USDA Forest Service Forest Inventory and Analysis data for more than 100 000 plots and nearly 3 million trees east of the 100th meridian were analyzed and aggregated to the county level to provide species importance values for each of more than 2100 counties. County-level data also were compiled on climate, soils, land use, elevation, and spatial pattern. Regression tree analysis (RTA) was used to devise prediction rules from current species–environment relationships, which were then used to replicate the current distribution and predict the potential future distributions under two scenarios of climate change (2× CO_2). RTA allows different variables to control

importance value predictions at different regions, e.g. at the northern versus southern range limits of a species. RTA outputs represent the potential 'environmental envelope' shifts required by species, while the migration model predicts the more realistic shifts based on colonization probabilities from varying species abundances within a fragmented landscape. The model shows severely limited migration in regions of high forest fragmentation, particularly when the species is low in abundance near the range boundary. These tools are providing mechanisms for evaluating the relationships among various environmental and landscape factors associated with tree-species importance and potential migration in a changing global climate.

Publication Ecological Modelling
Volume 115
Issue 1
Pages 77–93
Date February 1999
Journal Abbr Ecol. Model
DOI 10.1016/S0304-3800(98)00200-2
ISSN 0304-3800
Short Title Modeling potential future individual tree-species distributions in the eastern United States under a climate change scenario
URL http://www.sciencedirect.com/science/article/pii/S0304380098002002
Archive http://www.treesearch.fs.fed.us/pubs/22436
Extra Keywords: climate change; GIS; landscape ecology; species distribution; migration; regression tree analysis; FIA; model.
Date Added Sun Aug 28 03:05:14 2011
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Modeling the impact of black spruce on the fire regime of Alaskan boreal forest

Type Journal Article
Author T. Scott Rupp
Author Anthony M. Starfield
Author F. Stuart Chapin III
Author Paul Duffy
Abstract In the boreal biome, fire is the major disturbance agent affecting ecosystem change, and fire dynamics will likely change in response to climatic warming. We modified a spatially explicit model of Alaskan subarctic treeline dynamics (ALFRESCO) to simulate boreal vegetation dynamics in interior Alaska. The model is used to investigate the role of black spruce ecosystems in the fire regime of interior Alaska boreal forest. Model simulations revealed that vegetation shifts caused substantial changes to the fire regime. The number of fires and the total area burned increased as black spruce forest became an increasingly dominant component of the landscape. The most significant impact of adding black spruce to the model was an increase in the frequency and magnitude of largescale burning events (i.e., time steps in which total area burned far exceeded the normal distribution of area burned). Early successional deciduous forest vegetation burned more frequently when black spruce was added to the model, considerably decreasing the fire return interval of deciduous vegetation. Ecosystem flammability accounted for the majority of the differences in the distribution of the average area burned. These simulated vegetation effects and fire regime dynamics have important implications for global models of vegetation dynamics and potential biotic feedbacks to regional climate.
Publication Climatic Change
Volume 55
Issue 1-2
Pages 213–233
Date October 2002
Journal Abbr Climatic Change
DOI 10.1023/A:1020247405652
ISSN 0165-0009 (Print) 1573-1480 (Online)

URL http://www.springerlink.com/content/q1v45772p834413p/
Date Added Mon Aug 29 00:48:23 2011
Modified Mon Aug 29 01:09:14 2011

Modelling long-term fire regimes of southern California shrublands

Type Journal Article
Author Seth H. Peterson
Author Max A. Moritz
Author Marco E. Morais
Author Philip E. Dennison
Author Jean M. Carlson
Abstract This paper explores the environmental factors that drive the southern California chaparral fire regime. Specifically, we examined the response of three fire regime metrics (fire size distributions, fire return interval maps, cumulative total area burned) to variations in the number of ignitions, the spatial pattern of ignitions, the number of Santa Ana wind events, and live fuel moisture, using the HFire fire spread model. HFire is computationally efficient and capable of simulating the spatiotemporal progression of individual fires on a landscape and aggregating results for fully resolved individual fires over hundreds or thousands of years to predict long-term fire regimes. A quantitative understanding of the long-term drivers of a fire regime is of use in fire management and policy.
Publication International Journal of Wildland Fire
Volume 20
Issue 1
Pages 1-16
Date February 2011
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09102
ISSN 1049-8001
URL http://www.publish.csiro.au/paper/WF09102
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:30:13 2011

Models, data and mechanisms: Quantifying wildfire regimes

Type Journal Article
Author James D. A. Millington
Author George L. W. Perry
Author Bruce D. Malamud
Abstract The quantification of wildfire regimes, especially the relationship between the frequency with which events occur and their size, is of particular interest to both ecologists and wildfire managers. Recent studies in cellular automata (CA) and the fractal nature of the frequency-area relationship they produce has led some authors to ask whether the power-law frequency-area statistics seen in the CA might also be present in empirical wildfire data. Here, we outline the history of the debate regarding the statistical wildfire frequency-area models suggested by the CA and their confrontation with empirical data. In particular, the extent to which the utility of these approaches is dependent on being placed in the context of self-organized criticality (SOC) is examined. We also consider some of the other heavy-tailed statistical distributions used to describe these data. Taking a broadly ecological perspective we suggest that this debate needs to take more interest in the mechanisms underlying the observed power-law (or other) statistics. From this perspective, future studies utilizing the techniques associated with CA and statistical physics will be better able to contribute to the understanding of ecological processes and systems.
Publication Geological Society, London, Special Publications

Volume 261
Issue 9
Pages 155-167
Date 2006
Journal Abbr Geol. Soc. London, Special Publications
DOI 10.1144/GSL.SP.2006.261.01.12
ISSN 0305-8719
Short Title Models, data and mechanisms
URL http://sp.lyellcollection.org/cgi/doi/10.1144/GSL.SP.2006.261.01.12
Date Added Tue Aug 30 14:35:38 2011
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More intense, more frequent, and longer lasting heat waves in the 21st century

Type Journal Article
Author Gerald A. Meehl
Author Claudia Tebaldi
Abstract A global coupled climate model shows that there is a distinct geographic pattern to future changes in heat waves. Model results for areas of Europe and North America, associated with the severe heat waves in Chicago in 1995 and Paris in 2003, show that future heat waves in these areas will become more intense, more frequent, and longer lasting in the second half of the 21st century. Observations and the model show that present-day heat waves over Europe and North America coincide with a specific atmospheric circulation pattern that is intensified by ongoing increases in greenhouse gases, indicating that it will produce more severe heat waves in those regions in the future.
Publication Science
Volume 305
Issue 5686
Pages 994-997
Date 13 August 2004
Journal Abbr Science
DOI 10.1126/science.1098704
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1098704
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:35:38 2011

Multi-century variability in the Pacific North American circulation pattern reconstructed from tree rings

Type Journal Article
Author Valerie Trouet
Author Alan H. Taylor
Abstract We here present a reconstruction (1725–1999) of the winter Pacific North American (PNA) pattern based on three winter climate sensitive tree ring records from the western USA. Positive PNA phases in our record are associated with warm phases of ENSO and PDO and the reorganization of the PNA pattern towards a positive mode is strongest when ENSO and PDO are in phase. Regime shifts in our PNA record correspond to climatic shifts in other proxies of Pacific climate variability, including two well-documented shifts in the instrumental period (1976 and 1923). The correspondence breaks down in the early 19th century, when our record shows a prolonged period of positive PNA, with a peak in 1800–1820. This period corresponds to a period of low solar activity (Dalton Minimum), suggesting a 'positive PNA like' response to decreased solar irradiance. The

distinct 30-year periodicity that dominates the PNA reconstruction in the 18th century and again from 1875 onwards is disrupted during this period.

Publication Climate Dynamics
Volume 35
Issue 6
Pages 953-963
Date November 2010
Journal Abbr Clim. Dyn.
DOI 10.1007/s00382-009-0605-9
ISSN 0930-7575
URL http://www.springerlink.com/content/e75534pk11177237/
Extra Keywords: Pacific North American; PNA; PDO; ENSO; reconstruction; tree ring.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 17:04:10 2011

Multi-decadal variability of forest fire risk—eastern Australia

Type Journal Article
Author Danielle C. Verdon
Author Anthony S. Kiem
Author Stewart W. Franks
Abstract This study investigates the influence that the El Niño/Southern Oscillation (ENSO) and the Inter-decadal Pacific Oscillation (IPO) have on long term daily weather conditions pertinent to high forest fire danger in New South Wales, Australia. Using historical meteorological data for 22 weather stations to compute the daily value of McArthur's Forest Fire Danger Index (FFDI), it is shown that a strong relationship exists between climate variability, on a range of time scales, and forest fire risk. An investigation into the influence of ENSO on fire risk demonstrates that the proportion of days with a high, or greater than high, fire danger rating is markedly increased during El Niño episodes. More importantly, this study also shows that the already significantly enhanced fire danger associated with El Niño events was even further increased during El Niño events that occurred when the IPO was negative. The potential to use simple indices of climate variability to predict forest fire risk is therefore demonstrated to be significant.
Publication International Journal of Wildland Fire
Volume 13
Issue 2
Pages 165-171
Date June 2004
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF03034
ISSN 1049-8001
URL http://dx.doi.org/10.1071/WF03034
Extra Keywords: El Niño/Southern Oscillation (ENSO); Inter-decadal Pacific Oscillation (IPO); Pacific Decadal Oscillation (PDO); bushfire; climate variability.
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:53:58 2011

Multi-millennial fire history of the Giant Forest, Sequoia National Park, California, USA

Type Journal Article
Author Thomas W. Swetnam
Author Christopher H. Baisan

Author Anthony C. Caprio
Author Peter M. Brown
Author Ramzi Touchan
Author R. Scott Anderson
Author Douglas J. Hallett

Abstract Giant sequoias (Sequoiadendron giganteum [Lindl.] J. Buchholz) preserve a detailed history of fire within their annual rings. We developed a 3000 year chronology of fire events in one of the largest extant groves of ancient giant sequoias, the Giant Forest, by sampling and tree-ring dating fire scars and other fire-related indicators from 52 trees distributed over an area of about 350 ha. When all fire events were included in composite chronologies, the mean fire intervals (years between fires of any size) declined as a function of increasing spatial extent from tree, to group, to multiple groups, to grove scales: 15.5 yr (0.1 ha), 7.4 yr (1 ha.), 3.0 yr (70 ha), and 2.2 yr (350 ha), respectively. We interpreted widespread fires (i.e., fire events recorded on ≥2 trees, or ≥25 % of all trees recording fires within composites) to have occurred in areas of 70 ha to 350 ha at mean intervals ranging from about 6 yr to 35 yr. We compared the annual, multi-decadal and centennial variations in Giant Forest fire frequency with those documented in tree-ring and charcoal-based fire chronologies from four other giant sequoia groves in the Sierra Nevada, and with independent tree-ring-based reconstructions of summer drought and temperatures. The other giant sequoia fire histories (tree rings and charcoal-based) were significantly ($P < 0.001$) correlated with the Giant Forest fire frequency record and independent climate reconstructions, and confirm a maximum fire frequency during the warm and drought-prone period from 800 C.E. to 1300 C.E. (Common Era). This was the driest period of the past two millennia, and it may serve as an analog for warming and drying effects of anthropogenic greenhouse gases in the next few decades. Sequoias can sustain very high fire frequencies, and historically they have done so during warm, dry times. We suggest that preparation of sequoia groves for anticipated warming may call for increasing the rate of prescribed burning in most parts of the Giant Forest.

Publication Fire Ecology
Volume 5
Issue 3
Pages 120-150
Date December 2009
Journal Abbr Fire Ecol.
DOI 10.4996/fireecology.0503120
ISSN 1933-9747
URL http://fireecology.net/index.php?option=com_journal&…
Extra Keywords: dendrochronolog; fire history; Giant Forest; giant sequoia; Sequoia National Park.
Date Added Thu Sep 15 19:24:11 2011
Modified Thu Sep 15 19:24:11 2011

Multi-scale controls of historical forest-fire regimes: new insights from fire-scar networks (Reviews)

Type Journal Article
Author Donald A. Falk
Author Emily K. Heyerdahl
Author Peter M. Brown
Author Calvin Farris
Author Peter Z. Fulé
Author Donald McKenzie
Author Thomas W. Swetnam
Author Alan H. Taylor
Author Megan L. Van Horne

Abstract Anticipating future forest-fire regimes under changing climate requires that scientists and natural resource managers understand the factors that control fire across space and time. Fire scars – proxy records of fires, formed in the growth rings of long-lived trees – provide an annually accurate window into past low-severity fire regimes. In western North America, networks of the fire-scar records spanning centuries to millennia now include hundreds to thousands of trees sampled across hundreds to many thousands of hectares. Development of these local and regional fire-scar networks has created a new data type for ecologists interested in landscape and climate regulation of ecosystem processes – which, for example, may help to explain why forest fires are widespread during certain years but not others. These data also offer crucial reference information on fire as a dynamic landscape process for use in ecosystem management, especially when managing for forest structure and resilience to climate change.

Publication Frontiers in Ecology and the Environment
Volume e-view
Pages 13 p.
Date June 2011
Journal Abbr Front. Ecol. Environ.
DOI 10.1890/100052
ISSN 1540-9295
Short Title Multi-scale controls of historical forest-fire regimes
URL http://www.esajournals.org/doi/abs/10.1890/100052
Date Added Sun Aug 28 05:42:07 2011
Modified Sun Aug 28 05:45:37 2011

Multi-season climate synchronized forest fires throughout the 20th century, northern Rockies, USA

Type Journal Article
Author Penelope Morgan
Author Emily K. Heyerdahl
Author Carly E. Gibson
Abstract We inferred climate drivers of 20th-century years with regionally synchronous forest fires in the U.S. northern Rockies. We derived annual fire extent from an existing fire atlas that includes 5038 fire polygons recorded from 12 070 086 ha, or 71% of the forested land in Idaho and Montana west of the Continental Divide. The 11 regional-fire years, those exceeding the 90th percentile in annual fire extent from 1900 to 2003 (>102 314 ha or ~1% of the fire atlas recording area), were concentrated early and late in the century (six from 1900 to 1934 and five from 1988 to 2003). During both periods, regional-fire years were ones when warm springs were followed by warm, dry summers and also when the Pacific Decadal Oscillation (PDO) was positive. Spring snowpack was likely reduced during warm springs and when PDO was positive, resulting in longer fire seasons. Regional-fire years did not vary with El Niño–Southern Oscillation (ENSO) or with climate in antecedent years. The long mid-20th century period lacking regional-fire years (1935–1987) had generally cool springs, generally negative PDO, and a lack of extremely dry summers; also, this was a period of active fire suppression. The climate drivers of regionally synchronous fire that we inferred are congruent with those of previous centuries in this region, suggesting a strong influence of spring and summer climate on fire activity throughout the 20th century despite major land-use change and fire suppression efforts. The relatively cool, moist climate during the mid-century gap in regional-fire years likely contributed to the success of fire suppression during that period. In every regional-fire year, fires burned across a range of vegetation types. Given our results and the projections for warmer springs and continued warm, dry summers, forests of the U.S. northern Rockies are likely to experience synchronous, large fires in the future.
Publication Ecology
Volume 89
Issue 3
Pages 717–728
Date March 2008
Journal Abbr Ecology
DOI 10.1890/06-2049.1
ISSN 0012-9658
URL http://www.esajournals.org/doi/full/10.1890/06-2049.1

Extra Keywords: climate variability; digital polygon fire history; ENSO; fire atlas; Idaho; Montana; PDO; precipitation; season; temperature.

Date Added Tue Aug 30 14:35:38 2011

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Multi-season climate synchronized historical fires in dry forests (1650-1900), northern Rockies, USA

Type Journal Article

Author Emily K. Heyerdahl

Author Penelope Morgan

Author James P. Riser II

Abstract Our objective was to infer the climate drivers of regionally synchronous fire years in dry forests of the U.S. northern Rockies in Idaho and western Montana. During our analysis period (1650–1900), we reconstructed fires from 9245 fire scars on 576 trees (mostly ponderosa pine, Pinus ponderosa P. & C. Lawson) at 21 sites and compared them to existing tree-ring reconstructions of climate (temperature and the Palmer Drought Severity Index [PDSI]) and large-scale climate patterns that affect modern spring climate in this region (El Niño–Southern Oscillation [ENSO] and the Pacific Decadal Oscillation [PDO]). We identified 32 regional-fire years as those with five or more sites with fire. Fires were remarkably widespread during such years, including one year (1748) in which fires were recorded at 10 sites across what are today seven national forests plus one site on state land. During regional-fire years, spring–summers were significantly warm and summers were significantly warm-dry whereas the opposite conditions prevailed during the 99 years when no fires were recorded at any of our sites (no-fire years). Climate in prior years was not significantly associated with regional- or no-fire years. Years when fire was recorded at only a few of our sites occurred under a broad range of climate conditions, highlighting the fact that the regional climate drivers of fire are most evident when fires are synchronized across a large area. No-fire years tended to occur during La Niña years, which tend to have anomalously deep snowpacks in this region. However, ENSO was not a significant driver of regional-fire years, consistent with the greater influence of La Niña than El Niño conditions on the spring climate of this region. PDO was not a significant driver of past fire, despite being a strong driver of modern spring climate and modern regional-fire years in the northern Rockies.

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Date March 2008

Journal Abbr Ecology

DOI 10.1890/06-2047.1

ISSN 0012-9658

URL http://www.esajournals.org/doi/full/10.1890/06-2047.1

Extra Keywords: dendrochronology; El Niño–Southern Oscillation; fire history; fire scars; Idaho; Montana; Pacific Decadal Oscillation; Palmer Drought Severity Index; spring; summer; temperature.

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Multidecadal climate variability and climate interactions affect subalpine fire occurrence, western colorado (usa)

Type Journal Article

Author T Schoennagel

Author T.T. Veblen

Author D. Kulakowski

Author A.S. Holz

Abstract This study investigates the influence of climatic variability on subalpine forest fire occurrence in western Colorado during the AD 1600–2003 period. Interannual and multidecadal relationships between fire occurrence and the El Nin˜ o Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO), and Atlantic Multidecadal Oscillation (AMO) were examined, in addition to the effects of phase interactions among these oscillations. Fires occurred during short-term periods of significant drought and extreme cool (negative) phases of ENSO and PDO and during positive departures from mean AMO index. At longer time scales, fires exhibited 20-year periods of synchrony with the cool phase of the PDO, and 80- year periods of synchrony with extreme warm (positive) phases of the AMO. Years of combined positive AMO and negative ENSO and PDO phases represent ''triple whammies'' that significantly increased the occurrence of drought-induced fires. Fires were synchronous with this phase combination over 0–30 year periods and distinctly asynchronous with the opposite phase combination. Overall, because fires are synchronous at supra-annual to multidecadal time scales with warm AMO events, particularly when combined with cool ENSO and PDO phases, this suggests that we may be entering a qualitatively different fire regime in the next few decades due to the recent shift in 1998 to a likely long-term warm AMO phase. Although uncertainty remains regarding the effects of CO2-induced warming at regional scales, given the multidecadal persistence of the AMO there is mounting evidence that the recent shift to the positive phase of the AMO will promote higher fire frequencies in the region. Key words: AMO; climate; ENSO; fire ecology; multidecadal; PDO; Rocky Mountains; subalpine forest

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Date 2007
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Call Number 0019
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Multiproxy evidence from caves of Native Americans altering the overlying landscape during the late Holocene of east-central North America

Type Journal Article

Author Gregory S. Springer
Author D. Matthew White
Author Harold D. Rowe
Author Ben Hardt
Author L. Nivanthi Mihimdukulasooriya
Author Hai Cheng
Author R. Lawrence Edwards

Abstract We compare environmental changes recorded in stalagmites and alluvium from the mountainous Buckeye Creek basin of West Virginia, USA to a nearby, independent archaeological record of Native American presences in the forested watershed. A climatic record constructed from stable isotopic (δ^{18}Ocalc and δ^{13}Ccalc) and trace metal (Sr/Ca) ratios in stalagmitic calcite is consistent with regional palynology during much of the Holocene. The stalagmite δ^{13}Ccalc and Sr/Ca values track aridity associated with North Atlantic Ocean (NAO) ice-rafting events during solar minima. However, the δ^{13}Ccalc record diverges sharply from the Sr/Ca record at ~2100 (calendar) years BP, which maintains the same relationship with ice rafting in the NAO. A dramatic and sustained enrichment in δ^{13}Ccalc values (>1‰) without a corresponding shift in Sr/Ca values, suggests a systemic change in above-cave vegetation and soil carbon. This hypothesis is corroborated by a record of the stable isotopic composition of bulk organic carbon (δ^{13}Corg) in alluvial silts. Cultural artefacts record Native American presences in the watershed during the late Holocene and archaeologists place peak Native American presence as having occurred between 750 and 550 years BP, nearly contemporaneous with peaks in δ^{13}Ccalc, δ^{13}Corg, and relative charcoal abundances documented herein. Notably, values of the three environmental proxies decrease after Native Americans abandoned the watershed. The available evidence is consistent with Native Americans having made significant changes to the area's ecosystem and soils prior to the arrival of Euro-colonial peoples at ~225 years BP. Our findings highlight the active roles native peoples had in shaping

the North American “wilderness” described prior to its destruction by early European settlers.

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Volume 20
Issue 2
Pages 275-283
Date March 2010
Journal Abbr Holocene
DOI 10.1177/0959683609350395
ISSN 0959-6836
URL http://hol.sagepub.com/cgi/content/abstract/20/2/275
Extra Keywords: Native American; archaeology; isotopic geochemistry; stalagmite; land use; cave.
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National hierarchical framework of ecological units

Type Book Section
Author David T. Cleland
Author Peter E. Avers
Author W. Henry McNab
Author Mark E. Jensen
Author Robert G. Bailey
Author Thomas King
Author Walter E. Russell
Abstract INTRODUCTION: To implement ecosystem management, we need basic information about the nature and distribution of ecosystems. To develop this information, we need working definitions of ecosystems and supporting inventories of the components that comprise ecosystems. We also need to understand ecological patterns and processes and the interrelationships of social, physical, and biological systems. To meet these needs, we must obtain better information about the distribution and interaction of organisms and the environments in which they occur, including the demographics of species, the development and succession of communities, and the effects of humans activities and land use on species and ecosystems (Urban et al. 1987). Research has a critical role in obtaining this information. This chapter presents a brief background of regional land classifications, describes the hierarchical framework for ecological unit design, examines underlying principles, and shows how the framework can be used in resource planning and management. The basic objective of the hierarchical framework is to provide a systematic method for classifying and mapping areas of the earth based on associations of ecological factors at different geographic scales. The framework is needed to improve our efforts in national, regional, and forest level planning; to achieve consistency in ecosystem management across National Forests and regions; to advance our understanding of the nature and distribution of ecosystems; and to facilitate interagency data sharing and planning. Furthermore, this framework will help us evaluate inherent capabilities of land and water resources and the effects of management on them. Ecological units delimit areas of different biological and physical potentials. Ecological unit maps can be coupled with inventories of existing vegetation, air quality, aquatic systems, wildlife, and human elements to characterize complexes of life and environment, or ecosystems. This information on ecosystems can be combined with our knowledge of various processes to facilitate a more ecologically sound approach to resource planning, management, and research. Note that ecological classification and mapping systems are devised by humans to meet human needs and values. Ecosystems and their various components often change gradually, forming continua on the earth's surface which cross administrative and political boundaries. Based on their understanding of ecological systems, humans decide on ecosystems boundaries by using physical, biological, and social considerations. We recognize that the exact boundaries for each level envisioned in this process and developed in map format may not fit every analysis and management need. Developing boundaries of areas for analysis, however, will not change the boundaries of ecological units. In some cases, an ecological unit may be the analysis area. In other cases, watersheds, existing conditions, management emphasis, proximity to special features (for example natural, wilderness, or urban areas), or other conditions may define an analysis area. In these cases, ecological units can be aggregated or divided if necessary to focus on relevant issues and concerns.

Book Title Ecosystem Management: Applications for Sustainable Forest and Wildlife Resources
Edition illustrated
Place New Haven, CT
Publisher Yale University Press
Date 1997
Pages 181–200
ISBN 9780300078589
URL http://www.ncrs.fs.fed.us/gla/reports/hierarchy.htm
Extra Book: http://yalepress.yale.edu/yupbooks/book.asp?isbn=9780300078589
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Citation:

Cleland, D.T.; Avers, P.E.; McNab, W.H.; Jensen, M.E.; Bailey, R.G., King, T.; Russell, W.E. 1997. National Hierarchical Framework of Ecological Units. Published in, Boyce, M. S.; Haney, A., ed. 1997. Ecosystem Management Applications for Sustainable Forest and Wildlife Resources. Yale University Press, New Haven, CT. pp. 181-200.

Native American impacts on fire regimes of the California coastal ranges

Type Journal Article
Author Jon E. Keeley
Abstract • Aim: Native American burning impacts on California shrubland dominated landscapes are evaluated relative to the natural lightning fire potential for affecting landscape patterns. • Location: Focus was on the coastal ranges of central and southern California. • Methods: Potential patterns of Indian burning were evaluated based upon historical documents, ethnographic accounts, archaeological records and consideration of contemporary land management tactics. Patterns of vegetation distribution in this region were evaluated relative to environmental factors and the resilience of the dominant shrub vegetation to different fire frequencies. • Results: Lightning fire frequency in this region is one of the lowest in North America and the density of pre-Columbian populations was one of the highest. Shrublands dominate the landscape throughout most of the region. These woody communities have weak resilience to high fire frequency and are readily displaced by annual grasses and forbs under high fire frequency. Intact shrublands provided limited resources for native Americans and thus there was ample motivation for using fire to degrade this vegetation to an open mosaic of shrubland/grassland, not unlike the agropastoral modification of ecologically related shrublands by Holocene peoples in the Mediterranean Basin. Alien-dominated grasslands currently cover approximately one-quarter of the landscape and less than 1% of these grasslands have a significant native grass presence. Ecological studies in the Californian coastal ranges have failed to uncover any clear soil or climate factors explaining grassland and shrubland distribution patterns. • Main conclusions: Coastal ranges of California were regions of high Indian density and low frequency of lightning fires. The natural vegetation dominants on this landscape are shrubland vegetation that often form dense impenetrable stands with limited resources for Native Americans. Natural fire frequencies are not high enough to maintain these landscapes in habitable mixtures of shrublands and grasslands but such landscape mosaics are readily produced with additional human subsidy of ignitions. It is hypothesized that a substantial fraction of the landscape was type converted from shrubland to grassland and much of the landscape that underwent such type conversion has either been maintained by Euro-American land management practices or resisted recolonization of native shrublands. It appears that these patterns are disturbance dependent and result from anthropogenic alteration of landscapes initiated by Native Americans and sustained and expanded upon by Euro-American settlers.
Publication Journal of Biogeography
Volume 29
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Date March 2002

Journal Abbr J. Biogeogr.
DOI 10.1046/j.1365-2699.2002.00676.x
ISSN 0305-0270
URL http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2699.2002.00676.x/full
Extra Keywords: burning; fire; Indians; chaparral; coastal sage scrub; lightning; landscape history; Native Americans; type conversion.
Date Added Tue Aug 30 14:37:15 2011
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Native American land-use practices and ecological impacts (Chapter 9)

Type Book Section
Author M. Kat Anderson
Author Michael J. Moratto
Abstract During a span of 10,000 years or more, Native Americans in the Nevada were sustained by hunting and fishing, gathering, lithic quarrying, and trading. To meet their requirements for firewood, fish and game, vegetal foods, craft supplies, and building materials, the native peoples of the Sierra managed biotic resources intensively, with significant ecological and evolutionary consequences. The distribution, structure, composition, and extent of certain plant communities, for example, were shaped by burning, pruning, sowing, weeding, tilling, and selective harvesting. Numerous “protoagricultural” techniques, based upon traditional knowledge of natural processes gained over the millennia, were applied to increase the quantity and improve select qualities of focal plant species. Fire was the most important management tool, employed to clear brush, maintain grasslands and meadows, improve browse for deer, enhance production of basketry and cordage materials, modify understory species composition in forests, and reduce fuel accumulation that might otherwise sustain intense fires. Considering that the human population of the Sierra Nevada was approximately 90,000–100,000 in late prehistoric times (ca. A.D. 1300–1800), the environmental consequences fof aboriginal land-use and management practices were substantial. There is currently an ecological “vacuum,” or disequilibrium, in the Sierra resulting from the departure of Native American influences. The recent decline in biotic diversity, species extirpation and endangerment, human encroachment into fire-type plant communities (e.g., chaparral), and greatly increased risk of catastrophic fires are but symptoms of this disequilibrium. It is recommended, therefore, that land-managing agencies and land-use planners incorporate Native American traditional knowledge into future policies andprograms for ecosystem management in the Sierra Nevada. This traditional knowledge, which permitted the adaptive success of large human populations and the maintenance of Sierran environments for more than a hundred centuries, must not be dismissed.
Book Title Sierra Nevada Ecosystem Project
Series Final Report to Congress
Series Number Report No. 36
Volume II, Assessments and Scientific Basis for Management Options
# of Volumes 3
Place Davis, CA.
Publisher University of California, Centers for Water and Wildland Resources
Date 1996
Pages 187–206
ISBN 0-607-87153-9
URL http://ceres.ca.gov/snep/pubs/v2s2.html
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Citation:

Anderson, M.K. and M.J. Moratto. 1996. Native American land-use practices and ecological impacts, Chapter 9 in: SNEP Science Team (eds.), State of the Sierra Nevada, Vol. II, Centers for Water and Wildland Resources, Report No. 36, University of California, Davis.

Native Americans as active and passive promoters of mast and fruit trees in the eastern USA

Type Journal Article
Author Marc D. Abrams
Author Gregory J. Nowacki
Abstract We reviewed literature in the fields of anthropology, archaeology, ethnobotany, palynology and ecology to try to determine the impacts of Native Americans as active and passive promoters of mast (nuts and acorns) and fruit trees prior to European settlement. Mast was a critical resource for carbohydrates and fat calories and at least 30 tree species and genera were used in the diet of Native Americans, the most important being oak (Quercus), hickory (Carya) and chestnut (Castanea), which dominated much of the eastern forest, and walnut (Juglans) to a lesser extent. Fleshy tree fruits were most accessible in human-disturbed landscapes, and at least 20 fruit- and berry-producing trees were commonly utilized by Native Americans. They regularly used fire and tree girdling as management tools for a multitude of purposes, including land clearing, promotion of favoured mast and fruit trees, vegetation control and pasturage for big-game animals. This latter point also applies to the vast fire-maintained prairie region further west. Native Americans were a much more important ignition source than lightning throughout the eastern USA, except for the extreme Southeast. First-hand accounts often mention mast and fruit trees or orchards in the immediate vicinity of Native American villages and suggest that these trees existed as a direct result of Indian management, including cultivation and planting. We conclude that Native American land-use practices not only had a profound effect on promoting mast and fruit trees but also on the entire historical development of the eastern oak and pine forests, savannas and tall-grass prairies. Although significant climatic change occurred during the Holocene, including the `Mediaeval Warming Period' and the `Little Ice Age', we attribute the multimillennia domination of the eastern biome by prairie grasses, berry-producing shrubs and/or mast trees primarily to regular burning and other forms of management by Indians to meet their gastronomic needs. Otherwise, drier prairie and open woodlands would have converted to closed-canopy forests and more mesic mast trees would have succeeded to more shade-tolerant, fire-sensitive trees that are a significantly inferior dietary resource.
Publication The Holocene
Volume 18
Issue 7
Pages 1123 -1137
Date November 2008
Journal Abbr Holocene
DOI 10.1177/0959683608095581
ISSN 0959-6836
URL http://hol.sagepub.com/content/18/7/1123.abstract
Extra Keywords: Indian diet; fire; land-use history; cultivation; oak; hickory; mast; fruit trees; Holocene.
Date Added Tue Jul 12 10:28:09 2011
Modified Mon Aug 15 22:51:24 2011

Natural fire regime: A guide for sustainable management of the Canadian boreal forest

Type Journal Article
Author Yves Bergeron
Author Alain Leduc
Author Brian D. Harvey
Author Sylvie Gauthier

Abstract The combination of certain features of fire disturbance, notably fi re frequency, size and severity, may be used to characterize the disturbance regime in any region of the boreal forest. As some consequences of fi re resemble the effects of industrial forest harvesting, conventional forest management is often considered as a disturbance that has effects similar to those of natural disturbances. Although the analogy between forest management and fire disturbance in boreal ecosystems has some merit, it is important to recognise that it also has its limitations. Short fire cycles generally described for boreal ecosystems do not appear to be universal; rather, important spatial and temporal variations have been observed in Canada. These variations in the fire cycle have an important influence on forest composition and structure at the landscape and regional levels. Size and severity of fires also show a large range of variability. In regions where the natural matrix of the boreal forest remains relatively intact, maintenance of this natural variability should be targeted by forest managers concerned with biodiversity conservation. Current forest management tends to reduce this variability: for example, fully regulated, even-aged management will tend to truncate the natural forest age distribution and eliminate over-mature and old-growth forests from the landscape. We suggest that the development of strategic-level forest management planning approaches and silvicultural techniques designed to maintain a spectrum of forest compositions and structures at different scales in the landscape is one avenue to maintain this variability. Although we use the boreal forest of Quebec for our examples, it is possible to apply the approach to those portions of the boreal forest where the fi re regime favours the development of even-aged stands in burns.

Publication Silva Fennica

Volume 36

Issue 1

Pages 81–95

Date 2002

Journal Abbr Silva Fenn.

ISSN 0037-5330

Short Title Natural fire regime

URL http://www.metla.fi/silvafennica/abs/sa36/sa361081.htm

Extra Keywords: natural disturbance; landscape patterns; coarse filter; harvest pattern; volume retention; historic variability; even-age management; biodiversity.

Date Added Tue Aug 23 02:16:46 2011

Modified Wed Aug 24 04:40:32 2011

NCDC: Global surface temperature anomalies

Type Web Page

Author NOAA NCDC

Website Title Temperature Anomaly

Website Type Information and Gridded Dataset

URL http://www.ncdc.noaa.gov/cmb-faq/anomalies.html

Rights National Climatic Data Center (NCDC)

Date Added Tue Aug 30 16:46:38 2011

Modified Tue Aug 30 16:46:38 2011

Near-term increase in frequency of seasonal temperature extremes prior to the 2°C global warming target

Type Journal Article

Author Bruce T. Anderson

Abstract Given current international efforts to reduce greenhouse gas emissions and limit human-induced global-mean near-surface temperature increases to 2°C, relative to the pre-industrial era, we seek to determine the impact such a temperature increase might have upon the frequency of seasonal-mean temperature extremes; further we seek to determine what global-mean temperature increase would prevent extreme temperature values from becoming the norm. Results indicate that given a 2°C global mean temperature increase it is expected that for 70–80% of the land surface maximum seasonal-mean temperatures will exceed historical extremes (as determined from the 95th percentile threshold value over the second half of the 20th Century) in at least half of all years, i.e. the current historical extreme values will effectively become the norm. Many regions of the globe—including much of Africa, the southeastern and central portions of Asia, Indonesia, and the Amazon—will reach this point given the "committed" future global-mean temperature increase of 0.6°C (1.4°C relative to the pre-industrial era) and 50% of the land surface will reach it given a future global-mean temperature increase of between 0.8 and 0.95°C (1.6–1.75°C relative to the pre-industrial era). These results suggest substantial fractions of the globe could experience seasonal-mean temperature extremes with high regularity, even if the global-mean temperature increase remains below the 2°C target.

Publication Climatic Change
Volume 108
Issue 3
Pages 581-589
Date October 2011
Journal Abbr Climatic Change
DOI 10.1007/s10584-011-0196-4
ISSN 0165-0009, 1573-1480
URL http://www.springerlink.com/content/64034379mg211681/
Call Number 0000
Date Added Wed Sep 21 22:53:30 2011
Modified Wed Sep 28 17:53:43 2011

Newly discovered landscape traps produce regime shifts in wet forests

Type Journal Article
Author D. B. Lindenmayer
Author R. J. Hobbs
Author G. E. Likens
Author C. J. Krebs
Author S. C. Banks
Abstract We describe the "landscape trap" concept, whereby entire landscapes are shifted into, and then maintained (trapped) in, a highly compromised structural and functional state as the result of multiple temporal and spatial feedbacks between human and natural disturbance regimes. The landscape trap concept builds on ideas like stable alternative states and other relevant concepts, but it substantively expands the conceptual thinking in a number of unique ways. In this paper, we (i) review the literature to develop the concept of landscape traps, including their general features; (ii) provide a case study as an example of a landscape trap from the mountain ash (Eucalyptus regnans) forests of southeastern Australia; (iii) suggest how landscape traps can be detected before they are irrevocably established; and (iv) present evidence of the generality of landscape traps in different ecosystems worldwide.
Publication Proceedings of the National Academy of Sciences
Volume 108
Pages 15887-15891
Date 2011-08-29
DOI 10.1073/pnas.1110245108
ISSN 0027-8424, 1091-6490
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1110245108
Accessed Thu Oct 6 10:57:40 2011
Library Catalog CrossRef
Call Number 0000
Date Added Thu Oct 6 11:53:37 2011

Modified Thu Oct 6 11:59:48 2011

NOAA Global Statistics

Type Web Page
Author NOAA
Website Title NOAA: June, April to June, and Year-to-Date Global Temperatures are Warmest on Record
Date 2010
URL http://www.noaanews.noaa.gov/stories2010/20100715_globalstats.html
Rights NOAA
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

NOAA: 2010 Tied for warmest year on record

Type Web Page
Author NOAA
Abstract According to NOAA scientists, 2010 tied with 2005 as the warmest year of the global surface temperature record, beginning in 1880. This was the 34th consecutive year with global temperatures above the 20th century average. For the contiguous United States alone, the 2010 average annual temperature was above normal, resulting in the 23rd warmest year on record.
Website Title Global Stats
Date 2011
URL http://www.noaanews.noaa.gov/stories2011/20110112_globalstats.html
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

Non-CO_2 greenhouse gases and climate change

Type Journal Article
Author Stephen A. Montzka
Author Edward J. Dlugokencky
Author James H. Butler
Abstract Earth's climate is warming as a result of anthropogenic emissions of greenhouse gases, particularly carbon dioxide (CO_2) from fossil fuel combustion. Anthropogenic emissions of non-CO_2 greenhouse gases, such as methane, nitrous oxide and ozone-depleting substances (largely from sources other than fossil fuels), also contribute significantly to warming. Some non-CO_2 greenhouse gases have much shorter lifetimes than CO_2, so reducing their emissions offers an additional opportunity to lessen future climate change. Although it is clear that sustainably reducing the warming influence of greenhouse gases will be possible only with substantial cuts in emissions of CO_2, reducing non-CO_2 greenhouse gas emissions would be a relatively quick way of contributing to this goal.
Publication Nature
Volume 476
Issue 7358
Pages 43-50
Date 04 August 2011
Journal Abbr Nature
DOI 10.1038/nature10322
ISSN 0028-0836

URL http://www.nature.com/doifinder/10.1038/nature10322
Call Number 0000
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:19 2011

Normals Product Suite: Average U.S. temperature increases by 0.5 degrees F

Type Web Page
Author NOAA NCDC
Website Title Average U.S. temperature increases by 0.5 degrees F
Website Type NOAA News - Stories 2011
Date 2011
URL http://www.noaanews.noaa.gov/stories2011/20110629_newnormals.html
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

North Pacific decadal climate variability since 1661

Type Journal Article
Author Franco Biondi
Author Alexander Gershunov
Author Daniel R. Cayan
Abstract Climate in the North Pacific and North American sectors has experienced interdecadal shifts during the twentieth century. A network of recently developed tree-ring chronologies for Southern and Baja California extends the instrumental record and reveals decadal-scale variability back to 1661. The Pacific decadal oscillation (PDO) is closely matched by the dominant mode of tree-ring variability that provides a preliminary view of multiannual climate fluctuations spanning the past four centuries. The reconstructed PDO index features a prominent bidecadal oscillation, whose amplitude weakened in the late l700s to mid-1800s. A comparison with proxy records of ENSO suggests that the greatest decadal-scale oscillations in Pacific climate between 1706 and 1977 occurred around 1750, 1905, and 1947.
Publication Journal of Climate
Volume 14
Issue 1
Pages 5–10
Date January 2001
Journal Abbr J. Climate
DOI 10.1175/1520-0442(2001)014<0005:NPDCVS>2.0.CO;2
ISSN 1520-0442
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0442%282001%29014%3C0005%3ANPDCVS%3E2.0.CO%3B2
Date Added Tue Aug 23 02:31:18 2011
Modified Wed Aug 24 04:40:09 2011

Northern Hemisphere temperatures during the past millennium: Inferences, uncertainties, and limitations

Type Journal Article
Author Michael E. Mann

Author Raymond S. Bradley
Author Malcolm K. Hughes
Abstract Building on recent studies, we attempt hemispheric temperature reconstructions with proxy data networks for the past millennium. We focus not just on the reconstructions, but the uncertainties therein, and important caveats. Though expanded uncertainties prevent decisive conclusions for the period prior to AD 1400, our results suggest that the latter 20th century is anomalous in the context of at least the past millennium. The 1990s was the warmest decade, and 1998 the warmest year, at moderately high levels of confidence. The 20th century warming counters a millennial-scale cooling trend which is consistent with long-term astronomical forcing.
Publication Geophysical Research Letters
Volume 26
Issue 6
Pages 759-762
Date March 1999
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/1999GL900070
ISSN 0094–8276
Short Title Northern Hemisphere temperatures during the past millennium
URL http://www.agu.org/pubs/crossref/1999/1999GL900070.shtml
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:43:39 2011

Northern peatland initiation lagged abrupt increases in deglacial atmospheric CH_4

Type Journal Article
Author Alberto V. Reyes
Author Colin A. Cooke
Abstract Peatlands are a key component of the global carbon cycle. Chronologies of peatland initiation are typically based on compiled basal peat radiocarbon (^{14}C) dates and frequency histograms of binned calibrated age ranges. However, such compilations are problematic because poor quality ^{14}C dates are commonly included and because frequency histograms of binned age ranges introduce chronological artefacts that bias the record of peatland initiation. Using a published compilation of 274 basal ^{14}C dates from Alaska as a case study, we show that nearly half the ^{14}C dates are inappropriate for reconstructing peatland initiation, and that the temporal structure of peatland initiation is sensitive to sampling biases and treatment of calibrated ^{14}C dates. We present revised chronologies of peatland initiation for Alaska and the circumpolar Arctic based on summed probability distributions of calibrated ^{14}C dates. These revised chronologies reveal that northern peatland initiation lagged abrupt increases in atmospheric CH_4 concentration at the start of the Bølling–Allerød interstadial (Termination 1A) and the end of the Younger Dryas chronozone (Termination 1B), suggesting that northern peatlands were not the primary drivers of the rapid increases in atmospheric CH_4. Our results demonstrate that subtle methodological changes in the synthesis of basal ^{14}C ages lead to substantially different interpretations of temporal trends in peatland initiation, with direct implications for the role of peatlands in the global carbon cycle.
Publication Proceedings of the National Academy of Sciences
Volume 108
Issue 12
Pages 4748-4753
Date March 22, 2011
Journal Abbr PNAS
DOI 10.1073/pnas.1013270108
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1013270108
Call Number 0000

Extra Keywords: radiocarbon dating; peatland carbon; ice core methane; paleoclimate.
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:05 2011

Nutrient regime shift in the western North Atlantic indicated by compound-specific δ15N of deep-sea gorgonian corals

Type Journal Article
Author Owen A. Sherwood
Author Moritz F. Lehmann
Author Carsten J. Schubert
Author David B. Scott
Author Matthew D. McCarthy
Abstract Despite the importance of the nitrogen (N) cycle on marine productivity, little is known about variability in N sources and cycling in the ocean in relation to natural and anthropogenic climate change. Beyond the last few decades of scientific observation, knowledge depends largely on proxy records derived from nitrogen stable isotopes (δ15N) preserved in sediments and other bioarchives. Traditional bulk δ15N measurements, however, represent the combined influence of N source and subsequent trophic transfers, often confounding environmental interpretation. Recently, compound-specific analysis of individual amino acids (δ15N-AA) has been shown as a means to deconvolve trophic level versus N source effects on the δ15N variability of bulk organic matter. Here, we demonstrate the first use of δ15N-AA in a paleoceanographic study, through analysis of annually secreted growth rings preserved in the organic endoskeletons of deep-sea gorgonian corals. In the Northwest Atlantic off Nova Scotia, coral δ15N is correlated with increasing presence of subtropical versus subpolar slope waters over the twentieth century. By using the new δ15N-AA approach to control for variable trophic processing, we are able to interpret coral bulk δ15N values as a proxy for nitrate source and, hence, slope water source partitioning. We conclude that the persistence of the warm, nutrient-rich regime since the early 1970s is largely unique in the context of the last approximately 1,800 yr. This evidence suggests that nutrient variability in this region is coordinated with recent changes in global climate and underscores the broad potential of δ15N-AA for paleoceanographic studies of the marine N cycle.
Publication Proceedings of the National Academy of Sciences
Volume 108
Issue 3
Pages 1011-1015
Date January 18, 2011
Journal Abbr PNAS
Language 1091-6490
DOI 10.1073/pnas.1004904108
URL http://www.pnas.org/content/early/2010/12/27/1004904108.abstract
Extra Keywords: compound-specific isotope analysis; deep-sea corals; nitrogen cycle; North Atlantic Oscillation; stable N isotopes.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:00 2011

Observational and model evidence of global emergence of permanent, unprecedented heat in the 20th and 21st centuries

Type Journal Article
Author Noah S. Diffenbaugh
Author Martin Scherer

Abstract Given the severe impacts of extreme heat on natural and human systems, we attempt to quantify the likelihood that rising greenhouse gas concentrations will result in a new, permanent heat regime in which the coolest warm-season of the 21st century is hotter than the hottest warm-season of the late 20th century. Our analyses of global climate model experiments and observational data reveal that many areas of the globe are likely to permanently move into such a climate space over the next four decades, should greenhouse gas concentrations continue to increase. In contrast to the common perception that high-latitude areas face the most accelerated response to global warming, our results demonstrate that in fact tropical areas exhibit the most immediate and robust emergence of unprecedented heat, with many tropical areas exhibiting a 50% likelihood of permanently moving into a novel seasonal heat regime in the next two decades. We also find that global climate models are able to capture the observed intensification of seasonal hot conditions, increasing confidence in the projection of imminent, permanent emergence of unprecedented heat.

Publication Climatic Change
Volume 107
Issue 3-4
Pages 615-624
Date August 2011
Journal Abbr Climatic Change
DOI 10.1007/s10584-011-0112-y
ISSN 0165-0009
URL http://www.springerlink.com/index/10.1007/s10584-011-0112-y
Date Added Tue Aug 30 04:16:19 2011
Modified Tue Aug 30 04:25:42 2011

Observations on the nature and origin of fusain

Type Journal Article
Author Andrew C. Scott

Abstract Evidence for a wildfire origin of fusain is examined. Charcoal produced by natural fires and artificial charring resembles fossil fusain both in physical size and shape and in optical reflectance. Artificially charred leaves and naturally burnt wood are illustrated using the SEM. Reflectance studies on modem charcoals suggest that much semifusinite may be produced by pyrolysis. The ecological implications of a wildfire origin of fusain are discussed and it is concluded that fires have been a feature of terrestrial ecosystems from at least the Late Devonian.

Publication International Journal of Coal Geology
Volume 12
Issue 1-4
Pages 443–475
Date June 1989
Journal Abbr Int. J. Coal Geol.
DOI 10.1016/0166-5162(89)90061-X
ISSN 0166-5162
URL http://linkinghub.elsevier.com/retrieve/pii/016651628990061X
Date Added Sun Aug 28 17:26:09 2011
Modified Sun Aug 28 17:30:06 2011

Observations tending to investigate the nature of the Sun, in order to find the causes or symptoms of its variable emission of light and heat; with remarks on the use that may possibly be drawn from solar observations

Type Journal Article

Author William Herschel
Abstract no abstract
Publication Philosophical Transactions of the Royal Society of London
Volume 91
Pages 265-318
Date 1 January 1801
Journal Abbr Phil. Trans. R. Soc. Lond.
DOI 10.1098/rstl.1801.0015
ISSN 0261-0523
URL http://www.jstor.org/stable/107097
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:34:12 2011

Observed climate variability and change

Type Journal Article
Author Chris K. Folland
Author Thomas R. Karl
Author M. Jim Salinger
Abstract no abstract
Publication Weather
Volume 57
Issue 8
Pages 269-278
Date August 2002
Journal Abbr Weather
DOI 10.1256/004316502320517353
ISSN 0043-1656
URL http://doi.wiley.com/10.1256/004316502320517353
Date Added Mon Aug 29 05:19:52 2011
Modified Mon Aug 29 05:27:43 2011

Oceanographic events during El Niño

Type Journal Article
Author Mark A. Cane
Abstract El Niño events, the most spectacular instances of interannual variability in the ocean, have profound consequences for climate and the ocean ecosystem. The 1982-1983 El Niño is perhaps the strongest in this century. El Niño events usually have followed a predictable pattern, but the recent event differs markedly. The physical oceanography of this El Niño is described and compared with that of earlier events.
Publication Science
Volume 222
Issue 4629
Pages 1189-1195
Date 16 December 1983
Journal Abbr Science
DOI 10.1126/science.222.4629.1189
ISSN 0036-8075

URL http://www.sciencemag.org/content/222/4629/1189.abstract
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:03:25 2011

Old-growth forest landscape transitions from pre-European settlement to present

Type Journal Article
Author Mark A. White
Author David J. Mladenoff
Abstract We conducted a multi-temporal spatial analysis of forest cover for a 9600 ha landscape in northern Wisconsin, U.S.A., using data from pre-European settlement (1860s), post-settlement (1931), and current (1989) periods. Using GIS we have shown forest landscape changes and trajectories that have been generally described in aggregate for the norther Great Lake States region. We created the pre-European settlement map from the witness tree data of the original federal General Land Office survey notes. The 1931 cover was produced from the Wisconsin Land Economic Inventory, and the 1989 cover map was based on color infrared photography. We used GIS to analyze 1) land area occupied by different forest types at different dates, 2) temporal transitions between dates and their driving proceses, and 3) successional trajectories with landforms and spatial associations of forest types. Over the 120 year period, forest cover has changed from a landscape dominated by old-growth hemlock (Tsuga canadensis) and hardwood forests (Acer saccharum, Betula alleghaniensis) to largely second-growth hardwoods and conifers. The former dominant hemlock is largely eliminated from the landscape. From 1860 to 1931, large-scale disturbances associated with logging were the dominant processes on the landscape. Early successional forest types covered much of the landscape by the 1930s. From 1931 to 1989, succession was the dominant process driving forest transitions as forest types succeeded to a diverse group of upland hardwood and conifer forest types. If successional trajectories continue, a more homogeneous landscape may develop comprised of both a northern hardwood type dominated by sugar maple, and a boreal conifer/hardwood forest.
Publication Landscape Ecology
Volume 9
Issue 3
Pages 191-205
Date September 1994
Journal Abbr Landscape Ecol.
DOI 10.1007/BF00134747
ISSN 0921-2973 (Print) 1572-9761 (Online)
URL http://www.springerlink.com/content/l50616626878542v/
Extra Keywords: Acer saccharum; disturbance; geographic information systems (GIS); hemlock; hardwood; old-growth forest; spatial pattern; succession; Tsuga canadensis; Wisconsin; western Great Lakes.
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:37 2011

On the observational determination of climate sensitivity and its implications

Type Journal Article
Author Richard S. Lindzen
Author Yong-Sang Choi
Abstract We estimate climate sensitivity from observations, using the deseasonalized fluctuations in sea surface temperatures (SSTs) and the concurrent fluctuations in the top-of-atmosphere (TOA) outgoing radiation from the ERBE (1985–1999) and CERES (2000–2008) satellite instruments. Distinct periods of warming and cooling in the SSTs were used to evaluate feedbacks. An earlier study (Lindzen and Choi, 2009) was subject to significant criticisms. The present paper is an expansion of the earlier paper where the various criticisms are taken into account. The present analysis accounts for the 72 day precession period for the ERBE satellite in a more appropriate manner than in the earlier paper. We develop a method to distinguish noise in the outgoing

radiation as well as radiation changes that are forcing SST changes from those radiation changes that constitute feedbacks to changes in SST. We demonstrate that our new method does moderately well in distinguishing positive from negative feedbacks and in quantifying negative feedbacks. In contrast, we show that simple regression methods used by several existing papers generally exaggerate positive feedbacks and even show positive feedbacks when actual feedbacks are negative. We argue that feedbacks are largely concentrated in the tropics, and the tropical feedbacks can be adjusted to account for their impact on the globe as a whole. Indeed, we show that including all CERES data (not just from the tropics) leads to results similar to what are obtained for the tropics alone — though with more noise. We again find that the outgoing radiation resulting from SST fluctuations exceeds the zerofeedback response thus implying negative feedback. In contrast to this, the calculated TOA outgoing radiation fluxes from 11 atmospheric models forced by the observed SST are less than the zerofeedback response, consistent with the positive feedbacks that characterize these models. The results imply that the models are exaggerating climate sensitivity.

Publication Asia-Pacific Journal of Atmospheric Sciences
Volume 47
Issue 4
Pages 377-390
Date August 2011
Journal Abbr Asia-Pacific J. Atmos. Sci.
DOI 10.1007/s13143-011-0023-x
ISSN 1976-7633, 1976-7951
URL http://www.springerlink.com/index/10.1007/s13143-011-0023-x
Call Number 0000
Extra Keywords: climate sensitivity; climate feedback; cloud; radiation; satellite.
Date Added Thu Sep 22 04:22:26 2011
Modified Wed Sep 28 17:53:53 2011

On the operational predictability of blocking

Type Journal Article
Author Stefano Tibaldi
Author Franco Molteni
Abstract The entire 7-year archive of ECMWF operational analysis and forecast data is used to assess the skill of the Centre's model in short- and medium-range forecasting of atmospheric blocking. The assessment covers 7100-day periods, from 1 December to 10 March of all winters from 1980-81 to 1986-87, inclusive. A slightly modified version of the Legenäs and Økland objective zonal index is used to quantify both observed and forecast occurrence of blocking. The study is performed on 500 hPa geopotential height and on Euro-Atlantic and Pacific blocking separately. It is found that blocking frequency is severely underestimated in medium-range forecasts; the model is, on average, reasonably skilful if the initial conditions are blocked, but blocking onset is poorly represented if it occurs more than a few days into the forecast. This inability in entering the blocking regime has a substantial impact on the systematic error of the model.
Publication Tellus A
Volume 42
Issue 3
Pages 343-365
Date May 1990
Journal Abbr Tellus A
DOI 10.1034/j.1600-0870.1990.t01-2-00003.x
ISSN 0280-6495
URL http://www.blackwell-synergy.com/links/doi/10.1034%2Fj.1600-0870.1990.t01-2-00003.x
Call Number 0196
Date Added Thu Sep 22 06:05:09 2011
Modified Wed Sep 28 17:53:50 2011

On the role of the Agulhas system in ocean circulation and climate

Type	Journal Article
Author	Lisa M. Beal
Author	Wilhelmus P. M. De Ruijter
Author	Arne Biastoch
Author	Rainer Zahn
Author	Meghan Cronin
Author	Juliet Hermes
Author	Johann Lutjeharms
Author	Graham Quartly
Author	Tomoki Tozuka
Author	Sheekela Baker-Yeboah
Author	Thomas Bornman
Author	Paolo Cipollini
Author	Henk Dijkstra
Author	Ian Hall
Author	Wonsun Park
Author	Frank Peeters
Author	Pierrick Penven
Author	Herman Ridderinkhof
Author	Jens Zinke
Abstract	The Atlantic Ocean receives warm, saline water from the Indo-Pacific Ocean through Agulhas leakage around the southern tip of Africa. Recent findings suggest that Agulhas leakage is a crucial component of the climate system and that ongoing increases in leakage under anthropogenic warming could strengthen the Atlantic overturning circulation at a time when warming and accelerated meltwater input in the North Atlantic is predicted to weaken it. Yet in comparison with processes in the North Atlantic, the overall Agulhas system is largely overlooked as a potential climate trigger or feedback mechanism. Detailed modelling experiments —backed by palaeoceanographic and sustained modern observations—are required to establish firmly the role of the Agulhas system in a warming climate.
Publication	Nature
Volume	472
Issue	7344
Pages	429-436
Date	28 April 2011
Journal Abbr	Nature
DOI	10.1038/nature09983
ISSN	0028-0836
URL	http://www.nature.com/doifinder/10.1038/nature09983
Call Number	0000
Date Added	Tue Aug 23 02:01:06 2011
Modified	Wed Aug 24 04:41:52 2011

On the use of ATSR fire count data to estimate the seasonal and interannual variability of vegetation fire emissions

Type	Journal Article
Author	Martin G. Schultz

Abstract Biomass burning has long been recognised as an important source of trace gases and aerosols in the atmosphere. The burning of vegetation has a repeating seasonal pattern, but the intensity of burning and the exact localisation of fires vary considerably from year to year. Recent studies have demonstrated the high interannual variability of the emissions that are associated with biomass burning. In this paper I present a methodology using active fire counts from the Along-Track Scanning Radiometer (ATSR) sensor on board the ERS-2 satellite to estimate the seasonal and interannual variability of global biomass burning emissions in the time period 1996--2000. From the ATSR data, I compute relative scaling factors of burning intensity for each month, which are then applied to a standard inventory for carbon monoxide emissions from biomass burning. The new, time-resolved inventory is evaluated using the few existing multi-year burned area observations on continental scales.

Publication Atmospheric Chemistry and Physics

Volume 2

Issue 5

Pages 387–395

Date November 2002

Journal Abbr Atmos. Chem. Phys.

DOI 10.5194/acpd-2-1159-2002

ISSN 1680-7316

URL http://www.atmos-chem-phys.net/2/387/2002/acp-2-387-2002.html

Date Added Sun Aug 28 17:26:09 2011

Modified Wed Aug 31 00:30:25 2011

Ongoing climate change following a complete cessation of carbon dioxide emissions

Type Journal Article

Author Nathan P. Gillett

Author Vivek K. Arora

Author Kirsten Zickfeld

Author Shawn J. Marshall

Author William J. Merryfield

Abstract A threat of irreversible damage should prompt action to mitigate climate change, according to the United Nations Framework Convention on Climate Change, which serves as a basis for international climate policy. CO_2-induced climate change is known to be largely irreversible on timescales of many centuries, as simulated global mean temperature remains approximately constant for such periods following a complete cessation of carbon dioxide emissions while thermosteric sea level continues to rise. Here we use simulations with the Canadian Earth System Model to show that ongoing regional changes in temperature and precipitation are significant, following a complete cessation of carbon dioxide emissions in 2100, despite almost constant global mean temperatures. Moreover, our projections show warming at intermediate depths in the Southern Ocean that is many times larger by the year 3000 than that realized in 2100. We suggest that a warming of the intermediate-depth ocean around Antarctica at the scale simulated for the year 3000 could lead to the collapse of the West Antarctic Ice Sheet, which would be associated with a rise in sea level of several metres.

Publication Nature Geoscience

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Issue 2

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Journal Abbr Nature Geosci.

DOI 10.1038/ngeo1047

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Operational approaches to managing forests of the future in Mediterranean regions within a context of changing climates

Type Journal Article
Author Scott L. Stephens
Author Constance I. Millar
Author Brandon M. Collins
Abstract Many US forest managers have used historical ecology information to assist in the development of desired conditions. While there are many important lessons to learn from the past, we believe that we cannot rely on past forest conditions to provide us with blueprints for future management. To respond to this uncertainty, managers will be challenged to integrate adaptation strategies into plans in response to changing climates. Adaptive strategies include resistance options, resilience options, response options, and realignment options. Our objectives are to present ideas that could be useful in developing plans under changing climates that could be applicable to forests with Mediterranean climates. We believe that managing for species persistence at the broad ecoregion scale is the most appropriate goal when considering the effects of changing climates. Such a goal relaxes expectations that current species ranges will remain constant, or that population abundances, distribution, species compositions and dominances should remain stable. Allowing fundamental ecosystem processes to operate within forested landscapes will be critical. Management and political institutions will have to acknowledge and embrace uncertainty in the future since we are moving into a time period with few analogs and inevitably, there will be surprises.
Publication Environmental Research Letters
Volume 5
Issue 2
Pages 024003 (9 p.)
Date April-June 2010
Journal Abbr Environ. Res. Lett.
DOI 10.1088/1748-9326/5/2/024003
ISSN 1748-9326
URL http://stacks.iop.org/1748-9326/5/i=2/a=024003?key=crossref.45340bb0689aa66105104dc66b1b3923
Extra Keywords: climate change; historical variability; restoration; forest policy; Sierra Nevada; Sierra San Pedro Martir; mixed conifer; Jeffrey pine; ponderosa pine; upper montane.
Date Added Sun Aug 28 17:26:59 2011
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Options for National Parks and Reserves for Adapting to Climate Change

Type Journal Article
Author Jill S. Baron
Author Lance Gunderson
Author Craig D. Allen
Author Erica Fleishman
Author Donald McKenzie
Author Laura A. Meyerson
Author Jill Oropeza
Author Nate Stephenson
Abstract Past and present climate has shaped the valued ecosystems currently protected in parks and reserves, but future climate change will redefine these conditions. Continued conservation as climate changes will require thinking differently about resource management than we have in the past; we present some logical steps and tools for doing so. Three critical tenets underpin future management plans and activities: (1) climate patterns of the past will not be the climate patterns of the future; (2) climate defines the environment and influences future

trajectories of the distributions of species and their habitats; (3) specific management actions may help increase the resilience of some natural resources, but fundamental changes in species and their environment may be inevitable. Science-based management will be necessary because past experience may not serve as a guide for novel future conditions. Identifying resources and processes at risk, defining thresholds and reference conditions, and establishing monitoring and assessment programs are among the types of scientific practices needed to support a broadened portfolio of management activities. In addition to the control and hedging management strategies commonly in use today, we recommend adaptive management wherever possible. Adaptive management increases our ability to address the multiple scales at which species and processes function, and increases the speed of knowledge transfer among scientists and managers. Scenario planning provides a broad forward-thinking framework from which the most appropriate management tools can be chosen. The scope of climate change effects will require a shared vision among regional partners. Preparing for and adapting to climate change is as much a cultural and intellectual challenge as an ecological challenge. Keywords Adaptation - Climate change - National parks - Reserves - Uncertainty - Scenario planning - Adaptive management

Publication Environmental Management
Volume 44
Pages 1033-1042
Date 2009-5-16
DOI 10.1007/s00267-009-9296-6
ISSN 0364-152X, 1432-1009
URL http://www.springerlink.com/index/10.1007/s00267-009-9296-6
Accessed Thu Sep 29 13:41:07 2011
Library Catalog CrossRef
Call Number 0014
Date Added Thu Oct 6 11:51:50 2011
Modified Thu Oct 6 11:51:50 2011

Origin, development, and dynamics of coastal temperate conifer rainforests of southern Vancouver Island, Canada

Type Journal Article
Author Kendrick J. Brown
Author Richard J. Hebda
Abstract Pollen and charcoal from East Sooke Fen, Pixie Lake, and Whyac Lake were used to reconstruct the post glacial vegetation, climate, and fire-disturbance history across a precipitation gradient on southern Vancouver Island, British Columbia. An open Pinus woodland covered the landscape in the early late-glacial interval. Fires were absent under a cool and dry climate. Closed mixed conifer forests of Pinus, Picea, Abies, Tsuga heterophylla (Raf.) Sarg., and Tsuga mertensiana (Bong.) Carrière replaced the Pinus biogeochron in the late late-glacial interval. Fires became more common even though climate was cool and moist. Open Pseudotsuga menziesii (Mirb.) Franco forests expanded westward during the warm dry early Holocene, though closed Picea and Tsuga heterophylla forests grew in the wettest part of the area at Whyac Lake. Modern precipitation gradients likely originated at this time. Fires occurred in forested ecosystems, although East Sooke Fen at the driest end of the gradient experienced less fire. The middle and late Holocene was characterized by increasing precipitation and decreasing temperature, respectively. Quercus garryana Dougl. stands spread westward during the mid-Holocene. Extant closed Tsuga heterophylla and Cupressaceae (Thuja plicata Donn. ex D. Don) forests arose in the wetter part of the gradient, whereas Pseudotsuga forests occupied drier eastern areas. During this interval, fires were rare in wet western regions but apparently more common in dry eastern regions.
Publication Canadian Journal of Forest Research
Volume 32
Issue 2
Pages 353-372
Date February 2002
Journal Abbr Can. J. For. Res.

DOI 10.1139/x01-197
ISSN 0045-5067, 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x01-197
Date Added Thu Sep 15 18:57:41 2011
Modified Thu Sep 15 18:57:41 2011

Overstretching attribution

Type Journal Article
Author Camille Parmesan
Author Carlos Duarte
Author Elvira Poloczanska
Author Anthony J. Richardson
Author Michael C. Singer
Abstract no abstract
Publication Nature Climate Change
Volume 1
Pages 2-4
Date April 2011
Journal Abbr Nature Climate Change
DOI 10.1038/nclimate1056
ISSN 1758-678X
URL http://www.nature.com/doifinder/10.1038/nclimate1056
Date Added Sun Aug 28 00:27:26 2011
Modified Wed Aug 31 00:58:07 2011

Overview of the use of natural variability concepts in managing ecological systems

Type Journal Article
Author Peter B. Landres
Author Penelope Morgan
Author Frederick J. Swanson
Abstract Natural resource managers have used natural variability concepts since the early 1960s and are increasingly relying on these concepts to maintain biological diversity, to restore ecosystems that have been severely altered, and as benchmarks for assessing anthropogenic change. Management use of natural variability relies on two concepts: that past conditions and processes provide context and guidance for managing ecological systems today, and that disturbance-driven spatial and temporal variability is a vital attribute of nearly all ecological systems. We review the use of these concepts for managing ecological systems and landscapes. We conclude that natural variability concepts provide a framework for improved understanding of ecological systems and the changes occurring in these systems, as well as for evaluating the consequences of proposed management actions. Understanding the history of ecological systems (their past composition and structure, their spatial and temporal variability, and the principal processes that influenced them) helps managers set goals that are more likely to maintain and protect ecological systems and meet the social values desired for an area. Until we significantly improve our understanding of ecological systems, this knowledge of past ecosystem functioning is also one of the best means for predicting impacts to ecological systems today. These concepts can also be misused. No a priori time period or spatial extent should be used in defining natural variability. Specific goals, site-specific field data, inferences derived from data collected elsewhere, simulation models, and explicitly stated value judgment all must drive selection of the relevant time period and spatial extent used in defining natural variability. Natural variability concepts offer an opportunity and a challenge for ecologists to provide relevant information and to collaborate with managers to improve the management of ecological systems.
Publication Ecological Applications

Volume 9
Issue 4
Pages 1179–1188
Date November 1999
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(1999)009[1179:OOTUON]2.0.CO;2
ISSN 1051-0761
URL http://www.jstor.org/stable/2641389
Extra Keywords: disturbance; ecosystem management; historical range of variability; landscape management; management of ecological systems; natural variability; restoration; variation, spatial and temporal scales.
Date Added Tue Aug 30 14:37:58 2011
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Overview: Global fire regime conditions, threats, and opportunities for fire management in the tropics (Chapter 3)

Type Book Section
Author Ayn Shlisky
Author Ane A. C. Alencar
Author María Manta Nolasco
Author Lisa M. Curran
Abstract Fire is a natural process that has played a major role in shaping our environment and maintaining biodiversity worldwide. However, over 60% of the world's terrestrial habitats have altered fire regimes. At least 20% of global habitats are classified as fire-sensitive, including most tropical habitats; they are composed of species that did not largely evolve in the presence of fire. Over 70% of these fire-sensitive habitats have altered fire regimes. While fire has been, and still is, an important tool used by humans to cultivate agricultural landscapes, when human actions cause too much, too little, or the wrong type of fire, it can threaten our environment by releasing unacceptable levels of greenhouse gases into the atmosphere, providing pathways for harmful invasive species, altering landscape hydrology, impairing local and regional air quality, and presenting a direct and often increased risk to human habitation. Recognizing the value and need to assess the world's fire regimes, The Nature Conservancy, University of California at Berkeley, World Conservation Union (IUCN), and World Wildlife Fund (WWF) completed an expert-based analysis of the state of the world's fire regimes based on currently available data and expert opinion. The major sources of fire regime alteration worldwide include climate change, agriculture and ranching, deforestation, rural and urban development, energy production, fire exclusion and suppression, invasive species, plantations, and arson. Integrated fire management (IFM) is an approach that considers both damaging and beneficial fires within the context of the natural environments and socio-economic systems in which they occur. IFM takes into account fire ecology, socio-economic issues, and fire management technology to generate practical solutions to fire-related threats to biodiversity.
Book Title Tropical Fire Ecology: Climate Change, Land Use, and Ecosystem Dynamics
Series Springer Praxis Books
Edition 1st edition
Place UK
Publisher Springer (Jointly published with Praxis Publishing)
Date May 2009
Pages 65–83
ISBN 978-3540773801
Short Title Overview
URL http://www.springerlink.com/content/x824075qx34k7654/
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:17 2011

Palaeoclimate: Long-distance relationship

Type Journal Article
Author Kathleen R. Johnson
Abstract Oxygen isotope variations in Chinese cave deposits have been interpreted as proxies for the East Asian summer monsoon. Numerical simulations suggest the deposits may instead record remote climate changes over India and the Indian Ocean.
Publication Nature Geoscience
Volume 4
Issue 7
Pages 426–427
Date July 2011
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo1190
ISSN 1752-0894
Short Title Palaeoclimate
URL http://www.nature.com/doifinder/10.1038/ngeo1190
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:12:12 2011

Paleoclimate, global change and the future

Type Book
Editor Keith D. Alverson
Editor Raymond S. Bradley
Editor Thomas F. Pedersen
Abstract Description: This book provides a synthesis of the past decade of research into global changes that occurred in the earth system in the past. Focus is achieved by concentrating on those changes in the Earth's past environment that best inform our evaluation of current and future global changes and their consequences for human populations. The book stands as a ten year milestone in the operation of the Past Global Changes (PAGES) Project of the International Geosphere-Biosphere Programme (IGBP). It seeks to provide a quantitative understanding of the Earth’s environment in the geologically recent past and to define the envelope of natural environmental variability against which anthropogenic impacts on the Earth System may be assessed. A set of color overhead transparencies based on the figures in the book is available free on the PAGES website (www.pages-igbp.org) for use in teaching and lecturing. (from: http://www.amazon.com/Paleoclimate-Global-Change-Future-Alverson/dp/3540424024)
Series The IGBP (International Geosphere-Biosphere Programme) Series
Edition 1st edition
Place Verlag Berlin Heidelberg
Publisher Springer
Date 2003
# of Pages 221 p.
ISBN 3-540-42402-4
URL http://gidimap.giub.uni-bonn.de:9080/geomorph/themen/paleoclimate-global-change-and-the-future
Archive PAGES website
Loc. in Archive www.pages-igbp.org
Date Added Mon Aug 15 23:13:32 2011
Modified Wed Aug 31 23:58:43 2011

Paleoclimates: Understanding climate change past and present

Type Book
Author Thomas M. Cronin
Abstract The field of paleoclimatology relies on physical, chemical, and biological proxies of past climate changes that have been preserved in natural archives such as glacial ice, tree rings, sediments, corals, and speleothems. Paleoclimate archives obtained through field investigations, ocean sediment coring expeditions, ice sheet coring programs, and other projects allow scientists to reconstruct climate change over much of earth's history.When combined with computer model simulations, paleoclimatic reconstructions are used to test hypotheses about the causes of climatic change, such as greenhouse gases, solar variability, earth's orbital variations, and hydrological, oceanic, and tectonic processes. This book is a comprehensive, state-of-the art synthesis of paleoclimate research covering all geological timescales, emphasizing topics that shed light on modern trends in the earth's climate. Thomas M. Cronin discusses recent discoveries about past periods of global warmth, changes in atmospheric greenhouse gas concentrations, abrupt climate and sea-level change, natural temperature variability, and other topics directly relevant to controversies over the causes and impacts of climate change. This text is geared toward advanced undergraduate and graduate students and researchers in geology, geography, biology, glaciology, oceanography, atmospheric sciences, and climate modeling, fields that contribute to paleoclimatology. This volume can also serve as a reference for those requiring a general background on natural climate variability.
Edition illustrated
Place New York, NY
Publisher Columbia University Press
Date November 2009
# of Pages 448 p.
ISBN 0231144946, 9780231144940
Short Title Paleoclimates
URL http://cup.columbia.edu/book/978-0-231-14494-0/paleoclimates
Archive http://books.google.com/books?hl=en&lr=&
Call Number 0000
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:40 2011

Notes:

Contents:

Ch. 1. Paleoclimatology and Modern Challenges -- Ch. 2. Methods in Paleoclimatology -- Ch. 3. Deep Time: Climate from 3.8 Billion to 65 Million Years Ago -- Ch. 4. Cenozoic Climate -- Ch. 5. Orbital Climate Change -- Ch. 6. Glacial Millennial Climate Change -- Ch. 7. Millennial Climate Events During Deglaciation -- Ch. 8. Holocene Climate Variability -- Ch. 9. Abrupt Climate Events -- Ch. 10. Internal Modes of Climate Variability -- Ch. 11. The Anthropocene I: Global and Hemispheric Temperature -- Ch. 12. The Anthropocene II: Climatic and Hydrological Change During the Last 2000 Years -- Appendix. Paleoclimate Proxies.

Review site:
http://www.eurojnlofpsychotraumatol.net/coaction/index.php/polar/article/viewArticle/5927/html_38

Paleoclimatology: Reconstructing climates of the Quaternary

Type Book
Author Raymond S Bradley
Abstract no abstract
Series International geophysics series

Edition 1st edition
Place San Diego, California; London
Publisher Academic Press
Date 1999 (2005: 2nd edition)
# of Pages 613 p.
ISBN 012124010X
Short Title Paleoclimatology
URL http://www.geo.umass.edu/climate/paleo/html/
Date Added Wed Aug 24 12:07:03 2011
Modified Fri Aug 26 20:33:28 2011

Paleoecological perspectives on fire ecology: Revisiting the fire-regime concept

Type Journal Article
Author Cathy Whitlock
Author Philip E. Higuera
Author David B. McWethy
Author Christy E. Briles
Abstract Fire is well recognized as a key Earth system process, but its causes and influences vary greatly across spatial and temporal scales. The controls of fire are often portrayed as a set of superimposed triangles, with processes ranging from oxygen to weather to climate, combustion to fuel to vegetation, and local to landscape to regional drivers over broadening spatial and lengthening temporal scale. Most ecological studies and fire management plans consider the effects of fire-weather and fuels on local to sub-regional scales and time frames of years to decades. Fire reconstructions developed from high-resolution tree-ring records and lake-sediment data that span centuries to millennia offer unique insights about fire's role that cannot otherwise be obtained. Such records help disclose the historical range of variability in fire activity over the duration of a vegetation type; the role of large-scale changes of climate, such as seasonal changes in summer insolation; the consequences of major reorganizations in vegetation; and the influence of prehistoric human activity in different ecological settings. This paleoecological perspective suggests that fire-regime definitions, which focus on the characteristic frequency, size and intensity of fire and particular fuel types, should be reconceptualized to better include the controls of fire regimes over the duration of a particular biome. We suggest that approaches currently used to analyze fire regimes across multiple spatial scales should be employed to examine fire occurrence across multiple temporal scales. Such cross-scale patterns would better reveal the full variability of particular fire regimes and their controls, and provide relevant information for the types of fire regimes likely to occur in the future with projected climate and land-use change.
Publication The Open Ecology Journal
Volume 3
Issue Special Issue #001
Pages 6–23
Date 2010
Journal Abbr Open Ecology Journal
DOI 10.2174/1874213001003020006
ISSN 1874-2130
Short Title Paleoecological Perspectives on Fire Ecology
URL http://www.benthamscience.com/open/toecolj/openaccess2.htm
Extra Keywords: fire history; fire triangle; fire-climate; fire-human; fire-vegetation; charcoal records; fire regimes.
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:35 2011

Paleofire reconstruction for high-elevation forests in the Sierra Nevada, California, with implications

for wildfire synchrony and climate variability in the late Holocene

Type Journal Article
Author Douglas J. Hallett
Author R. Scott Anderson
Abstract Here, we present two high-resolution records of macroscopic charcoal from high-elevation lake sites in the Sierra Nevada, California, and evaluate the synchroneity of fire response for east- and west-side subalpine forests during the past 9200 yr. Charcoal influx was low between 11,200 and 8000 cal yr BP when vegetation consisted of sparse Pinus-dominated forest and montane chaparral shrubs. High charcoal influx after ~8000 cal yr BP marks the arrival of Tsuga mertensiana and Abies magnifica, and a higher-than-present treeline that persisted into the mid-Holocene. Coeval decreases in fire episode frequency coincide with neoglacial advances and lower treeline in the Sierra Nevada after 3800 cal yr BP. Independent fire response occurs between 9200 and 5000 cal yr BP, and significant synchrony at 100- to 1000-yr timescales emerges between 5000 cal yr BP and the present, especially during the last 2500 yr. Indistinguishable fire-return interval distributions and synchronous fires show that climatic control of fire became increasingly important during the late Holocene. Fires after 1200 cal yr BP are often synchronous and corroborate with inferred droughts. Holocene fire activity in the high Sierra Nevada is driven by changes in climate linked to insolation and appears to be sensitive to the dynamics of the El Niño–Southern Oscillation.
Publication Quaternary Research
Volume 73
Issue 2
Pages 180-190
Date March 2010
Journal Abbr Quaternary Res.
DOI 10.1016/j.yqres.2009.11.008
ISSN 0033-5894
URL http://www.sciencedirect.com/science/article/pii/S0033589409001562
Extra Keywords: charcoal; forest fire; synchrony; climate change; Ripley's K function; Sierra Nevada; snowpack; drought; Weibull distribution.
Date Added Thu Sep 15 19:37:20 2011
Modified Thu Sep 15 19:37:46 2011

Palynological evidence for 19th century grazing-induced vegetation change in the southern Sierra Nevada, California, U.S.A.

Type Journal Article
Author Robert A. Dull
Abstract • Aim: Stratigraphic pollen records are used to assess historic vegetation changes that have transpired in a North American mountain meadow since the introduction of Old World livestock species in the middle 1800s. • Location: Monache Meadows is located on the Kern Plateau in the Sierra Nevada mountain range, California, U.S.A. It is situated along the upper reaches of the South Fork Kern River in the southernmost drainage basin of the Sierra Nevada. • Methods: Short core samples of meadow sediments were extracted from five locations throughout Monache Meadows. These five samples are classified according to topographic position within the meadow - two upper meadow sites and three lower meadow sites. Stratigraphic analyses of fossil pollen from each core were used to assess vegetation composition before the introduction of European livestock (pre1850) and throughout the historic period (1850-present). The historic period geochronology is based on ^{210}Pb dating of selected strata from each core. • Results: Riccia was a dominant taxon in the upper meadow before the introduction of grazing; Salix seems to have been more abundant in the lower meadow. Both Riccia and Salix decreased dramatically by c.1900, coeval with marked increases in Artemisia (upper meadow) and Cyperaceae (upper and lower meadows). • Main conclusions: Changes in meadow vegetation occurring during the latter part of the 19th century at Monache Meadows are attributed primarily to the introduction of European livestock (sheep and cattle). Other factors that may have contributed to the observed shifts in composition and dominance include changes in native herbivore populations and decreased fire frequency as a result of 20th century fire suppression policies.

Publication Journal of Biogeography
Volume 26
Issue 4
Pages 899-912
Date July 1999
Journal Abbr J. Biogeogr.
DOI 10.1046/j.1365-2699.1999.00330.x
ISSN 0305-0270
URL http://www.jstor.org/stable/2656187
Extra Keywords: California; Sierra Nevada; vegetation change; mountain meadow ecology; grazing impacts; pollen analysis; ^{210}Pb.
Date Added Thu Sep 15 20:13:21 2011
Modified Thu Sep 15 20:14:20 2011

Palynological evidence for early Holocene aridity in the southern Sierra Nevada, California

Type Journal Article
Author Owen K. Davis
Author R. Scott Anderson
Author Patricia L. Fall
Author Mary K. O'Rourke
Author Robert S. Thompson
Abstract Sediments of Balsam Meadow have produced a 11,000-yr pollen record from the southern Sierra Nevada of California. The Balsam Meadow diagram is divided into three zones. (1) The Artemisia zone (11,000-7000 yr B.P.) is characterized by percentages of sagebrush (Artemisia) and other nonarboreal pollen higher than can be found in the modern local vegetation. Vegetation during this interval was probably similar to the modern vegetation on the east slope of the Sierra Nevada and the climate was drier than that of today. (2) Pinus pollen exceeded 80% from 7000 to 3000 yr B.P. in the Pinus zone. The climate was moister than during the Artemisia zone. (3) Fir (Abies, Cupressaceae, and oak (Quercus) percentages increased after 3000 yr B.P. in the Abies zone as the modern vegetation at the site developed and the present cool-moist climatic regime was established. Decreased fire frequency after 1200 yr B.P. is reflected in decreased abundance of macroscopic charcoal and increased concentration of Abies magnifica and Pinus murrayana needles.
Publication Quaternary Research
Volume 24
Issue 3
Pages 322-332
Date November 1985
Journal Abbr Quaternary Res.
DOI 10.1016/0033-5894(85)90054-7
ISSN 0033-5894
URL http://www.sciencedirect.com/science/article/pii/0033589485900547
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:07 2011

Paradise burnt: How colonizing humans transform landscapes with fire

Type Journal Article
Author David M. J. S. Bowman
Author Simon G. Haberle

Abstract A striking feature of Southern Hemisphere landscapes is the occurrence of grasslands in regions that are climatically suitable for forests (Fig. 1). Ecologists and biogeographers working in these southern lands have developed a range of theories to account for the biogeographic anomaly of grassland–forest mosaics (1– 7). Broadly speaking, these theories divide into those that privilege the importance of an ensemble of environmental factors, including fire, or those that stress the legacy of human landscape burning. The report by McWethy et al. in PNAS (8) provides incontrovertible evidence that anthropogenic burning transformed temperate forested landscapes on the South Island of New Zealand. They show that Polynesian (Māori) firing commenced shortly after colonization around A.D. 1280 and transformed 40% of the original forest cover of the island to grassland and fern-shrubland. There is little room for doubting their findings given the elegant integration of a range of paleoecological methodologies, very precise dating, and a high level of replication across the island. This report will spark renewed interest in the relative importance of fire, humans, and climate in shaping forest–grassland landscape mosaics worldwide (9).

Publication Proceedings of the National Academy of Sciences
Volume 107
Issue 50
Pages 21234 -21235
Date December 14, 2010
Journal Abbr PNAS
DOI 10.1073/pnas.1016393108
ISSN 0027-8424
Short Title Paradise burnt
URL http://www.pnas.org/content/107/50/21234.short
Call Number 0000
Date Added Tue Aug 23 03:46:54 2011
Modified Wed Aug 24 04:28:47 2011

Particle-size evidence for source areas of charcoal accumulation in late Holocene sediments of eastern North American lakes

Type Journal Article
Author James S. Clark
Author P. Daniel Royall
Abstract Two methods of analyzing charcoal in sediment reveal changes in charcoal accumulation across temperate eastern North America during the last several hundred years. In one method the analyst counts mostly small particles that reflect regional emissions; in the other, the analyst counts only larger particles derived mostly from such local sources as catchment fires. We used these methods to compare charcoal accumulation at 14 lakes from the prairie/forest border in Minnesota to eastern Maine. The two methods gave concordant accumulation rates for sediments of pre-1850 age at each of 4 lakes analyzed by both methods. This concordance is consistent with the interpretation that pre-1850 emissions were controlled by broad-scale factors, such as climatically controlled regional differences in fuels and moisture. Since 1900 large particles decreased greatly, and small particles decreased slightly, in Minnesota and Wisconsin. By contrast in the Northeast the large particle accumulation has remained at the low values measured in pre-1900 sediments at most sites, while small particles increased everywhere east of central New York and Pennsylvania. The observed patterns suggest that (1) large particles primarily reflect local fires that were common in the Midwest before fire suppression became effective, (2) large particles were rare in the Northeast, especially before extensive land clearance, (3) small particles reflect regional combustion that increased in the Northeast after extensive use of fire for land clearance and wood burning for industrial purposes of the 19th century, and (4) small particles remain abundant in the Midwest long after effective fire suppression, probably because these well-dispersed small particles have a large source area that extends beyond the local wildfires that account for large particles before European settlement.
Publication Quaternary Research
Volume 43
Issue 1

Pages 80–89
Date January 1995
Journal Abbr Quaternary Res.
DOI 10.1006/qres.1995.1008
ISSN 0033-5894
URL http://www.sciencedirect.com/science/article/pii/S0033589485710083
Call Number 0082
Date Added Sun Sep 4 02:11:48 2011
Modified Mon Sep 5 10:11:27 2011

Past and current trends of change in a dune prairie/oak savanna reconstructed through a multiple-scale history

Type Journal Article
Author Kenneth L. Cole
Author Robert S. Taylor
Abstract The history of a rapidly changing mosaic of prairie and oak savanna in northern Indiana was reconstructed using several methods emphasizing different time scales ranging from annual to millennial. Vegetation change was monitored for 8 yr using plots and for 30 yr using aerial photographs. A 20th century fire history was reconstructed from the stand structure of multiple-stemmed trees and fire scars. General Land Office Survey data were used to reconstruct the forest of A.D. 1834. Fossil pollen and charcoal records were used to reconstruct the last 4000 yr of vegetation and fire history. Since its deposition along the shore of Lake Michigan about 4000 yr ago, the area has followed a classical primary dune successional sequence, gradually changing from pine forest to prairie/oak savanna between A.D. 264 and 1007. This successional trend, predicted in the models of Henry Cowles, occurred even though the climate cooled and prairies elsewhere in the region retreated. Severe fires in the 19th century reduced most tree species but led to a temporary increase in Populus tremuloides. During the last few decades, the prairie has been invaded by oaks and other woody species, primarily because of fire suppression since A.D. 1972. The rapid and complex changes now occurring are a response to the compounded effects of plant succession, intense burning and logging in the 19th century, recent fire suppression, and possibly increased airborne deposition of nitrates. The compilation of several historical research techniques emphasizing different time scales allows this study of the interactions between multiple disturbance variables.
Publication Journal of Vegetation Science
Volume 6
Issue 3
Pages 399–410
Date June 1995
Journal Abbr J. Veg. Sci.
DOI 10.2307/3236239
ISSN 1654-1103
URL http://onlinelibrary.wiley.com/doi/10.2307/3236239/abstract
Extra Keywords: fire history; fossil charcoal; fossil pollen; Indiana; oak savanna; sand prairie; succession.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:06 2011

Pathways for climate change effects on fire: Models, data, and uncertainties

Type Journal Article
Author Amy E. Hessl

Abstract Fire is a global process affecting both the biosphere and the atmosphere. As a result, measuring rates of change in wildland fire and understanding the mechanisms responsible for such changes are important research goals. A large body of modeling studies projects increases in wildfire activity in future decades, but few empirical studies have documented change in modern fire regimes. Identifying generalizable pathways through which climate change may alter fire regimes is a critical next step for understanding, measuring, and modeling fire under a changing climate. In this progress report, I review recent model-, empirical-, and fire history-based studies of fire and climate change and propose three pathways along which fire regimes might respond to climate change: changes in fuel condition, fuel volume, and ignitions. Model- and empirical-based studies have largely focused on changes in fuel condition with some models projecting up to 50% increases in area burned under a 2 x CO_2 climate. Fire history data derived from tree-rings, sediment charcoal, and soil charcoal have helped identify past trajectories of change in fire regimes and can point to possible future conditions. However, most fire history research has focused on changes in area burned and fire frequency. Changes in fire severity may be equally important for the earth system and require further attention. Critical research needs include next generation dynamic vegetation models (DGVMs) that consider changes in vegetation alongside changes in human activities and long fire history records from a variety of vegetation types suitable for validating these DGVMs.

Publication Progress in Physical Geography
Volume 35
Issue 3
Pages 393 -407
Date June 2011
Journal Abbr Prog. Phys. Geog.
DOI 10.1177/0309133311407654
ISSN 1477-0296
Short Title Pathways for climate change effects on fire
URL http://ppg.sagepub.com/content/35/3/393.abstract
Call Number 0000
Extra Keywords: climate change; fire; fire history; sedimentary charcoal; tree-rings.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:23 2011

Pattern scaling: An examination of the accuracy of the technique for describing future climates

Type Journal Article
Author Timothy D. Mitchell
Abstract A fully probabilistic, or risk, assessment of future regional climate change and its impacts involves more scenarios of radiative forcing than can besimulated by a general (GCM) or regional (RCM) circulation model. Additional scenarios may be created by scaling a spatial response pattern from a GCM by a global warming projection from a simple climate model. I examine this technique, known as pattern scaling, using a particular GCM (HadCM2).The critical assumption is that there is a linear relationship between the scaler (annual global-mean temperature) and the response pattern. Previous studies have found this assumption to be broadly valid for annual temperature; I extend this conclusion to precipitation and seasonal climate. However,slight non-linearities arise from the dependence of the climatic response on the rate, not just the amount, of change in the scaler. These non-linearitiesintroduce some significant errors into the estimates made by pattern scaling,but nonetheless the estimates accurately represent the modelled changes. A response pattern may be made more robust by lengthening the period from which it is obtained, by anomalising it relative to the control simulation, and by using least squares regression to obtain it. The errors arising from pattern scaling may be minimised by interpolating from a stronger to a weaker forcing scenario.
Publication Climatic Change
Volume 60
Issue 3
Pages 217–242
Date October 2003

Journal Abbr	Climatic Change
DOI	10.1023/A:1026035305597
ISSN	0165-0009
Short Title	Pattern scaling
URL	http://www.springerlink.com/content/u3k8m05208105057/
Date Added	Tue Aug 30 14:35:38 2011
Modified	Tue Aug 30 14:46:48 2011

Patterns and drivers of Holocene vegetational change near the prairie–forest ecotone in Minnesota: Revisiting McAndrews' transect

Type	Journal Article
Author	David M. Nelson
Author	Feng Sheng Hu
Abstract	Summary: • Holocene vegetational dynamics along the prairie–forest border of Minnesota were first documented in McAndrews' classic work. Despite numerous subsequent paleo-studies, a number of questions remain unanswered about the vegetation history of the region. Here, pollen, stable-isotope, mineral, and charcoal data are described from three lakes near McAndrews' sites. These data were compared with other paleoenvironmental records to reconstruct vegetation, aridity, and fire. • The climate was relatively wet with increasing summer temperatures before ~8000 yr before present (BP). The rates of changes were asymmetric for the onset and termination of middle-Holocene aridity, with an abrupt increase at ~8000 yr BP and a gradual, but variable, decline from ~7800 to 4000 yr BP. • Early-Holocene coniferous forests changed to mixed-grass prairie without an intervening period of tallgrass prairie or deciduous forest, whereas the retreat of prairie was characterized by transitions from mixed-grass to tallgrass prairie to deciduous forest and finally to coniferous forest. Within the middle Holocene, the composition and structures of grass-dominated vegetation varied both temporally and spatially. • Fire primarily responded to changes in climate and fuel loads. Vegetation was more strongly influenced by climatic changes than by fire-regime shifts.
Publication	New Phytologist
Volume	179
Issue	2
Pages	449–459
Date	July 2008
Journal Abbr	New Phytol.
DOI	10.1111/j.1469-8137.2008.02482.x
ISSN	1469-8137
Short Title	Patterns and drivers of Holocene vegetational change near the prairie–forest ecotone in Minnesota
URL	http://onlinelibrary.wiley.com/doi/10.1111/j.1469-8137.2008.02482.x/full
Call Number	0012
Extra	Keywords: climate; fire; Holocene; McAndrews' transect; Minnesota; pollen; prairie–forest border.
Date Added	Sun Sep 4 06:43:12 2011
Modified	Mon Sep 5 10:11:10 2011

Patterns of fire severity and forest conditions in the western Klamath Mountains, California

Type	Journal Article
Author	Dennis C. Odion
Author	Evan J. Frost
Author	James R. Strittholt
Author	Hong Jiang
Author	Dominick A. Dellasala

Author Max A. Moritz

Abstract The Klamath-Siskiyou region of northwestern California and southwestern Oregon supports globally outstanding temperate biodiversity. Fire has been important in the evolutionary history that shaped this diversity, but recent human influences have altered the fire environment. We tested for modern human impacts on the fire regime by analyzing temporal patterns in fire extent and spatial patterns of fire severity in relation to vegetation structure, past fire occurrence, roads, and timber management in a 98,814-ha area burned in 1987. Fire severity was mapped by the U.S. Department of Agriculture Forest Service as low, moderate, and high based on levels of canopy scorch and consumption. We found (1) a trend of increasing fire size in recent decades; (2) that overall fire-severity proportions were 59% low, 29% moderate, and 12% high, which is comparable to both contemporary and historic fires in the region; (3) that multiaged, closed forests, the predominant vegetation, burned with much lower severity than did open forest and shrubby nonforest vegetation; (4) that considerably less high-severity fire occurred where fire had previously be absent since 1920 in closed forests compared to where the forests had burned since 1920 (7% vs. 16%); (5) that nonforest vegetation burned with greater severity where there was a history of fire since 1920 and in roaded areas; and (6) that tree plantations experienced twice as much severe fire as multi-aged forests. We concluded that fuel buildup in the absence of fire did not cause increased fire severity as hypothesized. Instead, fuel that is receptive to combustion may decrease in the long absence of fire in the closed forests of our study area, which will favor the fire regime that has maintained these forests. However, plantations are now found in one-third of the roaded landscape. Together with warming climate, this may increase the size and severity of future fires, favoring further establishment of structurally and biologically simple plantations.

Publication Conservation Biology
Volume 18
Issue 4
Pages 927–936
Date August 2004
Journal Abbr Conserv. Biol.
DOI 10.1111/j.1523-1739.2004.00493.x
ISSN 1523-1739
URL http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2004.00493.x/full
Extra Keywords: Douglas-fir; fire regimes; fire severity; hardwoods; Klamath-Siskiyou region; roadless areas; silviculture.
Date Added Sat Aug 27 18:47:16 2011
Modified Sat Aug 27 18:48:03 2011

Peak detection in sediment–charcoal records: Impacts of alternative data analysis methods on fire-history interpretations

Type Journal Article

Author Philip E. Higuera
Author Daniel G. Gavin
Author Patrick J. Bartlein
Author Douglas J. Hallett

Abstract Over the past several decades, high-resolution sediment–charcoal records have been increasingly used to reconstruct local fire history. Data analysis methods usually involve a decomposition that detrends a charcoal series and then applies a threshold value to isolate individual peaks, which are interpreted as fire episodes. Despite the proliferation of these studies, methods have evolved largely in the absence of a thorough statistical framework. We describe eight alternative decomposition models (four detrending methods used with two threshold-determination methods) and evaluate their sensitivity to a set of known parameters integrated into simulated charcoal records. Results indicate that the combination of a globally defined threshold with specific detrending methods can produce strongly biased results, depending on whether or not variance in a charcoal record is stationary through time. These biases are largely eliminated by using a locally defined threshold, which adapts to changes in variability throughout a charcoal record. Applying the alternative decomposition methods on three previously published charcoal records largely supports our conclusions from simulated records. We also present a minimum-count test for empirical records, which reduces the likelihood of false

positives when charcoal counts are low. We conclude by discussing how to evaluate when peak detection methods are warranted with a given sediment–charcoal record.

Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 996–1014
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09134
ISSN 1448-5516
Short Title Peak detection in sediment–charcoal records
URL http://www.publish.csiro.au/paper/WF09134.htm
Extra Keywords: bias; paleoecology; sensitivity.
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:34:44 2011

Permafrost carbon-climate feedbacks accelerate global warming

Type Journal Article
Author Charles D. Koven
Author Bruno Ringeval
Author Pierre Friedlingstein
Author Philippe Ciais
Author Patricia Cadule
Author Dmitry Khvorostyanov
Author Gerhard Krinner
Author Charles Tarnocai
Abstract Permafrost soils contain enormous amounts of organic carbon, which could act as a positive feedback to global climate change due to enhanced respiration rates with warming. We have used a terrestrial ecosystem model that includes permafrost carbon dynamics, inhibition of respiration in frozen soil layers, vertical mixing of soil carbon from surface to permafrost layers, and CH_4 emissions from flooded areas, and which better matches new circumpolar inventories of soil carbon stocks, to explore the potential for carbon-climate feedbacks at high latitudes. Contrary to model results for the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC AR4), when permafrost processes are included, terrestrial ecosystems north of 60°N could shift from being a sink to a source of CO_2 by the end of the 21st century when forced by a Special Report on Emissions Scenarios (SRES) A2 climate change scenario. Between 1860 and 2100, the model response to combined CO_2 fertilization and climate change changes from a sink of 68 Pg to a 27 + -7 Pg sink to 4 + -18 Pg source, depending on the processes and parameter values used. The integrated change in carbon due to climate change shifts from near zero, which is within the range of previous model estimates, to a climate-induced loss of carbon by ecosystems in the range of 25 + -3 to 85 + -16 Pg C, depending on processes included in the model, with a best estimate of a 62 + -7 Pg C loss. Methane emissions from high-latitude regions are calculated to increase from 34 Tg CH_4/y to 41–70 Tg CH_4/y, with increases due to CO_2 fertilization, permafrost thaw, and warming-induced increased CH_4 flux densities partially offset by a reduction in wetland extent.
Publication Proceedings of the National Academy of Sciences
Volume 108
Issue 36
Pages 14769-14774
Date September 6, 2011
Journal Abbr PNAS
DOI 10.1073/pnas.1103910108
ISSN 0027-8424

URL http://www.pnas.org/cgi/doi/10.1073/pnas.1103910108
Call Number 0000
Extra Keywords: carbon cycle; land surface models; cryosphere; soil organic matter; active layer.
Date Added Thu Sep 22 03:45:48 2011
Modified Wed Sep 28 17:54:01 2011

Persistence of climate changes due to a range of greenhouse gases

Type Journal Article
Author Susan Solomon
Author John S. Daniel
Author Todd J. Sanford
Author Daniel M. Murphy
Author Gian-Kasper Plattner
Author Reto Knutti
Author Pierre Friedlingstein
Abstract Emissions of a broad range of greenhouse gases of varying lifetimes contribute to global climate change. Carbon dioxide displays exceptional persistence that renders its warming nearly irreversible for more than 1,000 y. Here we show that the warming due to non-CO_2 greenhouse gases, although not irreversible, persists notably longer than the anthropogenic changes in the greenhouse gas concentrations themselves. We explore why the persistence of warming depends not just on the decay of a given greenhouse gas concentration but also on climate system behavior, particularly the timescales of heat transfer linked to the ocean. For carbon dioxide and methane, nonlinear optical absorption effects also play a smaller but significant role in prolonging the warming. In effect, dampening factors that slow temperature increase during periods of increasing concentration also slow the loss of energy from the Earth's climate system if radiative forcing is reduced. Approaches to climate change mitigation options through reduction of greenhouse gas or aerosol emissions therefore should not be expected to decrease climate change impacts as rapidly as the gas or aerosol lifetime, even for short-lived species; such actions can have their greatest effect if undertaken soon enough to avoid transfer of heat to the deep ocean.
Publication Proceedings of the National Academy of Sciences
Volume 107
Issue 43
Pages 18354-18359
Date October 26, 2010
Journal Abbr PNAS
DOI 10.1073/pnas.1006282107
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1006282107
Extra Keywords: atmosphere; dynamics; radiation.
Date Added Sun Aug 28 17:26:59 2011
Modified Sun Aug 28 17:26:59 2011

Persistent El Niño–Southern Oscillation variation during the Pliocene Epoch

Type Journal Article
Author Nicholas Scroxton
Author Sarah G. Bonham
Author Rosalind E. M. Rickaby
Author S. H. F. Lawrence
Author Michael Hermoso

Author Alan M. Haywood

Abstract There is an urgent requirement to understand how large fluctuations in tropical heat distribution associated with the El Niño–Southern Oscillation (ENSO) will respond to anthropogenic emissions of greenhouse gases. Intervals of global warmth in Earth history provide a unique natural laboratory to explore the behavior of ENSO in a warmer world. To investigate interannual climatic variability, specifically ENSO, in the mid-Piacenzian Warm Period (mPWP) (3.26–3.03 Ma), we integrate observations from the stable isotopes of multiple individual planktonic foraminifera from three different species from the eastern equatorial Pacific with ENSO simulations from the Hadley Centre Coupled Model version 3 (HadCM3), a fully coupled ocean-atmosphere climate model. Our proxy data and model outputs show persistent interannual variability during the mPWP caused by a fluctuating thermocline, despite a deeper thermocline and reduced upwelling. We show that the likely cause of the deeper thermocline is due to warmer equatorial undercurrents rather than reduced physical upwelling. We conclude that the mPWP was characterized by ENSO-related variability around a mean state akin to a modern El Niño event. Furthermore, HadCM3 predicts that the warmer Pliocene world is characterized by a more periodic, regular-amplitude ENSO fluctuation, suggestive that the larger and deeper west Pacific warm pool is more easily destabilized eastward. These conclusions are comparable to the observed trend over the last 40 years to more regular and intense ENSO events. Future research must resolve whether global warming alone, or in concert with tectonic factors, was sufficient to alter ENSO variability during warm intervals of the Pliocene.

Publication Paleoceanography

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Issue 2

Pages PA2215 (13 p.)

Date May 2011

Journal Abbr Paleoceanography

DOI 10.1029/2010PA002097

ISSN 0883-8305

URL http://www.agu.org/pubs/crossref/2011/2010PA002097.shtml

Extra Keywords: Pliocene warm period; mid-Piacenzian Warm Period; El Padre.

Date Added Sun Aug 28 17:26:09 2011

Modified Sun Aug 28 17:30:35 2011

Persistent positive North Atlantic Oscillation mode dominated the Medieval Climate Anomaly

Type Journal Article

Author Valérie Trouet

Author Jan Esper

Author Nicholas E. Graham

Author Andy Baker

Author James D. Scourse

Author David C. Frank

Abstract The Medieval Climate Anomaly (MCA) was the most recent pre-industrial era warm interval of European climate, yet its driving mechanisms remain uncertain. We present here a 947-year-long multidecadal North Atlantic Oscillation (NAO) reconstruction and find a persistent positive NAO during the MCA. Supplementary reconstructions based on climate model results and proxy data indicate a clear shift to weaker NAO conditions into the Little Ice Age (LIA). Globally distributed proxy data suggest that this NAO shift is one aspect of a global MCA-LIA climate transition that probably was coupled to prevailing La Niña–like conditions amplified by an intensified Atlantic meridional overturning circulation during the MCA.

Publication Science

Volume 324

Issue 5923

Pages 78-80

Date 3 April 2009

Journal Abbr Science
DOI 10.1126/science.1166349
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1166349
Extra CO2 Science: http://www.co2science.org/articles/V12/N27/EDIT.php
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:23 2011

Pervasive oxygenation along late Archaean ocean margins

Type Journal Article
Author Brian Kendall
Author Christopher T. Reinhard
Author Timothy W. Lyons
Author Alan J. Kaufman
Author Simon W. Poulton
Author Ariel D. Anbar
Abstract The photosynthetic production of oxygen in the oceans is thought to have begun by 2.7 billion years ago, several hundred million years before appreciable accumulation of oxygen in the atmosphere. However, the abundance and distribution of dissolved oxygen in the late Archaean oceans is poorly constrained. Here we present geochemical profiles from 2.6- to 2.5-billion-year-old black shales from the Campbellrand–Malmani carbonate platform in South Africa. We find a high abundance of rhenium and a low abundance of molybdenum, which, together with the speciation of sedimentary iron, points to the presence of dissolved oxygen in the bottom waters on the platform slope. The water depth on the slope probably reached several hundred metres, implying the export of O_2 below the photic zone. Our data also indicate that the mildly oxygenated surface ocean gave way to an anoxic deep ocean. We therefore suggest that the production of oxygen in the surface ocean was vigorous at this time, but was not sufficient to fully consume the deep-sea reductants. On the basis of our results and observations from the Hamersley basin in Western Australia, we conclude that the productive regions along ocean margins during the late Archaean eon were sites of substantial O_2 accumulation, at least 100 million years before the first significant increase in atmospheric O_2 concentration.
Publication Nature Geoscience
Volume 3
Issue 9
Pages 647-652
Date September 2010
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo942
ISSN 1752-0894
URL http://dx.doi.org/10.1038/ngeo942
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:18:50 2011

Phase Synchronization of the El Niño-Southern Oscillation with the Annual Cycle

Type Journal Article
Author Karl Stein
Author Axel Timmermann
Author Niklas Schneider

Abstract The El Niño-Southern Oscillation (ENSO) is the largest global climate signal on the interannual time scale. ENSO events occur irregularly, yet individual events follow a similar pattern of developing during boreal summer or fall and peaking during boreal winter. This characteristic of ENSO is often referred to as "phase locking" of ENSO with the annual cycle. However, no observational evidence of phase interaction between the two phenomena has thus far been presented. In this study, we analyze sea surface temperature observations and find the first evidence of partial phase synchronization of ENSO with the annual cycle.

Publication Physical Review Letters
Volume 107
Date 9/2011
DOI 10.1103/PhysRevLett.107.128501
ISSN 0031-9007, 1079-7114
URL http://link.aps.org/doi/10.1103/PhysRevLett.107.128501
Accessed Thu Sep 29 10:26:34 2011
Library Catalog CrossRef
Call Number 0000
Date Added Thu Oct 6 11:55:29 2011
Modified Thu Oct 6 11:55:29 2011

Physiographic analysis of witness-tree distribution (1765–1798) and present forest cover through north central Pennsylvania

Type Journal Article
Author Marc D. Abrams
Author Charles M. Ruffner

Abstract This study analyzed witness-tree data recorded from 1765 to 1798 with respect to landform in four major physiographic provinces represented through north central Pennsylvania. These data were also compared with present-day forest composition to evaluate broad changes that occurred 200 years after European settlement. In the Allegheny High Plateau, Tsuga canadensis (L.) Carr. represented 40-47% of witness trees in mountain coves and stream valleys, but only 9% on plateau tops, which comprised 45% Fagus grandifolia Ehrh. Pinus strobus L. represented less than or equal to 4% frequency across all landforms. The original forests of the Allegheny Mountains were dominated by mixed Quercus, Acer, Castanea dentata (Marsh.) Borkh., and Pinus and had significant T. canadensis only in stream valleys. The presettlement forests of the Allegheny Front and the Ridge and Valley provinces had a similar mix of Quercus, Pinus, Castanea, and Carya, with increased P. strobus the more mesic sites and Pinus rigida Mill. on the xeric ridges. Comparisons of presettlement with present-day forest composition indicate a dramatic reduction of T. canadensis (32% to 4%) and F. grandifolia (33% to 12%) in the High Plateau and increases in Acer (11% to 37%), Quercus rubra L. (0% to 10%), Prunus serotina Ehrh. (1% to 6%), and Betula (5% to 10%). Other units exhibited reductions in P. strobus, P. rigida, Quercus alba L., and Carya spp. and increases in Quercus prinus L., Q. rubra, Acer rubrum L., and P. serotina. Castanea dentata had its greatest abundance on higher elevation sites in each physiographic unit, and the elimination of this species this century apparently facilitated the increase in Q. prinus and Q. rubra on ridge sites. South of the Allegheny Plateau, increases in A. rubrum, P. serotina, and other mixed-mesophytic species may be in response to fire exclusion this century. The results of this study indicate the importance of landform and physiography on presettlement forest composition

Publication Canadian Journal of Forest Research
Volume 25
Issue 4
Pages 659–668
Date April 1995
Journal Abbr Can. J. For. Res.
DOI 10.1139/x95-073
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x95-073

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Pine Barrens: Ecosystem and landscape

Type Book
Editor Richard T. T. Forman
Abstract no abstract
Series Environmental Studies and Ecology
Edition illustrated, reprint, revised
Place New Brunswick, NJ, and London
Publisher Rutgers University Press
Date October 1998
# of Pages 684 p.
ISBN 9780813525938, 081352534
Short Title Pine Barrens
URL http://rutgerspress.rutgers.edu/acatalog/__Pine_Barrens_329.html
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:54 2011

Plant functional traits in relation to fire in crown-fire ecosystems

Type Journal Article
Author Juli G. Pausas
Author Ross A. Bradstock
Author David A. Keith
Author Jon E. Keeley
Abstract Disturbance is a dominant factor in many ecosystems, and the disturbance regime is likely to change over the next decades in response to land-use changes and global warming. We assume that predictions of vegetation dynamics can be made on the basis of a set of life-history traits that characterize the response of a species to disturbance. For crown-fire ecosystems, the main plant traits related to postfire persistence are the ability to resprout (persistence of individuals) and the ability to retain a persistent seed bank (persistence of populations). In this context, we asked (1) to what extent do different life-history traits co-occur with the ability to resprout and/or the ability to retain a persistent seed bank among differing ecosystems and (2) to what extent do combinations of fire-related traits (fire syndromes) change in a fire regime gradient? We explored these questions by reviewing the literature and analyzing databases compiled from different crown-fire ecosystems (mainly eastern Australia, California, and the Mediterranean basin). The review suggests that the pattern of correlation between the two basic postfire persistent traits and other plant traits varies between continents and ecosystems. From these results we predict, for instance, that not all resprouters respond in a similar way everywhere because the associated plant traits of resprouter species vary in different places. Thus, attempts to generalize predictions on the basis of the resprouting capacity may have limited power at a global scale. An example is presented for Australian heathlands. Considering the combination of persistence at individual (resprouting) and at population (seed bank) level, the predictive power at local scale was significantly increased.
Publication Ecology
Volume 85
Issue 4
Pages 1085-1100
Date April 2004
Journal Abbr Ecology

DOI 10.1890/02-4094
ISSN 0012-9658
URL http://www.jstor.org/stable/3450323
Extra Keywords: fire-prone ecosystems; forest fires; Mediterranean-type ecosystems; plant functional types; plant traits; regeneration; resprouting seeding; wildfires.
Date Added Sun Aug 28 00:27:26 2011
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Plants and people: Vegetation change in North America

Type Book
Author Thomas R. Vale
Abstract no abstract
Edition illustrated
Place Washington, DC
Publisher Association of American Geographers
Date 1982
# of Pages 88 p.
ISBN 0892911514, 9780892911516
Short Title Plants and people
URL http://www.getcited.org/pub/102212082
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Notes:

Original title:

Plants and People: Vegetation Change in North America (Resource Publications in Geography)

Polar front shift and atmospheric CO_2 during the glacial maximum of the Early Paleozoic Icehouse

Type Journal Article
Author Thijs R. A. Vandenbroucke
Author Howard A. Armstrong
Author Mark Williams
Author Florentin Paris
Author Jan A. Zalasiewicz
Author Koen Sabbe
Author Jaak Nõlvak
Author Thomas J. Challands
Author Jacques Verniers
Author Thomas Servais
Abstract Our new data address the paradox of Late Ordovician glaciation under supposedly high ρCO_2 (8 to 22× PAL: preindustrial atmospheric level). The paleobiogeographical distribution of chitinozoan (“mixed layer”) marine zooplankton biotopes for the Hirnantian glacial maximum (440 Ma) are reconstructed and compared to those from the Sandbian (460 Ma): They demonstrate a steeper latitudinal temperature gradient and an equatorwards shift of the Polar Front through time from 55°–70° S to ~40° S. These changes are comparable to those during Pleistocene interglacial-glacial cycles. In comparison with the Pleistocene, we hypothesize a significant decline in mean global temperature from the Sandbian to Hirnantian, proportional with a fall in ρCO_2 from a modeled

Sandbian level of ~8× PAL to ~5× PAL during the Hirnantian. Our data suggest that a compression of midlatitudinal biotopes and ecospace in response to the developing glaciation was a likely cause of the end-Ordovician mass extinction.

Publication Proceedings of the National Academy of Sciences
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Issue 34
Pages 14983-14986
Date August 24, 2010
Journal Abbr PNAS
DOI 10.1073/pnas.1003220107
ISSN 0027-8424
URL www.pnas.org/cgi/doi/10.1073/pnas.1003220107
Call Number 0000
Extra Keywords: chitinozoans; Ordovician; zooplankton biotopes; Hirnantian glaciations; climate belts.
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:53:45 2011

Pollen analysis of Tulare Lake, California: Great Basin-like vegetation in Central California during the full-glacial and early Holocene

Type Journal Article
Author Owen K. Davis
Abstract Pollen analysis and nine radiocarbon dates of an 853-cm core from historically drained Tulare Lake, south-central California are reported prior to 7000 yr B.P., the vegetation of the southern San Joaquin Valley (central California) resembled that of the contemporary Great Basin, including abundant greasewood (Sarcobatus), which currently does not occur west of the Sierra Nevada. The early-Holocene pollen assemblage is dominated by Cupressaceae (>40%), Pinus (>20%), Quercus (5-20%), Artemisia (>15%), and Sarcobatus (>5%), suggesting pinyon-juniper-oak woodland in the uplands, with greasewood on the saltflats near the lake. Giant sequoia was widespread along the Sierra Nevada streams draining into Tulare Lake, prior to 9000 yr B.P. as Sequoiadendron pollen is greater than 4%. The pollen assemblages before 18,500 yr B.P. are similar to those of the early Holocene (Cupressaceae, Artemisia, and Sarcobatus), but a gap in sedimentation from ca. 18,500-10,500 yr B.P. prohibits characterization of full-glacial vegetation. The end of Great Basin-like pollen assemblages 7000 yr B.P. (demise of Sarcobatus) coincides with increased frequency of charcoal; i.e., greater fire frequency in the Holocene woodland and grassland. From 7000-4000 yr B.P. the pollen assemblage is dominated by Other Compositae and Chenopodiaceae-Amaranthus pollen, suggesting expansion of xerophytic steppe at the expense of oak woodland. Higher percentages of littoral pollen (Cyperaceae, Typha-Sparganium) and lower percentages of pelagic algae (Botryococcus + Pediastrum) during the middle Holocene indicate lake levels generally lower than during the early Holocene. The late Holocene begins with a cold-wet period 3500-2500 yr B.P. followed by progressive drying of the lake. Climate estimates based on modern pollen analogs confirm the climate implications of the vegetation and lake history. Early Holocene climate was cold and wet, and maximum Holocene temperature and drought occurred between 7000 and 4000 yr B.P. Cool-moist climate from 4000 to 2000 yr B.P. is followed by a return to aridity and high temperature ca. 1000 yr B.P.
Publication Review of Palaeobotany and Palynology
Volume 107
Issue 3-4
Pages 249-257
Date November 1999
Journal Abbr Rev. Palaeobot. Palyno.
DOI 10.1016/S0034-6667(99)00020-2
ISSN 0034-6667
Short Title Pollen analysis of Tulare Lake, California
URL http://www.sciencedirect.com/science/article/pii/S0034666799000202

Extra Keywords: Quaternary; vegetation; California; palynology; climate change; biogeography.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:38:54 2011

Pollen records, postglacial | Southeastern North America

Type Book Section
Author Debra A. Willard
Abstract The unglaciated southeastern United States is an excellent region to examine vegetational response to retreat of the Laurentide ice sheet and associated climatic fluctuations over the last not, vert, similar22 kyr. Postglacial sedimentary records from this region provide details on migration rates and environmental tolerance of taxa during the interval between maximum glaciation and the present Holocene interglacial period. This article summarizes 75 yr of research on the vegetational history of the southeastern United States and presents a summary of the present distribution of vegetation in the region calibrated with pollen abundance trends. Changes in distribution of forest communities from the full glacial, deglacial, and Holocene are presented, along with current and potential future directions for paleoecological research in the region.
Book Title Encyclopedia of Quaternary Science
Volume 1
# of Volumes 4
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Possible implications of global climate change on global lightning distributions and frequencies

Type Journal Article
Author Colin Price
Author David Rind
Abstract The Goddard Institute for Space Studies (GISS) general circulation model (GCM) is used to study the possible implications of past and future climate change on global lightning frequencies. Two climate change experiments were conducted: one for a 2 × CO_2 climate (representing a 4.2°C global warming) and one for a 2% decrease in the solar constant (representing a 5.9°C global cooling). The results suggest a 30% increase in global lightning activity for the warmer climate and a 24% decrease in global lightning activity for the colder climate. This implies an approximate 5–6% change in global lightning frequencies for every 1°C global warming/cooling. Both intracloud and cloud-to-ground frequencies are modeled, with cloud-to-ground lightning frequencies showing larger sensitivity to climate change than intracloud frequencies. The magnitude

of the modeled lightning changes depends on season, location, and even time of day.

Publication Journal of Geophysical Research
Volume 99
Issue D5
Pages 10823-10831
Date May 20, 1994
Journal Abbr J. Geophys. Res.
DOI 10.1029/94JD00019
ISSN 0148–0227
URL http://www.agu.org/pubs/crossref/1994/94JD00019.shtml
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:31:29 2011

Postglacial fire, vegetation, and climate history in the Clearwater Range, Northern Idaho, USA

Type Journal Article
Author Andrea Brunelle
Author Cathy Whitlock
Abstract The environmental history of the Northern Rocky Mountains was reconstructed using lake sediments from Burnt Knob Lake, Idaho, and comparing the results with those from other previously published sites in the region to understand how vegetation and fire regimes responded to large-scale climate changes during the Holocene. Vegetation reconstructions indicate parkland or alpine meadow at the end of the glacial period indicating cold-dry conditions. From 14,000 to 12,000 cal yr B.P., abundant Pinus pollen suggests warmer, moister conditions than the previous period. Most sites record the development of a forest with Pseudotsuga ca. 9500 cal yr B.P. indicating warm dry climate coincident with the summer insolation maximum. As the amplification of the seasonal cycle of insolation waned during the middle Holocene, Pseudotsuga was replaced by Pinus and Abies suggesting cool, moist conditions. The fire reconstructions show less synchroneity. In general, the sites west of the continental divide display a fire-frequency maximum around 12,000–8000 cal yr B.P., which coincides with the interval of high summer insolation and stronger-than-present subtropical high. The sites on the east side of the continental divide have the highest fire frequency ca. 6000–3500 cal yr B.P. and may be responding to a decrease in summer precipitation as monsoonal circulation weakened in the middle and late Holocene. This study demonstrated that the fire frequency of the last two decades does not exceed the historical range of variability in that periods of even higher-than-present fire frequency occurred in the past.
Publication Quaternary Research
Volume 60
Issue 3
Pages 307-318
Date November 2003
Journal Abbr Quaternary Res.
DOI 10.1016/j.yqres.2003.07.009
ISSN 0033-5894
URL http://linkinghub.elsevier.com/retrieve/pii/S0033589403001273
Extra Keywords: Idaho; Clearwater Range; Selway–Bitterroot Wilderness Area; fire history; charcoal analyses; pollen; paleoecology.
Date Added Thu Aug 25 10:47:25 2011
Modified Wed Aug 31 00:34:04 2011

Postglacial vegetation and fire history, eastern Klamath Mountains, California, USA

Type Journal Article

Author Jerry A. Mohr
Author Cathy Whitlock
Author Carl N. Skinner

Abstract Pollen and high-resolution charcoal data from Bluff Lake and Crater Lake, California, indicate simi lar changes in climate, vegetation and fire history during the last 15 500 years. Pollen data at Bluff Lake suggest that the vegetation betweenc. 15 500 and 13 100 cal. BP consisted of subalpine parkland with scattered Pinus andAbies. After 13 100 cal. BP a relatively closed forest ofP. monticola,P. contorta andAbies developed, and fire-event frequency was low. The inferred climate then was cooler and wetter than present. Pinus and Quercus vaccinifolia dominated at both sites during the early Holocene, when conditions were warm and dry. As climate became wetter and cooler in the late Holocene,Abies spp. at both sites andTsuga mertensi ana at Crater Lake increased in importance, displacingPinus andQuercus. The two lake records have similar trends in fire history, with high event frequencies atc. 8400, 4000 and 1000 cal. BP and low values atc. 4800 cal. BP. The fire and vegetation history at both sites suggests a similar response to large-scale changes in climate during the Holocene.

Publication The Holocene
Volume 10
Issue 5
Pages 587–601
Date July 2000
Journal Abbr Holocene
DOI 10.1191/095968300675837671
ISSN 1477-0911
URL http://hol.sagepub.com/content/10/5/587.refs
Extra Keywords: fire history; vegetation history; charcoal records; Holocene; Pacific Northwest; Klamath Mountains.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:14 2011

Postglacial vegetation, fire, and climate history of the Siskiyou Mountains, Oregon, USA

Type Journal Article
Author Christy E. Briles
Author Cathy Whitlock
Author Patrick J. Bartlein

Abstract The forests of the Siskiyou Mountains are among the most diverse in North America, yet the long-term relationship among climate, diversity, and natural disturbance is not well known. Pollen, plant macrofossils, and high-resolution charcoal data from Bolan Lake, Oregon, were analyzed to reconstruct a 17,000-yr-long environmental history of high-elevation forests in the region. In the late-glacial period, the presence of a subalpine parkland of Artemisia, Poaceae, Pinus, and Tsuga with infrequent fires suggests cool dry conditions. After 14,500 cal yr B.P., a closed forest of Abies, Pseudotsuga, Tsuga, and Alnus rubra with more frequent fires developed which indicates more mesic conditions than before. An open woodland of Pinus, Quercus, and Cupressaceae, with higher fire activity than before, characterized the early Holocene and implies warmer and drier conditions than at present. In the late Holocene, Abies and Picea were more prevalent in the forest, suggesting a return to cool wet conditions, although fire-episode frequency remained relatively high. The modern forest of Abies and Pseudotsuga and the present-day fire regime developed ca. 2100 cal yr B.P. and indicates that conditions had become slightly drier than before. Sub-millennial-scale fluctuations in vegetation and fire activity suggest climatic variations during the Younger Dryas interval and within the early Holocene period. The timing of vegetation changes in the Bolan Lake record is similar to that of other sites in the Pacific Northwest and Klamath region, and indicates that local vegetation communities were responding to regional-scale climate changes. The record implies that climate-driven millennial- to centennial-scale vegetation and fire change should be considered when explaining the high floristic diversity observed at present in the Siskiyou Mountains.

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Volume 64

Issue 1
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Date July 2005
Journal Abbr Quaternary Res.
DOI 10.1016/j.yqres.2005.03.001
ISSN 0033-5894
URL http://www.sciencedirect.com/science/article/pii/S0033589405000396
Extra Keywords: Pacific Northwest; Siskiyou Mountains; vegetation history; fire history; plant diversity controls; Holocene.
Date Added Wed Aug 24 12:15:15 2011
Modified Fri Aug 26 20:34:02 2011

Postglacial vegetational and fire history: pollen, plant macrofossil and charcoal records from two Alaskan lakes

Type Journal Article
Author Willy Tinner
Author Feng Sheng Hu
Author Ruth Beer
Author Petra Kaltenrieder
Author Brigitte Scheurer
Author Urs Krähenbühl
Abstract Pollen, plant macrofossil and charcoal analyses of sediments from two Alaskan lakes provide new data for inferring Lateglacial and Holocene environmental change. The records span the past 14,700 years at Lost Lake, 240 m a.s.l., central Alaska, north of the Alaska Range and 9600 years at Grizzly Lake, 720 m a.s.l., Copper River Plateau, south of the Alaska Range. Salix shrubs expanded in the herb tundra about 14,400 cal b.p., and Betula shrub tundra became established at ca. 13,200 cal b.p. Diminished Betula shrub cover in association with the increased abundance of herbaceous taxa occurred at 12,500–11,600 cal b.p., although the timing of these changes is not well constrained. Populus expanded at 11,200 cal b.p. and formed dense stands until 9600–9400 cal b.p. when Picea glauca forests or woodlands became established at both sites. The abundance of Alnus viridis increased markedly around 8500 cal b.p. at both sites, marking the development of alder shrub thickets around the lakes and on mountain slopes in these areas. Boreal forests dominated by Picea mariana became established around 7200 cal b.p. at Grizzly Lake and 5700 cal b.p. at Lost Lake. At Grizzly Lake, marked vegetational oscillations occurred within the past 8500 years; for example, A. viridis expanded at 2750 cal b.p. and 450 cal b.p. and declined at 150 cal b.p. Some of these oscillations coincide with large-scale climatic events, such as the Little Ice Age cooling (LIA), and they probably reflect vegetational sensitivity to climatic change at this high site. Microscopic charcoal at Lost Lake suggests that fire was important in the lateglacial birch tundra, probably because of severe moisture deficits of the regional climate and/or high abundance of fine fuels. On the basis of the Grizzly Lake microscopic charcoal record, regional fires were common between 8500 and 6800 cal b.p. and between 450 and 150 cal b.p. Around Grizzly Lake, the mean return intervals of local fires estimated from macroscopic charcoal were ~386 years between 6800 and 5500 cal b.p. when Picea glauca dominated over P. mariana, ~254 years between 5500 and 3900 cal b.p. when P. mariana was more abundant than P. glauca, and ~200 years after 3900 cal b.p. in both P. glauca and P. mariana dominated forests. Correlation analysis of pollen and microscopic charcoal at Grizzly Lake reveals that increased fire activity led to the reductions of P. glauca, P. mariana, and tree Betula in association with the expansions of A. viridis, Epilobium, Lycopodium clavatum, and L. annotinum.
Publication Vegetation History and Archaeobotany
Volume 15
Issue 4
Pages 279-293
Date September 2006
Journal Abbr Veg. Hist. Archaeobot.
DOI 10.1007/s00334-006-0052-z

ISSN 0939-6314
Short Title Postglacial vegetational and fire history
URL http://www.springerlink.com/content/k0l828q62v844142/
Call Number 0017
Extra Keywords: microscopic charcoal; macroscopic charcoal; Holocene; Lateglacial; Picea mariana; Picea glauca.
Date Added Sun Sep 4 06:10:02 2011
Modified Mon Sep 5 10:11:16 2011

Postsettlement changes in natural fire regimes and forest structure: Ecological restoration of old-growth ponderosa pine forests

Type Journal Article
Author W. Wallace Covington
Author Margaret M. Moore
Abstract Heavy livestock grazing, logging, and fire exclusion associated with Euro-American settlement has brought about substantial changes in forest conditions in western forests. Thus, old-growth definitions based on current forest conditions may not be compatible with the natural conditions prevalent throughout the evolutionary history of western forest types. Detailed analysis of data from two study areas in the southwestern ponderosa pine type suggests that average tree densities have increased from as few as 23 trees per acre in presettlement times to as many as 851 trees per acre today. Associated with these increases in tree density are increases in canopy closure, vertical fuel continuity, and surface fuel loadings resulting in fire hazards over large areas never reached before settlement. In addition, fire exclusion and increased tree density has likely decreased tree vigor (increasing mortality from disease, insect, drought, etc.), herbaceous and shrub production, aesthetic values, water availability and runoff, and nutrient availability, and also changed soil characteristics and altered wildlife habitat. To remedy these problems and restore these forest ecosystems to more nearly natural conditions, and maintain a viable cohort of old age-class trees, it will be necessary to thin out most of the postsettlement trees, manually remove heavy fuels from the base of large, old trees, and reintroduce periodic burning.
Publication Journal of Sustainable Forestry
Volume 2
Issue 1-2
Pages 153–181
Date October 1994
Journal Abbr J. Sustain. Forestry
DOI 10.1300/J091v02n01_07
ISSN 1054-9811
URL http://www.tandfonline.com/doi/abs/10.1300/J091v02n01_07
Archive http://library.eri.nau.edu/cgi-bin/library.cgi?e=q-01000-00---off-0erilibra--00-1----0-10-0---0---0direct-10-DC--4-------0-1l--11-en-50---20-about-M.+M.+Moore--00-3-21-00-0-0-11-0-0utfZz-8-00&
Extra Keywords: logging effect; pine forest; ponderosa; old-growth; restoration; simulation model.
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:03:25 2011

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Source:

Category: General Publications

Title: Postsettlement Changes in Natural Fire Regimes and Forest Structure: Ecological Restoration of Old-Growth Ponderosa Pine Forests

Author: Covington, W.W., Moore, M.M.

Subject: Ecological Restoration

Date: 1994

Type: Book

Source: Ecological and Historical Perspectives

Identifier: 153-181

Publisher: The Haworth Press, Inc.

Language: English

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http://library.eri.nau.edu/cgi-bin/library.cgi?e=q-01000-00---off-0erilibra--00-1----0-10-0---0---0direct-10-DC--4-------0-1l--11-en-50---20-about-M.+M.+Moore--00-3-21-00-0-0-11-0-0utfZz-8-00&a=d&c=erilibra&srp=0&srn=0&cl=search&d=HASHdd92e6da703e4d7ec64887)

Potential alteration by climate change of the forest-fire regime in the boreal forest of central Yukon Territory

Type	Journal Article
Author	V. M. McCoy
Author	Christopher R. Burn
Abstract	Statistical relations were obtained to describe the association between forest fires and climate for the Dawson and Mayo fire management districts, central Yukon Territory. Annual fire incidence, area burned, and seasonal fire severity rating were compared with summer observations of mean temperature, total precipitation, mean relative humidity, and mean wind speed. The relations were obtained by multiple regression and combined with regional scenarios of future climate from general circulation models. The strongest statistical associations for fire occurrence and area burned were with temperature and precipitation at Dawson. Depending on the scenario, the statistics suggest that the average annual fire occurrence and area burned may as much as double by 2069, but there may still be years with few fires. The maximum number of fires may increase by two-thirds over present levels, and the maximum area burned per summer may increase to more than three times the present value. Without incorporating changes in climate variability into the scenarios, the year-to-year variability in number of fires is not projected to increase, but the range in area burned per summer may rise by about 15%.
Publication	Arctic
Volume	58
Issue	3
Pages	276–285
Date	September 2005
Journal Abbr	Arctic
ISSN	0004-0843
URL	http://arctic.synergiesprairies.ca/arctic/index.php/arctic/article/view/429
Call Number	0000
Extra	Keywords: forest fire; wildfire; climate; climate change; Yukon Territory.
Date Added	Tue Aug 30 14:35:38 2011
Modified	Wed Aug 31 00:22:04 2011

Potential changes in tree species richness and forest community types following climate change

Type Journal Article
Author Louis R. Iverson
Author Anantha M. Prasad
Abstract Potential changes in tree species richness and forest community types were evaluated for the eastern United States according to five scenarios of future climate change resulting from a doubling of atmospheric carbon dioxide (CO_2). DISTRIB, an empirical model that uses a regression tree analysis approach, was used to generate suitable habitat, or potential future distributions, of 80 common tree species for each scenario. The model assumes that the vegetation and climate are in equilibrium with no barriers to species migration. Combinations of the individual species model outcomes allowed estimates of species richness (from among the 80 species) and forest type (from simple rules) for each of 2100 counties in the eastern United States. Average species richness across all counties may increase slightly with climatic change. This increase tends to be larger as the average temperature of the climate change scenario increases. Dramatic changes in the distribution of potential forest types were modeled. All five scenarios project the extirpation of the spruce-fir forest types from New England. Outputs from only the two least severe scenarios retain aspen-birch, and they are largely reduced. Maple-beech-birch also shows a large reduction in area under all scenarios. By contrast, oak-hickory and oak-pine types were modeled to increase by 34% and 290%, respectively, averaged over the five scenarios. Although many assumptions are made, these modeled outcomes substantially agree with a limited number of predictions from researchers using paleoecological data or other models.
Publication Ecosystems
Volume 4
Issue 3
Pages 186–199
Date April 2001
Journal Abbr Ecosystems
DOI 10.1007/s10021-001-0003-6
ISSN 1432-9840
URL http://www.springerlink.com/content/gacgvb8d4mjcf05v/
Extra Keywords: climate change; species richness; forest types; GIS; statistical model; eastern United States.
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:11:42 2011

Potential impacts of climate change on fire regimes in the tropics based on MAGICC and a GISS GCM-derived lightning model

Type Journal Article
Author Johann Georg Goldammer
Author Colin Price
Abstract Investigations of the ecological, atmospheric chemical, and climatic impacts of contemporary fires in tropical vegetation have received increasing attention during the last 10 years. Little is known, however, about the impacts of climate changes on tropical vegetation and wildland fires. This paper summarizes the main known interactions of fire, vegetation, and atmosphere. Examples of predictive models on the impacts of climate change on the boreal and temperate zones are given in order to highlight the possible impacts on the tropical forest and savanna biomes and to demonstrate parameters that need to be involved in this process. Response of tropical vegetation to fire is characterized by degradation towards xerophytic and pyrophytic plant communities dominated by grasses and fire-tolerant tree and bush invaders. The potential impacts of climate change on tropical fire regimes are investigated using a GISS GCM-based lightning and fire model and the Model for the Assessment of Greenhouse Gas-Induced Climate Change (MAGICC).
Publication Climatic Change
Volume 39
Issue 2-3

Pages 273–296
Date July 1998
Journal Abbr Climatic Change
DOI 10.1023/A:1005371923658
ISSN 0165-0009 (Print) 1573-1480 (Online)
URL http://www.springerlink.com/content/v26qv0um20054g75/
Extra Keywords: fire regime; fire scenarios; climate change; tropical vegetation.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:54 2011

Potential redistribution of tree species habitat under five climate change scenarios in the eastern US

Type Journal Article
Author Louis R. Iverson
Author Anantha M. Prasad
Abstract Global climate change could have profound effects on the Earth's biota, including large redistributions of tree species and forest types. We used DISTRIB, a deterministic regression tree analysis model, to examine environmental drivers related to current forest-species distributions and then model potential suitable habitat under five climate change scenarios associated with a doubling of atmospheric CO_2. Potential shifts in suitable habitat for 76 common tree species in the eastern US were evaluated based on more than 100,000 plots and 33 environmental variables related to climate, soils, land use, and elevation. Regression tree analysis was used to devise prediction rules from current species–environment relationships. These rules were used to replicate the current distribution and predict the potential suitable habitat for more than 2100 counties east of the 100th meridian. The calculation of an importance value-weighted area score, averaged across the five climate scenarios, allowed comparison among species for their overall potential to be affected by climate change. When this score was averaged across all five climate scenarios, 34 tree species were projected to expand by at least 10%, while 31 species could decrease by at least 10%. Several species (Populus tremuloides, P. grandidentata, Acer saccharum, Betula papyrifera, Thuja occidentalis) could have their suitable habitat extirpated from US. Depending on the scenario, the optimum latitude of suitable habitat moved north more than 20 km for 38–47 species, including 8–27 species more than 200 km or into Canada. Although the five scenarios were in general agreement with respect to the overall tendencies in potential future suitable habitat, significant variations occurred in the amount of potential movement in many of the species. The five scenarios were ranked for their severity on potential tree habitat changes. Actual species redistributions, within the suitable habitat modeled here, will be controlled by migration rates through fragmented landscapes, as well as human manipulations.
Publication Forest Ecology and Management
Volume 155
Issue 1-3
Pages 205–222
Date January 2002
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/S0378-1127(01)00559-X
ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/pii/S037811270100559X
Extra Keywords: climate change; eastern US; tree species migration; regression tree analysis.
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:11:46 2011

Potentially limited detectability of short-term changes in boreal fire regimes: A simulation study

Type Journal Article
Author Juha M. Metsaranta

Abstract Climate change is expected to increase area burned in the boreal plains ecozone of Canada in the early 21st century (2001–50). I examined the influence of inter-annual variability in area burned and short observed time series on the probability of detecting if an increase has occurred, using a null model of present and future fire regimes. A wide range of fire cycles are consistent with annual area burned in the late 20th century (1959–99). Fire cycles estimated from the reciprocal of the average annual burn fraction over a 50-year period are not very precise, and overestimate the fire cycle if years with large annual area burned have not recently occurred. Under the default assumptions, the probability of detecting a doubling of annual area burned during 2001–50 is 73% if it occurred instantaneously, but only 31% if it occurred gradually. Imprecise estimates and uncertainty in the ability to detect changes in fire cycles poses challenges for implementing aspects of sustainable forest management. Alternate empirical or model-based statistics, such as return periods for annual areas burned of a given magnitude, may be useful for inferring frequencies and magnitudes of large fire years that have not yet been observed.

Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 1140–1146
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF10037
ISSN 1448-5516
Short Title Potentially limited detectability of short-term changes in boreal fire regimes
URL http://www.publish.csiro.au/paper/WF10037.htm
Extra Keywords: climate change; extreme fire; log normal model; natural disturbance emulation; return period.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:46:06 2011

Pre-colonial (A.D. 1100-1600) sedimentation related to prehistoric maize agriculture and climate change in eastern North America

Type Journal Article
Author Gary E. Stinchcomb
Author Timothy C. Messner
Author Steven G. Driese
Author Lee C. Nordt
Author R. Michael Stewart
Abstract Despite the importance of understanding the effect of land use on floodplains in eastern North America, few studies have directly addressed the possibility and extent of prehistoric indigenous land use on floodplain development. Here we report geoarchaeological evidence of increasing floodplain sedimentation and prehistoric land-use intensification in the Delaware River Valley (eastern United States) during the Medieval Climate Anomaly–Little Ice Age transition. The evidence of this anthropogenic sedimentation event, documented throughout eastern North America, is designated here as pre-colonial sediment (PCS), ca. A.D. 1100–1600. The data demonstrate that the combined effects of prehistoric land use and climate change affected eastern North American floodplain development several hundred years prior to the onset of major European settlement.
Publication Geology
Volume 39
Issue 4
Pages 363-366
Date April 2011
Journal Abbr Geology
DOI 10.1130/G31596.1
ISSN 0091-7613

URL http://geology.gsapubs.org/cgi/doi/10.1130/G31596.1
Date Added Sun Aug 28 17:26:59 2011
Modified Sun Aug 28 17:32:20 2011

Pre-Columbian Native American use of fire on southern Appalachian landscapes

Type Journal Article
Author Hazel R. Delcourt
Author Paul A. Delcourt
Abstract no abstract
Publication Conservation Biology
Volume 11
Issue 4
Pages 1010–1014
Date August 1997
Journal Abbr Conserv. Biol.
DOI 10.1046/j.1523-1739.1997.96338.x
ISSN 0888-8892
URL http://www.jstor.org/stable/2387336
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:47 2011

Predictability of Euro-Russian blocking in summer of 2010

Type Journal Article
Author Mio Matsueda
Abstract Eastern Europe and Western Russia experienced a strong heat wave during the summer of 2010. Maximum temperatures exceeded 40°C in early August, resulting in over 15,000 deaths and many wildfires, inflicting large economic losses on Russia. The heat wave resulted from strong atmospheric blocking that persisted over the Euro-Russian region from late June to early August. This study investigates the predictabilities of extreme Euro-Russian blocking and of the blocking-induced extreme surface temperatures in the summer of 2010, using medium-range ensemble forecasts. The results show that the blocking in June–August (JJA) of 2010 was easily predictable, even for a lead time of +216 hr; however, the blocking that occurred from 30th July to 9th August showed a lower predictability in forecasts over +144 hr compared with other blocking occurrences in JJA of 2010. This low predictability resulted in the failure to predict the extreme temperatures associated with the mature blocking in early August. Most of the forecasts predicted a decay of the blocking earlier than that observed.
Publication Geophysical Research Letters
Volume 38
Issue 6
Pages L06801 (6 p.)
Date March 2011
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2010GL046557
ISSN 0094-8276
URL http://www.agu.org/pubs/crossref/2011/2010GL046557.shtml
Call Number 0004
Extra Keywords: blocking; heatwave; medium-range ensemble forecast; TIGGE; predictability.
Date Added Thu Sep 22 05:04:12 2011

Modified Wed Sep 28 17:53:58 2011

Predicted changes in fire weather suggest increases in lightning fire initiation and future area burned in the mixedwood boreal forest

Type Journal Article

Author Meg A. Krawchuk
Author Steve G. Cumming
Author Mike D. Flannigan

Abstract Forecasting future fire activity as a function of climate change is a step towards understanding the future state of the western mixedwood boreal ecosystem. We developed five annual weather indices based on the Daily Severity Rating (DSR) of the Canadian Forest Fire Weather Index System and estimated their relationship with annual, empirical counts of lightning fire initiation for 588 landscapes in the mixedwood boreal forest in central-eastern Alberta, Canada from data collected between 1983 and 2001 using zero-inflated negative binomial regression models. Two indices contributed to a parsimonious model of initiation; these were Seasonal Severity Rating (SSR), and DSR-sequence count. We used parameter estimates from this model to predict lightning fire initiation under weather conditions predicted in 1 × CO_2 (1975–1985), 2 × CO_2 (2040–2049) and 3 × CO_2 (2080–2089) conditions simulated by the Canadian Regional Climate Model (CRCM). We combined predicted initiation rates for these conditions with existing empirical estimates of the number of fire initiations that grow to be large fires (fire escapes) and the fire size distribution for the region, to predict the annual area burned by lightning-caused fires in each of the three climate conditions. We illustrated a 1.5-fold and 1.8-fold increase of lightning fire initiation by 2040–2049 and 2080–2089 relative to 1975–1985 conditions due to changes in fire weather predicted by the CRCM; these increases were calculated independent of changes in lightning activity. Our simulations suggested that weather-mediated increases in initiation frequency could correspond to a substantial increase in future area burned with 1.9-fold and 2.6-fold increases in area burned in 2040–2049 and 2080–2089 relative to 1975–1985 conditions, respectively. We did not include any biotic effects in these estimates, though future patterns of initiation and fire growth will be regulated not only by weather, but also by vegetation and fire management.

Publication Climatic Change
Volume 92
Issue 1-2
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Date January 2009
Journal Abbr Climatic Change
DOI 10.1007/s10584-008-9460-7
ISSN 0165-0009
URL http://www.springerlink.com/index/10.1007/s10584-008-9460-7
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:17:16 2011

Predicting abundance of 80 tree species following climate change in the eastern United States

Type Journal Article

Author Louis R. Iverson
Author Anantha M. Prasad

Abstract Projected climate warming will potentially have profound effects on the earth's biota, including a large redistribution of tree species. We developed models to evaluate potential shifts for 80 individual tree species in the eastern United States. First, environmental factors associated with current ranges of tree species were assessed using geographic information systems (GIS) in conjunction with regression tree analysis (RTA). The method was then extended to better understand the potential of species to survive and/or migrate under a changed climate. We collected, summarized, and analyzed data for climate, soils, land use, elevation, and species assemblages for >2100 counties east of the 100th meridian. Forest Inventory Analysis (FIA) data for

>100 000 forested plots in the East provided the tree species range and abundance information for the trees. RTA was used to devise prediction rules from current species–environment relationships, which were then used to replicate the current distribution as well as predict the future potential distributions under two scenarios of climate change with twofold increases in the level of atmospheric CO_2. Validation measures prove the utility of the RTA modeling approach for mapping current tree importance values across large areas, leading to increased confidence in the predictions of potential future species distributions. With our analysis of potential effects, we show that roughly 30 species could expand their range and/or weighted importance at least 10%, while an additional 30 species could decrease by at least 10%, following equilibrium after a changed climate. Depending on the global change scenario used, 4–9 species would potentially move out of the United States to the north. Nearly half of the species assessed (36 out of 80) showed the potential for the ecological optima to shift at least 100 km to the north, including seven that could move >250 km. Given these potential future distributions, actual species redistributions will be controlled by migration rates possible through fragmented landscapes.

Publication Ecological Monographs
Volume 68
Issue 4
Pages 465–485
Date November 1998
Journal Abbr Ecol. Monogr.
DOI 10.1890/0012-9615(1998)068[0465:PAOTSF]2.0.CO;2
ISSN 0012-9615
URL www.jstor.org/stable/2657150
Archive http://nrs.fs.fed.us/pubs/7930
Extra Keywords: climate change; envelope analysis; forest inventory; geographic information systems (GIS); global change; landscape ecology; predictive vegetation mapping; regression tree analysis (RTA); species-environment relationships; tree species distribution; tree species migration; tree species ranges.
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:11:39 2011

Predicting climate change effects on wildfires requires linking processes across scales

Type Journal Article

Author Marc Macias Fauria
Author Sean T. Michaletz
Author Edward A. Johnson

Abstract Accurate process-based prediction of climate change effects on wildfires requires coupling processes across orders of magnitude of time and space scales, because climate dynamic processes operate at relatively large scales (e.g., hemispherical and centennial), but fire behavior processes operate at relatively small scales (e.g., molecules and microseconds). In this review, we outline some of the current understanding of the processes by which climate/meteorology controls wildfire behavior by focusing on four critical stages of wildfire development: (1) fuel drying, (2) ignition, (3) spread, and (4) extinction. We identify some key mechanisms that are required for predicting climate change effects on fires, as well as gaps in our understanding of the processes linking climate and fires. It is currently not possible to make accurate predictions of climate change effects on wildfires due to the limited understanding of the linkage between general circulation model outputs and the local-scale meteorology to which fire behavior processes respond.

Publication Wiley Interdisciplinary Reviews: Climate Change
Volume 2
Issue 1
Pages 99-112
Date January/February 2011
Journal Abbr WIREs Clim. Change
DOI 10.1002/wcc.92
ISSN 1757-7780

URL http://wires.wiley.com/WileyCDA/WiresArticle/wisId-WCC92.html
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 01:04:44 2011

Predicting extinctions as a result of climate change

Type Journal Article
Author Mark W. Schwartz
Author Louis R. Iverson
Author Anantha M. Prasad
Author Stephen N. Matthews
Author Raymond J. O'Connor
Abstract Widespread extinction is a predicted ecological consequence of global warming. Extinction risk under climate change scenarios is a function of distribution breadth. Focusing on trees and birds of the eastern United States, we used joint climate and environment models to examine fit and climate change vulnerability as a function of distribution breadth. We found that extinction vulnerability increases with decreasing distribution size. We also found that model fit decreases with decreasing distribution size, resulting in high prediction uncertainty among narrowly distributed species. High prediction uncertainty creates a conservation dilemma in that excluding these species under-predicts extinction risk and favors mistaken inaction on global warming. By contrast, including narrow endemics results in over-predicting extinction risk and promotes mistaken inaction on behalf of individual species prematurely considered doomed to extinction.
Publication Ecology
Volume 87
Issue 7
Pages 1611–1615
Date July 2006
Journal Abbr Ecology
DOI 10.1890/0012-9658(2006)87[1611:PEAARO]2.0.CO;2
ISSN 0012-9658
URL www.jstor.org/stable/20069119
Extra Keywords: climate and environmental models; climate change; distribution breadth; eastern United States; endemic; extinction; prediction uncertainty; regression tree; vulnerability.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:23 2011

Predicting global change effects on forest biomass and composition in south-central Siberia

Type Journal Article
Author Eric J. Gustafson
Author Anatoly Z. Shvidenko
Author Brian R. Sturtevant
Author Robert M. Scheller
Abstract Multiple global changes such as timber harvesting in areas not previously disturbed by cutting and climate change will undoubtedly affect the composition and spatial distribution of boreal forests, which will, in turn, affect the ability of these forests to retain carbon and maintain biodiversity. To predict future states of the boreal forest reliably, it is necessary to understand the complex interactions among forest regenerative processes (succession), natural disturbances (e.g., fire, wind, and insects), and anthropogenic disturbances (e.g., timber harvest). We used a landscape succession and disturbance model (LANDIS-II) to study the relative effects of climate change, timber harvesting, and insect outbreaks on forest composition, biomass (carbon), and landscape pattern in south-central Siberia. We found that most response variables were more strongly influenced by timber harvest and insect outbreaks than by the direct effects of climate change. Direct climate effects generally

increased tree productivity and modified probability of establishment, but indirect effects on the fire regime generally counteracted the direct effects of climate on forest composition. Harvest and insects significantly changed forest composition, reduced living aboveground biomass, and increased forest fragmentation. We concluded that: (1) Global change is likely to significantly change forest composition of south-central Siberian landscapes, with some changes taking ecosystems outside the historic range of variability. (2) The direct effects of climate change in the study area are not as significant as the exploitation of virgin forest by timber harvest and the potential increased outbreaks of the Siberian silk moth. (3) Novel disturbance by timber harvest and insect outbreaks may greatly reduce the aboveground living biomass of Siberian forests and may significantly alter ecosystem dynamics and wildlife populations by increasing forest fragmentation.

Publication Ecological Applications
Volume 20
Issue 3
Pages 700-715
Date April 2010
Journal Abbr Ecol. Appl.
DOI 10.1890/08-1693.1
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/08-1693.1?prevSearch=%5Ball%3A+10.1890%2F08-1693.1%5D&…
Archive http://www.nrs.fs.fed.us/pubs/34928
Extra Keywords: aboveground live biomass; boreal forests; climate; fire; forest fragmentation; global change; insect disturbance; LANDIS-II; timber harvest.
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:44:58 2011

Predicting maximum tree heights and other traits from allometric scaling and resource limitations

Type Journal Article
Author Christopher P. Kempes
Author Geoffrey B. West
Author Kelly Crowell
Author Michelle Girvan
Abstract Terrestrial vegetation plays a central role in regulating the carbon and water cycles, and adjusting planetary albedo. As such, a clear understanding and accurate characterization of vegetation dynamics is critical to understanding and modeling the broader climate system. Maximum tree height is an important feature of forest vegetation because it is directly related to the overall scale of many ecological and environmental quantities and is an important indicator for understanding several properties of plant communities, including total standing biomass and resource use. We present a model that predicts local maximal tree height across the entire continental United States, in good agreement with data. The model combines scaling laws, which encode the average, base-line behavior of many tree characteristics, with energy budgets constrained by local resource limitations, such as precipitation, temperature and solar radiation. In addition to predicting maximum tree height in an environment, our framework can be extended to predict how other tree traits, such as stomatal density, depend on these resource constraints. Furthermore, it offers predictions for the relationship between height and whole canopy albedo, which is important for understanding the Earth's radiative budget, a critical component of the climate system. Because our model focuses on dominant features, which are represented by a small set of mechanisms, it can be easily integrated into more complicated ecological or climate models.
Publication PLoS ONE
Volume 6
Issue 6
Pages e20551 (10 p.)
Date June 2011
Journal Abbr PLoS ONE
DOI 10.1371/journal.pone.0020551

ISSN 1932-6203
URL http://dx.plos.org/10.1371/journal.pone.0020551
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:37:15 2011

Predicting stochastic systems by noise sampling, and application to the El Nino-Southern Oscillation

Type Journal Article
Author Mickaël David Chekroun
Author Dmitri Kondrashov
Author Michael Ghil
Abstract Interannual and interdecadal prediction are major challenges of climate dynamics. In this article we develop a prediction method for climate processes that exhibit low-frequency variability (LFV). The method constructs a nonlinear stochastic model from past observations and estimates a path of the "weather" noise that drives this model over previous finite-time windows. The method has two steps: (i) select noise samples—or "snippets"—from the past noise, which have forced the system during short-time intervals that resemble the LFV phase just preceding the currently observed state; and (ii) use these snippets to drive the system from the current state into the future. The method is placed in the framework of pathwise linear-response theory and is then applied to an El Niño–Southern Oscillation (ENSO) model derived by the empirical model reduction (EMR) methodology; this nonlinear model has 40 coupled, slow, and fast variables. The domain of validity of this forecasting procedure depends on the nature of the system's pathwise response; it is shown numerically that the ENSO model's response is linear on interannual time scales. As a result, the method's skill at a 6- to 16-month lead is highly competitive when compared with currently used dynamic and statistic prediction methods for the Niño-3 index and the global sea surface temperature field.
Publication Proceedings of the National Academy of Sciences
Volume 108
Issue 29
Pages 11766-11771
Date July 19, 2011
Journal Abbr PNAS
DOI 10.1073/pnas.1015753108
ISSN 0027-8424, 1091-6490
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1015753108
Call Number 0001
Extra Keywords: climate predictability; nonlinear systems; stochastic-dynamic modeling; stochasticity.
Date Added Wed Sep 21 23:28:22 2011
Modified Wed Sep 28 17:54:02 2011

Predicting the composition of Canadian southern boreal forest in different fire cycles

Type Journal Article
Author Yves Bergeron
Author Pierre-René Dansereau
Abstract Post-fire succession was reconstructed for a sector located in the southern part of the Québec boreal forest. Forest composition for different periods since fire was evaluated using a stand initiation map together with ecological maps representing both site conditions and stand types. Nine fires covering at least 100 ha and representing a chronosequence of more than 230 yr were used. Although a relatively clear successional pattern from deciduous to coniferous composition relating to time-since-fire was observed, Pinus banksiana stands showed an erratic distribution not related to succession but possibly to the pre-fire stand composition. A comparison with forest cover maps produced after a recent spruce budworm outbreak, showed that succession toward coniferous dominance appeared to be interrupted by spruce budworm (Choristoneura fumiferana)

outbreaks which, by killing Abies balsamea, lead to a mixed deciduous forest composition. A simple empirical model based on a negative exponential distribution of age classes was developed to evaluate how changes in the fire cycle would affect the composition of the forest mosaic. The transition between deciduous dominance and coniferous dominance occurs in a fire cycle > 200 yr. Although pure deciduous stands tend to disappear during long fire cycles, the proportion of mixed stands remains relatively constant. Prediction of the forest composition for longer fire cycles is complicated by the interaction between post-fire composition and stand vulnerability to spruce budworm outbreaks.

Publication Journal of Vegetation Science

Volume 4

Issue 6

Pages 827–832

Date December 1993

Journal Abbr J. Veg. Sci.

DOI 10.2307/3235621

ISSN 1100-9233

URL http://www.jstor.org/stable/3235621

Extra Keywords: Abies balsamea; Choristoneura fumiferana; disturbance; forest mosaic; Pinus banksiana; spruce budworm; succession.

Date Added Tue Aug 23 02:15:56 2011

Modified Wed Aug 24 04:40:35 2011

Prediction of the probability of large fires in the Sydney region of south-eastern Australia using fire weather

Type Journal Article

Author Ross A. Bradstock

Author Janet S. Cohn

Author A. Malcolm Gill

Author Michael Bedward

Author Christopher Lucas

Abstract The probability of large-fire (≥1000 ha) ignition days, in the Sydney region, was examined using historical records. Relative influences of the ambient and drought components of the Forest Fire Danger Index (FFDI) on large fire ignition probability were explored using Bayesian logistic regression. The preferred models for two areas (Blue Mountains and Central Coast) were composed of the sum of FFDI (Drought Factor, DF = 1) (ambient component) and DF as predictors. Both drought and ambient weather positively affected the chance of large fire ignitions, with large fires more probable on the Central Coast than in the Blue Mountains. The preferred, additive combination of drought and ambient weather had a marked threshold effect on large-fire ignition and total area burned in both localities. This may be due to a landscape-scale increase in the connectivity of available fuel at high values of the index. Higher probability of large fires on the Central Coast may be due to more subdued terrain or higher population density and ignitions. Climate scenarios for 2050 yielded predictions of a 20–84% increase in potential large-fire ignitions days, using the preferred model.

Publication International Journal of Wildland Fire

Volume 18

Issue 8

Pages 932-943

Date December 2009

Journal Abbr Int. J. Wildland Fire

DOI 10.1071/WF08133

ISSN 1049-8001

URL http://dx.doi.org/10.1071/WF08133

Extra Keywords: climate change; drought; fire danger; fire weather indices.

Date Added Wed Aug 24 12:10:30 2011
Modified Fri Aug 26 20:33:43 2011

Preface: Four degrees and beyond: The potential for a global temperature increase of four degrees and its implications

Type Journal Article
Author Mark New
Abstract no abstract
Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences
Volume 369
Issue 1934
Pages 4-5
Date 13 January 2011
Journal Abbr Phil. Trans. R. Soc. A
DOI 10.1098/rsta.2010.0304
ISSN 1364-503X
URL http://rsta.royalsocietypublishing.org/cgi/doi/10.1098/rsta.2010.0304
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:37:24 2011

Prehistoric fire area and emissions from California's forests, woodlands, shrublands, and grasslands

Type Journal Article
Author Scott L. Stephens
Author Robert E. Martin
Author Nicholas E. Clinton
Abstract In the majority of US political settings wildland fire is still discussed as a negative force. Lacking from current wildfire discussions are estimates of the spatial extent of fire and their resultant emissions before the influences of Euro-American settlement and this is the focus of this work. We summarize the literature on fire history (fire rotation and fire return intervals) and past Native American burning practices to estimate past fire occurrence by vegetation type. Once past fire intervals were established they were divided into the area of each corresponding vegetation type to arrive at estimates of area burned annually. Finally, the First Order Fire Effects Model was used to estimate emissions. Approximately 1.8 million ha burned annually in California prehistorically (pre 1800). Our estimate of prehistoric annual area burned in California is 88% of the total annual wildfire area in the entire US during a decade (1994–2004) characterized as "extreme" regarding wildfires. The idea that US wildfire area of approximately two million ha annually is extreme is certainly a 20th or 21st century perspective. Skies were likely smoky much of the summer and fall in California during the prehistoric period. Increasing the spatial extent of fire in California is an important management objective. The best methods to significantly increase the area burned is to increase the use of wildland fire use (WFU) and appropriate management response (AMR) suppression fire in remote areas. Political support for increased use of WFU and AMR needs to occur at local, state, and federal levels because increasing the spatial scale of fire will increase smoke and inevitability, a few WFU or AMR fires will escape their predefined boundaries.
Publication Forest Ecology and Management
Volume 251
Issue 3
Pages 205–216
Date 15 November 2007
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/j.foreco.2007.06.005

ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/pii/S0378112707004379
Extra Keywords: wildfire; fire regime; fire policy; fire suppression; fire rotation; smoke; air resources; air quality; particulates; fire exclusion; carbon.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:00 2011

Prehistoric human use of fire, the eastern agricultural complex, and Appalachian oak-chestnut forests: Paleoecology of Cliff Palace Pond, Kentucky

Type Journal Article
Author Paul A. Delcourt
Author Hazel R. Delcourt
Author Cecil R. Ison
Author William E. Sharp
Author Kristen J. Gremillion
Abstract Fossil pollen assemblages from Cliff Palace Pond, Kentucky, characterize changes in forest composition through the past 9,500 years of the Holocene. Early-Holocene spruce and northern white cedar stands were replaced by mixed mesophytic forests after 7300 B.P. Hemlock declined around 4800 B.P., and eastern red cedar became locally important. After 3000 B.P, mixed oak-chestnut and pine forests were dominant. The fossil charcoal record from Cliff Palace Pond demonstrates that Late Archaic and Woodland peoples cleared forest gaps to cultivate native plants in the Eastern Agricultural Complex and that anthropogenic fires served to increase populations of fire-tolerant oaks, chestnut, and pines in upland forests of the northern Cumberland Plateau.
Publication American Antiquity
Volume 63
Issue 2
Pages 263–278
Date April 1998
Journal Abbr Am. Antiquity
ISSN 0002-7316
Short Title Prehistoric human use of fire, the eastern agricultural complex, and Appalachian oak-chestnut forests
URL http://www.jstor.org/stable/2694697
Date Added Tue Aug 30 04:16:19 2011
Modified Tue Aug 30 04:25:13 2011

Prehistoric Native Americans and ecological change: Human ecosystems in eastern North America since the Pleistocene

Type Book
Author Paul A. Delcourt
Author Hazel R. Delcourt
Abstract Description: There has long been controversy between ecologists and archaeologists over the role of prehistoric Native Americans as agents of ecological change. Using ecological and archaeological data from the woodlands of eastern North America, Paul and Hazel Delcourt show that Holocene human ecosystems are complex adaptive systems in which humans have interacted with the environment on a series of spatial and time scales. Their work therefore has important implications for the conservation of biological diversity and for ecological restoration today. It will be a thought-provoking read for ecologists and archaeologists alike.
Edition illustrated, 1st edition
Place Cambridge, United Kingdom

Publisher Cambridge University Press
Date July 2004
# of Pages 216 p.
ISBN 0521662702, 9780521662703
Short Title Prehistoric Native Americans and Ecological Change
URL http://www.cambridge.org/gb/knowledge/isbn/item5708443/?site_locale=en_GB
Archive http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511525520
Date Added Tue Aug 30 04:16:19 2011
Modified Tue Aug 30 04:16:19 2011

Preliminary response of sandhills prairie to fire and bison grazing

Type Journal Article
Author Kent E. Pfeiffer
Author Allen A. Steuter
Abstract This research determined the preliminary response of sandhills prairie to spring and summer prescribed burns, and their interaction with bison (Bison bison) grazing. Changes in species composition and standing crop were determined for paired (caged/uncaged) plots established in burned and unburned areas during the 1991 and 1992 growing seasons. End of season standing crop of both rhizomatous grasses and bunchgrasses was increased by spring burning on sands range sites. Summer burning did not affect rhizomatous grass standing crop, but dramatically reduced bunchgrass standing crop. On burned areas, bison grazing reduced bunchgrass standing crop by 56%, while reducing rhizomatous grass standing crop by only 18%. Forbs generally appeared unaffected by bison grazing and were affected variously by burning. The current bunchgrass composition of Nebraska Sandhills prairie appears dependent on fire exclusion. With fire, a replacement of bunchgrass with rhizomatous grasses may increase available forage, but also increase the risk of wind erosion, particularly on choppy sands range sites.
Publication Journal of Range Management
Volume 47
Issue 5
Pages 395-397
Date September 1994
Journal Abbr J. Range Manage.
DOI 10.2307/4002337
ISSN 0022-409X
URL http://www.jstor.org/stable/4002337
Call Number 0027
Extra Keywords: fire effects; bison grazing; rhizomatous grass; bunchgrass; matrix forb; interstitial forb.
Date Added Sun Sep 4 05:56:10 2011
Modified Mon Sep 5 10:11:06 2011

Preliminary vegetation maps of the world since the last glacial maximum: An aid to archaeological understanding

Type Journal Article
Author Jonathan M. Adams
Author Hugues Faure
Abstract A set of preliminary, broad-scale vegetation map reconstructions for use by archaeologists and anthropologists is presented here for the world at the last glacial maximum (18,000 years ago), the early Holocene (8000 years ago), and the mid-Holocene (5000 years ago). For comparison we also give "present-potential" maps which

may be regarded as approximating the late Holocene vegetation as it would--or might--be without agricultural modification. The maps were produced through consultation with an extensive network of experts and a range of literature and map sources. Accompanying each regional map is a bibliography detailing the principal literature sources of evidence on Late Quaternary palaeovegetation and climates. The maps presented here are not intended as the "last word" on the distribution of vegetation at each time slice--they are merely a preliminary attempt at appraisal of current knowledge and opinion. Nevertheless, together with the accompanying citation summary they should provide a valuable and readily accessible source of information on current opinion in the Quaternary community. It is also hoped that the maps will themselves act as a catalyst for archaeologists to use their own data to contribute to the broader climatic/palaeovegetational picture.

Publication Journal of Archaeological Science
Volume 24
Issue 7
Pages 623-647
Date July 1997
Journal Abbr J. Archaeol. Sci.
DOI 10.1006/jasc.1996.0146
ISSN 0305-4403
Short Title Preliminary vegetation maps of the world since the last glacial maximum
URL http://www.sciencedirect.com/science/article/B6WH8-45M2V58-1C/2/99fdcced3f3df85715f14e74881368e8
Extra Keywords: vegetation; glacial maximum; Holocene; atlas; human ecology.
Date Added Mon Aug 15 22:32:39 2011
Modified Mon Aug 15 22:51:34 2011

Prescribed burning in the South: Trends, purpose, and barriers

Type Journal Article
Author Terry K. Haines
Author Rodney L. Busby
Author David A. Cleaves
Abstract The results of a survey of fire management officials concerning historical and projected prescribed burning activity in the South is reported. Prescribed burning programs on USDA Forest Service and private and state-owned lands are described in terms of area burned by ownership and state, intended resource benefits, barriers to expanded burning, and optimum burning area needed to achieve resource management goals. More than 4.1 million ac/yr of pine-type forest were burned between 1985 and 1994, about 6.5% of the area in pine-type forest per year.
Publication Southern Journal of Applied Forestry
Volume 25
Issue 4
Pages 149–153
Date November 2001
Journal Abbr South. J. Appl. For.
ISSN 0148-4419
Short Title Prescribed burning in the South
URL http://www.ingentaconnect.com/content/saf/sjaf/2001/00000025/00000004/art00001
Archive http://www.treesearch.fs.fed.us/pubs/2897
Extra Keywords: air quality; endangered species; hazard reduction; ecosystem management; reforestation.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:32:23 2011

Prescribing fire in eastern oak forests: Is time running out?

Type Journal Article

Author Marc D. Abrams

Abstract Before European settlement, vast areas of the eastern US deciduous forest were dominated by oak species. Evidence indicates that periodic understory fire was an important ecological factor in the historical development of oak forests. During European settlement of the late 19th and early 20th century, much of the eastern United States was impacted by land-clearing, extensive timber harvesting, severe fires, the chestnut blight, and then fire suppression and intensive deer browsing. These activities had the greatest negative impact on the once-dominant white oak, while temporarily promoting the expansion of other oaks such as red oak and chestnut oak. More recently, however, recruitment of all the dominant upland oaks waned on all but the most xeric sites. Mixed-mesophytic and later successional hardwood species, such as red maple, sugar maple, black birch, beech, black gum and black cherry, are aggressively replacing oak. The leaf litter of these replacement species is less flammable and more rapidly mineralized than that of the upland oaks, reinforcing the lack of fire. The trend toward increases in nonoak tree species will continue in fire-suppressed forests, rendering them less combustible for forest managers who wish to restore natural fires regimes. This situation greatly differs from the western United States, where fire suppression during the 20th century has made a variety of conifer-dominated forests more prone to stand-replacing fire.

Publication Northern Journal of Applied Forestry

Volume 22

Issue 3

Pages 190–196

Date September 2005

Journal Abbr North. J. Appl. For.

ISSN 0742-6348

Short Title Prescribing Fire in Eastern Oak Forests

URL http://saf.publisher.ingentaconnect.com/content/saf/njaf/2005/00000022/00000003/art00007

Extra Keywords: historical ecology; disturbance; succession; fire suppression; oak replacement.

Date Added Tue Jul 12 10:28:04 2011

Modified Mon Aug 15 22:51:19 2011

Presettlement and present forest vegetation in northern Vermont with special reference to Chittenden County

Type Journal Article

Author Thomas G. Siccama

Abstract The trees recorded in the original land surveys of the township lines of northern Vermont (ca. 1783-1787) and the lotting surveys within the townships of Chittenden Co. (ca. 1763-1802) have been used to study the composition and map the distribution of the presettlement forests. Forest composition was measured in 1962 at 193 points in Chittenden Co. where original survey data was available, and was compared to presettlement composition. Several general regions of forest were delimited in northern Vermont based primarily on the distribution of pine, hemlock, spruce and fir. A gradient of relative abundance of these conifer species was evident from pine in the Champlain Valley and Connecticut River Valley to hemlock on the midslope uplands and fir and spruce in the mountains and northeastern highlands of the state. A map of probable presettlement vegetation of Chittenden Co. was prepared based on geographical distribution of species of witness trees, elevation, soil-substrate types, topography, and early historical records. The outstanding feature of the presettlement forest was the great abundance of beech. Beech ranged from more than 60% of the species composition on the upland midelevation soils in Chittenden Co. to 13% on the spruce-fir-dominated highlands in northeastern Vermont. Average beech abundance in hardwood forests was about 40%, which is in accord with the findings of other studies based on witness trees in New York, Pennsylvania and north central states. Beech made up over 40% of the trees in the presettlement forest, but in 1962 it comprised only 3-5%. This is probably due to the slow but persistent pattern of regeneration of beech in stands by root sprouts and the formation of clones resulting in its maximum development in old-age, undisturbed forests. Comparison of pre-settlement and present forest composition indicated no outstanding changes in the presence or absence of species within soil-substrate types or elevation belts, but there was a distinctive overall increase in the importance of pine, hardhack and poplar in the present forests on the intermediate elevations which reflects the

stages of secondary succession on much abandoned farmland throughout Chittenden Co. Surveyor bias for selection of some species over others as witness trees was investigated. A study of stake-to-tree distances which could reveal possible selection due to greater distances to those species which were being favored did not indicate any bias and the surveyors apparently took the tree nearest the stake which met whatever diameter and state-of-vigor requirements the surveyors were using. The number of witness trees per unit area in Chittenden Co. was similar to the number used in studies in other areas in the north central states.

Publication American Midland Naturalist
Volume 85
Issue 1
Pages 153–172
Date January 1971
Journal Abbr Am. Midl. Nat.
ISSN 0003-0031
URL http://www.jstor.org/stable/2423919
Archive The University of Notre Dame
Date Added Sun Aug 28 17:26:09 2011
Modified Sun Aug 28 17:31:00 2011

Presettlement fire frequency regimes of the United States: A first approximation (Chapter 4) (In Studies in landscape fire ecology and presettlement vegetation of the southeastern United States)

Type Thesis
Author Cecil C. III Frost
Abstract It is now apparent that fire once played some role in shaping all but the wettest, the most arid, or the most fire-sheltered plant communities of the United States. Understanding the role of fire in structuring vegetation is critical for land management choices that will, for example, prevent extinction of rare species and natural vegetation types. Pre-European fire frequency can be reconstructed in two main ways. First is by dating fire scars on old trees, using a composite fire scar chronology. Where old fire-scarred trees are lacking, as in much of the eastern U.S., a second approach is possible. This is a landscape method, using a synthesis of physiographic factors such as topography and land surface form, alon with fire compartment size, historical vegetation records, fire frequency indicator species, lightning ignition data, and remnant natural vegetation. Such kinds of information, along with a survey of published fire history studies, were used to construct a map of presettlement fire frequency regions of the conterminous U.S. The map represents frequcency in the most fire-exposed parts pf the landscape. Original fire-return intervals in different parts of the U.S. ranged from nearly every years to more than 700 years. Vegetation types were distributes accordingly along the fire frequency master gradient. A fire regime classification system in proposed that involves, rather than a focus on trees, a consideration of all vegetaion layers.
Type Ph.D. Dissertation Chapter
University University of North Carolina
Place Chapel Hill, N.C.
Date 2000
# of Pages 35 p. (p.163-197) (in 620 p.)
URL http://www.bio.unc.edu/faculty/peet/lab/theses/Frost_PhD_2000.pdf
Loc. in Archive Chaple Hill, NC: University of North Carolina
Extra Keywords: fire history; fire regime classification; presettlement fire frequency; site fire frequency; fire compartments; fire frequency mapping; fire effects; presettlement vegetaion; rare plant species.
Date Added Mon Aug 29 05:19:52 2011
Modified Mon Aug 29 15:02:38 2011

Notes:

Citation:

Frost, Cecil C. III. 2000. Presettlement fire frequency regimes of the United States: a first approximation (Chapter 4) In Frost, Cecil C. III., Studies in landscape fire ecology and presettlement vegetation of the southeastern United States. p.163-197. Ph.D. dissertation, University of North Carolina, Chapel Hill, N.C.

Frost, Cecil Carlysle, III. 1998. Presettlement fire frequency regimes of the United States: a first approximation. In Teresa L. Pruden and Leonard A. Brennan, (eds.). Fire in ecosystem management: shifting the paradigm from suppression to prescription. Tall Timbers Fire Ecology Conference Proceedings, No. 20. Tall Timbers Research Station, Tallahassee, FL.

Presettlement fire regime and vegetation mapping in Southeastern Coastal Plain forest ecosystems

Type Conference Paper

Author Andrew D. Bailey

Author Robert Mickler

Author Cecil Frost

Abstract Fire-adapted forest ecosystems make up 95 percent of the historic Coastal Plain vegetation types in the Southeastern United States. Fire suppression over the last century has altered the species composition of these ecosystems, increased fuel loads, and increased wildfire risk. Prescribed fire is one management tool used to reduce fuel loading and restore fire-adapted species, but little information exists on the presettlement extent and location of fire-dependent ecosystems at a level of detail useful to guide land management decisions at the local spatial scale. In an effort to close this knowledge gap, the principles of landscape fire ecology have been applied to develop a detailed presettlement fire regime map for ~200,000 acres of Coastal Plain ecosystems. Factors evaluated include the effects of fire compartment size in the original landscape, fire barriers, fire filters, prevailing wind direction during fire season, topographic and soil factors affecting fire intensity, fire frequency, fire spread, and fire effects on vegetation. The fire regime map was then combined with remnant fire-adapted vegetation surveys, historic aerial photography, digital elevation models, and soil survey information to create a map of presettlement vegetation. This map is being used to develop prescribed burning plans that restore original fire regimes, guide the use of prescribed fire as a management tool, restore fire-adapted vegetation structure and understory species diversity for threatened and endangered species, and enhance ecosystem sustainability.

Date 26-30 March 2007

Proceedings Title The Fire Environment—Innovations, Management, and Policy: Proceedings of a Conference

Conference Name Fire Behavior and Fuels

Place Destin, FL.

Publisher USDA Forest Service Proceedings RMRS-P-46CD. September 2007. Rocky Mountain Research Station: Fort Collins, CO

Pages 275–286

URL http://www.treesearch.fs.fed.us/pubs/28568

Extra Keywords: wildland fire management; vegetation mapping; Coastal Plain; landscape fire ecology; presettlement vegetation.

Date Added Tue Aug 16 11:27:43 2011

Modified Tue Aug 16 11:27:43 2011

Notes:

Citation:

Bailey, Andrew D.; Mickler, Robert; Frost, Cecil. 2007. Presettlement fire regime and vegetation mapping in southeastern coastal plain forest ecosystems. Pages 275-286 In: Butler, Bret W.; Cook, Wayne (comps.). The fire environment-innovations, management, and policy; conference proceedings. 26-30 March 2007; Destin, FL. Proceedings RMRS-P-46CD. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.

Probability of afternoon precipitation in eastern United States and Mexico enhanced by high evaporation

Type Journal Article
Author Kirsten L. Findell
Author Pierre Gentine
Author Benjamin R. Lintner
Author Christopher Kerr
Abstract Moisture and heat fluxes from the land surface to the atmosphere form a critical nexus between surface hydrology and atmospheric processes, particularly those relevant to precipitation. Although current theory suggests that soil moisture generally has a positive impact on subsequent precipitation, individual studies have shown support both for and against this positive feedback. Broad assessment of the coupling between soil moisture and evapotranspiration, and evapotranspiration and precipitation, has been limited by a lack of large-scale observations. Quantification of the influence of evapotranspiration on precipitation remains particularly uncertain. Here, we develop and apply physically based, objective metrics for quantifying the impacts of surface evaporative and sensible heat fluxes on the frequency and intensity of convective rainfall during summer, using North American reanalysis data. We show that high evaporation enhances the probability of afternoon rainfall east of the Mississippi and in Mexico. Indeed, variations in surface fluxes lead to changes in afternoon rainfall probability of between 10 and 25% in these regions. The intensity of rainfall, by contrast, is largely insensitive to surface fluxes. We suggest that local surface fluxes represent an important trigger for convective rainfall in the eastern United States and Mexico during the summer, leading to a positive evaporation–precipitation feedback.
Publication Nature Geoscience
Volume 4
Issue 7
Pages 434–439
Date July 2011
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo1174
ISSN 1752-0894
URL http://www.nature.com/doifinder/10.1038/ngeo1174
Date Added Sun Aug 28 05:42:07 2011
Modified Sun Aug 28 05:45:58 2011

Productivity of southern pine plantations: Where are we and how did we get here?

Type Journal Article
Author John A. Stanturf
Author Robert C. Kellison
Author F. S. Broerman
Author Stephen B. Jones
Abstract The productivity and extensiveness of southern forests in general, and pine plantations in particular, has placed the South at the forefront of production forestry in the United States. That industrial loblolly pine plantations are very productive is a result of researchers and managers developing and applying increasingly intensive silvicultural practices. Our estimates of the percentage of productivity gains attributable to improvements made in individual management practices are based on our collective experience, anecdotal information, and discussions with knowledgeable colleagues. Such informed judgments are based on potential productivity revealed by designed experiments coupled with estimates of how well technology has been implemented.
Publication Journal of forestry
Volume 101
Issue 3

Pages 26–31
Date April/May 2003
Journal Abbr J. Forest
ISSN 0022-1201
Short Title Productivity of southern pine plantations
URL http://treesearch.fs.fed.us/pubs/5461
Extra Keywords: economics; plantations; silviculture; timber markets.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:19 2011

Projected distributions of novel and disappearing climates by 2100 AD

Type Journal Article
Author John W. Williams
Author Stephen T. Jackson
Author John E. Kutzbach
Abstract Key risks associated with projected climate trends for the 21st century include the prospects of future climate states with no current analog and the disappearance of some extant climates. Because climate is a primary control on species distributions and ecosystem processes, novel 21st-century climates may promote formation of novel species associations and other ecological surprises, whereas the disappearance of some extant climates increases risk of extinction for species with narrow geographic or climatic distributions and disruption of existing communities. Here we analyze multimodel ensembles for the A2 and B1 emission scenarios produced for the fourth assessment report of the Intergovernmental Panel on Climate Change, with the goal of identifying regions projected to experience (i) high magnitudes of local climate change, (ii) development of novel 21st-century climates, and/or (iii) the disappearance of extant climates. Novel climates are projected to develop primarily in the tropics and subtropics, whereas disappearing climates are concentrated in tropical montane regions and the poleward portions of continents. Under the high-end A2 scenario, 12–39% and 10–48% of the Earth's terrestrial surface may respectively experience novel and disappearing climates by 2100 AD. Corresponding projections for the low-end B1 scenario are 4–20% and 4–20%. Dispersal limitations increase the risk that species will experience the loss of extant climates or the occurrence of novel climates. There is a close correspondence between regions with globally disappearing climates and previously identified biodiversity hotspots; for these regions, standard conservation solutions (e.g., assisted migration and networked reserves) may be insufficient to preserve biodiversity.
Publication Proceedings of the National Academy of Sciences
Volume 104
Issue 14
Pages 5738 -5742
Date April 3, 2007
Journal Abbr PNAS
DOI 10.1073/pnas.0606292104
ISSN 0027-8424
URL http://www.pnas.org/content/104/14/5738.abstract
Extra Keywords: biodiversity hotspots; climate change; dispersal limitations; global-change ecology; ecological surprises.
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:26:56 2011

Prospects for decadal climate prediction

Type Journal Article
Author Noel S. Keenlyside

Author Jin Ba

Abstract During the last decade, global surface temperatures did not increase as rapidly as in the preceding decades. Although relatively small compared to the observed centennial scale global warming, it has renewed interest in understanding and even predicting climate on time scales of decades, and sparked a community initiative on near-term prediction that will feature in the fifth intergovernmental panel on climate change assessment report. Decadal prediction, however, is in its infancy, with only a few publications existing. This article has three aims. The first is to make the case for decadal prediction. Decadal fluctuations in global climate similar to that of recent decades were observed during the past century. Associated with large regional changes in precipitation and climate extremes, they are of socioeconomic importance. Climate models, which capture some aspects of observed decadal variability, indicate that such variations might be partly predictable. The second aim is to describe the major challenges to skilful decadal climate prediction. One is poor understanding of mechanisms of decadal climate variability, with climate models showing little agreement. Sparse observations in the past, particularly in the ocean, are also a limiting factor to developing and testing of initialization and prediction systems. The third aim is to stress that despite promising initial results, decadal prediction is in a highly experimental stage, and care is needed in interpreting results and utilizing data from such experiments. In the long-term, decadal prediction has the potential to improve models, reduce uncertainties in climate change projections, and be of socioeconomic benefit.

Publication Wiley Interdisciplinary Reviews: Climate Change

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Issue 5

Pages 627-635

Date September/October 2010

Journal Abbr WIREs Clim. Change

DOI 10.1002/wcc.69

ISSN 17577780

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Proxy-based reconstructions of hemispheric and global surface temperature variations over the past two millennia

Type Journal Article

Author Michael E. Mann

Author Zhihua Zhang

Author Malcolm K. Hughes

Author Raymond S. Bradley

Author Sonya K. Miller

Author Scott Rutherford

Author Fenbiao Nicolussi

Abstract Following the suggestions of a recent National Research Council report [NRC (National Research Council) (2006) Surface Temperature Reconstructions for the Last 2,000 Years (Natl Acad Press, Washington, DC).], we reconstruct surface temperature at hemispheric and global scale for much of the last 2,000 years using a greatly expanded set of proxy data for decadal-to-centennial climate changes, recently updated instrumental data, and complementary methods that have been thoroughly tested and validated with model simulation experiments. Our results extend previous conclusions that recent Northern Hemisphere surface temperature increases are likely anomalous in a long-term context. Recent warmth appears anomalous for at least the past 1,300 years whether or not tree-ring data are used. If tree-ring data are used, the conclusion can be extended to at least the past 1,700 years, but with additional strong caveats. The reconstructed amplitude of change over past centuries is greater than hitherto reported, with somewhat greater Medieval warmth in the Northern Hemisphere, albeit still not reaching recent levels.

Publication Proceedings of the National Academy of Sciences

Volume 105

Issue 36
Pages 13252-13257
Date September 9, 2008
Journal Abbr PNAS
DOI 10.1073/pnas.0805721105
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.0805721105
Call Number 0000
Extra Keywords: climate change; global warming.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:21:42 2011

Pyrogeography: Understanding the ecological niche of fire

Type Journal Article
Author Max A. Moritz
Author Meg A. Krawchuk
Author Marc-André Parisien
Abstract With insights into the controls of past, current and potential future fire patterns, there is great potential to integrate a modern understanding of pyrogeography with paleoecological studies.
Publication PAGES Newsletter
Volume 18
Issue 2
Pages 83-85
Date August 2010
Journal Abbr PAGES News
ISSN 1811-1602
URL http://pages-142.unibe.ch/products/newsletters/2010-2/Special%20Section/Moritz_2010-2(83-85).pdf
Loc. in Archive PAGES

Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:35:38 2011

Quantifying fire severity, carbon, and nitrogen emissions in Alaska's boreal forest

Type Journal Article
Author Leslie A. Boby
Author Edward A. G. Schuur
Author Michelle C. Mack
Author David Verbyla
Author Jill F. Johnstone
Abstract The boreal region stores a large proportion of the world's terrestrial carbon (C) and is subject to high-intensity, stand-replacing wildfires that release C and nitrogen (N) stored in biomass and soils through combustion. While severity and extent of fires drives overall emissions, methods for accurately estimating fire severity are poorly tested in this unique region where organic soil combustion is responsible for a large proportion of total emissions. We tested a method using adventitious roots on black spruce trees (Picea mariana) in combination with canopy allometry to reconstruct prefire organic soil layers and canopy biomass in boreal black spruce forests of Alaska (USA), thus providing a basis for more accurately quantifying fire severity levels. We calibrated this adventitious-root-height method in unburned spruce stands and then tested it by comparing our

biomass and soils estimates reconstructed in burned stands with actual prefire stand measurements. We applied this approach to 38 black spruce stands burned in 2004 in Alaska, where we measured organic soil and stand characteristics and estimated the amount of soil and canopy biomass, as well as C and N pools, consumed by fire. These high-intensity quantitative estimates of severity were significantly correlated to a semiquantitative visual rapid assessment tool, the composite burn index (CBI). This index has proved useful for assessing fire severity in forests in the western United States but has not yet been widely tested in the boreal forest. From our study, we conclude that using postfire measurements of adventitious roots on black spruce trees in combination with soils and tree data can be used to reconstruct prefire organic soil depths and biomass pools, providing accurate estimates of fire severity and emissions. Furthermore, using our quantitative reconstruction we show that CBI is a reasonably good predictor of biomass and soil C loss at these sites, and it shows promise for rapidly estimating fire severity across a wide range of boreal black spruce forest types, especially where the use of high-intensity measurements may be limited by cost and time.

Publication Ecological Applications
Volume 20
Issue 6
Pages 1633-1647
Date September 2010
Journal Abbr Ecol. Appl.
DOI 10.1890/08-2295.1
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/08-2295.1
Extra Keywords: adventitious roots; Alaska; USA; allometric equations; black spruce; carbon emissions; forest fire; nitrogen; organic layer depth; Picea mariana; soil carbon; surface fuel consumption.
Date Added Tue Aug 23 02:51:39 2011
Modified Wed Aug 24 04:39:58 2011

Quantifying the fire regime attributes of severity and spatial complexity using field and imagery data

Type Thesis
Author Andrea Elizabeth Thode
Abstract Fire regimes are a useful way to classify, describe and categorize the pattern of fire occurrence through time and space and can be described using seven fire regime attributes: seasonality, frequency, size, spatial complexity, intensity, severity and type. Over the last 20 years, assessing different methods for mapping burn severity using remote sensing has been an active area of research with good results. This work uses remote sensing to quantify the fire regime attributes of severity and spatial complexity for a 19-year time period in Yosemite National Park. Field data collected from 2001--2003 in one year-old wildfires were used to select a subset of ten field variables that best relate to burn severity imagery values. The field data were then used to classify and assess seven different indices that have been used to map burn severity with Landsat data, and a generalized classification for burn severity was created and tested against classifications created for individual fires. The generalized classification showed no significant difference from the individual fire classifications, and the top four burn severity mapping indices showed no significant difference in their final classifications for burn severity. One of the top four indices was chosen to map burn severity for 99 large fires in Yosemite National Park that burned between 1984 and 2003. The resultant burn severity atlas was used to quantify the fire regime attributes of severity and spatial complexity. These current distributions of severity and spatial complexity are compared to historic, theoretical distributions and discussed. This study is a first attempt at quantifying the distribution of effects by fire regime types for a large landscape over a longer time period. As this process is refined and combined with other fire regime attributes, a new set of valuable information will be available for researchers and land mangers. This information can be used to understand how fire regimes have changed from the past and how we might be able to change them in the future.
Type Ph.D. Dissertation
University University of California, Davis
Place Davis, CA.
Date 2005
# of Pages 294 p.

URL http://gradworks.umi.com/32/03/3203609.html
Extra Keywords: fire; burn severity.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:33 2011

Quaternary landscape ecology: Relevant scales in space and time

Type Journal Article
Author Hazel R. Delcourt
Author Paul A. Delcourt
Abstract Two primary goals of landscape ecologists are to (1) evaluate changes in ecological pattern and process on natural landscapes through time and (2) determine the ecological consequences of transforming natural land-scapes to cultural ones. Paleoecological techniques can be used to reconstruct past landscapes and their changes through time; use of paleoecological methods of investigation in combination with geomorphic and paleoethnobiological data, historical records, and shorter-term ecological data sets makes it possible to integrate long-term ecological pattern and process on a nested series of temporal and spatial scales. lsquoNatural experimentsrsquo of the past can be used to test alternative hypotheses about the relative influences of environmental change, biological interactions, and human activities in structuring biotic communities within landscape mosaics. On the absolute time scale of the Quaternary Period, spanning the past 1.8 million years, current distributional ranges of the biota have taken shape and modern biotic communities have assembled. Quaternary environmental changes have influenced the development of natural landscapes over time scales of centuries to hundreds of thousands of years; human cultural evolution has resulted in the transformation of much of the biosphere from natural to cultural landscapes over the past 5,000 years. The Quaternary extends to and includes the present and the immediate future. Knowledge of landscape changes on a Quaternary time scale is essential to landscape ecologists who wish to have a context for predicting future trends on local, regional, and global scales.
Publication Landscape Ecology
Volume 2
Issue 1
Pages 23–44
Date November 1988
Journal Abbr Landscape Ecol.
DOI 10.1007/BF00138906
ISSN 0921-2973
Short Title Quaternary landscape ecology
URL http://www.springerlink.com/content/p18t17p74j01140l/
Extra Keywords: archaeology; hierarchy; long-term data sets; paleoecology; southeastern United States.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 16:08:41 2011

Radiative forcing due to anthropogenic vegetation change based on MODIS surface albedo data

Type Journal Article
Author Gunnar Myhre
Author Maria M. Kvalevåg
Author Crystal B. Schaaf
Abstract In this study we use the capabilities of the MODerate Resolution Imaging Spectroradiometer (MODIS) land surface product to estimate the radiative forcing due to surface albedo changes caused by anthropogenic vegetation changes. We improve the representation of the present surface albedo by using data retrieved from MODIS. The change in surface albedo is based on the current vegetation land cover from MODIS, the MODIS surface albedos for those vegetation types, and a data set for potential natural vegetation. We arrive at a

radiative forcing due to anthropogenic vegetation changes of −0.09 Wm^{-2} since pre-agriculture times to present, weaker than most earlier published results for this climate forcing mechanism. This is mainly due to a lower surface albedo associated with cropland and further with the use of MODIS data to allow us to constrain the surface albedo change.

Publication Geophysical Research Letters
Volume 32
Issue 21
Pages L21410 (4 p.)
Date November 2005
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2005GL024004
ISSN 0094-8276
URL http://www.agu.org/pubs/crossref/2005/2005GL024004.shtml
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:24:09 2011

Rapid landscape transformation in South Island, New Zealand, following initial Polynesian settlement

Type Journal Article

Author David B. McWethy
Author Cathy Whitlock
Author Janet M. Wilmshurst
Author Matt S. McGlone
Author Mairie Fromont
Author Xun Li
Author Ann Dieffenbacher-Krall
Author William O. Hobbs
Author Sherilyn C. Fritz
Author Edward R. Cook

Abstract Humans have altered natural patterns of fire for millennia, but the impact of human-set fires is thought to have been slight in wet closed-canopy forests. In the South Island of New Zealand, Polynesians (Māori), who arrived 700–800 calibrated years (cal y) ago, and then Europeans, who settled ~150 cal y ago, used fire as a tool for forest clearance, but the structure and environmental consequences of these fires are poorly understood. High-resolution charcoal and pollen records from 16 lakes were analyzed to reconstruct the fire and vegetation history of the last 1,000 y. Diatom, chironomid, and element concentration data were examined to identify disturbance-related limnobiotic and biogeochemical changes within burned watersheds. At most sites, several high-severity fire events occurred within the first two centuries of Māori arrival and were often accompanied by a transformation in vegetation, slope stability, and lake chemistry. Proxies of past climate suggest that human activity alone, rather than unusually dry or warm conditions, was responsible for this increased fire activity. The transformation of scrub to grassland by Europeans in the mid-19th century triggered further, sometimes severe, watershed change, through additional fires, erosion, and the introduction of nonnative plant species. Alteration of natural disturbance regimes had lasting impacts, primarily because native forests had little or no previous history of fire and little resilience to the severity of burning. Anthropogenic burning in New Zealand highlights the vulnerability of closed-canopy forests to novel disturbance regimes and suggests that similar settings may be less resilient to climate-induced changes in the future.

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Issue 50
Pages 21343-21348
Date December 14, 2010
Journal Abbr PNAS
DOI 10.1073/pnas.1011801107

ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1011801107
Extra Keywords: human impacts; land cover change; deforestation.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:22:15 2011

Rapid responses of the prairie-forest ecotone to early Holocene aridity in mid-continental North America

Type Journal Article

Author John W. Williams
Author Bryan N. Shuman
Author Patrick J. Bartlein

Abstract The prairie-forest transition in midcontinental North America is a major physiognomic boundary, and its shifts during the Holocene are a classic example of climate-driven ecotonal dynamics. Recent work suggests asymmetrical Holocene behavior, with a relatively rapid early Holocene deforestation and more gradual reforestation later in the Holocene. This paper presents a new synthesis of the Holocene history of the Great Plains prairie-forest ecotone in the north-central US and central Canada that updates prior mapping efforts and systematically assesses rates of change. Changes in percent woody cover (%WC) are inferred from fossil pollen records, using the modern analog technique and surface-sediment pollen samples cross-referenced against remotely sensed observations. For contemporary pollen samples from the Great Plains, %WC linearly correlates to percent arboreal pollen (%AP), but regression parameters vary interregionally. At present, %AP is consistently higher than %WC, because of high background levels of arboreal pollen. Holocene maps of the eastern prairie-forest ecotone agree with prior maps, showing a rapid decrease in %WC and eastward prairie advance between 10,000 and 8000 ka (1 ka = 1000 calibrated years before present), a maximum eastward position of the ecotone from 7 to 6 ka, and increased %WC and westward prairie retreat after 6 ka. Ecotone position is ambiguous in Iowa and southeastern Minnesota, due to a scarcity of modern analogs for early-Holocene samples with high Ulmus abundances and for samples from alluvial sediments. The northern prairie-forest ecotone was positioned in central Saskatchewan between 12 and 10 ka, stabilized from 10 to 6 ka despite decreases in %WC at some sites, then moved south after 6 ka. In both east and north, ecotonal movements are consistent with a dry early Holocene and increasing moisture availability after 6 ka. Sites near the ecotone consistently show an asymmetric pattern of abrupt early Holocene deforestation (< 300 years) and gradual reforestation after 6 ka. Early Holocene decreases in %WC are faster than the corresponding drops in %AP, because the analog-based %WC reconstructions correct for the high background levels of arboreal pollen types that blur temporal variations in %AP. For example, at Elk Lake, the %AP decline lasts 1000 years, whereas the %WC decline occurs between adjacent pollen samples, approximately 300 years apart. Thus, early Holocene deforestation may have been even more abrupt than previously recognized. Rapid deforestation likely was promoted both by rapid climate changes around 8.2 ka and positive fire-vegetation feedbacks. Non-linear vegetational responses to hydrological variability are consistent with 1) other paleorecords showing rapid die-offs of some eastern tree species in response to aridity and 2) observations of threshold-type ecological responses to recent climate events. The 21st-century trajectory for the Great Plains prairie-forest ecotone is uncertain, because climate models differ over the direction of regional precipitation trends, but future drying would be more likely to trigger threshold-type shifts in ecotone position.

Publication Global and Planetary Change
Volume 66
Issue 3-4
Pages 195–207
Date April 2009
Journal Abbr Global Planet Change
DOI 10.1016/j.gloplacha.2008.10.012
ISSN 0921-8181
URL http://www.sciencedirect.com/science/article/pii/S0921818108001513
Call Number 0011

Extra Keywords: aridity; deforestation; drought; Great Plains; Holocene; prairie-forest ecotone.
Date Added Sun Sep 4 05:23:41 2011
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Rates of change in natural and anthropogenic radiative forcing over the past 20,000 years

Type Journal Article
Author Fortunat Joos
Author Renato Spahni
Abstract The rate of change of climate codetermines the global warming impacts on natural and socioeconomic systems and their capabilities to adapt. Establishing past rates of climate change from temperature proxy data remains difficult given their limited spatiotemporal resolution. In contrast, past greenhouse gas radiative forcing, causing climate to change, is well known from ice cores. We compare rates of change of anthropogenic forcing with rates of natural greenhouse gas forcing since the Last Glacial Maximum and of solar and volcanic forcing of the last millennium. The smoothing of atmospheric variations by the enclosure process of air into ice is computed with a firn diffusion and enclosure model. The 20th century increase in CO_2 and its radiative forcing occurred more than an order of magnitude faster than any sustained change during the past 22,000 years. The average rate of increase in the radiative forcing not just from CO_2 but from the combination of CO_2 , CH_4 , and N_2O is larger during the Industrial Era than during any comparable period of at least the past 16,000 years. In addition, the decadal-to- century scale rate of change in anthropogenic forcing is unusually high in the context of the natural forcing variations (solar and volcanoes) of the past millennium. Our analysis implies that global climate change, which is anthropogenic in origin, is progressing at a speed that is unprecedented at least during the last 22,000 years.
Publication Proceedings of the National Academy of Sciences
Volume 105
Issue 5
Pages 1425-1430
Date February 5, 2008
Journal Abbr PNAS
DOI 10.1073/pnas.0707386105
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.0707386105
Extra Keywords: climate change; global warming; greenhouse gas; ice core.
Date Added Sun Aug 28 03:05:14 2011
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RCP4.5: A pathway for stabilization of radiative forcing by 2100

Type Journal Article
Author Allison M. Thomson
Author Katherine V. Calvin
Author Steven J. Smith
Author G. Page Kyle
Author April Volke
Author Pralit Patel
Author Sabrina Delgado-Arias
Author Ben Bond-Lamberty
Author Marshall A. Wise
Author Leon E. Clarke
Author James A. Edmonds

Abstract Representative Concentration Pathway (RCP) 4.5 is a scenario that stabilizes radiative forcing at 4.5 W m^{-2} in the year 2100 without ever exceeding that value. Simulated with the Global Change Assessment Model (GCAM), RCP4.5 includes long-term, global emissions of greenhouse gases, short-lived species, and land-use-land-cover in a global economic framework. RCP4.5 was updated from earlier GCAM scenarios to incorporate historical emissions and land cover information common to the RCP process and follows a cost-minimizing pathway to reach the target radiative forcing. The imperative to limit emissions in order to reach this target drives changes in the energy system, including shifts to electricity, to lower emissions energy technologies and to the deployment of carbon capture and geologic storage technology. In addition, the RCP4.5 emissions price also applies to land use emissions; as a result, forest lands expand from their present day extent. The simulated future emissions and land use were downscaled from the regional simulation to a grid to facilitate transfer to climate models. While there are many alternative pathways to achieve a radiative forcing level of 4.5 W m^{-2}, the application of the RCP4.5 provides a common platform for climate models to explore the climate system response to stabilizing the anthropogenic components of radiative forcing.

Publication Climatic Change
Volume Published online
Pages 18 p.
Date 29 July 2011
Journal Abbr Climatic Change
DOI 10.1007/s10584-011-0151-4
ISSN 0165-0009
Short Title RCP4.5
URL http://www.springerlink.com/content/70114wmj1j12j4h2/
Call Number 0000
Date Added Sat Aug 27 06:05:17 2011
Modified Mon Aug 29 23:25:04 2011

Recent acceleration of biomass burning and carbon losses in Alaskan forests and peatlands

Type Journal Article
Author Merritt R. Turetsky
Author Evan S. Kane
Author Jennifer W. Harden
Author Roger D. Ottmar
Author Kristen L. Manies
Author Elizabeth Hoy
Author Eric S. Kasischke
Abstract Climate change has increased the area affected by forest fires each year in boreal North America. Increases in burned area and fire frequency are expected to stimulate boreal carbon losses. However, the impact of wildfires on carbon emissions is also affected by the severity of burning. How climate change influences the severity of biomass burning has proved difficult to assess. Here, we examined the depth of ground-layer combustion in 178 sites dominated by black spruce in Alaska, using data collected from 31 fire events between 1983 and 2005. We show that the depth of burning increased as the fire season progressed when the annual area burned was small. However, deep burning occurred throughout the fire season when the annual area burned was large. Depth of burning increased late in the fire season in upland forests, but not in peatland and permafrost sites. Simulations of wildfire-induced carbon losses from Alaskan black spruce stands over the past 60 years suggest that ground-layer combustion has accelerated regional carbon losses over the past decade, owing to increases in burn area and late-season burning. As a result, soils in these black spruce stands have become a net source of carbon to the atmosphere, with carbon emissions far exceeding decadal uptake.
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Volume 4
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Date January 2011

Journal Abbr Nature Geosci.
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ISSN 1752-0894
URL http://www.nature.com/doifinder/10.1038/ngeo1027
Call Number 0000
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:36 2011

Recent advances in ecosystem-atmosphere interactions: An ecological perspective

Type Journal Article
Author Paul R. Moorcroft
Abstract The atmosphere and terrestrial ecosystems are fundamentally coupled on a variety of time–scales. On short time–scales, this bi–directional interaction is dominated by the rapid exchange of CO_2, water and energy between the atmosphere and the land surface; on long time–scales, the interaction involves changes in ecosystem structure and composition in response to changes in climate that feed back through biophysical and biogeochemical mechanisms to influence climate over decades and centuries. After briefly describing some early pioneering work, I focus this review on recent advances in understanding long–term ecosystem–atmosphere interactions through a discussion of three case studies. I then examine how efforts to assess the stability and resilience of ecosystem–atmosphere interactions over these long time–scales using Dynamic Global Vegetation Models are hampered by the presence of important functional diversity and heterogeneity within plant communities. Recent work illustrates how this issue can be addressed through the use of Structured Ecosystem Models that more accurately scale between the short–term physiological responses of individual plants and the long–term, large–scale dynamics of heterogeneous, functionally diverse ecosystems.
Publication Proceedings of the Royal Society B: Biological Sciences
Volume 270
Issue 1521
Pages 1215-1227
Date 22 June 2003
Journal Abbr Proc. R. Soc. B
DOI 10.1098/rspb.2002.2251
ISSN 0962-8452
Short Title Recent advances in ecosystem-atmosphere interactions
URL http://rspb.royalsocietypublishing.org/cgi/doi/10.1098/rspb.2002.2251
Extra Keywords: atmospheric models; terrestrial ecosystem models; vegetation dynamics; climate change; land–atmosphere interactions; structured population models.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 21:45:33 2011

Recent advances in the analysis and interpretation of sediment-charcoal records

Type Journal Article
Author Philip E. Higuera
Author Daniel G. Gavin
Author Paul D. Henne
Author Ryan F. Kelly
Abstract Numerical models and statistical analysis aid interpretation of fire history from sediment-charcoal records, allowing inferences into the causes of past fire-regime shifts through quantitative analyses and data-model comparisons. High-resolution charcoal records from lake sediments are an increasingly important proxy for understanding the characteristics and variability of past fire regimes (e.g., Gavin et al., 2007). Recent advances

in simulating sediment-charcoal records have improved our understanding of this proxy and help guide data analysis methods. With improved quantitative analyses, comparisons between fire-history records, other paleoenvironmental records and dynamic ecosystem models increasingly enable insights into the causal mechanisms controlling past fire regimes.

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Volume 18
Issue 2
Pages 57-59
Date August 2010
Journal Abbr PAGES News
ISSN 1874-2130
URL http://pages-142.unibe.ch/products/newsletters/2010-2/Special%20Section/Higuera_2010-2%2857-59%29.pdf
Call Number 0000

Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:08 2011

Recent changes in the fire regime across the North American boreal region—Spatial and temporal patterns of burning across Canada and Alaska

Type Journal Article
Author Eric S. Kasischke
Author Merritt R. Turetsky
Abstract We used historic records from 1959–99 to explore fire regime characteristics at ecozone scales across the entire North American boreal region (NABR). Shifts in the NABR fire regime between the 1960s/70s and the 1980s/90s were characterized by a doubling of annual burned area and more than a doubling of the frequency of larger fire years because of more large fire events (>1,000 km²). The proportion of total burned area from human-ignited fires decreased over this same time period, while the proportion of burning during the early and late- growing-seasons increased. Trends in increased burned area were consistent across the NABR ecozones, though the western ecozones experienced greater increases in larger fire years compared to the eastern ecozones. Seasonal patterns of burning differed among ecozones. Along with the climate warming, changes in the fire regime characteristics may be an important driver of future ecosystem processes in the NABR.
Publication Geophysical Research Letters
Volume 33
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Pages L09703 (5 p.)
Date May 2006
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2006GL025677
ISSN 0094–8276
URL http://www.agu.org/pubs/crossref/2006/2006GL025677.shtml
Date Added Tue Aug 30 14:37:15 2011
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Recent decline in the global land evapotranspiration trend due to limited moisture supply

Type Journal Article
Author Martin Jung
Author Markus Reichstein

Author Philippe Ciais
Author Sonia I. Seneviratne
Author Justin Sheffield
Author Michael L. Goulden
Author Gordon Bonan
Author Alessandro Cescatti
Author Jiquan Chen
Author Richard de Jeu
Author A. Johannes Dolman
Author Werner Eugster
Author Dieter Gerten
Author Damiano Gianelle
Author Nadine Gobron
Author Jens Heinke
Author John Kimball
Author Beverly E. Law
Author Leonardo Montagnani
Author Qiaozhen Mu
Author Brigitte Mueller
Author Keith Oleson
Author Dario Papale
Author Andrew D. Richardson
Author Olivier Roupsard
Author Steve Running
Author Enrico Tomelleri
Author Nicolas Viovy
Author Ulrich Weber
Author Christopher Williams
Author Eric Wood
Author Sönke Zaehle
Author Ke Zhang

Abstract More than half of the solar energy absorbed by land surfaces is currently used to evaporate water. Climate change is expected to intensify the hydrological cycle and to alter evapotranspiration, with implications for ecosystem services and feedback to regional and global climate. Evapotranspiration changes may already be under way, but direct observational constraints are lacking at the global scale. Until such evidence is available, changes in the water cycle on land—a key diagnostic criterion of the effects of climate change and variability—remain uncertain. Here we provide a data-driven estimate of global land evapotranspiration from 1982 to 2008, compiled using a global monitoring network, meteorological and remote-sensing observations, and a machine-learning algorithm. In addition, we have assessed evapotranspiration variations over the same time period using an ensemble of process-based land-surface models. Our results suggest that global annual evapotranspiration increased on average by 7.1 ± 1.0 millimetres per year per decade from 1982 to 1997. After that, coincident with the last major El Niño event in 1998, the global evapotranspiration increase seems to have ceased until 2008. This change was driven primarily by moisture limitation in the Southern Hemisphere, particularly Africa and Australia. In these regions, microwave satellite observations indicate that soil moisture decreased from 1998 to 2008. Hence, increasing soil-moisture limitations on evapotranspiration largely explain the recent decline of the global land-evapotranspiration trend. Whether the changing behaviour of evapotranspiration is representative of natural climate variability or reflects a more permanent reorganization of the land water cycle is a key question for earth system science.

Publication Nature
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Issue 7318
Pages 951-954

Date 21 October 2010
Journal Abbr Nature
DOI 10.1038/nature09396
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URL http://www.nature.com/doifinder/10.1038/nature09396
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:12:40 2011

Recent decreases in fossil-fuel emissions of ethane and methane derived from firn air

Type Journal Article

Author Murat Aydin
Author Kristal R. Verhulst
Author Eric S. Saltzman
Author Mark O. Battle
Author Stephen A. Montzka
Author Donald R. Blake
Author Qi Tang
Author Michael J. Prather

Abstract Methane and ethane are the most abundant hydrocarbons in the atmosphere and they affect both atmospheric chemistry and climate. Both gases are emitted from fossil fuels and biomass burning, whereas methane (CH_4) alone has large sources from wetlands, agriculture, landfills and waste water. Here we use measurements in firn (perennial snowpack) air from Greenland and Antarctica to reconstruct the atmospheric variability of ethane (C_2H_6) during the twentieth century. Ethane levels rose from early in the century until the 1980s, when the trend reversed, with a period of decline over the next 20 years. We find that this variability was primarily driven by changes in ethane emissions from fossil fuels; these emissions peaked in the 1960s and 1970s at 14–16 teragrams per year (1 Tg = 10^{12} g) and dropped to 8–10 Tg yr^{-1} by the turn of the century. The reduction in fossil-fuel sources is probably related to changes in light hydrocarbon emissions associated with petroleum production and use. The ethane-based fossil-fuel emission history is strikingly different from bottom-up estimates of methane emissions from fossil-fuel use and implies that the fossil-fuel source of methane started to decline in the 1980s and probably caused the late twentieth century slow-down in the growth rate of atmospheric methane.

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Date 11 August 2011
Journal Abbr Nature
DOI 10.1038/nature10352
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature10352
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Recent fire history of the northern Great Plains

Type Journal Article

Author Charles Edward Umbanhowar Jr

Abstract The fire history of the northern Great Plains has been largely reconstructed from the historical record. To clarify this history, segments of 1-m cores from four lakes in North and South Dakota and northeastern Montana were examined for charcoal fragments. The cores spanned a time interval of 172 to 380 yr. Samples integrating 5-10 yr of deposition were taken from 2-cm sections along each core and sieved. Charcoal concentrations ranged from 6-14,799 fragments/gram of sediment, and mean charcoal abundance was negatively correlated with longitude. Results suggest periods of increased fire from A.D. 1700-1740 and A.D. 1850-1900. These peaks were broadly synchronous across the region and ranged in duration from 20-40 yr. Postsettlement patterns of charcoal deposition were highly variable but generally much lower than presettlement intervals.

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Volume 135
Issue 1
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Date January 1996
Journal Abbr Am. Midl. Nat.
DOI 10.2307/2426877
ISSN 0003-0031
URL http://www.jstor.org/stable/2426877
Date Added Sat Aug 27 04:08:03 2011
Modified Sun Sep 4 04:26:42 2011

Recent forest insect outbreaks and fire risk in colorado forests: a brief synthesis of relevant research

Type Journal Article
Author WH Romme
Author J. Clement
Author J. Hicke
Author D. Kulakowski
Author LH MacDonald
Author TL Schoennagel
Author TT Veblen
Abstract No Abstract
Date 2006
Short Title Recent forest insect outbreaks and fire risk in colorado forests
Library Catalog Google Scholar
Call Number 0024
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

Recent history of large-scale ecosystem disturbances in North America derived from the AVHRR satellite record

Type Journal Article
Author Christopher Potter
Author Pang-Ning Tan
Author Vipin Kumar
Author Chris Kucharik
Author Steven Klooster
Author Vanessa Genovese
Author Warren Cohen

Author Sean Healey

Abstract Ecosystem structure and function are strongly affected by disturbance events, many of which in North America are associated with seasonal temperature extremes, wildfires, and tropical storms. This study was conducted to evaluate patterns in a 19-year record of global satellite observations of vegetation phenology from the advanced very high resolution radiometer (AVHRR) as a means to characterize major ecosystem disturbance events and regimes. The fraction absorbed of photosynthetically active radiation (FPAR) by vegetation canopies worldwide has been computed at a monthly time interval from 1982 to 2000 and gridded at a spatial resolution of 8–km globally. Potential disturbance events were identified in the FPAR time series by locating anomalously low values (FPAR-LO) that lasted longer than 12 consecutive months at any 8-km pixel. We can find verifiable evidence of numerous disturbance types across North America, including major regional patterns of cold and heat waves, forest fires, tropical storms, and large-scale forest logging. Summed over 19 years, areas potentially influenced by major ecosystem disturbances (one FPAR-LO event over the period 1982–2000) total to more than 766,000 km². The periods of highest detection frequency were 1987–1989, 1995–1997, and 1999. Sub-continental regions of the Pacific Northwest, Alaska, and Central Canada had the highest proportion (>90%) of FPAR-LO pixels detected in forests, tundra shrublands, and wetland areas. The Great Lakes region showed the highest proportion (39%) of FPAR-LO pixels detected in cropland areas, whereas the western United States showed the highest proportion (16%) of FPAR-LO pixels detected in grassland areas. Based on this analysis, an historical picture is emerging of periodic droughts and heat waves, possibly coupled with herbivorous insect outbreaks, as among the most important causes of ecosystem disturbance in North America.

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Date November 2005
Journal Abbr Ecosystems
DOI 10.1007/s10021-005-0041-6
ISSN 1432-9840
URL http://www.springerlink.com/index/10.1007/s10021-005-0041-6
Extra Keywords: ecosystem disturbance; remote sensing; fire; drought; forests.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:31:05 2011

Recent warming by latitude associated with increased length of ragweed pollen season in central North America

Type Journal Article
Author Lewis Ziska
Author Kim Knowlton
Author Christine Rogers
Author Dan Dalan
Author Nicole Tierney
Author Mary Ann Elder
Author Warren Filley
Author Jeanne Shropshire
Author Linda B. Ford
Author Curtis Hedberg
Author Pamela Fleetwood
Author Kim T. Hovanky
Author Tony Kavanaugh
Author George Fulford
Author Rose F. Vrtis

Author Jonathan A. Patz
Author Jay Portnoy
Author Frances Coates
Author Leonard Bielory
Author David Frenz
Abstract A fundamental aspect of climate change is the potential shifts in flowering phenology and pollen initiation associated with milder winters and warmer seasonal air temperature. Earlier floral anthesis has been suggested, in turn, to have a role in human disease by increasing time of exposure to pollen that causes allergic rhinitis and related asthma. However, earlier floral initiation does not necessarily alter the temporal duration of the pollen season, and, to date, no consistent continental trend in pollen season length has been demonstrated. Here we report that duration of the ragweed (Ambrosia spp.) pollen season has been increasing in recent decades as a function of latitude in North America. Latitudinal effects on increasing season length were associated primarily with a delay in first frost of the fall season and lengthening of the frost free period. Overall, these data indicate a significant increase in the length of the ragweed pollen season by as much as 13–27 d at latitudes above ~44°N since 1995. This is consistent with recent Intergovernmental Panel on Climate Change projections regarding enhanced warming as a function of latitude. If similar warming trends accompany long-term climate change, greater exposure times to seasonal allergens may occur with subsequent effects on public health.
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Volume 108
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Date March 8, 2011
Journal Abbr PNAS
DOI 10.1073/pnas.1014107108
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1014107108
Extra Keywords: aerobiology; allergies; global warming.
Date Added Tue Aug 16 01:07:05 2011
Modified Tue Aug 16 01:08:18 2011

Reconciling anthropogenic climate change with observed temperature 1998-2008

Type Journal Article
Author Robert K. Kaufmann
Author Heikki Kauppi
Author Michael L. Mann
Author James H. Stock
Abstract Given the widely noted increase in the warming effects of rising greenhouse gas concentrations, it has been unclear why global surface temperatures did not rise between 1998 and 2008. We find that this hiatus in warming coincides with a period of little increase in the sum of anthropogenic and natural forcings. Declining solar insolation as part of a normal eleven-year cycle, and a cyclical change from an El Nino to a La Nina dominate our measure of anthropogenic effects because rapid growth in short-lived sulfur emissions partially offsets rising greenhouse gas concentrations. As such, we find that recent global temperature records are consistent with the existing understanding of the relationship among global surface temperature, internal variability, and radiative forcing, which includes anthropogenic factors with well known warming and cooling effects.
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Volume Published online before print
Date July 5, 2011
Journal Abbr PNAS
DOI 10.1073/pnas.1102467108
ISSN 0027-8424

URL http://www.pnas.org/cgi/doi/10.1073/pnas.1102467108
Extra Keywords: aerosol emissions; carbon emissions; coal consumption; black carbon; stratospheric water vapor.
Date Added Tue Aug 30 14:37:15 2011
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Reconciling carbon-cycle concepts, terminology, and methods

Type Journal Article
Author F. Stuart Chapin III
Author George M. Woodwell
Author James T. Randerson
Author Edward B. Rastetter
Author Gary M. Lovett
Author Dennis D. Baldocchi
Author Deborah A. Clark
Author Mark E. Harmon
Author David S. Schimel
Author Riccardo Valentini
Author Christian Wirth
Author John D. Aber
Author Jonathan J. Cole
Author Michael L. Goulden
Author Jennifer W. Harden
Author Martin Manning
Author Robert W. Howarth
Author Pamela A. Matson
Author A. David McGuire
Author Jerry M. Melillo
Author Harold A. Mooney
Author Jason C. Neff
Author Richard A. Houghton
Author Michael L. Pace
Author Michael G. Ryan
Author Steven W. Running
Author Osvaldo E. Sala
Author William H. Schlesinger
Author Ernst-Detlef Schulze
Abstract Recent projections of climatic change have focused a great deal of scientific and public attention on patterns of carbon (C) cycling as well as its controls, particularly the factors that determine whether an ecosystem is a net source or sink of atmospheric carbon dioxide (CO_2). Net ecosystem production (NEP), a central concept in C-cycling research, has been used by scientists to represent two different concepts. We propose that NEP be restricted to just one of its two original definitions—the imbalance between gross primary production (GPP) and ecosystem respiration (ER). We further propose that a new term—net ecosystem carbon balance (NECB)—be applied to the net rate of C accumulation in (or loss from [negative sign]) ecosystems. Net ecosystem carbon balance differs from NEP when C fluxes other than C fixation and respiration occur, or when inorganic C enters or leaves in dissolved form. These fluxes include the leaching loss or lateral transfer of C from the ecosystem; the emission of volatile organic C, methane, and carbon monoxide; and the release of soot and CO_2 from fire. Carbon fluxes in addition to NEP are particularly important determinants of NECB over long time scales. However, even over short time scales, they are important in ecosystems such as streams, estuaries, wetlands, and cities. Recent technological advances have led to a diversity of approaches to the measurement of C fluxes at different temporal and spatial scales. These approaches frequently capture different

components of NEP or NECB and can therefore be compared across scales only by carefully specifying the fluxes included in the measurements. By explicitly identifying the fluxes that comprise NECB and other components of the C cycle, such as net ecosystem exchange (NEE) and net biome production (NBP), we can provide a less ambiguous framework for understanding and communicating recent changes in the global C cycle.

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Journal Abbr Ecosystems
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ISSN 1432-9840
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Call Number 0000
Extra Keywords: net ecosystem production; net ecosystem carbon balance; gross primary production; ecosystem respiration; autotrophic respiration; heterotrophic respiration; net ecosystem exchange; net biome production; net primary production.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:32 2011

Reconstructed historical land cover and biophysical parameters for studies of land-atmosphere interactions within the eastern United States

Type Journal Article
Author Louis T. Steyaert
Author Robert G. Knox
Abstract Over the past 350 years, the eastern half of the United States experienced extensive land cover changes. These began with land clearing in the 1600s, continued with widespread deforestation, wetland drainage, and intensive land use by 1920, and then evolved to the present-day landscape of forest regrowth, intensive agriculture, urban expansion, and landscape fragmentation. Such changes alter biophysical properties that are key determinants of land-atmosphere interactions (water, energy, and carbon exchanges). To understand the potential implications of these land use transformations, we developed and analyzed 20-km land cover and biophysical parameter data sets for the eastern United States at 1650, 1850, 1920, and 1992 time slices. Our approach combined potential vegetation, county-level census data, soils data, resource statistics, a Landsat-derived land cover classification, and published historical information on land cover and land use. We reconstructed land use intensity maps for each time slice and characterized the land cover condition. We combined these land use data with a mutually consistent set of biophysical parameter classes, to characterize the historical diversity and distribution of land surface properties. Time series maps of land surface albedo, leaf area index, a deciduousness index, canopy height, surface roughness, and potential saturated soils in 1650, 1850, 1920, and 1992 illustrate the profound effects of land use change on biophysical properties of the land surface. Although much of the eastern forest has returned, the average biophysical parameters for recent landscapes remain markedly different from those of earlier periods. Understanding the consequences of these historical changes will require land-atmosphere interactions modeling experiments.
Publication Journal of Geophysical Research
Volume 113
Issue 2
Pages D02101 (27 p.)
Date January 2008
Journal Abbr J. Geophys. Res.
DOI 10.1029/2006JD008277
ISSN 0148-0227

URL www.agu.org/journals/ABS/2008/2006JD008277.shtml
Extra Keywords: land use change; ecosystem-atmosphere interactions; vegetation structure.
Date Added Sun Aug 28 17:26:59 2011
Modified Sun Aug 28 17:32:15 2011

Reconstruction of early nineteenth-century vegetation and fire regimes in the Missouri Ozarks

Type Journal Article
Author Michael J. Batek
Author Alan J. Rebertus
Author Walter A. Schroeder
Author Timothy L. Haithcoat
Author Eric Compas
Author Richard P. Guyette
Abstract • Aim: The purpose of this study was to reconstruct early nineteenth-century vegetation and fire regimes to examine the role of fire, topography, and substrate interactions in shaping landscape and regional vegetation patterns. • Location: Our study area was the Current River watershed of the Ozark Highlands in south-central Missouri, USA. • Methods: We combined analysis of early nineteenth-century Public Land Survey (PLS) notes and dendrochronology-based fire histories to reconstruct vegetation and disturbance regimes of pine-oak (Pinus-Quercus) woodlands. Three methods were used to display and analyse PLS data within a Geographic Information System (GIS): (1) simple point distributions for each tree species; (2) section line descriptions of each tree species and other coded features (e.g. `prairie'); and (3) spatial interpolation of the point-tree data. Vegetation patterns were then related to geological parent material, topography, and mean fire-return intervals from 23 sites using correlation and Canonical Correspondence Analysis (CCA). • Results: The most striking patterns in the early 1800 s were extensive stands of shortleaf pine (Pinus echinata Mill.) and oak-dominated `barrens' (savanna) in the frequently burned areas south-west of the Current River, and more mesophytic, fire-sensitive species (red oaks (Quercus rubra L., Q. coccinea Muenchh.), maples (Acer rubrum L., Acer saccharum Marsh), eastern red cedar (Juniperus virginiana L.) in a fire shadow north-east of the river. Several kilometre-wide ecotones of pine-mixed hardwood encompassed the major pineries and barrens. Fire-return intervals and relative dominance of several tree species were strongly correlated at both fine (3-64 km^2) and coarse (> 100 km^2) spatial scales. At fine scales, relative dominance of shortleaf pine increased with increasing fire frequency during 1701-1820. Relative dominance of black oak (Q. velutina Lam.), and to a lesser extent post oak (Q. stellata Wang.), decreased with increasing fire frequency. Shortleaf pine and these xerophytic oak species occurred on similar bedrock types but were strongly differentiated by fire regimes. • Main conclusions: Fires exerted strong constraints on vegetation composition and patterns. Historical patterns of Native American occupancy in the region are consistent with the reconstructed vegetation and fire histories and suggest that anthropogenic fire regimes played an overriding role in the development of Ozark vegetation in the 1800s.
Publication Journal of Biogeography
Volume 26
Issue 2
Pages 397–412
Date March 1999
Journal Abbr J. Biogeogr.
DOI 10.1046/j.1365-2699.1999.00292.x
ISSN 0305-0270
URL http://www.jstor.org/stable/2656124
Extra Keywords: vegetation; fire history; landscape; Public Land Survey; Ozarks; geographic information system.
Date Added Tue Aug 23 02:00:21 2011
Modified Wed Aug 24 04:41:56 2011

Reconstruction of natural fire regimes through ecological modelling

Type Journal Article
Author Chao Li
Abstract To reconstruct a natural fire regime it is necessary to estimate the historical fire cycle when human influence was less evident. This can be accomplished through the construction of a fire-origin map. The dynamic fire regime is a result of interactions among forest ecosystem components under various conditions. This paper examines the question of whether an ecological modelling approach could be helpful in providing a complementary solution for reconstructing natural fire regimes. Simulation of forest fire effects has been one component of the SEM-LAND model, and simulation results were validated by empirical observations from west-central Alberta, Canada. Model sensitivity analysis revealed that model behaviour was not influenced significantly by the initial forest age mosaic pattern and the critical value of daily precipitation that would be enough to stop a fire event. The methodology of simulating fire regimes is discussed. The ecological modelling approach could help forest managers evaluate proposed forest policy with emulation of natural disturbance patterns through harvesting.
Publication Ecological Modelling
Volume 134
Issue 2-3
Pages 129–144
Date 30 October 2000
Journal Abbr Ecol. Model
DOI 10.1016/S0304-3800(00)00290-8
ISSN 0304-3800
URL http://www.sciencedirect.com/science/article/pii/S0304380000002908
Extra Keywords: natural fire regime; SEM-LAND model; simulation model; spatial data.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:29 2011

Reduced interannual rainfall variability in East Africa during the last ice age

Type Journal Article
Author Christian Wolff
Author Gerald H. Haug
Author Axel Timmermann
Author Jaap S. Sinninghe Damsté
Author Achim Brauer
Author Daniel M. Sigman
Author Mark A. Cane
Author Dirk Verschuren
Abstract Interannual rainfall variations in equatorial East Africa are tightly linked to the El Niño Southern Oscillation (ENSO), with more rain and flooding during El Niño and droughts in La Niña years, both having severe impacts on human habitation and food security. Here we report evidence from an annually laminated lake sediment record from southeastern Kenya for interannual to centennial-scale changes in ENSO-related rainfall variability during the last three millennia and for reductions in both the mean rate and the variability of rainfall in East Africa during the Last Glacial period. Climate model simulations support forward extrapolation from these lake sediment data that future warming will intensify the interannual variability of East Africa's rainfall.
Publication Science
Volume 333
Issue 6043
Pages 743-747
Date 5 August 2011
Journal Abbr Science
DOI 10.1126/science.1203724

ISSN 1095-9203
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1203724
Call Number 0000
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:26:51 2011

Reduced methane growth rate explained by decreased Northern Hemisphere microbial sources

Type Journal Article
Author Fuu Ming Kai
Author Stanley C. Tyler
Author James T. Randerson
Author Donald R. Blake
Abstract Atmospheric methane (CH_4) increased through much of the twentieth century, but this trend gradually weakened until a stable state was temporarily reached around the turn of the millennium after which levels increased once more. The reasons for the slowdown are incompletely understood, with past work identifying changes in fossil fuel, wetland and agricultural sources and hydroxyl (OH) sinks as important causal factors. Here we show that the late-twentieth-century changes in the CH_4 growth rates are best explained by reduced microbial sources in the Northern Hemisphere. Our results, based on synchronous time series of atmospheric CH_4 mixing and $^{13}C/^{12}C$ ratios and a two-box atmospheric model, indicate that the evolution of the mixing ratio requires no significant change in Southern Hemisphere sources between 1984 and 2005. Observed changes in the interhemispheric difference of ^{13}C effectively exclude reduced fossil fuel emissions as the primary cause of the slowdown. The ^{13}C observations are consistent with long-term reductions in agricultural emissions or another microbial source within the Northern Hemisphere. Approximately half ($51 \pm 18\%$) of the decrease in Northern Hemisphere CH_4 emissions can be explained by reduced emissions from rice agriculture in Asia over the past three decades associated with increases in fertilizer application and reductions in water use.
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Date 11 August 2011
Journal Abbr Nature
DOI 10.1038/nature10259
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature10259
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:17:50 2011

References on the American Indian use of fire in ecosystems

Type Document
Author Gerald W. Williams
Abstract no abstract
Publisher USDA Forest Service, Washington, D.C.
Date May 2005
URL http://www.dof.virginia.gov/fire/prescribed-smoke-mgmt.shtml
Loc. in Archive Virginia Department of Forestry
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:02 2011

Reflections on the conception, birth, and childhood of numerical weather prediction

Type Journal Article
Author Edward N. Lorenz
Abstract In recognition of the contributions of Norman Phillips and Joseph Smagorinsky to the field of numerical weather prediction (NWP), a symposium was held in 2003; this account is an amplification of a talk presented there. Ideas anticipating the advent of NWP, the first technically successful numerical weather forcast, and the subsequent progression of NWP to a mature discipline are described, with special emphasis on the work of Phillips and Smagorinsky and their mentor Jule Charney.
Publication Annual Review of Earth and Planetary Sciences
Volume 34
Pages 37-45
Date May 2006
Journal Abbr Annu. Rev. Earth Planet. Sci.
DOI 10.1146/annurev.earth.34.083105.102317
ISSN 0084-6597
URL http://www.annualreviews.org/doi/full/10.1146/annurev.earth.34.083105.102317
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:52 2011

Reframing the climate change challenge in light of post-2000 emission trends

Type Journal Article
Author Kevin Anderson
Author Alice Bows
Abstract The 2007 Bali conference heard repeated calls for reductions in global greenhouse gas emissions of 50 per cent by 2050 to avoid exceeding the 2°C threshold. While such endpoint targets dominate the policy agenda, they do not, in isolation, have a scientific basis and are likely to lead to dangerously misguided policies. To be scientifically credible, policy must be informed by an understanding of cumulative emissions and associated emission pathways. This analysis considers the implications of the 2°C threshold and a range of post-peak emission reduction rates for global emission pathways and cumulative emission budgets. The paper examines whether empirical estimates of greenhouse gas emissions between 2000 and 2008, a period typically modelled within scenario studies, combined with short-term extrapolations of current emissions trends, significantly constrains the 2000–2100 emission pathways. The paper concludes that it is increasingly unlikely any global agreement will deliver the radical reversal in emission trends required for stabilization at 450 ppmv carbon dioxide equivalent (CO_2e). Similarly, the current framing of climate change cannot be reconciled with the rates of mitigation necessary to stabilize at 550 ppmv CO_2e and even an optimistic interpretation suggests stabilization much below 650 ppmv CO_2e is improbable.
Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences
Volume 366
Issue 1882
Pages 3863-3882
Date 13 November 2008
Journal Abbr Phil. Trans. R. Soc. A.
DOI 10.1098/rsta.2008.0138
ISSN 1471-2962
URL http://rsta.royalsocietypublishing.org/content/366/1882/3863
Extra Keywords: emission scenarios; cumulative emissions; climate policy; energy; emission trends.
Date Added Mon Aug 15 23:24:26 2011
Modified Mon Aug 15 23:24:42 2011

Regeneration patterns in old-growth red fir–western white pine forests in the northern Sierra Nevada, Lake Tahoe, USA

Type Journal Article
Author Andrew E. Scholl
Author Alan H. Taylor
Abstract Red fir (Abies magnifica) forests in the Sierra Nevada are known to demonstrate both shade tolerant and disturbance related regeneration making it difficult to understand the role of disturbances in the regeneration dynamics of the forests. Four stands with different structural characteristics were selected for intensive sampling in order to capture the observed range of structural variability (e.g. composition, age, size and spatial pattern) in an old-growth red fir–western white pine (Pinus monticola) forest in the northern Sierra Nevada. We used detailed stem mapping, stand structural analysis and cross-dated fire scar samples to identify the relationships between disturbances and stand structure. All trees >5 cm dbh within four 0.5-ha plots were aged and mapped. The species composition of the plots was similar but the density and basal area of the tree populations varied among the plots. Red fir density and basal areas are greater than that of western white pine. The age structure indicated continuous, but variable recruitment and there were few seedlings and saplings. The mean point fire return interval was 76 years (range 25–175 years) for the 400-ha study area. Most fires scarred only single samples suggesting that burns were small and patchy, but pulses of recruitment suggest that some fires were moderate in severity. Regeneration pulses coincided with the dates of several fires (e.g. 1636, 1770). Moran's I, a measure of spatial autocorrelation, indicated that red fir and western white pine exhibited positive spatial autocorrelation at short (3–12 m) and intermediate (36–75 m) distances. Groups of similar age trees were spatially discrete and groups of different ages tended to overlap, resulting in an all aged forest. The spatial pattern of tree ages and the record of disturbance indicate that infrequent moderate severity fires have a lasting influence on the structure and development of old-growth red fir forests.
Publication Forest Ecology and Management
Volume 235
Issue 1-3
Pages 143–154
Date 1 November 2006
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/j.foreco.2006.08.006
ISSN 0378-1127
URL http://www.sciencedirect.com/science/article/pii/S0378112706005226
Extra Keywords: Abies magnifica; Pinus monticola; forest dynamics; disturbance; fire history; age structure; size structure; spatial patterns; Moran's I; regeneration.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:26:16 2011

Regional and local controls on postglacial vegetation and fire in the Siskiyou Mountains, northern California, USA

Type Journal Article
Author Christy E. Briles
Author Cathy Whitlock
Author Patrick J. Bartlein
Author Philip Higuera
Abstract The Siskiyou Mountains of northwestern California and southwestern Oregon are a floristic hotspot, and the high diversity of conifers there likely results from a combination of geological, ecological, climatological and historical factors. To evaluate how past climate variability has influenced the composition, structure and fire regime of the Siskiyou forests, pollen, charcoal, and lithological evidence was examined from two lakes along a moisture gradient to reconstruct the vegetation, fire and climate history. The late-glacial period was characterized by subalpine parkland and infrequent fire at both sites. During the late-glacial/Early Holocene

transition period, subalpine parkland was replaced by a closed forest of Pinus, Cupressaceae, Abies and Pseudotsuga and more frequent fires a 1000 years earlier at the wetter site, and it is likely that reduced Pacific Ocean upwelling created warmer drier conditions at the coast. In the Early Holocene, Pinus, Cupressaceae were less abundant and fire less frequent at the coastal site during a period of increased coastal upwelling and fog production. In the Late Holocene, Abies, Pseudotsuga, Pinus, and Quercus vaccinifolia increased in the forest at both sites suggesting a widespread response to cooling. Fewer fires at the wetter site may account for the abundance of Picea breweriana within the last 1000 years. The comparison of the two records implies that large-scale controls in climate during the last 14,000 cal yr BP have resulted in major changes in vegetation and fire regime. Asynchrony in the ecosystem response of wetter and drier sites arises from small-scale spatial variations in effective moisture and temperature resulting from topographically-influenced microclimates and coastal-to-inland climate gradients.

Publication Palaeogeography, Palaeoclimatology, Palaeoecology
Volume 265
Issue 1-2
Pages 159–169
Date 31 July 2008
Journal Abbr PALAEO
DOI 10.1016/j.palaeo.2008.05.007
ISSN 0031-0182
URL http://www.sciencedirect.com/science/article/pii/S0031018208003234
Extra Keywords: Pacific Northwest; Siskiyou Mountains; vegetation history; biological diversity controls; climate change; synchrony.
Date Added Wed Aug 24 12:15:01 2011
Modified Fri Aug 26 20:33:58 2011

Regional relationships between climate and wildfire-burned area in the Interior West, USA

Type Journal Article

Author B.M. Collins
Author P.N. Omi
Author P.L. Chapman

Abstract Recent studies have linked the Atlantic Multidecadal Oscillation (AMO) and the Pacific Decadal Oscillation (PDO) with drought occurrence in the interior United States. This study evaluates the influence of AMO and PDO phases on interannual relationships between climate and wildfire-burned area during the 20th century. Palmer’s Drought Severity Index (PDSI) is strongly related to burned area at both regional and subregional scales. In the southern Interior West, PDSI is most strongly related to yearly burned area during warm-phase AMO, while for the same period no significant relationships exist between PDSI and burned area in the central Interior West. During cool-phase PDO, interannual climate has little influence on burned area in either the northern or the central Interior West. The opposite is true for the southern Interior West and the eastern slope of the Colorado Rockies using the Southern Oscillation Index and PDSI, respectively. The western slope of the Colorado Rockies is the only climate division or region in which burned area is not related to preceding PDSI. During warm-phase PDO, current PDSI explains 67% of the interannual variance in burned area on the western slope. These regional and temporal differences are most likely governed by variations in fuel dynamics associated with dominant regional and subregional vegetation types.

Publication Can. J. For. Res
Volume 36
Date 2006
Library Catalog Google Scholar
Call Number 0034
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

Regions of autumn Eurasian snow cover and associations with North American winter temperatures

Type Journal Article
Author Thomas L. Mote
Author Emily R. Kutney
Abstract The extent of snow cover over Eurasia during autumn has been shown to be influential in shaping atmospheric circulation over the Northern Hemisphere the following winter via the Arctic Oscillation (AO), North Atlantic Oscillation (NAO), and the Pacific/North American (PNA) teleconnections. Regions of Eurasian snow cover were derived from Principal Component Analysis and compared to winter temperatures across North America for 1967/1968–2007/2008, excluding 1969/1970 and 1971/1972. The score time series of each principal component was then compared to winter averages of the AO, NAO, and PNA indices in order to identify possible links in the snow-temperature relationship. Results showed that autumn snow cover from northern Scandinavia to the West Siberian Plain is most significantly associated with winter temperatures over the interior of North America. More (less) frequent snow cover over this region is related to lower (higher) winter temperatures over the interior of North America in January, extending to the eastern and southern United States in February. The greatest temperature response to anomalous snow cover occurred near the geographic centre of North America where winter temperature differences exceeded 5 °C. More (less) frequent autumn snow cover across the eastern Tibetan Plateau was associated with higher (lower) temperatures in the Great Basin and eastern Canada.
Publication International Journal of Climatology
Volume Article first published online
Pages 14 p.
Date 17 May 2011
Journal Abbr Int. J. Climatol.
DOI 10.1002/joc.2341
ISSN 0899-8418
URL http://onlinelibrary.wiley.com/doi/10.1002/joc.2341/full
Extra Keywords: snow cover; Eurasia; Arctic Oscillation; Pacific/North American teleconnection.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:47:49 2011

Relations between El Niño/Southern Oscillation anomalies and wildland fire activity in the United States

Type Journal Article
Author Albert J. Simard
Author Donald A. Haines
Author William A. Main
Abstract The 1982--1983 El Nino resulted in climatic anomalies on a global scale, including record high wildland fire activity in Indonesia and record low activity in the United States. This paper describes the El Nino/Southern Oscillation phenomena and possible teleconnections to United States weather. Because precursors of an El Nino may be evident several months before the onset of an event, the phenomena has potential for long-range fire activity predictions. Using 53 years of data, we tested the hypothesis that El Nino events affect annual fire occurrence and area burned in the United States. We found a statistically significant relation between El Nino events and decreased fire activity in the South. Results for the North-Central and Eastern states are weak or inconsistent. There is no evidence for any relation with the Pacific Coast or Rocky Mountain states. Despite the coarse, exploratory nature of this study, the results are sufficiently encouraging to warrant more detailed examination.
Publication Agricultural and Forest Meteorology
Volume 36
Issue 2
Pages 93–104

Date December 1985
Journal Abbr Agr. Forest Meteorol.
DOI 10.1016/0168-1923(85)90001-2
ISSN 0168-1923
URL http://www.sciencedirect.com/science/article/pii/0168192385900012
Date Added Sun Aug 28 17:26:09 2011
Modified Sun Aug 28 17:31:10 2011

Relationships of subalpine forest fires in the Colorado Front Range with interannual and multidecadal-scale climatic variation

Type Journal Article
Author Jason S. Sibold
Author Thomas T. Veblen
Abstract • Aim: An understanding of past relationships between fire occurrence and climate variability will help to elucidate the implications of climate-change scenarios for future patterns of wildfire. In the present study we investigate the relationships between subalpine-zone fire occurrence and climate variability and broad-scale climate patterns in the Pacific and Atlantic Oceans at both interannual and multidecadal time-scales. • Location: The study area is the subalpine zone of Engelmann spruce (Picea engelmannii) and subalpine fir (Abies lasiocarpa), and lodgepole pine (Pinus contorta) in the southern sector of the Rocky Mountain National Park, which straddles the continental divide of the northern Colorado Front Range. • Methods: We compared years of widespread fire from AD 1650 to 1978 for the subalpine zone of southern Rocky Mountain National Park, with climate variables such as measures of drought, and indices such as the El Niño–Southern Oscillation (ENSO), the Pacific Decadal Oscillation (PDO), and the Atlantic Multidecadal Oscillation (AMO). • Results: Years of extensive subalpine-zone fires are significantly related to climate variability, phases of ENSO, the PDO, and the AMO, as well as to phase combinations of ENSO, the PDO, and the AMO at both interannual and centennial time-scales. • Main conclusions: Years of extensive fires are related to extreme drought conditions and are significantly related to the La Niña phase of ENSO, the negative (cool) phase of the PDO, and the positive (warm) phase of the AMO. The co-occurrence of the phase combination of La Niña-negative PDO-positive AMO is more important to fire occurrence than the individual influences of the climate patterns. Low-frequency trends in the occurrence of this combination of climate-pattern phases, resulting from trends in the AMO, are the primary climate pattern associated with periods of high fire occurrence (1700–89 and 1851–1919) and a fire-free period (1790–1850). The apparent controlling influence of the AMO on drought and years of large fires in the subalpine forests of the Colorado Front Range probably applies to an extensive area of western North America.
Publication Journal of Biogeography
Volume 33
Issue 5
Pages 833-842
Date May 2006
Journal Abbr J. Biogeogr.
DOI 10.1111/j.1365-2699.2006.01456.x
ISSN 0305-0270
URL http://doi.wiley.com/10.1111/j.1365-2699.2006.01456.x
Extra Keywords: Abies lasiocarpa; Atlantic Multidecadal Oscillation; El Niño–Southern Oscillation; fire–climate relationships; Pacific Decadal Oscillation; Picea engelmannii; Pinus contorta; subalpine forests.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:29:58 2011

Relative importance of fuel management, ignition management and weather for area burned: Evidence from five landscape–fire–succession models

Type Journal Article
Author Geoffrey J. Cary
Author Mike D. Flannigan
Author Robert E. Keane
Author Ross A. Bradstock
Author Ian D. Davies
Author James M. Lenihan
Author Chao Li
Author Kimberley A. Logan
Author Russell A. Parsons
Abstract The behaviour of five landscape fire models (CAFÉ, FIRESCAPE, LAMOS(HS), LANDSUM and SEM-LAND) was compared in a standardised modelling experiment. The importance of fuel management approach, fuel management effort, ignition management effort and weather in determining variation in area burned and number of edge pixels burned (a measure of potential impact on assets adjacent to fire-prone landscapes) was quantified for a standardised modelling landscape. Importance was measured as the proportion of variation in area or edge pixels burned explained by each factor and all interactions among them. Weather and ignition management were consistently more important for explaining variation in area burned than fuel management approach and effort, which were found to be statistically unimportant. For the number of edge pixels burned, weather and ignition management were generally more important than fuel management approach and effort. Increased ignition management effort resulted in decreased area burned in all models and decreased number of edge pixels burned in three models. The findings demonstrate that year-to-year variation in weather and the success of ignition management consistently prevail over the effects of fuel management on area burned in a range of modelled ecosystems.
Publication International Journal of Wildland Fire
Volume 18
Issue 2
Pages 147-156
Date April 2009
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07085
ISSN 1448-5516
Short Title Relative importance of fuel management, ignition management and weather for area burned
URL http://dx.doi.org/10.1071/WF07085
Extra Keywords: CAFÉ; fire management; FIRESCAPE; LAMOS; LANDSUM; model comparison; SEM-LAND; simulation modelling.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:23 2011

Relative importance of weather and climate on wildfire growth in interior Alaska

Type Journal Article
Author John T. Abatzoglou
Author Crystal A. Kolden
Abstract Efforts to quantify relationships between climate and wildfire in Alaska have not yet explored the role of higher-frequency meteorological conditions on individual wildfire ignition and growth. To address this gap, meteorological data for 665 large fires that burned across the Alaskan interior between 1980 and 2007 were assessed to determine the respective influence of higher-frequency weather and lower-frequency climate, in terms of both antecedent and post-ignition conditions on fire growth. Antecedent climate exhibited no discernable influence on eventual fire size. In contrast, fire size was sensitive to weather in the days to weeks following ignition, particularly the post-ignition timing of precipitation. Prolonged periods of warm and dry conditions coincident with blocking that persists for several weeks after ignition enabled growth of large wildfires, whereas the return of wetting precipitation generally within a week after ignition inhibited growth of

smaller wildfires. These results suggest that daily weather data are a critical predictor of fire growth and large fire potential and encourage their use in fire management and modelling.

Publication International Journal of Wildland Fire
Volume 20
Issue 4
Pages 479
Date June 2011
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF10046
ISSN 1448-5516
URL http://www.publish.csiro.au/?paper=WF10046
Call Number 0000
Extra Keywords: boreal forest; fire danger indices.
Date Added Tue Jul 12 10:22:23 2011
Modified Mon Aug 15 22:51:06 2011

Research applications of ecosystem patterns

Type Conference Paper
Author Robert G. Bailey
Abstract This article discusses the origins of natural ecosystem patterns from global to local scales. It describes how understanding these patterns can help scientists and managers in two ways. First, the local systems are shown within the context of larger systems. This perspective can be applied in assessing the connections between action at one scale and effect at another, the spatial transferability of models, and the links between terrestrial and aquatic systems. Second, scientists and managers can benefit because they gain information about the geographic patterns in ecosystems. Consequently, they are in a better position to design sampling networks, transfer knowledge, and analyze ecosystem diversity. The usefulness of multiscale analysis of ecosystem patterns suggests new scientific directions for research and points the way for restructuring the Forest Service, U.S. Department of Agriculture research programs.
Date October 16-19, 2006
Proceedings Title Proceedings of the Eighth Annual Forest Inventory and Analysis Symposium
Conference Name Annual Forest Inventory and Analysis Symposium
Place Monterey, CA.
Publisher U.S. Department of Agriculture, Forest Service: Washington, DC
Pages 83-90
Series General Technical Report WO-79
URL http://www.treesearch.fs.fed.us/pubs/17256
Date Added Tue Aug 16 11:56:10 2011
Modified Tue Aug 16 11:56:10 2011

Notes:

Citation:

Bailey, Robert G. 2009. Research applications of ecosystem patterns. In: McRoberts, Ronald E.; Reams, Gregory A.; Van Deusen, Paul C.; McWilliams, William H., eds. Proceedings of the eighth annual forest inventory and analysis symposium; 2006 October 16-19; Monterey, CA. Gen. Tech. Report WO-79. Washington, DC: U.S. Department of Agriculture, Forest Service. 83-90.

Research News: NASA Research Finds 2010 Tied for Warmest Year on Record

Type Web Page
Author NASA
Abstract Global surface temperatures in 2010 tied 2005 as the warmest on record, according to an analysis released Wednesday by researchers at NASA's Goddard Institute for Space Studies (GISS) in New York.
Website Title National Aeronautics and Space Administration: Goddard Institute for Space Studies
Date 2011
URL http://www.giss.nasa.gov/research/news/20110112/
Rights NASA
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

Resilience and vulnerability of permafrost to climate change

Type Journal Article
Author M. Torre Jorgenson
Author Vladimir Romanovsky
Author Jennifer Harden
Author Yuri Shur
Author Jonathan O'Donnell
Author Edward A. G. Schuur
Author Mikhail Kanevskiy
Author Sergei Marchenko
Abstract The resilience and vulnerability of permafrost to climate change depends on complex interactions among topography, water, soil, vegetation, and snow, which allow permafrost to persist at mean annual air temperatures (MAATs) as high as +2 °C and degrade at MAATs as low as –20 °C. To assess these interactions, we compiled existing data and tested effects of varying conditions on mean annual surface temperatures (MASTs) and 2 m deep temperatures (MADTs) through modeling. Surface water had the largest effect, with water sediment temperatures being ~10 °C above MAAT. A 50% reduction in snow depth reduces MADT by 2 °C. Elevation changes between 200 and 800 m increases MAAT by up to 2.3 °C and snow depths by ~40%. Aspect caused only a ~1 °C difference in MAST. Covarying vegetation structure, organic matter thickness, soil moisture, and snow depth of terrestrial ecosystems, ranging from barren silt to white spruce (Picea glauca (Moench) Voss) forest to tussock shrub, affect MASTs by ~6 °C and MADTs by ~7 °C. Groundwater at 2–7 °C greatly affects lateral and internal permafrost thawing. Analyses show that vegetation succession provides strong negative feedbacks that make permafrost resilient to even large increases in air temperatures. Surface water, which is affected by topography and ground ice, provides even stronger negative feedbacks that make permafrost vulnerable to thawing even under cold temperatures.
Publication Canadian Journal of Forest Research
Volume 40
Issue 7
Pages 1219–1236
Date July 2010
Journal Abbr Can. J. For. Res.
DOI 10.1139/X10-060
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/full/10.1139/X10-060
Call Number 0014
Extra This article is one of a selection of papers from The Dynamics of Change in Alaska's Boreal Forests: Resilience and Vulnerability in Response to Climate Warming.
Date Added Sun Sep 4 03:39:13 2011
Modified Mon Sep 5 10:11:07 2011

Resilience of Alaska’s boreal forest to climatic change

Type	Journal Article
Author	F. Stuart Chapin III
Author	A. David McGuire
Author	Roger W. Ruess
Author	Teresa N. Hollingsworth
Author	Michelle C. Mack
Author	Jill F. Johnstone
Author	Eric S. Kasischke
Author	Eugenie S. Euskirchen
Author	Jeremy B. Jones
Author	M. Torre Jorgenson
Author	Knut Kielland
Author	Gary P. Kofinas
Author	Merritt R. Turetsky
Author	John Yarie
Author	Andrea H. Lloyd
Author	D. Lee Taylor
Abstract	This paper assesses the resilience of Alaska’s boreal forest system to rapid climatic change. Recent warming is associated with reduced growth of dominant tree species, plant disease and insect outbreaks, warming and thawing of permafrost, drying of lakes, increased wildfire extent, increased postfire recruitment of deciduous trees, and reduced safety of hunters traveling on river ice. These changes have modified key structural features, feedbacks, and interactions in the boreal forest, including reduced effects of upland permafrost on regional hydrology, expansion of boreal forest into tundra, and amplification of climate warming because of reduced albedo (shorter winter season) and carbon release from wildfires. Other temperature-sensitive processes for which no trends have been detected include composition of plant and microbial communities, long-term landscape-scale change in carbon stocks, stream discharge, mammalian population dynamics, and river access and subsistence opportunities for rural indigenous communities. Projections of continued warming suggest that Alaska’s boreal forest will undergo significant functional and structural changes within the next few decades that are unprecedented in the last 6000 years. The impact of these social–ecological changes will depend in part on the extent of landscape reorganization between uplands and lowlands and on policies regulating subsistence opportunities for rural communities.
Publication	Canadian Journal of Forest Research
Volume	40
Issue	7
Pages	1360-1370
Date	July 2010
Journal Abbr	Can. J. For. Res.
DOI	10.1139/X10-074
ISSN	1208-6037
URL	http://www.nrcresearchpress.com/doi/abs/10.1139/X10-074
Call Number	0008
Extra	This article is one of a selection of papers from The Dynamics of Change in Alaska’s Boreal Forests: Resilience and Vulnerability in Response to Climate Warming.
Date Added	Sun Sep 4 02:02:21 2011
Modified	Mon Sep 5 10:11:19 2011

Resilience of the boreal forest in response to Holocene fire-frequency changes assessed by pollen diversity and population dynamics

Type Journal Article
Author Christopher Carcaillet
Author Pierre J. H. Richard
Author Yves Bergeron
Author Bianca Fréchette
Author Adam A. Ali
Abstract The hypothesis that changes in fire frequency control the long-term dynamics of boreal forests is tested on the basis of paleodata. Sites with different wildfire histories at the regional scale should exhibit different vegetation trajectories. Mean fire intervals and vegetation reconstructions are based respectively on sedimentary charcoal and pollen from two small lakes, one in the Mixedwood boreal forests and the second in the Coniferous boreal forests. The pollen-inferred vegetation exhibits different trajectories of boreal forest dynamics after afforestation, whereas mean fire intervals have no significant or a delayed impact on the pollen data, either in terms of diversity or trajectories. These boreal forests appear resilient to changes in fire regimes, although subtle modifications can be highlighted. Vegetation compositions have converged during the last 1200 years with the decrease in mean fire intervals, owing to an increasing abundance of boreal species at the southern site (Mixedwood), whereas changes are less pronounced at the northern site (Coniferous). Although wildfire is a natural property of boreal ecosystems, this study does not support the hypothesis that changes in mean fire intervals are the key process controlling long-term vegetation transformation. Fluctuations in mean fire intervals alone do not explain the historical and current distribution of vegetation, but they may have accelerated the climatic process of borealisation, likely resulting from orbital forcing.
Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 1026–1039
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09097
ISSN 1448-5516
URL http://www.publish.csiro.au/?paper=WF09097
Extra Keywords: climate; fire; Holocene; lake sediments; numerical analysis; pollen diversity.
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:07:56 2011

Response of plant functional types to changes in the fire regime in Mediterranean ecosystems: A simulation approach

Type Journal Article
Author Juli G. Pausas
Abstract In the Mediterranean basin, the climate is predicted to be warmer and effectively drier, leading to changes in fuel conditions and fire regime. Land abandonment in the Mediterranean basin is also changing the fire regime through the increase in fuel loads. In the present study, two simulation models of vegetation dynamics were tested in order to predict changes in plant functional types due to changes in fire recurrence in eastern Spain. The two modelling approaches are the FATE-model (based on vital attributes) and the gap model BROLLA (based on the gap-phase theory). The models were arranged to simulate four functional types, based mainly on their regenerative strategies after disturbance: Quercus (resprouter), Pinus (non-resprouter with serotinous cones), Erica (resprouter), and Cistus (non-resprouter with germination stimulated by fire). The simulation results suggested a decrease in Quercus abundance, an increase in Cistus and Erica, and a maximum of Pinus at intermediate recurrence scenarios. Despite their different approaches, both models predicted a similar response to increased fire recurrence, and the results were consistent with field observations.
Publication Journal of Vegetation Science
Volume 10
Issue 5

Pages 717–722
Date October 1999
Journal Abbr J. Veg. Sci.
DOI 10.2307/3237086
ISSN 1100-9233
Short Title Response of plant functional types to changes in the fire regime in Mediterranean ecosystems
URL http://www.jstor.org/stable/3237086
Extra Keywords: disturbance; fire recurrence; functional group; gap modelling; liife form; Spain.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:29:47 2011

Response of vegetation and fire to Little Ice Age climate change: Regional continuity and landscape heterogeneity

Type Journal Article
Author Sara C. Hotchkiss
Author Randy Calcote
Author Elizabeth A. Lynch
Abstract Late-Holocene climatic conditions in the upper Great Lakes region have changed sufficiently to produce significant changes in vegetation and fire regimes. The objective of this study was to determine how the vegetation mosaic and fire regimes on an oak (Quercus spp.)- and pine (Pinus spp.)-dominated sand plain in northwestern Wisconsin responded to climatic changes of the past 1,200 years. We used pollen and charcoal records from a network of sites to investigate the range of natural variability of vegetation on a 1,500-km² landscape on the southern part of the sand plain. A major vegetation shift from jack pine (Pinus banksiana) and red pine (P. resinosa) to increased abundance of white pine (P. strobus) occurred between 700 and 600 calendar years before present (cal yr BP), apparently corresponding to more mesic conditions regionally. A decrease in charcoal accumulation rate also occurred at most sites but was not synchronous with the vegetation change. At some sites there were further changes in vegetation and fire regimes occurring ~500–300 cal yr BP, but these changes were not as strong or unidirectional as those that occurred 700–600 cal yr BP. Our results suggest that both the composition and the distribution of vegetation of the southern part of the sand plain have been sensitive to relatively small climatic changes, and that the vegetation at the time of European settlement was a transitory phenomenon, rather than a long-term stable condition.
Publication Landscape Ecology
Volume 22
Issue S1
Pages 25-41
Date December 2007
Journal Abbr Landscape Ecol.
DOI 10.1007/s10980-007-9133-3
ISSN 0921-2973
Short Title Response of vegetation and fire to Little Ice Age climate change
URL http://www.springerlink.com/content/c06843k384131371/
Extra Keywords: charcoal analysis; fire history; landscape history; Little Ice Age; climatic change; pollen analysis; sand plain; vegetation history; Wisconsin.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:30:54 2011

Responses of terrestrial ecosystems and carbon budgets to current and future environmental variability

Type Journal Article

Author David Medvigy
Author Steven C. Wofsy
Author J. William Munger
Author Paul R. Moorcroft

Abstract We assess the significance of high-frequency variability of environmental parameters (sunlight, precipitation, temperature) for the structure and function of terrestrial ecosystems under current and future climate. We examine the influence of hourly, daily, and monthly variance using the Ecosystem Demography model version 2 in conjunction with the long-term record of carbon fluxes measured at Harvard Forest. We find that fluctuations of sunlight and precipitation are strongly and nonlinearly coupled to ecosystem function, with effects that accumulate through annual and decadal timescales. Increasing variability in sunlight and precipitation leads to lower rates of carbon sequestration and favors broad-leaved deciduous trees over conifers. Temperature variability has only minor impacts by comparison. We also find that projected changes in sunlight and precipitation variability have important implications for carbon storage and ecosystem structure and composition. Based on Intergovernmental Panel on Climate Change model estimates for changes in high-frequency meteorological variability over the next 100 years, we expect that terrestrial ecosystems will be affected by changes in variability almost as much as by changes in mean climate. We conclude that terrestrial ecosystems are highly sensitive to high-frequency meteorological variability, and that accurate knowledge of the statistics of this variability is essential for realistic predictions of ecosystem structure and functioning.

Publication Proceedings of the National Academy of Sciences
Volume 107
Issue 18
Pages 8275-8280
Date May 4, 2010
Journal Abbr PNAS
DOI 10.1073/pnas.0912032107
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.0912032107
Extra Keywords: carbon fluxes; climate variability; climate-ecosystem models; terrestrial biosphere; Harvard Forest.
Date Added Tue Aug 30 14:35:38 2011
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Rethinking adaptation for a 4°C world

Type Journal Article
Author Mark Stafford Smith
Author Lisa Horrocks
Author Alex Harvey
Author Clive Hamilton

Abstract With weakening prospects of prompt mitigation, it is increasingly likely that the world will experience 4°C and more of global warming. In such a world, adaptation decisions that have long lead times or that have implications playing out over many decades become more uncertain and complex. Adapting to global warming of 4°C cannot be seen as a mere extrapolation of adaptation to 2°C; it will be a more substantial, continuous and transformative process. However, a variety of psychological, social and institutional barriers to adaptation are exacerbated by uncertainty and long timeframes, with the danger of immobilizing decision-makers. In this paper, we show how complexity and uncertainty can be reduced by a systematic approach to categorizing the interactions between decision lifetime, the type of uncertainty in the relevant drivers of change and the nature of adaptation response options. We synthesize a number of issues previously raised in the literature to link the categories of interactions to a variety of risk-management strategies and tactics. Such application could help to break down some barriers to adaptation and both simplify and better target adaptation decision-making. The approach needs to be tested and adopted rapidly.

Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences
Volume 369
Issue 1934

Pages 196-216
Date 13 January 2011
Journal Abbr Phil. Trans. R. Soc. A.
DOI 10.1098/rsta.2010.0277
ISSN 1364-503X
URL http://rsta.royalsocietypublishing.org/cgi/doi/10.1098/rsta.2010.0277
Extra Keywords: adaptation; uncertainty; decision-making; risk management; complexity; climate change.
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:41 2011

Review of scenario selection and downscaling methods for the assessment of climate change impacts on hydrology in the United States pacific northwest

Type Journal Article
Author Eric P. Salathé Jr.
Author Philip W. Mote
Author Matthew W. Wiley
Abstract This paper reviews methods that have been used to evaluate global climate simulations and to downscale global climate scenarios for the assessment of climate impacts on hydrologic systems in the Pacific Northwest, USA. The approach described has been developed to facilitate integrated assessment research in support of regional resource management. Global climate model scenarios are evaluated and selected based on historic 20th century simulations. A statistical downscaling method is then applied to produce a regional data set. To facilitate the use of climate projections in hydrologic assessment, additional statistical mapping may be applied to generate synthetic station time series. Finally, results are presented from a regional climate model that indicate important differences in the regional climate response from what is captured by global models and statistical downscaling.
Publication International Journal of Climatology
Volume 27
Issue 12
Pages 1611–1621
Date October 2007
Journal Abbr Int. J. Climatol.
DOI 10.1002/joc.1540
ISSN 1097-0088
URL http://onlinelibrary.wiley.com/doi/10.1002/joc.1540/abstract
Extra Keywords: climate impacts; downscalling; hydrologic modelling; climate change; regional climate modelling.
Date Added Sun Aug 28 17:22:07 2011
Modified Sun Aug 28 17:22:07 2011

Risk of natural disturbances makes future contribution of Canada's forests to the global carbon cycle highly uncertain

Type Journal Article
Author Werner A. Kurz
Author Graham Stinson
Author Gregory J. Rampley
Author Caren C. Dymond
Author Eric T. Neilson

Abstract A large carbon sink in northern land surfaces inferred from global carbon cycle inversion models led to concerns during Kyoto Protocol negotiations that countries might be able to avoid efforts to reduce fossil fuel emissions by claiming large sinks in their managed forests. The greenhouse gas balance of Canada's managed forest is strongly affected by naturally occurring fire with high interannual variability in the area burned and by cyclical insect outbreaks. Taking these stochastic future disturbances into account, we used the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) to project that the managed forests of Canada could be a source of between 30 and 245 Mt CO_2e yr^{-1} during the first Kyoto Protocol commitment period (2008–2012). The recent transition from sink to source is the result of large insect outbreaks. The wide range in the predicted greenhouse gas balance (215 Mt CO_2e yr^{-1}) is equivalent to nearly 30% of Canada's emissions in 2005. The increasing impact of natural disturbances, the two major insect outbreaks, and the Kyoto Protocol accounting rules all contributed to Canada's decision not to elect forest management. In Canada, future efforts to influence the carbon balance through forest management could be overwhelmed by natural disturbances. Similar circumstances may arise elsewhere if global change increases natural disturbance rates. Future climate mitigation agreements that do not account for and protect against the impacts of natural disturbances, for example, by accounting for forest management benefits relative to baselines, will fail to encourage changes in forest management aimed at mitigating climate change.

Publication Proceedings of the National Academy of Sciences
Volume 105
Issue 5
Pages 1551-1555
Date February 5, 2008
Journal Abbr PNAS
DOI 10.1073/pnas.0708133105
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.0708133105
Extra Keywords: greenhouse gases; factoring out; mitigation options; forest management; Kyoto Protocol.
Date Added Tue Aug 30 14:37:15 2011
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Role of land cover changes for atmospheric CO_2 increase and climate change during the last 150 years

Type Journal Article
Author Victor Brovkin
Author Stephen Sitch
Author Werner von Bloh
Author Martin Claussen
Author Eva Bauer
Author Wolfgang Cramer
Abstract We assess the role of changing natural (volcanic, aerosol, insolation) and anthropogenic (CO_2 emissions, land cover) forcings on the global climate system over the last 150 years using an earth system model of intermediate complexity, CLIMBER-2. We apply several datasets of historical land-use reconstructions: the cropland dataset by Ramankutty & Foley (1999) (R&F), the HYDE land cover dataset of Klein Goldewijk (2001), and the land-use emissions data from Houghton & Hackler (2002). Comparison between the simulated and observed temporal evolution of atmospheric CO_2 and $\delta^{13}CO_2$ are used to evaluate these datasets. To check model uncertainty, CLIMBER-2 was coupled to the more complex Lund–Potsdam–Jena (LPJ) dynamic global vegetation model. In simulation with R&F dataset, biogeophysical mechanisms due to land cover changes tend to decrease global air temperature by 0.26°C, while biogeochemical mechanisms act to warm the climate by 0.18°C. The net effect on climate is negligible on a global scale, but pronounced over the land in the temperate and high northern latitudes where a cooling due to an increase in land surface albedo offsets the warming due to land-use CO_2 emissions. Land cover changes led to estimated increases in atmospheric CO_2 of between 22 and 43 ppmv. Over the entire period 1800–2000, simulated $\delta^{13}CO_2$ with HYDE compares most favourably with ice core during 1850–1950 and Cape Grim data, indicating preference of earlier land clearance in HYDE over R&F. In relative terms, land cover forcing corresponds to 25–49% of the observed growth in atmospheric CO_2. This contribution declined from 36–60% during 1850–1960 to 4–35% during 1960–2000. CLIMBER-2-LPJ

simulates the land cover contribution to atmospheric CO_2 growth to decrease from 68% during 1900–1960 to 12% in the 1980s. Overall, our simulations show a decline in the relative role of land cover changes for atmospheric CO_2 increase during the last 150 years.

Publication	Global Change Biology
Volume	10
Issue	8
Pages	1253-1266
Date	August 2004
Journal Abbr	Glob. Change Biol.
DOI	10.1111/j.1365-2486.2004.00812.x
ISSN	13541013
URL	http://doi.wiley.com/10.1111/j.1365-2486.2004.00812.x
Extra	Keywords: atmospheric CO_2 concentration; atmospheric $\delta^{13}CO_2$; biogeophysical effects; biosphere–atmosphere interaction; earth system modelling; historical land cover changes; interactive carbon cycle.
Date Added	Wed Aug 24 12:30:45 2011
Modified	Fri Aug 26 20:34:25 2011

Role of tropical Pacific SSTs in global medieval hydroclimate: A modeling study

Type	Journal Article
Author	Robert Burgman
Author	Richard Seager
Author	Amy Clement
Author	Celine Herweijer
Abstract	The role of tropical Pacific SSTs in driving global medieval hydroclimate is assessed. Using fossil coral records from Palmyra Atoll, tropical Pacific sea surface temperature (SST) boundary conditions are derived for the period 1320–1462 A.D. These boundary conditions consist of La Niña-like mean state conditions in the tropical Pacific with inter-annual and decadal variability about that altered state. The reconstructed SSTs in the tropical Pacific are used to force a 16 member ensemble of atmospheric general circulation model (AGCM) simulations, coupled to a one layer ocean model outside of the tropical Pacific. The AGCM simulations of medieval climate are compared with modern climate simulations for the period 1856–2005 A.D. and are shown to reproduce many aspects of medieval hydroclimate found in paleo-proxy records for much of the Western Hemisphere, northern Eurasia, and the northern tropics. These results suggest that many features of global medieval hydroclimate changes can be explained by changes in tropical Pacific SSTs, though the potential role for other oceans is also discussed.
Publication	Geophysical Research Letters
Volume	37
Issue	6
Pages	L06705 (6 p.)
Date	March 2010
Journal Abbr	Geophys. Res. Lett.
DOI	10.1029/2009GL042239
ISSN	0094–8276
Short Title	Role of tropical Pacific SSTs in global medieval hydroclimate
URL	http://www.agu.org/journals/gl/gl1006/2009GL042239/
Extra	Keywords: hydroclimate; medieval; paleoclimate.
Date Added	Thu Aug 25 10:47:25 2011
Modified	Wed Aug 31 00:34:03 2011

Rossby wave propagation and teleconnection patterns in the austral winter

Type Journal Article
Author Tércio Ambrizzi
Author Brian J. Hoskins
Author Huang-Hsiung Hsu
Abstract Observational evidence of and theoretical support for the Northern and Southern Hemisphere teleconnection patterns in the austral (Southern Hemisphere) winter are examined through an upper troposphere streamfunction teleconnectivity map and time-lag cross-correlation analysis using ECMWF initialized analysis 2OO-hPa winds for the 11 June-August periods from 1979 to 1989.As was previously found for the Northern Hemisphere winter, the regions of strong teleconnectivity, particularly in the winter hemisphere, tend to he oriented in the zonal direction and coincide with the location of the major jet streams. Although equatorward propagation from the Northern and Southern Hemispheres is observed, little evidence of cross-equatorial propagation has been found.For comparison, the response of a barotropic model, linearized about a climatological 300-hPa June-August time-mean flow to localized forcing is determined. It is found that the activity tends to be trapped inside each of the Southern Hemisphere subtropical and polar jet streams, with these acting as waveguides. In the Northern Hemisphere a weak waveguide belt is found near 40°N around the whole hemisphere. The patterns simulated by the model are generally in good agreement with the teleconnectivity study described above. Both the observations and the model support the existence of the Pacific-South American pattern.
Publication Journal of the Atmospheric Sciences
Volume 52
Issue 21
Pages 3661-3672
Date November 1995
Journal Abbr J. Atmos. Sci.
DOI 10.1175/1520-0469(1995)052<3661:RWPATP>2.0.CO;2
ISSN 0022-4928
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0469%281995%29052%3C3661%3ARWPATP%3E2.0.CO%3B2
Archive http://www.met.reading.ac.uk/~swr07rmf/Ambrizzi_Hoskins_Hsu_1995.pdf
Call Number 0000
Date Added Wed Sep 21 22:41:09 2011
Modified Wed Sep 28 17:53:49 2011

Rossby wave propagation on a realistic longitudinally varying flow

Type Journal Article
Author Brian J. Hoskins
Author Tercio Ambrizzi
Abstract The response of a barotropic model, linearized about a climatological 300-mb December– February time-mean flow to localized forcing, is considered. In order to aid the design of the experiments and interpretation of the results, a simplified analysis is made of the basic flow in terms of zonal wind, meridional vorticity gradient, and stationary wavenumber. From the analysis the possible existence of a strong waveguide in the Asian jet and weaker waveguides in the North Atlantic and Southern Hemisphere jets is deduced. The possibility of propagation into the equatorial east Pacific and Atlantic oceans and even across these regions is also suggested. These features are confirmed by barotropic model integrations for a variety of perturbation vorticity source positions and shapes. These integrations also show preferred propagation regions arching across North America, from Europe to the Arabian Gulf and, in the Southern Hemisphere, into the equatorial Indian Ocean and Indonesian regions. They also show a tendency to produce a low-wavenumber, fast westward-moving “tail” along the Asian jet. Many of the features found in this study are remarkably consistent with observational teleconnection studies.
Publication Journal of the Atmospheric Sciences
Volume 50
Issue 12

Pages 1661-1671
Date June 1993
Journal Abbr J. Atmos. Sci.
DOI 10.1175/1520-0469(1993)050<1661:RWPOAR>2.0.CO;2
ISSN 0022-4928
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0469%281993%29050%3C1661%3ARWPOAR%3E2.0.CO%3B2
Call Number 0282
Date Added Thu Sep 22 03:17:57 2011
Modified Wed Sep 28 17:54:05 2011

Royal Society's climate change guide cuts confusion out of the hard science: UK's 'definitive voice of science' hopes guide will counter misunderstanding and bogus claims about man-made global warming

Type Web Page
Author Duncan Clark
Website Title guardian.co.uk
Website Type Guardian News and Media
Date 2010-09-30
URL http://www.guardian.co.uk/environment/2010/sep/30/royal-society-climate-change-guide

Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:03:25 2011

Satellite- and ground-based CO total column observations over 2010 Russian fires: Accuracy of top-down estimates based on thermal IR satellite data

Type Journal Article
Author Leonid Yurganov
Author Vadim Rakitin
Author Anatoliy Dzhola
Author Thomas August
Author Ekaterina Fokeeva
Author Gennadiy Gorchakov
Author Evgeniy Grechko
Author Scott Hannon
Author Aleksey Karpov
Author Lesley Ott
Author Evgenia Semutnikova
Author Roman Shumsky
Author Larrabee Strow
Abstract Data are presented from three space sounders and two ground-based spectrometers in Moscow and its suburbs during the forest and peat fires that occurred in Central Russia in July–August 2010. The Moscow area was strongly impacted by the CO plume from these fires. Concurrent satellite- and ground-based observations were used to quantify the errors of CO top-down emission estimates. On certain days, CO total columns retrieved from the data of the space-based sounders were 2–3 times less than those obtained from the ground-based sun-tracking spectrometers. The depth of the polluted layer over Moscow was estimated using total column measurements compared with CO volume mixing ratios in the surface layer and on the TV tower and found to be between 180 and 360 m. The missing CO that is the average difference between the CO total column

accurately determined by the ground spectrometer and that retrieved by MOPITT and AIRS, was determined for the Moscow area as ~3 E18 molec cm^{-2}. This value was extrapolated onto the entire plume; subsequently, the CO burden (total mass) over Russia during the fire event was corrected. A top-down estimate of the total emitted CO, obtained by a simple mass balance model increased by 80%–100% due to this correction (up to 40 Tg).

Publication Atmospheric Chemistry and Physics Discussions
Volume 11
Issue 4
Pages 12207-12250
Date April 2011
Journal Abbr Atmos. Chem. Phys. Discuss.
DOI 10.5194/acpd-11-12207-2011
ISSN 1680-7375
Short Title Satellite- and ground-based CO total column observations over 2010 Russian fires
URL http://www.atmos-chem-phys-discuss.net/11/12207/2011/
Date Added Tue Aug 16 01:24:21 2011
Modified Tue Aug 16 01:24:21 2011

Savannas, barrens, and rock outcrop plant communities of North America

Type Book
Editor Roger C. Anderson
Editor James S. Fralish
Editor Jerry M. Baskin
Abstract Description: Savannas and barrens were major components of the historic North American landscape before it was extensively altered by agricultural and urban development during the past century. Rock outcrop plant communities and serpentine barrens are of interest because they are refugia for endemic species adapted to extreme environmental conditions. Many of these communities have been reduced to less than one per cent of their original area and are imperiled ecosystems. This book provides a coherent, readable summary of the technical information available on savannas, barrens and rock outcrop plant communities. It is organized by region into four parts: eastern south-eastern region, central/midwest region, western/south-western region, and northern region. Written by internationally recognized regional specialists, each chapter includes a description of the climate, geology, soils associated with the community, and information about its historic and current vegetation.
Edition 1st edition
Place Cambridge, UK; New York, NY
Publisher Cambridge University Press
Date 1999
# of Pages 488 p.
ISBN 9780521573221
URL http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511574627
Date Added Mon Aug 15 23:38:01 2011
Modified Thu Sep 1 00:09:05 2011

Related

- Deep-soil savannas and barrens of the Midwestern United States (Chapter 9)

Science and technology for sustainable development special feature: A framework for vulnerability analysis in sustainability science

Type Journal Article
Author Billie L. Turner II
Author Roger E. Kasperson
Author Pamela A. Matson
Author James J. McCarthy
Author Robert W. Corell
Author Lindsey Christensen
Author Noelle Eckley
Author Jeanne X. Kasperson
Author Amy Luers
Author Marybeth L. Martello
Author Colin Polsky
Author Alexander Pulsipher
Author Andrew M. Schiller
Abstract Global environmental change and sustainability science increasingly recognize the need to address the consequences of changes taking place in the structure and function of the biosphere. These changes raise questions such as: Who and what are vulnerable to the multiple environmental changes underway, and where? Research demonstrates that vulnerability is registered not by exposure to hazards (perturbations and stresses) alone but also resides in the sensitivity and resilience of the system experiencing such hazards. This recognition requires revisions and enlargements in the basic design of vulnerability assessments, including the capacity to treat coupled human–environment systems and those linkages within and without the systems that affect their vulnerability. A vulnerability framework for the assessment of coupled human–environment systems is presented. Research on global environmental change has significantly improved our understanding of the structure and function of the biosphere and the human impress on both (1). The emergence of "sustainability science" (2–4) builds toward an understanding of the human–environment condition with the dual objectives of meeting the needs of society while sustaining the life support systems of the planet. These objectives, in turn, require improved dialogue between science and decision making (5–8). The vulnerability of coupled human–environment systems is one of the central elements of this dialogue and sustainability research (6, 9–11). It directs attention to such questions as: Who and what are vulnerable to the multiple environmental and human changes underway, and where? How are these changes and their consequences attenuated or amplified by different human and environmental conditions? What can be done to reduce vulnerability to change? How may more resilient and adaptive communities and societies be built? Answers to these and related questions require conceptual frameworks that account for the vulnerability of coupled human–environment systems with diverse and complex linkages. Various expert communities have made considerable progress in pointing the way toward the design of these frameworks (10, 11). These advances are briefly reviewed here and, drawing on them, we present a conceptual framework of vulnerability developed by the Research and Assessment Systems for Sustainability Program (http://sust.harvard.edu) that produced the set of works in this Special Feature of PNAS. The framework aims to make vulnerability analysis consistent with the concerns of sustainability and global environmental change science. The case study by Turner et al. (12) in this issue of PNAS illustrates how the framework informs vulnerability assessments.
Publication Proceedings of the National Academy of Sciences
Volume 100
Issue 14
Pages 8074-8079
Date July 8, 2003
DOI 10.1073/pnas.1231335100
ISSN 0027-8424
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1231335100
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:59 2011

Scientific and social challenges for the management of fire-prone wildland–urban interfaces

Type Journal Article
Author A. Malcolm Gill
Author Scott L. Stephens
Abstract At their worst, fires at the rural–urban or wildland–urban interface cause tragic loss of human lives and homes, but mitigating these fire effects through management elicits many social and scientific challenges. This paper addresses four interconnected management challenges posed by socially disastrous landscape fires. The issues concern various assets (particularly houses, human life and biodiversity), fuel treatments, and fire and human behaviours. The topics considered are: 'asset protection zones'; 'defensible space' and urban fire spread in relation to house ignition and loss; 'stay-or-go' policy and the prediction of time available for safe egress and the possible conflict between the creation of defensible space and wildland management objectives. The first scientific challenge is to model the effective width of an asset protection zone of an urban area. The second is to consider the effect of vegetation around a house, potentially defensible space, on fire arrival at the structure. The third scientific challenge is to present stakeholders with accurate information on rates of spread, and where the fire front is located, so as to allow them to plan safe egress or preparation time in their particular circumstances. The fourth scientific challenge is to be able to predict the effects of fires on wildland species composition. Associated with each scientific challenge is a social challenge: for the first two scientific challenges the social challenge is to co-ordinate fuel management within and between the urban and rural or wildland sides of the interface. For the third scientific challenge, the social challenge is to be aware of, and appropriately use, fire danger information so that the potential for safe egress from a home can be estimated most accurately. Finally, the fourth social challenge is to for local residents of wildland–urban interfaces with an interest in biodiversity conservation to understand the effects of fire regimes on biodiversity, thereby assisting hard-pressed wildland managers to make informed choices.
Publication Environmental Research Letters
Volume 4
Issue 3
Pages 034014 (10 p.)
Date July-September 2009
Journal Abbr Environ. Res. Lett.
DOI 10.1088/1748-9326/4/3/034014
ISSN 1748-9326
URL http://iopscience.iop.org/1748-9326/4/3/034014/
Extra Keywords: fire behaviour; urban–wildland interface; social disasters; ‘stay-or-go’; defensible space.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:06 2011

Seasonal fire danger forecasts for the USA

Type Journal Article
Author John Roads
Author Francis Fujioka
Author Shyh-Chin Chen
Author R. Burgan
Abstract The Scripps Experimental Climate Prediction Center has been making experimental, near-real-time, weekly to seasonal fire danger forecasts for the past 5 years. US fire danger forecasts and validations are based on standard indices from the National Fire Danger Rating System (NFDRS), which include the ignition component (IC), energy release component (ER), burning index (BI), spread component (SC), and the Keetch–Byram drought index (KB). The Fosberg fire weather index, which is a simplified form of the BI, has been previously used not only for the USA but also for other global regions and is thus included for comparison. As will be shown, all of these indices can be predicted well at weekly times scales and there is even skill out to seasonal time scales over many US West locations. The most persistent indices (BI and ER) tend to have the greatest seasonal forecast skill. The NFDRS indices also have a weak relation to observed fire characteristics such as fire counts and acres burned, especially when the validation fire danger indices are used.
Publication International Journal of Wildland Fire

Volume 14
Issue 1
Pages 1–18
Date March 2005
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF03052
ISSN 1049-8001
URL http://www.publish.csiro.au/?paper=WF03052
Date Added Mon Aug 29 00:48:23 2011
Modified Mon Aug 29 22:45:11 2011

Seasonal variations in fuel and fuel consumption by fires in a bluestem prairie

Type Journal Article
Author Thomas B. Bragg
Abstract Plots in an ungrazed, re-established grassland near Omaha, Nebraska, USA, dominated by little bluestem (Andropogon scoparius), were burned at 3-wk intervals from March through November 1976. The amount of vegetative biomass consumed during burning, a measure of flammability, was high throughout the study period, varying from >99% in April to 84% in mid-June. Areas burned in March were able to carry a second fire in October of the same year. High flammability throughout the growing season, in conjunction with current fire and climatic records, suggests that widespread, late-summer fires were probably common in presettlement, ungrazed, bluestem prairies.
Publication Ecology
Volume 63
Issue 1
Pages 7–11
Date February 1982
Journal Abbr Ecology
DOI 10.2307/1937024
ISSN 0012-9658
URL http://www.jstor.org/stable/1937024
Extra Keywords: Andropogon scoparius; bluestem prairie; burning probability; ecosystem maintenance; fire; flammability; fuel; grassland; Nebraska.
Date Added Wed Aug 24 12:11:45 2011
Modified Fri Aug 26 20:33:49 2011

Seasonality of vegetation fires as modified by human action: Observing the deviation from eco-climatic fire regimes

Type Journal Article
Author Yannick Le Page
Author Duarte Oom
Author João M. N. Silva
Author Per Jönsson
Author José M. C. Pereira
Abstract • Aim: In any region affected, fires exhibit a strong seasonal cycle driven by the dynamic of fuel moisture and ignition sources throughout the year. In this paper we investigate the global patterns of fire seasonality, which we relate to climatic, anthropogenic, land-cover and land-use variables. • Location: Global, with detailed

analyses from single 1°× 1° grid cells. • Methods: We use a fire risk index, the Chandler burning index (CBI), as an indicator of the 'natural', eco-climatic fire seasonality, across all types of ecosystems. A simple metric, the middle of the fire season, is computed from both gridded CBI data and satellite-derived fire detections. We then interpret the difference between the eco-climatic and observed metrics as an indicator of the human footprint on fire seasonality. • Results: Deforestation, shifting cultivation, cropland production or tropical savanna fires are associated with specific timings due to land-use practices, sometimes largely decoupled from the CBI dynamics. Detailed time series from relevant locations provide comprehensive information about these practices and how they are adapted to eco-climatic conditions. • Main conclusions: We find a great influence of anthropogenic activities on global patterns of fire seasonality. The specificity of the main fire practices and their easy identification from global observation is a potential tool to support land-use monitoring efforts. Our results should also prove valuable in the development of a methodological approach for improving the representation of anthropogenic fire practices in dynamic global vegetation models.

Publication Global Ecology and Biogeography

Volume 19

Issue 4

Pages 575-588

Date July 2010

Journal Abbr Global Ecol. Biogeogr.

DOI 10.1111/j.1466-8238.2010.00525.x

ISSN 1466-822X

URL http://blackwell-synergy.com/doi/abs/10.1111/j.1466-8238.2010.00525.x

Extra Keywords: anthropogenic fires; anticipated/delayed fire season; Chandler burning index; dry season; fire drivers; fire season.

Date Added Tue Aug 30 14:37:58 2011

Modified Wed Aug 31 00:19:54 2011

Sedimentary charcoal as an indicator of late-Holocene drought in the Sierra Nevada, California, and its relevance to the future

Type Journal Article

Author Andrea Brunelle

Author R. Scott Anderson

Abstract A Holocene record of climate, fire and vegetation regimes was reconstructed for Siesta Lake, Yosemite National Park, California, using fossil pollen and charcoal from lake sediments. These reconstructions were generated to provide a long-term perspective on drought in the Sierra Nevada. The sedimentary record is in agreement with other long-term records of climate and vegetation from the Sierra Nevada, and the records of climate and fire for the last c. 1000 years are in agreement with tree-ring and hydrological studies. This correspondence suggests that sedimentary charcoal and pollen are reliable indicators of change in climate, vegetation and fire frequency through time. The fire frequencies associated with the droughts of the 'Mediaeval Warm Period' are only half as great as those recorded during the early-Holocene insolation maximum. Model results suggest that the temperature increases associated with the insolation maximum are a good analogue for those expected with global warming. If this is the case, future droughts may be more severe than any experi enced in the last several thousand years, and these data should be considered in planning for future change.

Publication The Holocene

Volume 13

Issue 1

Pages 21–28

Date January 2003

Journal Abbr Holocene

DOI 10.1191/0959683603hl591rp

ISSN 1477-0911

URL http://hol.sagepub.com/content/13/1/21

Extra Keywords: palaeoecology; charcoal; pollen; drought; fire frequency; 'Mediaeval Warm Period'; Holocene; Sierra Nevada; California.

Date Added Thu Aug 25 10:47:25 2011

Modified Wed Aug 31 00:34:06 2011

Severe wind and fire regimes in northern forests: Historical variability at the regional scale

Type Journal Article

Author Lisa A. Schulte

Author David J. Mladenoff

Abstract Within the northern Great Lakes region, mesoscale (10s to 100s of km²) forest patterning is driven by disturbance dynamics. Using original Public Land Survey (PLS) records in northern Wisconsin, USA, we study spatial patterns of wind and fire disturbances during the pre-Euroamerican settlement period (ca. 1850). Our goals were: (1) to determine how effectively wind and fire disturbance can be reconstructed from the PLS, (2) to assess the roles of wind and fire in shaping vegetation patterns, (3) to evaluate landscape to regional controls of wind and fire regimes, and (4) to assess the potential for interactions between these disturbances. Our analyses indicate that only relatively intense fire and wind disturbance can be reliably detected from the PLS (62-68% canopy removal). Heavy windthrow was more prevalent than fire disturbance in presettlement forests, and wind-disturbed patches were comparatively smaller and more complex in shape. Disturbance rotation periods ranged between 450 and 10 500 years for heavy windthrow and between 700 and 93 000 years for stand-replacing fire. Occurrences of wind and fire disturbance were related to geographic province and to regional soil patterns; analysis further suggests a negative interaction between the two disturbance types. Given that severe wind disturbance was infrequent, mature to old forests of late-successional species dominated much of pre-Euroamerican northern Wisconsin, but wind disturbances may have allowed regional persistence of less shade-tolerant species, such as Betula alleghaniensis. Pine-dominated vegetation was limited to regions with more frequent fire, but frequencies of stand-replacing fire derived from survey records were insufficient to maintain these successional vegetation types; we suggest that frequent surface fires, not recorded in the PLS, along with infrequent stand-replacing fire, maintained these vegetation types. The extensive nature of the PLS provides a powerful baseline for addressing changes in forest conditions and disturbance regimes associated with climate and land use for both the present and more distant past. Such baselines are informative in discussions of historical variability and restoration silviculture.

Publication Ecology

Volume 86

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Pages 431-445

Date February 2005

Journal Abbr Ecology

DOI 10.1890/03-4065

ISSN 0012-9658

Short Title Severe Wind and Fire Regimes in Northern Forests

URL http://www.jstor.org/stable/3450963

Extra Keywords: Betula alleghaniensis; disturbance; fire ecology; landscape ecology; pre-Euroamerican settlement; pinus; public land survey; restoration baselins; windthrow.

Date Added Sun Aug 28 17:26:09 2011

Modified Wed Aug 31 00:30:30 2011

Sierra Nevada forests: Where did they come from? Where are they going? What does it mean?

Type Conference Paper

Author Constance I. Millar

Author Wallace B. Woolfenden

Abstract Description: The prospect of human-induced global warning has received centerstage attention from ecologists concerned about future ecosystems. While such effects deserve critical analysis, they are best understood in the context of natural climate change. Anthropogenic atmospheric effects are often discussed as if background climates were stable (Mahlman 1997). Even in the recent past, however, climates have changed at similar rates and magnitudes to predicted anthropogenic changes, catalyzing significant natural changes in terrestrial ecosystems. With or without the complication of human effects, implications of climate change to conservation and management planning are great. Over the past twenty years, advances in Quaternary sciences have significantly imr proved our understanding of historic climate and its influence on biota and planetary systems.

Date August 1999

Proceedings Title Transactions of the 64th North American Wildlife and Natural Resource Conference

Conference Name Transactions of the Sixty-Fourth North American Wildlife and Natural Resources Conference. March 26-30, 1999, Burlingame, California

Place Washington, D.C.

Publisher Wildlife Management Institute

Pages 206-236

ISBN 9990641560

Short Title Sierra Nevada Forests

URL http://www.treesearch.fs.fed.us/pubs/24289

Date Added Tue Aug 30 14:35:38 2011

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Notes:

Citation:

Millar, Constance I.; Woolfenden, Wallace B. 1999. Sierra Nevada forests: Where did they come from? Where are they going? What does it mean?. In: McCabe, Richard E.; Loos, Samantha E., eds. Transactions of the 64th North American Wildlife and Natural Resource Conference; March 26-30, 1999; Burlingame, California. Washington, D.C.: Wildlife Management Institute. pp. 206-236.

Simulating broad-scale fire severity in a dynamic global vegetation model

Type Journal Article

Author James M. Lenihan

Author Christopher Daly

Author Dominique Bachelet

Author Ronald P. Neilson

Abstract Simulating the impact of fire in a broad-scale Dynamic Vegetation Model (DGVM) used for global change impact assessments requires components and concepts not part of existing fire modeling systems. The focus shifts from fire behavior and danger at the small scale to the system-specific impacts of fire at the broad scale (i.e., fire severity). MCFIRE, a broad-scale fire severity model we are currently developing as part of our MAPSS-CENTURY DGVM, simulates the occurrence and impacts (i.e., vegetation mortality and fuel consumption) of relatively infrequent and extreme events historically responsible for the majority of fire disturbance to ecosystems. The occurrence of severe fire is strongly related to synoptic-scale climatic conditions producing extended drought, which is indicated in MCFIRE by the low moisture content of large dead fuels. Due to constraints posed by currently available datasets, we have been developing our DGVM model on a relatively fine-scale data grid at a landscape-scale, but we will implement the model at regional to global scales on much coarser data grids. Constraints on the broad-scale impact of severe fire imposed by the fine-scale heterogeneity of fuel properties will be represented in our coarse-scale simulations by sub-grid parameterizations of the fire behavior and effects algorithms for distinct land surface types. Ecosystem structure and function are often constrained by disturbance, so it is critical to include disturbance processes in dynamic vegetation models used to assess the potential broad-scale impact of global change. The ability to simulate the impact of changes in fire severity on vegetation and the atmosphere has been a central focus in the development of the MAPSS-Century Dynamic Global Vegetation Model.

Publication Northwest Science

Volume 72
Issue Special Issue 1
Pages 91–103
Date 1998
Journal Abbr NW Sci.
ISSN 0029-344X
URL http://www.fsl.orst.edu/dgvm/pub1.htm
Archive http://www.vetmed.wsu.edu/org_nws/NWSci%20journal%20articles/1998%20files/1998%20Vol%2072.htm
Extra About Us: Dynamic Vegetation Models—MC1: http://www.fs.fed.us/pnw/mdr/mapss/about/dvm/mc.shtml
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:37:58 2011

Simulating climate change impacts on fire frequency and vegetation dynamics in a Mediterranean-type ecosystem

Type Journal Article
Author Florent Mouillot
Author Serge Rambal
Author Richard Joffre
Abstract The impacts of climate change on Mediterranean-type ecosystems may result from complex interactions between direct effects on water stress and subsequent modifications in flammability and fire regime leading to changes in standing biomass and plant species composition. We analysed these interrelations through a simulation approach combining scenarios of climate change developed from GCM results and a multispecies functional model for vegetation dynamics, SIERRA. A fire risk procedure based on weekly estimates of vegetation water stress has been implemented. Using climate data from 1960 to 1997, simulations of a typical maquis woodland community have been performed as baseline and compared with two climate scenarios: a change in the rainfall regime alone, and changes in both rainfall and air temperature. Climate changes are defined by an increase in temperature, particularly in summer, and a change in the rainfall pattern leading to a decrease in low rainfall events, and an increase in intense rainfall events. The results illustrate the lack of drastic changes in the succession process, but highlight modifications in the water budget and in the length of the drought periods. Water stress lower than expected regarding statistics on the current climate is simulated, emphasizing a long-term new equilibrium of vegetation to summer drought but with a higher sensibility to rare events. Regarding fire frequency, climate changes tend to decrease the time interval between two successive fires from 20 to 16 years for the maquis shrubland and from 72 to 62 years in the forested stages. This increase in fire frequency leads to shrub-dominated landscapes, which accentuates the yield of water by additional deep drainage and runoff.
Publication Global Change Biology
Volume 8
Issue 5
Pages 423–437
Date May 2002
Journal Abbr Glob. Change Biol.
DOI 10.1046/j.1365-2486.2002.00494.x
ISSN 1365-2486
URL http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2486.2002.00494.x/full
Extra Keywords: climate change; fire regime; Mediterranean-type ecosystem; process-based simulation model.
Date Added Tue Aug 30 14:35:38 2011
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Simulating the effects of future fire regimes on western Canadian boreal forests

Type Journal Article
Author William J. de Groot
Author Peter M. Bothwell
Author D. H. Carlsson
Author Kimberley A. Logan
Abstract Effects of future fire regimes on boreal tree species and plant functional types were studied in W Canada using a simulation approach. Present (1975–1990) and future (2080–2100) fire regimes were simulated using data from the Canadian Global Coupled Model (CGCM1). The long-term effects of these fire regimes were simulated using a stand level, boreal fire effects model (BORFIRE) developed for this study. Changes in forest composition and biomass storage due to future altered fire regimes were determined by comparing the effects of present and future fire regimes on forest stands over a 400-yr period. Differences in the two scenarios after 400 yr indicate shifting trends in forest composition and biomass that can be expected as a result of future changes in the fire regime. The ecological impacts of altered fire regimes are discussed in terms of general plant functional types. The Canadian Global Coupled Model showed more severe burning conditions under future fire regimes including fires with greater intensity, greater depth of burn and greater total fuel consumption. Shorter fire cycles estimated for the future generally favoured species which resprout (fire endurers) or store seed (fire evaders). Species with no direct fire survival traits (fire avoiders) declined under shorter fire cycles. The moderately thick barked trait of fire resisters provided little additional advantage in crown fire dominated boreal forests. Many species represent PFTs with multiple fire survival traits. The fire evader and avoider PFT was adaptable to the widest range of fire cycles. There was a general increase in biomass storage under the simulated future fire regimes caused by a shift in species composition towards fast-growing re-sprouting species. Long-term biomass storage was lower in fire exclusion simulations because some stands were unable to reproduce in the absence of fire.
Publication Journal of Vegetation Science
Volume 14
Issue 3
Pages 355–364
Date June 2003
Journal Abbr J. Veg. Sci.
DOI 10.1111/j.1654-1103.2003.tb02161.x
ISSN 1100-9233
URL http://www.jstor.org/stable/3236513
Call Number 0000
Extra Keywords: biomass; climate change; fire effects; forest composition;plant functional type.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:28 2011

Sir Gilbert Walker and a connection between El Niño and statistics

Type Journal Article
Author Richard W. Katz
Abstract The eponym "Walker Circulation" refers to a concept used by atmospheric scientists and oceanographers in providing a physical explanation for the El Niño–Southern Oscillation phenomenon, whereas the eponym "Yule–Walker equations" refers to properties satisfied by the autocorrelations of an autoregressive process. But how many statisticians (or, for that matter, atmospheric scientists) are aware that the "Walker" in both terms refers to the same individual, Sir Gilbert ThomasWalker, and that these two appellations arose in conjunction with the same research on the statistical prediction of climate? Like George Udny Yule (the "Yule" in Yule–Walker), Walker's motivation was to devise a statistical model that exhibited quasiperiodic behavior. The original assessments of Walker's work, both in the meteorology and in statistics, were somewhat negative.With hindsight, it is argued that his research should be viewed as quite successful.
Publication Statistical Science
Volume 17
Issue 1

Pages 97–112
Date May 2002
Journal Abbr Stat. Sci.
DOI 10.1214/ss/1023799000
ISSN 0883-4237
URL http://projecteuclid.org/DPubS?service=UI&…
Extra Keywords: autoregressive process; quasiperiodic behavior; Southern Oscillation; teleconnections; Yule–Walker equations.
Date Added Tue Aug 30 14:37:15 2011
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Slow release of fossil carbon during the Palaeocene–Eocene Thermal Maximum

Type Journal Article
Author Ying Cui
Author Lee R. Kump
Author Andy J. Ridgwell
Author Adam J. Charles
Author Christopher K. Junium
Author Aaron F. Diefendorf
Author Katherine H. Freeman
Author Nathan M. Urban
Author Ian C. Harding
Abstract The transient global warming event known as the Palaeocene–Eocene Thermal Maximum occurred about 55.9 Myr ago. The warming was accompanied by a rapid shift in the isotopic signature of sedimentary carbonates, suggesting that the event was triggered by a massive release of carbon to the ocean–atmosphere system. However, the source, rate of emission and total amount of carbon involved remain poorly constrained. Here we use an expanded marine sedimentary section from Spitsbergen to reconstruct the carbon isotope excursion as recorded in marine organic matter. We find that the total magnitude of the carbon isotope excursion in the ocean–atmosphere system was about 4‰. We then force an Earth system model of intermediate complexity to conform to our isotope record, allowing us to generate a continuous estimate of the rate of carbon emissions to the atmosphere. Our simulations show that the peak rate of carbon addition was probably in the range of 0.3–1.7 Pg C yr^{-1}, much slower than the present rate of carbon emissions.
Publication Nature Geoscience
Volume 4
Issue 7
Pages 481–485
Date July 2011
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo1179
ISSN 1752-0894
URL http://www.nature.com/doifinder/10.1038/ngeo1179
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:52 2011

Small interannual variability of global atmospheric hydroxyl

Type Journal Article
Author Stephen A. Montzka

Author Maarten Krol
Author Edward Dlugokencky
Author Bradley Hall
Author Patrick Jockel
Author Jos Lelieveld
Abstract The oxidizing capacity of the global atmosphere is largely determined by hydroxyl (OH) radicals and is diagnosed by analyzing methyl chloroform (CH_3CCl_3) measurements. Previously, large year-to-year changes in global mean OH concentrations have been inferred from such measurements, suggesting that the atmospheric oxidizing capacity is sensitive to perturbations by widespread air pollution and natural influences. We show how the interannual variability in OH has been more precisely estimated from CH_3CCl_3 measurements since 1998, when atmospheric gradients of CH_3CCl_3 had diminished as a result of the Montreal Protocol. We infer a small interannual OH variability as a result, indicating that global OH is generally well buffered against perturbations. This small variability is consistent with measurements of methane and other trace gases oxidized primarily by OH, as well as global photochemical model calculations.
Publication Science
Volume 331
Issue 6013
Pages 67-69
Date 7 January 2011
Journal Abbr Science
DOI 10.1126/science.1197640
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1197640
Date Added Tue Aug 30 14:35:38 2011
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Societal challenges in understanding and responding to regime shifts in forest landscapes

Type Journal Article
Author J. F. Franklin
Author K. N. Johnson
Abstract Many natural landscapes have undergone dramatic permanent alterations as a result of human activities, including conversion to cultural landscapes; such changes are readily observed and understood. However, extensive ecological change can also occur in regional landscapes that are maintained in a seminatural state, changes that go largely unrecognized because the regional landscape retains an approximation of its dominant physiognomic cover, such as forest or grassland. In PNAS, Lindenmayer et al. describe the concept of regime shifts in forest landscapes that represent landscape traps in that “entire landscapes are shifted into a state in which major functional and ecological attributes are compromised [and] lead to feedback processes that either maintain an ecosystem in a compromised state or push it into a further regime shift in which an entirely new type of vegetation cover develops.”Such state changes can result in dramatic reductions in functionality (e.g., carbon sequestration, water yields) and biodiversity, as with their primary example of mountain ash forests (Eucalyptus regnans) in southeastern Australia. The degradation of seminatural landscapes at regional scales, whereby essential functional capabilities and biotic elements are permanently lost as a result of altered disturbance regimes, is a widespread phenomenon. An outstanding example of regional scale simplification of landscapes is the permanent replacement of diverse native steppe in North America’s Great Basin with grasslands dominated by annuals, such as cheatgrass (Bromus tectorum), and an associated change in fire regime. A comparable forest example is the massive shift from open pine-dominated forests to dense fuel-loaded stands highly vulnerable to unnaturally intense and large wildfires in western North America as a result of fire suppression, logging, and grazing. Many more examples of “trapped” landscapes can be expected to occur as a result of climate change and human activities, as suggested for the Greater Yellowstone region.
Publication Proceedings of the National Academy of Sciences
Date 2011-10-03
DOI 10.1073/pnas.1114045108

ISSN 0027-8424, 1091-6490
URL http://www.pnas.org/cgi/doi/10.1073/pnas.1114045108
Accessed Wed Oct 5 14:12:28 2011
Library Catalog CrossRef
Call Number 0000
Date Added Thu Oct 6 11:52:49 2011
Modified Thu Oct 6 11:52:49 2011

Soil carbon and nitrogen accumulation in a forested debris flow chronosequence, California

Type Journal Article
Author Judith K. Turk
Author Robert C. Graham
Abstract The role of forest soils in the biogeochemical cycling of C and N is most dynamic during the early stages of soil development. To define C and N trends that occur with soil development in a mixed coniferous forest, a chronosequence formed by debris flows was studied. The accumulation rates of total organic C (TOC) and total N (TN) were evaluated in soils on 10 debris flow deposits, ranging from <1 to 244 yr old. Analysis of the mineral soils was restricted to the 30-cm depth, since this was the depth of the shallowest debris flows. Carbon was found to accumulate in the organic horizons at a rate of 26.5 $gm^{-2}yr^{-1}$ throughout the time span of the chronosequence. Total organic C accumulation in the mineral horizons (0–30 cm) occurred from 0 to 82 yr at a rate of 13 $gm^{-2}yr^{-1}$, and was nearly stable from 82 to 244 yr. Total N accumulated at a rate of 0.57 $gm^{-2}yr^{-1}$ in the organic horizons and a rate of 0.17 $gm^{-2}yr^{-1}$ in the mineral horizons (0–30 cm) throughout the 244 yr chronosequence. This study suggests that C accumulation in the upper mineral horizons of young forest soils occurs for <100 yr, while N accumulation is a slower process that occurs for >250 yr. Carbon and N accumulation in the organic horizons, however, both follow a linear trend over the 244-yr period. The rates of C accumulation suggest a rapid recovery of the soil organic C pool following disturbance.
Publication Soil Science Society of America Journal
Volume 73
Issue 5
Pages 1504-1509
Date September–October 2009
Journal Abbr Soil Sci. Soc. Am. J.
DOI 10.2136/sssaj2008.0106
ISSN 0361-5995
URL https://www-soils-org/publications/sssaj/abstracts/73/5/1504
Call Number 0000
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:41 2011

Soil morphology of a debris flow chronosequence in a coniferous forest, southern California, USA

Type Journal Article
Author Judith K. Turk
Author Brett R. Goforth
Author Robert C. Graham
Author Katherine J. Kendrick
Abstract Soils on a series of debris flow deposits, ranging from < 1 to 244 years old, were described and sampled in order to investigate the early stages of soil development. The parent material at the site is debris flow regolith, composed mainly of gneiss, the soil moisture regime is xeric, and the vegetation is mixed coniferous forest. Ages of the deposits were assessed using dendrochronology. Morphologic trends in the organic horizons

included a thickening of the humus form over time, along with the development of Fm and Hr horizons. The humus forms underwent a progression from Mormodors (20 years old), to Hemimors (26–101 years old), and finally Lignomors (163 years old) and Resimors (184–244 years old). Changes in physical properties of the uppermost mineral horizons as a function of increasing age included a decrease in the volume of coarse fragments, a linear decrease in bulk density, and a darkening and reddening of the soil color. No significant soil development took place in the subsoil during the time span of this chronosequence. The soils described were classified as Typic Xerofluvents and Typic Xerorthents (Regosols and Leptosols). Buried A horizons were observed in many of the soils. Where the A horizons could be linked to dendrochronology to assess the age of the buried surface, we found that the properties of the buried A horizons do not serve as a good indicator of the age of the surface. This study suggests rapid development of the humus form profile (organic horizons and A horizon) following debris flow deposition and rapid degradation of these horizons when the debris flow surface is buried.

Publication Geoderma (A Global Journal of Soil Science)
Volume 146
Issue 1-2
Pages 157–165
Date 31 July 2008
Journal Abbr Geoderma
DOI 10.1016/j.geoderma.2008.05.012
ISSN 0016-7061
URL http://www.sciencedirect.com/science/article/pii/S0016706108001328
Extra Keywords: bulk density; buried soils; chronosequences; entisols; mor; pedogenesis; soil color.
Date Added Sat Aug 27 06:05:17 2011
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Solar influences on climate

Type Journal Article
Author Lesley J. Gray
Author Jürg Beer
Author Marvin Geller
Author Joanna D. Haigh
Author Michael Lockwood
Author Katja Matthes
Author Ulrich Cubasch
Author Dominik Fleitmann
Author Giles Harrison
Author Lon Hood
Author Jürg Luterbacher
Author Gerald A. Meehl
Author Drew Shindell
Author Bas van Geel
Author Warren White
Abstract Understanding the influence of solar variability on the Earth's climate requires knowledge of solar variability, solar-terrestrial interactions, and the mechanisms determining the response of the Earth's climate system. We provide a summary of our current understanding in each of these three areas. Observations and mechanisms for the Sun's variability are described, including solar irradiance variations on both decadal and centennial time scales and their relation to galactic cosmic rays. Corresponding observations of variations of the Earth's climate on associated time scales are described, including variations in ozone, temperatures, winds, clouds, precipitation, and regional modes of variability such as the monsoons and the North Atlantic Oscillation. A discussion of the available solar and climate proxies is provided. Mechanisms proposed to explain these climate observations are described, including the effects of variations in solar irradiance and of charged particles.

Finally, the contributions of solar variations to recent observations of global climate change are discussed.

Publication Reviews of Geophysics
Volume 48
Issue 4
Pages RG4001 (53 p.)
Date October 2010
Journal Abbr Rev. Geophys.
DOI 10.1029/2009RG000282
ISSN 8755-1209
URL http://www.agu.org/pubs/crossref/2010/2009RG000282.shtml
Extra Keywords: solar; climate; variability.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:52 2011

Some 1929 fire-weather comparisons

Type Journal Article
Author E. M. Keyser
Abstract The season of 1929 holds a unique place in fire-weather historv in United States district forest No. 1. This District comprises northeastern Washington, northern Idaho, Montana, and northwestern South Dakota. Since forest fire records have been tabulated, the last 32years, the four seasons, 1910, 1919, 1926, and 1929 are outstanding. These four years account for 87 per cent of the fire losses in the district since 1907.
Publication Monthly Weather Review
Volume 58
Issue 9
Pages 365-368
Date September 1930
Journal Abbr Mon. Wea. Rev.
DOI 10.1175/1520-0493(1930)58<365b:SFC>2.0.CO;2
ISSN 1520-0493
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0493%281930%2958%3C365b%3ASFC%3E2.0.CO%3B2
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:40:17 2011

Southern Ocean dust–climate coupling over the past four million years

Type Journal Article
Author Alfredo Martínez-Garcia
Author Antoni Rosell-Melé
Author Samuel L. Jaccard
Author Walter Geibert
Author Daniel M. Sigman
Author Gerald H. Haug
Abstract Dust has the potential to modify global climate by influencing the radiative balance of the atmosphere and by supplying iron and other essential limiting micronutrients to the ocean. Indeed, dust supply to the Southern Ocean increases during ice ages, and 'iron fertilization' of the subantarctic zone may have contributed up to 40 parts per million by volume (p.p.m.v.) of the decrease (80–100 p.p.m.v.) in atmospheric carbon dioxide observed during late Pleistocene glacial cycles. So far, however, the magnitude of Southern Ocean dust deposition in earlier times and its role in the development and evolution of Pleistocene glacial cycles have

remained unclear. Here we report a high-resolution record of dust and iron supply to the Southern Ocean over the past four million years, derived from the analysis of marine sediments from ODP Site 1090, located in the Atlantic sector of the subantarctic zone. The close correspondence of our dust and iron deposition records with Antarctic ice core reconstructions of dust flux covering the past 800,000 years indicates that both of these archives record large-scale deposition changes that should apply to most of the Southern Ocean, validating previous interpretations of the ice core data. The extension of the record beyond the interval covered by the Antarctic ice cores reveals that, in contrast to the relatively gradual intensification of glacial cycles over the past three million years, Southern Ocean dust and iron flux rose sharply at the Mid-Pleistocene climatic transition around 1.25 million years ago. This finding complements previous observations over late Pleistocene glacial cycles, providing new evidence of a tight connection between high dust input to the Southern Ocean and the emergence of the deep glaciations that characterize the past one million years of Earth history.

Publication Nature
Volume 476
Issue 7360
Pages 312-315
Date 18 August 2011
Journal Abbr Nature
DOI 10.1038/nature10310
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature10310
Call Number 0000
Date Added Thu Sep 22 04:40:53 2011
Modified Wed Sep 28 17:53:47 2011

Southern Oscillation anomalies and their relationship to wildfire activity in Florida

Type Journal Article
Author Jim Brenner
Abstract Some relationships between the El Niño/Southern Oscillation (ENSO) and wildfire in Florida are examined. Unlike many ENSO/wildfire studies to date, no particular emphasis was placed on the positive side of the ENSO. Both the positive and negative sides were equally examined. Linear correlation coefficients, scatter diagrams and line graphs are constructed to compare acres burned with indices of central and eastern Pacific sea surface temperature and pressure anomalies. The study reveals a significant relationship between anomalous sea surface temperatures and sea level pressures in the central and eastern Pacific, and acres burned in Florida due to wildfires. The typical fire season in Florida is during the winter months, and the best correlation coefficient ("r" 0.7 1) was derived from the average central Pacific sea surface temperature anomaly for the period January through May, indicating it correlated with up to 50% of the variance in acres burned during the years examined. The study further suggests that it may be possible to develop a predictive model for wildfire activity in Florida, based on observed anomalies of sea surface temperature and sea level pressure in the central and eastern Pacific.
Publication International Journal of Wildland Fire
Volume 1
Issue 1
Pages 73-78
Date January 1991
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF9910073
ISSN 1448-5516
URL http://www.publish.csiro.au/paper/WF9910073
Extra Keywords: El Nino; weather; ENSO; climate; Florida; wildfire.
Date Added Wed Aug 24 12:13:13 2011
Modified Fri Aug 26 20:33:55 2011

Spatial and temporal characteristics of wildfires in Mississippi, USA

Type Journal Article
Author Katarzyna Grala
Author William H. Cooke
Abstract Forests constitute a large percentage of the total land area in Mississippi and are a vital element of the state economy. Although wildfire occurrences have been considerably reduced since the 1920s, there are still ~4000 wildfires each year in Mississippi burning over 24 000 ha (60 000 acres). This study focusses on recent history and various characteristics of Mississippi wildfires to provide better understanding of spatial and temporal characteristics of wildfires in the state. Geographic information systems and Mississippi Forestry Commission wildfire occurrence data were used to examine relationships between climatic and anthropogenic factors, the incidence, burned area, wildfire cause, and socioeconomic factors. The analysis indicated that wildfires are more frequent in southern Mississippi, in counties covered mostly by pine forest, and are most prominent in the winter–spring season. Proximity to roads and cities were two anthropogenic factors that had the most statistically significant correlation with wildfire occurrence and size. In addition, the validity of the Palmer Drought Severity Index as a measure of fire activity was tested for climatic districts in Mississippi. Analysis indicated that drought influences fire numbers and size during summer and fall (autumn). The strongest relationship between the Palmer Drought Severity Index and burned area was found for the southern climatic districts for the summer–fall season.
Publication International Journal of Wildland Fire
Volume 19
Issue 1
Pages 14-28
Date February 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF08104
ISSN 1448-5516
URL http://dx.doi.org/10.1071/WF08104
Extra Keywords: fire potential; GIS; spatial pattern analysis; wildfire history.
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:20:38 2011

Spatial and temporal variation in historic fire regimes in subalpine forests across the Colorado Front Range in Rocky Mountain National Park, Colorado, USA

Type Journal Article
Author J.S. Sibold
Author T.T. Veblen
Author M.E. González
Abstract Aim The historical variability of fire regimes must be understood in the context of drivers of the occurrence of fire operating at a range of spatial scales from local site conditions to broad-scale climatic variation. In the present study we examine fire history and variations in the fire regime at multiple spatial and temporal scales for subalpine forests of Engelmann spruce–subalpine fir (Picea engelmannii, Abies lasiocarpa) and lodgepole pine (Pinus contorta) of the southern Rocky Mountains. Location The study area is the subalpine zone of spruce–fir and lodgepole pine forests in the southern sector of Rocky Mountain National Park (ROMO), Colorado, USA, which straddles the continental divide of the northern Colorado Front Range (40□20¢ N and 105□40¢ W). Methods We used a combination of dendroecological and Geographic Information System methods to reconstruct fire history, including fire year, severity and extent at the forest patch level, for c. 30,000 ha of subalpine forest. We aggregated fire history information at appropriate spatial scales to test for drivers of the fire regime at local, meso, and regional scales. Results The fire histories covered c. 30,000 ha of forest and were based on a total of 676 partial cross-sections of fire-scarred trees and 6152 tree-core age samples. The subalpine forest fire regime of ROMO is dominated by infrequent, extensive, stand-replacing fire

events, whereas surface fires affected only 1–3% of the forested area. Main conclusions Local-scale influences on fire regimes are reflected by differences in the relative proportions of stands of different ages between the lodgepole pine and spruce–fir forest types. Lodgepole pine stands all originated following fires in the last 400 years; in contrast, large areas of spruce–fir forests consisted of stands not affected by fire in the past 400 years. Meso-scale influences on fire regimes are reflected by fewer but larger fires on the west vs. east side of the continental divide. These differences appear to be explained by less frequent and severe drought on the west side, and by the spread of fires from lower-elevation mixed-conifer montane forests on the east side. Regional-scale climatic variation is the primary driver of infrequent, large fire events, but its effects are modulated by local- and meso-scale abiotic and biotic factors. The low incidence of fire during the period of fire-suppression policy in the twentieth century is not unique in comparison with the previous 300 years of fire history. There is no evidence that fire suppression has resulted in either the fire regime or current forest conditions being outside their historic ranges of variability during the past 400 years. Furthermore, in the context of fuel treatments to reduce fire hazard, regardless of restoration goals, the association of extremely large and severe fires with infrequent and exceptional drought calls into question the future effectiveness of tree thinning to mitigate fire hazard in the subalpine zone.

Publication Journal of Biogeography (J. Biogeogr.)
Volume 32
Pages 631–647
Date 2006
Library Catalog Google Scholar
Call Number 0043
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

Spatial and temporal variation of fire regimes in a mixed conifer forest landscape, Southern Cascades, California, USA

Type Journal Article
Author R. Matthew Beaty
Author Alan H. Taylor
Abstract • Aim: In this study, we evaluated the fire-forest mosaic of a mixed conifer forest landscape by testing the hypothesis that pre-fire suppression fire regime parameters vary with species composition (tree species), and environment (i.e. slope aspect, slope position, elevation). • Location: Our study was conducted in the 1587 ha Cub Creek Research Natural Area (CCRNA), Lassen National Forest, CA, USA. • Methods: We quantified the return interval, seasonal occurrence, size, rotation period, and severity of fires using dendroecology. • Results: Slope aspect, potential soil moisture, forest composition, and fire regime parameters in our study area co-vary. Median composite and point fire return intervals (FRI) were longest on higher, cooler, more mesic, north-facing (NF) slopes covered with white fir (Abies concolor), Douglas fir (Pseudotsuga menziesii)–white fir, and red fir (A. magnifica)–white fir forests, shortest on the dry, south-facing (SF) slopes covered with ponderosa pine (Pinus ponderosa)–white fir forests and intermediate on west-facing slopes dominated by white fir–sugar pine (P. lambertiana)–incense cedar (Libocedrus decurrens) forests. The spatial pattern for length of fire rotation (FR) was the same as that for FRI. Fires in CCRNA mixed conifer forests occurred mainly (90%) in the dormant season. Size of burns in CCRNA mixed conifer forests were generally small (mean=106 ha), however, during certain drought years widespread fires burned across fuel breaks and spread throughout the watershed. Fire severity was mainly high on upper slopes, low on lower slopes and moderate and low severity on middle slopes. Patterns of fire severity also varied with slope aspect. Fire frequency decreased dramatically in CCRNA after 1905. • Conclusions: In CCRNA, fire regime parameters [e.g. FRI, fire extent, FR, fire severity] varied widely with species composition, slope aspect and slope position. There was also temporal variation in fire extent with the most widespread fires occurring during drought years. The important contributions of topography and climate to variation in the fire regime indicates that exogenous factors play a key role in shaping the fire-forest structure mosaic and that the fire-forest structure mosaic is more variable, less predictable and less stable than previously thought. Finally, some characteristics of the fire regime (i.e. fire severity, season of burn) in CCRNA are different than those described for other mixed conifer forests and this suggests that there are geographical differences in mixed conifer fire regimes along the Pacific slope.
Publication Journal of Biogeography

Volume 28
Issue 8
Pages 955-966
Date August 2001
Journal Abbr J. Biogeogr.
DOI 10.1046/j.1365-2699.2001.00591.x
ISSN 1365-2699
URL http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2699.2001.00591.x/full
Extra Keywords: fire regimes; mixed conifer forest; dendroecology; disturbance; California.
Date Added Tue Aug 23 02:04:26 2011
Modified Wed Aug 24 04:41:41 2011

Spatial controls of historical fire regimes: A multiscale example from the interior West, USA

Type Journal Article
Author Emily K. Heyerdahl
Author Linda B. Brubaker
Author James K. Agee
Abstract Our objective was to infer the controls of spatial variation in historical fire regimes. We reconstructed a multicentury history of fire frequency, size, season, and severity from fire scars and establishment dates of 1426 trees sampled on grids in four watersheds (64 plots, over 1620 ha each) representative of the Blue Mountains, Oregon and Washington, USA. The influence of regional climate, a top-down control, was inferred from among-watershed variation in fire regimes, while the influence of local topography, a bottom-up control, was inferred from within-watershed variation. Before about 1900, fire regimes varied among and within watersheds, suggesting that both top-down and bottom-up controls were important. At the regional scale, dry forests (dominated by ponderosa pine), burned twice as frequently and earlier in the growing season in southern watersheds than in northern watersheds, consistent with longer and drier fire seasons to the south. Mesic forests (dominated by subalpine fir or grand fir) probably also burned more frequently to the south. At the local scale, fire frequency varied with different parameters of topography in watersheds with steep terrain, but not in the watershed with gentle terrain. Frequency varied with aspect in watersheds where topographic facets are separated by significant barriers to fire spread, but not in watersheds where such facets interfinger without fire barriers. Frequency varied with elevation where elevation and aspect interact to create gradients in snow-cover duration and also where steep talus interrupts fuel continuity. Frequency did not vary with slope within any watershed. The presence of both regional-scale and local-scale variation in the Blue Mountains suggests that top-down and bottom-up controls were both important and acted simultaneously to influence fire regimes in the past. However, an abrupt decline in fire frequency around 1900 was much greater than any regional or local variation in the previous several centuries and indicates that 20th-century fire regimes in these watersheds were dramatically affected by additional controls such as livestock grazing and fire suppression. Our results demonstrate the usefulness of examining spatial variation in historical fire regimes across scales as a means for inferring their controls.
Publication Ecology
Volume 82
Issue 3
Pages 660-678
Date March 2001
Journal Abbr Ecology
DOI 10.1890/0012-9658(2001)082[0660:SCOHFR]2.0.CO;2
ISSN 0012-9658
Short Title Spatial controls of historical fire regimes
URL http://www.esajournals.org/doi/abs/10.1890/0012-9658%282001%29082%5B0660%3ASCOHFR%5D2.0.CO%3B2?journalCode=ecol

Extra Keywords: bottom-up; climate; dendrochronology; fire history; landscape ecology; local scale; Oregon; regional scale; top-down; topography; Washington.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:25 2011

Spatial modeling of forest landscape change: Approaches and applications

Type Book
Editor David J. Mladenoff
Editor William L. Baker
Abstract Description: In this unique volume, key researchers present newly emerging approaches to computer simulation models of large, forest landscapes. Over the past decade the field of landscape ecology has developed rapidly, focusing on the need to address ecological research and management at large spatial scales, and longer temporal domains. There is also great attention being focused on the use and management of forests throughout the world, particularly on issues such as longterm sustainability, ecosystem management, and biodiversity protection. These models have the potential to help answer research and management questions through simulation experiments that have not, in the past, considered spatial interactions among ecological processes and human activities at broad scales. Representing a rapidly emerging area in the field of landscape ecology, this volume will be of value to ecologists, forest and natural resource managers, as well as wildlife biologists and conservationists.
Edition illustrated
Place Cambridge, United Kingdom
Publisher Cambridge University Press
Date 1999
# of Pages 364 p.
ISBN 9780521631228, 052163122X
Short Title Spatial modeling of forest landscape change
URL http://landscape.forest.wisc.edu/spatmod_chaps.asp
Archive http://books.google.com/books?id=mfIlUpuumMsC&
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:23:12 2011

Spatial pattern analyses of post-fire residual stands in the black spruce boreal forest of western Quebec

Type Journal Article
Author Amar Madoui
Author Alain Leduc
Author Sylvie Gauthier
Author Yves Bergeron
Abstract In this study, we characterised the composition and configuration of post-fire residual habitats belonging to two physiographic zones of the black spruce–moss domain in western Quebec. Thirty-three large fires (2000–52 000 ha) were selected and extracted on classified Landsat satellite imagery. The results show that a minimum of 2% and a maximum of 22% of burned areas escaped fire, with an overall average of 10.4%. The many forest patches that partially or entirely escaped fire formed residual habitats (RHs). It was found that although the area of RHs follows a linear relationship with fire size, their proportion appears relatively constant. Spatial analyses showed that the fires could be separated into two groups depending on the physiographic zones (East-Canadian Shield v. West-Clay Belt Lowlands). Fires in the west zone generate less RHs and appear to be associated with more extreme weather conditions. In most cases there was no association with water or wetlands; in some fires the presence of RHs is associated with the proximity of water bodies. The failure to find an association between RHs and wetlands suggests that this type of environment is part of the fuel. Coniferous woodland with moss appears particularly overrepresented within RHs. Our results suggest that the local and regional physiographic conditions strongly influence the creation of RHs; therefore, it is important to consider those differences when

applying ecosystem-based management.

Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 1110–1126
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF10049
ISSN 1448-5516
URL http://www.publish.csiro.au/paper/WF10049.htm
Extra Keywords: fire pattern; physiographic zone; satellite imagery.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:43:26 2011

Spatial patterns and controls on historical fire regimes and forest structure in the Klamath Mountains

Type Journal Article
Author Alan H. Taylor
Author Carl N. Skinner
Abstract Fire exclusion in mixed conifer forests has increased the risk of fire due to decades of fuel accumulation. Restoration of fire into altered forests is a challenge because of a poor understanding of the spatial and temporal dynamics of fire regimes. In this study the spatial and temporal characteristics of fire regimes and forest age structure are recon- structed in a 2325-ha mixed conifer forest in the Klamath Mountains. Forests were multiaged and burned frequently at low and moderate severity, but forest age structure did not vary with aspect, elevation, or topographic position. Recently there has been an increase in forest density and a forest compositional shift to shade-tolerant species. Median fire return in- tervals (FRI) ranged from 11.5 to 16.5 yr and varied with aspect but not with forest composition or elevation. The median area burned was 106 ha, and the pre-Euro-American fire rotation of 19 yr increased to 238 yr after 1905. Intra-annual position of fire scars in the tree rings indicates that 93% of fires occurred during the dry midsummer through fall period. Spatial patterns of sites with similar fire dates were spatially coherent and separated from others by topographic features that influence fire spread. Thus, patterns of fire oc- currence tended to be fixed in space with timing of fires varying among groups of sites. Spatial and temporal patterns of fire occurrence suggest that managers using physical fea- tures to contain prescribed fire will create burn patterns consistent with historical fires in the Klamath Mountains.
Publication Ecological Applications
Volume 13
Issue 3
Pages 704–719
Date June 2003
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(2003)013[0704:SPACOH]2.0.CO;2
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/1051-0761%282003%29013%5B0704:SPACOH%5D2.0.CO%3B2
Extra Keywords: California; dendroecology; fire history; fire regimes; forest age structure; landscape ecology; landscape structure; mixed conifer forest.
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:21 2011

Spatial patterns of forest fires in Canada, 1980–1999

Type Journal Article
Author Marc-André Parisien
Author Vernon S. Peters
Author Yonghe Wang
Author John M. Little
Author Erin M. Bosch
Author Brian J. Stocks
Abstract The present study characterized the spatial patterns of forest fires in 10 fire-dominated ecozones of Canada by using a database of mapped fires ≥200 ha from 1980 to 1999 (n = 5533 fires). Spatial metrics were used individually to compare measures of fire size, shape (eccentricity and complexity), clustering, and geographic orientation among ecozones and were used concurrently in a multivariate analysis. In addition, a set of factors that influence the fire regime at the ecozone level – topography, climate, fuels, and anthropogenic factors – was compared with the metric outputs. We found significant differences in all spatial metrics among ecozones. The multivariate analysis showed that the Montane Cordillera ecozone, which covers most of British Columbia, had the most distinctive fires: its fires were smaller, less complex, and had a more regular distribution. The fire regime descriptors of ecozones were useful to interpret the spatial variation of some spatial metrics, such as fire size, eccentricity, and clustering, but provided little insight into the mechanisms of patterns of fire complexity, which were shown to be sensitive to data quality. Our results provide additional information about the creation of spatially heterogeneous landscapes. Furthermore, they illustrate the potential use of spatial metrics for a more detailed characterization of fire regimes and provide novel information for ecosystems-based land management.
Publication International Journal of Wildland Fire
Volume 15
Issue 3
Pages 361–374
Date September 2006
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF06009
ISSN 1448-5516
URL http://www.publish.csiro.au/nid/114/paper/WF06009.htm
Extra Keywords: ecozones; spatial scale.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:29:32 2011

Spatial scaling in ecology

Type Journal Article
Author John A. Wiens
Abstract no abstrtact
Publication Functional Ecology
Volume 3
Issue 4
Pages 385–397
Date 1989
Journal Abbr Funct. Ecol.
DOI 10.2307/2389612
ISSN 1365-2435
URL http://www.jstor.org/stable/2389612
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:13 2011

Spatial variation in extreme winds predicts large wildfire locations in chaparral ecosystems

Type Journal Article
Author Max A. Moritz
Author Tadashi J. Moody
Author Meg A. Krawchuk
Author Mimi Hughes
Author Alex Hall
Abstract Fire plays a crucial role in many ecosystems, and a better understanding of different controls on fire activity is needed. Here we analyze spatial variation in fire danger during episodic wind events in coastal southern California, a densely populated Mediterranean-climate region. By reconstructing almost a decade of fire weather patterns through detailed simulations of Santa Ana winds, we produced the first high-resolution map of where these hot, dry winds are consistently most severe and which areas are relatively sheltered. We also analyzed over half a century of mapped fire history in chaparral ecosystems of the region, finding that our models successfully predict where the largest wildfires are most likely to occur. There is a surprising lack of information about extreme wind patterns worldwide, and more quantitative analyses of their spatial variation will be important for effective fire management and sustainable long-term urban development on fire-prone landscapes.
Publication Geophysical Research Letters
Volume 37
Issue 4
Pages L04801 (5 p.)
Date February 2010
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2009GL041735
ISSN 0094-8276
URL http://www.agu.org/pubs/crossref/2010/2009GL041735.shtml
Extra Keywords: extreme fire weather; Santa Ana winds; chaparral ecosystems.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:47:37 2011

Spatial variation of trends in wildfire and summer drought in British Columbia, Canada, 1920–2000

Type Journal Article
Author Andrea Meyn
Author Sebastian Schmidtlein
Author Stephen W. Taylor
Author Martin P. Girardin
Author Kirsten Thonicke
Author Wolfgang Cramer
Abstract Owing to large climatic and orographic variation, British Columbia covers a variety of ecosystems extending from temperate rainforests on the Pacific coast to boreal forests in the north-east. The aim of this study is to investigate the spatial variation of trends in wildfire activity and their relationship to summer drought for the entire province of British Columbia. Time series of annual wildfire extent and occurrence, summer self-calibrating Palmer Drought Severity Index and summer Aridity Index were derived from spatially explicit data. Sixteen landscape regions according to the provincial Biogeoclimatic Ecosystem Classification system served as spatial reference. The regional series for 1920–2000 were subjected to trend analysis. Correlations between area burned and summer drought were assessed and tested for significance. The observed decrease in wildfire activity is significantly related to wetter summers with the strength of the relationship considerably varying between British Columbia's landscapes. Our results suggest that aggregated statistics for large regions with complex topography and climate can hide the spatial variation in direction and strength of changes and may accordingly obscure the relationship between fire and drought. Based on high-spatial-resolution data, our

study is the first to provide a differentiated picture for British Columbia.

Publication International Journal of Wildland Fire
Volume 19
Issue 3
Pages 272-283
Date May 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09055
ISSN 1049-8001
URL http://dx.doi.org/10.1071/WF09055
Extra Keywords: area burned; Aridity Index; BEC; fire frequency; PDSI; self-calibrating PDSI.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:22:45 2011

Spatially-explicit simulation of the effect of prescribed burning on fire regimes and plant extinctions in shrublands typical of south-eastern Australia

Type Journal Article
Author R. A. Bradstock
Author M. Bedward
Author Belinda J. Kenny
Author Judith Scott
Abstract A spatial model was used to simulate plant extinction in relation to prescribed burning in fire-prone shrublands. Prescribed burning may be used to manipulate fuel to levels that are sub-critical for fire-spread in extreme weather. Effects of variation in area of annual prescribed burning on area of unplanned fires occurring under severe weather and the probability of extinction in three functional groups of shrubs (serotinous and leguminous obligate seeders and serotinous resprouters) were examined. Results of 200 year simulations indicated that restriction of the size of unplanned fires occurred when large (> 30%) areas of the landscape were burnt annually. Risk of extinction in obligate seeders was high at such levels of prescribed burning. Extinction probability was also positively related to frequency of unplanned fires. In resprouters, risk of extinction was unaffected by prescribed fire. The model predicts that passive restriction of unplanned fires in extreme weather, by prescribed burning, is incompatible with floristic conservation objectives.
Publication Biological Conservation
Volume 86
Issue 1
Pages 83-95
Date October 1998
Journal Abbr Biol. Conserv.
DOI 10.1016/S0006-3207(97)00170-5
ISSN 0006-3207
URL http://www.sciencedirect.com/science/article/B6V5X-3TP5RMP-9/2/4c896646e45051052c6af84ac1b005ec
Extra Keywords: extinction; prescribed burning; cellular model.
Date Added Wed Aug 24 12:10:20 2011
Modified Fri Aug 26 20:33:40 2011

Spatio-temporal patterns of large grassland fires in the Intermountain West, USA

Type Journal Article
Author Paul A. Knapp

Abstract The spatial and temporal occurrence of large grassland fires (>2008 ha) in the Intermountain West was examined for the period 1980 through 1995. Results suggest that these fires are largely predictable through space and time. Of the 360 large fires, 339 occurred within eight regions as defined by clustering of fires within physiographic boundaries. These regions were characterized by their abundance of exotic annual grasses and flatter terrain that provided continuous fine-fuel conditions that promoted fire spread. Temporally, the likelihood of a large fire is correlated with summer moisture conditions (Z-index values) in the year preceding that of the fire that are either near-normal or wetter. Conversely, <20% of all the large fires occurred when the previous summer's Z values were below normal. This may be explained by enhanced fine-fuel build-up enabled by mesic conditions, causing increased biomass in the following summer and thus increasing the incidence of large fires. Moisture conditions in the summer in which the large fires occurred appeared to have less influence on the likelihood of those fires.

Publication Global Ecology and Biogeography Letters
Volume 7
Issue 4
Pages 259–272
Date July 1998
Journal Abbr Global Ecol. Biogeogr. Lett.
ISSN 0960-7447
URL http://www.jstor.org/stable/2997600
Extra Keywords: Intermountain West U.S.A.; grassland fires; fire occurrence; fire prediction; exotic annual grasses; Palmer's Z-index values.
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:16:14 2011

Spatiotemporal variability of ENSO and SST teleconnections to summer drought over the United States during the twentieth century

Type Journal Article

Author Balaji Rajagopalan
Author Edward Cook
Author Upmanu Lall
Author Bonnie K. Ray

Abstract Presented are investigations into the spatial structure of teleconnections between both the winter El Niño–Southern Oscillation (ENSO) and global sea surface temperatures (SSTs), and a measure of continental U.S. summer drought during the twentieth century. Potential nonlinearities and nonstationarities in the relationships are noted. During the first three decades of this century, summer drought teleconnections in response to SST patterns linked to ENSO are found to be strongest in the southern regions of Texas, with extensions into regions of the Midwest. From the 1930s through the 1950s, the drought teleconnection pattern is found to extend into southern Arizona. The most recent three decades show weak teleconnections between summer drought over southern Texas and Arizona, and winter SSTs, which is consistent with previous findings. Instead, the response to Pacific SSTs shows a clear shift to the western United States and southern regions of California. These epochal variations are consistent with epochal variations observed in ENSO and other low-frequency climate indicators. This changing teleconnection response complicates statistical forecasting of drought.

Publication Journal of climate
Volume 13
Issue 24
Pages 4244–4255
Date December 2000
Journal Abbr J. Climate
DOI 10.1175/1520-0442(2000)013<4244:SVOEAS>2.0.CO;2
ISSN 1520-0442

URL http://journals.ametsoc.org/doi/full/10.1175/1520-0442%282000%29013%3C4244%3ASVOEAS%3E2.0.CO%3B2
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:24:43 2011

Special paper: A global biome model based on plant physiology and dominance, soil properties and climate

Type Journal Article
Author I. Colin Prentice
Author Wolfgang Cramer
Author Sandy P. Harrison
Author Rik Leemans
Author Robert A. Monserud
Author Allen M. Solomon
Abstract A model to predict global patterns in vegetation physiognomy was developed from physiological considera- tions influencing the distributions of different functional types of plant. Primary driving variables are mean coldest- month temperature, annual accumulated temeprature over 5°C, and a drought index incorporating the seasonality of precipitation and the available water capacity of the soil. The model predicts which plant types can occur in a given environment, and selects the potentially dominant types from among them. Biomes arise as combinations of domi- nant types. Global environmental data were supplied as monthly means of temperature, precipitation and sunshine (interpolated to a global 0.5° grid, with a lapse-rate correction) and soil texture class. The resulting predictions of global vegetation patterns were in good agreement with the mapped distribution of actual ecosystem complexes (Olson, J.S., Watts, J.A. & Allison, L.J. (1983) ORNL-5862, Oak Ridge Nat. Lab., 164 pp.), except where intensive agricul- ture has obliterated the natural patterns. The model will help in assessing impacts of future climate changes on potential natural vegetation patterns, land-surface characteristics and terrestrial carbon storage, and in analysis of the effects of past climate change on these variables.
Publication Journal of Biogeography
Volume 19
Issue 2
Pages 117–134
Date March 1992
Journal Abbr J. Biogeogr.
ISSN 0305-0270
Short Title Special paper
URL http://www.jstor.org/stable/2845499
Extra Keywords: biome; carbon cycle; climate change; map comparison; plant functional types.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:31:21 2011

Special paper: The Holdridge life zones of the conterminous United States in relation to ecosystem mapping

Type Journal Article
Author Ariel E. Lugo
Author Sandra L. Brown
Author Rusty Dodson
Author Thomas S. Smith
Author Herman H. Shugart

Abstract • Aim: Our main goals were to develop a map of the life zones for the conterminous United States, based on the Holdridge Life Zone system, as a tool for ecosystem mapping, and to compare the map of Holdridge life zones with other global vegetation classification and mapping efforts. • Location: The area of interest is the forty-eight contiguous states of the United States. • Methods: We wrote a PERL program for determining life zones from climatic data and linked it to the image processing workbench (IPW). The inputs were annual precipitation (Pann), biotemperature (Tjbo), sea-level biotemperature (Tobjo), and the frost line. The spatial resolution chosen for this study (2.5 arc-minute for classification, 4-km for mapping) was driven by the availability of current state-of-the-art, accurate and reliable precipitation data. We used the Precipitation-elevation Regressions on Independent Slopes Model, or PRISM, output for the contiguous United States downloaded from the Internet. The accepted standard data for air temperature surfaces were obtained from the Vegetation/Ecosystem Modelling and Analysis Project (VEMAP). This data set along with station data obtained from the National Climatic Data Center for the US, were used to develop all temperature surfaces at the same resolution as the Pann. • Results: The US contains thirty-eight life zones (34% of the world's life zones and 85% of the temperate ones) including one boreal, twelve cool temperate, twenty warm temperate, four subtropical, and one tropical. Seventy-four percent of the US falls in the 'basal belt', 18% is montane, 8% is subalpine, 1% is alpine, and < 0.1% is nival. The US ranges from supcrarid to superhumid, and the humid province is the largest (45% of the US). The most extensive life zone is the warm temperate moist forest, which covers 23 % of the country. We compared the Holdridge life zone map with output from the BIOME model, Bailey's ecoregions, Ktichler potential vegetation, and land cover, all aggregated to four cover classes. Despite differences in the goals and methods for all these classification systems, there was a very good to excellent agreement among them for forests but poor for grasslands, shrublands, and nonvegetated lands. • Main conclusions: We consider the life zone approach to have many strengths for ecosystem mapping because it is based on climatic driving factors of ecosystem processes and recognizes ecophysiological responses of plants; it is hierarchical and allows for the use of other mapping criteria at the association and successional levels of analysis; it can be expanded or contracted without losing functional continuity among levels of ecological complexity; it is a relatively simple system based on few empirical data; and it uses objective mapping criteria.

Publication Journal of Biogeography
Volume 26
Issue 5
Pages 1025–1038
Date September 1999
Journal Abbr J. Biogeogr.
ISSN 0305-0270
Short Title Special Paper
URL http://www.jstor.org/stable/2656243
Extra Keywords: ecosystem management; frost line; Holdridge; life zones; United States; vegetation mapping.
Date Added Tue Aug 30 14:37:58 2011
Modified Thu Sep 15 20:09:08 2011

Special report on emissions scenarios: A special report of Working Group III of the Intergovernmental Panel on Climate Change

Type Book
Editor Nebojsa Nakicenovic
Editor Robert Swart
Abstract no abstract
Place Cambridge, United Kingdom
Publisher Cambridge University Press
Date October 2000
# of Pages 612 p.
ISBN 0521804930, 978-0521804936
Short Title Special report on emissions scenarios

URL http://www.grida.no/publications/other/ipcc_sr/?src=/climate/ipcc/emission/index.htm
Library Catalog IPCC
Extra Subject: 54 environmental sciences; 29 energy planning, policy and economy; climatic change; recommendations; air pollution; environmental policy
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

Notes:

Contents:

Spring flowering response to climate change between 1936 and 2006 in Alberta, Canada

Type Journal Article
Author Elisabeth Beaubien
Author Andreas Hamann
Abstract In documenting biological responses to climate change, the Intergovernmental Panel on Climate Change has used phenology studies from many parts of the world, but data from the high latitudes of North America are missing. In the present article, we evaluate climate trends and the corresponding changes in sequential bloom times for seven plant species in the central parklands of Alberta, Canada (latitude 52°–57° north). For the study period of 71 years (1936–2006), we found a substantial warming signal, which ranged from an increase of 5.3 degrees Celsius (°C) in the mean monthly temperatures for February to an increase of 1.5°C in those for May. The earliest-blooming species' (Populus tremuloides and Anemone patens) bloom dates advanced by two weeks during the seven decades, whereas the later-blooming species' bloom dates advanced between zero and six days. The early-blooming species' bloom dates advanced faster than was predicted by thermal time models, which we attribute to decreased diurnal temperature fluctuations. This unexpectedly sensitive response results in an increased exposure to late-spring frosts.

Publication BioScience
Volume 61
Issue 7
Pages 514-524
Date July 2011
Journal Abbr BioScience
DOI 10.1525/bio.2011.61.7.6
ISSN 1525-3244
URL http://www.jstor.org/stable/info/10.1525/bio.2011.61.7.6
Extra Keywords: climate change; global warming; phenology; flowering; Canada.
Date Added Tue Aug 23 02:06:40 2011
Modified Wed Aug 24 04:41:36 2011

Spruce beetles and fires in the nineteenth-century subalpine forests of western Colorado, U.S.A.

Type Journal Article
Author William L. Baker
Author Thomas T. Veblen
Abstract We analyzed 17 photographs, taken between 1873 and 1915, that illustrate widespread mortality in subalpine forests of western Colorado. Eight of these photographs, reproduced here, contain three general patterns of mortality, interpreted to result from spruce beetle (Dendroctonus rufipennis) attacks, fires, and wind. Tree-ring chronologies at four of the sites corroborated the role of spruce beetle in killing the trees visible in the photographs. The photographs and tree-ring dates suggest that the spruce beetle outbreak occurred between the 1850s and the 1880s, and affected forests from central New Mexico to north-central Colorado. Spruce beetle outbreaks are a significant type of natural disturbance in these forests. The relative contribution of beetles and fires to subalpine forest structure is in need of further research. The sequence and spatial configuration of disturbances by spruce beetles, fire, and wind varies, and can be spatially heterogeneous, even on small land areas. In such areas, forest responses to uniformly applied disturbance controls (e.g., fire suppression) will be spatially heterogeneous, not affecting all parts of the landscape uniformly.
Publication Arctic and Alpine Research
Volume 22
Issue 1
Pages 65-80
Date February 1990
Journal Abbr Arct. Alp. Res.
DOI 10.2307/1551721
ISSN 0004-0851
URL http://www.jstor.org/stable/1551721
Date Added Tue Aug 23 01:44:06 2011
Modified Wed Aug 24 04:42:41 2011

Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies

Type Journal Article
Author S. Pacala
Abstract Humanity already possesses the fundamental scientific, technical, and industrial know-how to solve the carbon and climate problem for the next half-century. A portfolio of technologies now exists to meet the world's energy needs over the next 50 years and limit atmospheric CO2 to a trajectory that avoids a doubling of the preindustrial concentration. Every element in this portfolio has passed beyond the laboratory bench and demonstration project; many are already implemented somewhere at full industrial scale. Although no element

is a credible candidate for doing the entire job (or even half the job) by itself, the portfolio as a whole is large enough that not every element has to be used.

Publication Science
Volume 305
Pages 968-972
Date 2004-08-13
DOI 10.1126/science.1100103
ISSN 0036-8075, 1095-9203
Short Title Stabilization Wedges
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1100103
Accessed Thu Sep 29 13:39:28 2011
Library Catalog CrossRef
Call Number 1093
Date Added Thu Oct 6 11:54:56 2011
Modified Thu Oct 6 11:59:46 2011

State of the climate in 2009

Type Journal Article
Editor Derek S. Arndt
Editor Molly O. Baringer
Editor Michael R. Johnson
Abstract The year was characterized by a transition from a waning La Niña to a strengthening El Niño, which first developed in June. By December, SSTs were more than 2.0°C above average over large parts of the central and eastern equatorial Pacific. Eastward surface current anomalies, associated with the El Niño, were strong across the equatorial Pacific, reaching values similar to the 2002 El Niño during November and December 2009. The transition from La Niña to El Niño strongly influenced anomalies in many climate conditions, ranging from reduced Atlantic basin hurricane activity to large scale surface and tropospheric warmth. Global average surface and lower-troposphere temperatures during the last three decades have been progressively warmer than all earlier decades, and the 2000s (2000–09) was the warmest decade in the instrumental record. This warming has been particularly apparent in the mid- and high-latitude regions of the Northern Hemisphere and includes decadal records in New Zealand, Australia, Canada, Europe, and the Arctic. The stratosphere continued a long cooling trend, except in the Arctic. Atmospheric greenhouse gas concentrations continued to rise, with CO_2 increasing at a rate above the 1978 to 2008 average. The global ocean CO_2 uptake flux for 2008, the most recent year for which analyzed data are available, is estimated to have been 1.23 Pg C yr^{-1}, which is 0.25 Pg C yr^{-1} smaller than the long-term average and the lowest estimated ocean uptake in the last 27 years. At the same time, the total global ocean inventory of anthropogenic carbon stored in the ocean interior as of 2008 suggests an uptake and storage of anthropogenic CO_2 at rates of 2.0 and 2.3 ±0.6 Pg C yr^{-1} for the decades of the 1990s and 2000s, respectively. Total-column ozone concentrations are still well below pre-1980 levels but have seen a recent reduction in the rate of decline while upper-stratospheric ozone showed continued signs of ongoing slow recovery in 2009. Ozone-depleting gas concentrations continued to decline although some halogens such as hydrochlorofluorocarbons are increasing globally. The 2009 Antarctic ozone hole was comparable in size to recent previous ozone holes, while still much larger than those observed before 1990. Due to large interannual variability, it is unclear yet whether the ozone hole has begun a slow recovery process. Global integrals of upper-ocean heat content for the last several years have reached values consistently higher than for all prior times in the record, demonstrating the dominant role of the oceans in the planet's energy budget. Aside from the El Niño development in the tropical Pacific and warming in the tropical Indian Ocean, the Pacific Decadal Oscillation (PDO) transitioned to a positive phase during the fall/winter 2009. Ocean heat fluxes contributed to SST anomalies in some regions (e.g., in the North Atlantic and tropical Indian Oceans) while dampening existing SST anomalies in other regions (e.g., the tropical and extratropical Pacific). The downward trend in global chlorophyll observed since 1999 continued through 2009, with current chlorophyll stocks in the central stratified oceans now approaching record lows since 1997. Extreme warmth was experienced across large areas of South America, southern Asia, Australia, and New Zealand. Australia had its second warmest year on record. India experienced its warmest year on record; Alaska had its second warmest July on record, behind

2004; and New Zealand had its warmest August since records began 155 years ago. Severe cold snaps were reported in the UK, China, and the Russian Federation. Drought affected large parts of southern North America, the Caribbean, South America, and Asia. China suffered its worst drought in five decades. India had a record dry June associated with the reduced monsoon. Heavy rainfall and floods impacted Canada, the United States, the Amazonia and southern South America, many countries along the east and west coasts of Africa, and the UK. The U.S. experienced its wettest October in 115 years and Turkey received its heaviest rainfall over a 48-hr period in 80 years. Sea level variations during 2009 were strongly affected by the transition from La Niña to El Niño conditions, especially in the tropical Indo-Pacific. Globally, variations about the long-term trend also appear to have been influenced by ENSO, with a slight reduction in global mean sea level during the 2007/08 La Niña event and a return to the long-term trend, and perhaps slightly higher values, during the latter part of 2009 and the current El Niño event. Unusually low Florida Current transports were observed in May and June and were linked to high sea level and coastal flooding along the east coast of the United States in the summer. Sea level significantly decreased along the Siberian coast through a combination of wind, ocean circulation, and steric effects. Cloud and moisture increased in the tropical Pacific. The surface of the western equatorial Pacific freshened considerably from 2008 to 2009, at least partially owing to anomalous eastward advection of fresh surface water along the equator during this latest El Niño. Outside the more variable tropics, the surface salinity anomalies associated with evaporation and precipitation areas persisted, consistent with an enhanced hydrological cycle. Global tropical cyclone (TC) activity was the lowest since 2005, with six of the seven main hurricane basins (the exception is the Eastern North Pacific) experiencing near-normal or somewhat below-normal TC activity. Despite the relatively mild year for overall hurricane activity, several storms were particularly noteworthy: Typhoon Morakot was the deadliest typhoon on record to hit Taiwan; Cyclone Hamish was the most intense cyclone off Queensland since 1918; and the state of Hawaii experienced its first TC since 1992. The summer minimum ice extent in the Arctic was the third-lowest recorded since 1979. The 2008/09 boreal snow cover season marked a continuation of relatively shorter snow seasons, due primarily to an early disappearance of snow cover in spring. Preliminary data indicate a high probability that 2009 will be the 19th consecutive year that glaciers have lost mass. Below normal precipitation led the 34 widest marine terminating glaciers in Greenland to lose 101 km² ice area in 2009, within an annual loss rate of 106 km² over the past decade. Observations show a general increase in permafrost temperatures during the last several decades in Alaska, northwest Canada, Siberia, and Northern Europe. Changes in the timing of tundra green-up and senescence are also occurring, with earlier green-up in the High Arctic and a shift to a longer green season in fall in the Low Arctic. The Antarctic Peninsula continues to warm at a rate five times larger than the global mean warming. Associated with the regional warming, there was significant ice loss along the Antarctic Peninsula in the last decade. Antarctic sea ice extent was near normal to modestly above normal for the majority of 2009, with marked regional contrasts within the record. The 2008/09 Antarctic-wide austral summer snowmelt was the lowest in the 30-year history. This 20th annual State of the Climate report highlights the climate conditions that characterized 2009, including notable extreme events. In total, 37 Essential Climate Variables are reported to more completely characterize the State of the Climate in 2009.

Publication Bulletin of the American Meteorological Society
Volume 91
Issue 7
Pages S1-S22
Date July 2010
Series Title State of the Climate
Journal Abbr BAMS
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- **Citing a section (example):** Halpert, M., G. D. Bell, and M. L'Heureux, 2010: ENSO and the Tropical Pacific [in .State of the Climate in 2009.]. *Bull. Amer. Meteor. Soc.*, **91** (7), S79-S82.

State of the climate in 2010

Type Journal Article
Editor Jessica Blunden
Editor Derek S. Arndt
Editor Molly O. Baringer
Abstract Several large-scale climate patterns influenced climate conditions and weather patterns across the globe during 2010. The transition from a warm El Niño phase at the beginning of the year to a cool La Niña phase by July contributed to many notable events, ranging from record wetness across much of Australia to historically low Eastern Pacific basin and near-record high North Atlantic basin hurricane activity. The remaining five main hurricane basins experienced below- to well-below-normal tropical cyclone activity. The negative phase of the Arctic Oscillation was a major driver of Northern Hemisphere temperature patterns during 2009/10 winter and again in late 2010. It contributed to record snowfall and unusually low temperatures over much of northern Eurasia and parts of the United States, while bringing above-normal temperatures to the high northern latitudes. The February Arctic Oscillation Index value was the most negative since records began in 1950. The 2010 average global land and ocean surface temperature was among the two warmest years on record. The Arctic continued to warm at about twice the rate of lower latitudes. The eastern and tropical Pacific Ocean cooled about 1°C from 2009 to 2010, reflecting the transition from the 2009/10 El Niño to the 2010/11 La Niña. Ocean heat fluxes contributed to warm sea surface temperature anomalies in the North Atlantic and the tropical Indian and western Pacific Oceans. Global integrals of upper ocean heat content for the past several years have reached values consistently higher than for all prior times in the record, demonstrating the dominant role of the ocean in the Earth's energy budget. Deep and abyssal waters of Antarctic origin have also trended warmer on average since the early 1990s. Lower tropospheric temperatures typically lag ENSO surface fluctuations by two to four months, thus the 2010 temperature was dominated by the warm phase El Niño conditions that occurred during the latter half of 2009 and early 2010 and was second warmest on record. The stratosphere continued to be anomalously cool. Annual global precipitation over land areas was about five percent above normal. Precipitation over the ocean was drier than normal after a wet year in 2009. Overall, saltier (higher evaporation) regions of the ocean surface continue to be anomalously salty, and fresher (higher precipitation) regions continue to be anomalously fresh. This salinity pattern, which has held since at least 2004, suggests an increase in the hydrological cycle. Sea ice conditions in the Arctic were significantly different than those in the Antarctic during the year. The annual minimum ice extent in the Arctic— reached in September —was the third lowest on record since 1979. In the Antarctic, zonally averaged sea ice extent reached an all-time record maximum from mid-June through late August and again from mid-November through early December. Corresponding record positive Southern Hemisphere Annular Mode Indices influenced the Antarctic sea ice extents. Greenland glaciers lost more mass than any other year in the decade-long record. The Greenland Ice Sheet lost a record amount of mass, as the melt rate was the highest since at least 1958, and the area and duration of the melting was greater than any year since at least 1978. High summer air temperatures and a longer melt season also caused a continued increase in the rate of ice mass loss from small glaciers and ice caps in the Canadian Arctic. Coastal sites in Alaska show continuous permafrost warming and sites in Alaska, Canada, and Russia indicate more significant warming in relatively cold permafrost than in warm permafrost in the same geographical area. With regional differences, permafrost temperatures are now up to 2°C warmer than they were 20 to 30 years ago. Preliminary data indicate there is a high probability that 2010 will be the 20th consecutive year that alpine glaciers have lost mass. Atmospheric greenhouse gas concentrations continued to rise and ozone depleting substances continued to decrease. Carbon dioxide increased by 2.60 ppm in 2010, a rate above both the 2009 and the 1980–2010 average rates. The global ocean carbon dioxide uptake for the 2009 transition period from La Niña to El Niño conditions, the most recent period for which analyzed data are available, is estimated to be similar to the long-term average. The 2010 Antarctic ozone hole was among the lowest 20% compared with other years since 1990, a result of warmer-than-average temperatures in the Antarctic stratosphere during austral winter between mid-July and early September.
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Volume 92

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Date June 2011
Series Title State of the Climate
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DOI 10.1175/1520-0477-92.6.S1
ISSN 0003-0007
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Call Number 0000
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- **Citing a chapter (example):** Fogt, R. L., , Ed., 2011: Antarctica [in "State of the Climate in 2010"]. *Bull. Amer. Meteor. Soc.*, **92** (6), S161-171.
- **Citing a section (example):** Wovrosh, A. J., S. Barreira, and R. L. Fogt, 2011: [Antarctica] Circulation [in .State of the Climate in 2010.]. *Bull. Amer. Meteor. Soc.*, **92** (6), S161-S163.

Strong Response of an Invasive Plant Species (Centaurea solstitialis L.) to Global Environmental Changes

Type Journal Article
Author Jeffrey Dukes
Author Nona Chiariello
Author Scott Loarie
Author Christopher Field
Abstract Global environmental changes are altering interactions among plant species, sometimes favoring invasive species. Here, we examine how a suite of five environmental factors, singly and in combination, can affect the success of a highly invasive plant. We introduced Centaurea solstitialis L. (yellow starthistle), which is considered by many to be California's most troublesome wildland weed, to grassland plots in the San Francisco Bay Area. These plots experienced ambient or elevated levels of warming, atmospheric CO_2, precipitation, and nitrate deposition, and an accidental fire in the previous year created an additional treatment. Centaurea grew more than six times larger in response to elevated CO_2, and, outside of the burned area, grew more than three times larger in response to nitrate deposition. In contrast, resident plants in the community responded less strongly (or did not respond) to these treatments. Interactive effects among treatments were rarely significant. Results from a parallel mesocosm experiment, while less dramatic, supported the pattern of results observed in the field. Taken together, our results suggest that ongoing environmental changes may dramatically increase Centaurea's prevalence in western North America.
Publication Ecological Applications
Volume Preprints
Pages 110527080348010
Date May 2011 - In press
Journal Abbr Ecol. Appl.
DOI 10.1890/11-0111.1
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/11-0111.1

Call Number 0000
Extra Keywords: Centaurea solstitialis (yellow starthistle); climate change; elevated CO_2; grasslands; invasive species; nitrogen deposition; rangelands; weed.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:53 2011

Summer aridity in the United States: Response to mid-Holocene changes in insolation and sea surface temperature

Type Journal Article
Author Noah S. Diffenbaugh
Author Moetasim Ashfaq
Author Bryan Shuman
Author John W. Williams
Author Patrick J. Bartlein
Abstract We examine the response of summer precipitation to mid-Holocene insolation forcing and insolation-induced changes in sea surface temperature. Using a high-resolution nested climate modeling system, we find that mid-Holocene insolation forcing results in drier-than-present conditions over the central continental United States (U.S.) and northern Rocky Mountains, as well as wetter-than-present conditions over the Atlantic seaboard and northwestern Great Plains. We find that changes in summer precipitation are dominated by changes in large-scale processes, with similar patterns of change in the global and nested models. We also find that insolation-induced changes in sea surface temperature do not change the basic pattern of precipitation response, primarily because the dynamical response is very similar with and without sea surface temperature changes. Notably, drier-than-present conditions over the central U.S. are associated with enhanced anticyclonic circulation aloft over the mid-continent and reduced low-level moisture content over the Gulf of Mexico and south-central U.S., while wetter-than-present conditions over the Atlantic seaboard are associated with enhanced low-level cyclonic circulation and elevated low-level moisture content. The simulated patterns of precipitation and soil moisture agree with proxy moisture records from most regions, indicating both that insolation was the strongest determinant of mid-Holocene summer aridity in the continental U.S. and that high-resolution nested climate modeling systems are able to capture the basic response of midlatitude warm-season aridity to changes in external climate forcing.
Publication Geophysical Research Letters
Volume 33
Issue 22
Pages L22712 (5 p.)
Date November 2006
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2006GL028012
ISSN 0094–8276
Short Title Summer aridity in the United States
URL http://www.agu.org/pubs/crossref/2006/2006GL028012.shtml
Extra Keywords: mid-Holocene; regional climate model; data-model comparison.
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Modified Wed Aug 31 00:40:11 2011

Summer heat waves over western Europe 1880–2003, their relationship to large-scale forcings and predictability

Type Journal Article
Author Paul M. Della-Marta

Author Jürg Luterbacher
Author Hans von Weissenfluh
Author Elena Xoplaki
Author Manola Brunet
Author Heinz Wanner

Abstract We investigate the large-scale forcing and teleconnections between atmospheric circulation (sea level pressure, SLP), sea surface temperatures (SSTs), precipitation and heat wave events over western Europe using a new dataset of 54 daily maximum temperature time series. Forty four of these time series have been homogenised at the daily timescale to ensure that the presence of inhomogeneities has been minimised. The daily data have been used to create a seasonal index of the number of heat waves. Using canonical correlation analysis (CCA), heat waves over western Europe are shown to be related to anomalous high pressure over Scandinavia and central western Europe. Other forcing factors such as Atlantic SSTs and European precipitation, the later as a proxy for soil moisture, a known factor in strengthening land–atmosphere feedback processes, are also important. The strength of the relationship between summer SLP anomalies and heat waves is improved (from 35%) to account for around 46% of its variability when summer Atlantic and Mediterranean SSTs and summer European precipitation anomalies are included as predictors. This indicates that these predictors are not completely collinear rather that they each have some contribution to accounting for summer heat wave variability. However, the simplicity and scale of the statistical analysis masks this complex interaction between variables. There is some useful predictive skill of summer heat waves using multiple lagged predictors. A CCA using preceding winter North Atlantic SSTs and preceding January to May Mediterranean total precipitation results in significant hindcast (1972–2003) Spearman rank correlation skill scores up to 0.55 with an average skill score over the domain equal to 0.28 ± 0.28. In agreement with previous studies focused on mean summer temperature, there appears to be some predictability of heat wave events on the decadal scale from the Atlantic Multidecadal Oscillation (AMO), although the long-term global mean temperature is also well related to western European heat waves. Combining these results with the observed positive trends in summer continental European SLP, North Atlantic SSTs and indications of a decline in European summer precipitation then possibly these long-term changes are also related to increased heat wave occurrence and it is important that the physical processes controlling these changes be more fully understood.

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Volume 29
Issue 2-3
Pages 251-275
Date August 2007
Journal Abbr Clim. Dyn.
DOI 10.1007/s00382-007-0233-1
ISSN 0930-7575
URL http://www.springerlink.com/index/10.1007/s00382-007-0233-1
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:34 2011

Synchronicity of Antarctic temperatures and local solar insolation on orbital timescales

Type Journal Article

Author Thomas Laepple
Author Martin Werner
Author Gerrit Lohmann

Abstract The Milankovitch theory states that global climate variability on orbital timescales from tens to hundreds of thousands of years is dominated by the summer insolation at high northern latitudes. The supporting evidence includes reconstructed air temperatures in Antarctica that are nearly in phase with boreal summer insolation and out of phase with local summer insolation. Antarctic climate is therefore thought to be driven by northern summer insolation. A clear mechanism that links the two hemispheres on orbital timescales is, however, missing. We propose that key Antarctic temperature records derived from ice cores are biased towards austral winter because of a seasonal cycle in snow accumulation. Using present-day estimates of this bias in the 'recorder' system, here we show that the local insolation can explain the orbital component of the temperature record without having to invoke a link to the Northern Hemisphere. Therefore, the Antarctic ice-core-derived temperature record, one of the best-dated records of the late Pleistocene temperature evolution, cannot be used to support or contradict the Milankovitch hypothesis that global climate changes are driven by Northern Hemisphere summer insolation variations.

Publication Nature
Volume 471
Issue 7336
Pages 91-94
Date 03 March 2011
Journal Abbr Nature
DOI 10.1038/nature09825
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature09825
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:17:37 2011

Synoptic climatology of extreme fire-weather conditions across the southwest United States

Type Journal Article
Author Michael A. Crimmins
Abstract Extreme fire-weather conditions are usually thought of as discrete events rather than part of a continuum of meteorological and climatological variability. This study uses a synoptic climatological approach (weather typing) to examine the seasonal climatology of extreme fire-weather conditions across the southwest United States (Arizona and New Mexico) during the period of 1988–2003. Three key circulation patterns representing broad southwesterly flow and large geopotential height gradients are associated with over 80% of the extreme fire-weather days identified in this study. Seasonal changes in relative humidity levels, strength of height gradient, and geopotential heights all modulate the relationship between these key circulation patterns and extreme fire-weather days. Examination of daily incident summaries for three recent wildfires (May 2000, June 2002 and June 2003) shows that wildfire activity can be strongly regulated by these critical fire-weather circulation patterns.
Publication International Journal of Climatology
Volume 26
Issue 8
Pages 1001–1016
Date 30 June 2006
Journal Abbr Int. J. Climatol.
DOI 10.1002/joc.1300
ISSN 1097-0088
URL http://onlinelibrary.wiley.com/doi/10.1002/joc.1300/abstract
Extra Keywords: fire weather; synoptic weather types; self-organizing maps; wildfires; southwest United States.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:25 2011

Synoptic patterns associated with large summer forest fires in Portugal

Type Journal Article
Author Mário G. Pereira
Author Ricardo M. Trigo
Author Carlos C. da Camara
Author José M. C. Pereira

Author Solange M. Leite

Abstract Time series of the total annual burnt area in Portugal reveal two main features, a large inter-annual variability and a positive trend since the early 80 s. Here we show that inter-annual variability is partly due to the amount of precipitation in the fire season and in the preceding late spring season and partly to the occurrence of atmospheric circulation patterns that induce extremely hot and dry spells over western Iberia. On the other hand, the observed positive trend of burnt area is mainly related to changes in farming and land use. Meteorological conditions play a fundamental role, both in the ignition and during the fire spread. The description of spatial and temporal variability of wildfire characteristics is performed using the comprehensive fire data set (between 1980 and 2000) from the Portuguese forest service. We show that the vast majority of the burnt area in Portugal (80%) is due to fire events that occurred on in a very small number (10%) of summer days. Large-scale climatic and dynamical meteorological fields were retrieved from the NCAR/NCEP Reanalyses data sets for the 1961–2000 period and composites were then obtained for the 10% of summer days associated with the highest values of burnt area. Anomaly fields of climate variables (e.g. 850 hPa temperature and relative humidity) are interpreted based on physical mechanisms associated with dynamical variables such as the surface wind field or the 500 hPa geopotential height. Overall, one may state that synoptic patterns of most analysed meteorological fields present statistically significant anomalies over western Iberia. In particular, composites of geopotential height for mid (500 hPa) and lower (850 hPa) troposphere show that large forest fires in Portugal occur when the atmospheric circulation forms a prominent ridge over the Iberian peninsula with the flow being dominated by a strong meridional component. Near the surface, wind and sea level pressure anomalies show that these days are associated with south-easterly conditions, with a strong anomalous advection from northern Africa that is further heated when crossing the central Iberian plateau. Large asymmetries between minimum and maximum temperatures composites are analysed taking into account the lack of cloud cover and corresponding precipitation. Finally, we present a linear model based on the monthly precipitation and the occurrence of previously identified wildfire prone atmospheric patterns. The developed model gives a correlation coefficient of 0.8 between the observed and modeled extent of burnt area during the summer.

Publication Agricultural and Forest Meteorology
Volume 129
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Pages 11-25
Date 28 March 2005
Journal Abbr Agr. Forest Meteorol.
DOI 10.1016/j.agrformet.2004.12.007
ISSN 0168-1923
URL http://linkinghub.elsevier.com/retrieve/pii/S0168192305000043
Extra Keywords: wildland fire; weather; rainfall; temperature; wind structure; Portugal.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:30:09 2011

Synoptic weather types associated with critical fire weather

Type Report

Author Mark J. Schroeder
Author Glovinsky Monte
Author Virgil F. Henricks
Author Frank C. Hood
Author Melvin K. Hull
Author Henry L. Jacobson
Author Robert Kirkpatrick
Author Daniel W. Krueger
Author Lester P. Mallory
Author Albert G. 0ertel
Author Robert H. Reese

Author Leo A. Sergius
Author Charles E. Syverson
Abstract Mass fires are likely to spread rapidly and burn intensely when strong winds are combined with low humidities and high temperatures, particularly after a rainless period. To identify synoptic weather types that create such periods of critical fire weather, the 48 contiguous states were divided into 14 regions and fire danger indexes were computed from weather data at 89 stations for the years 1951-60. Surface weather types and upper-air patterns associated with high fire danger are described for each region.
Report Number AD 449630
Report Type Scientific And Technical Information: Meteorology and Civil Defense
Place Office of Civil Defense, Office of the Secretary of the Army
Institution Pacific Southwest Forest And Range Experiment Station Berkeley CA, Forest Service, U.S. Department of Agriculture
Date 1964
Pages 492 p.
URL http://oai.dtic.mil/oai/oai?verb=getRecord&…
Extra Keywords: fires; forest fires; meteorology; atmospheric motion; meteorological charts; weather forecasting; wind.
Date Added Sun Aug 28 17:26:09 2011
Modified Sun Aug 28 17:26:09 2011

Notes:

Citation:

Schroeder, M. J., M. Glovinski, and V. F. Hendricks. 1964. Synoptic weather types associated with critical fire weather. U.S. Department of Commerce, National Bureau of Standards, Institute for Applied Technology, AD 449-630, Washington, D.C., USA.

Synoptic weather types associated with critical fire weather. Schroeder M, Glovinsky M, Hendricks V, Hood F, Hull M, Jacobson H, Kirkpatrick R, Krueger D, Mallory L, Oertel A, Reese R, Sergius L, Syverson C. 1964. Pacific Southwest Forest and Range Experiment Station, Berkeley CA. 492 pp.

Synthesis and assessment product 3.3: Weather and climate extremes in a changing climate. Regions of focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands

Type Report
Series Editor Thomas R. Karl
Author US CCSP
Author Subcommittee on Global Change Research
Series Editor Gerald A. Meehl
Series Editor Christopher D. Miller
Series Editor Susan J. Hassol
Series Editor Anne M. Waple
Series Editor William L. Murray
Abstract Synopsis: Changes in extreme weather and climate events have significant impacts and are among the most serious challenges to society in coping with a changing climate. Many extremes and their associated impacts are now changing. For example, in recent decades most of North America has been experiencing more unusually hot days and nights, fewer unusually cold days and nights, and fewer frost days. Heavy downpours have become more frequent and intense. Droughts are becoming more severe in some regions, though there are no clear trends for North America as a whole. The power and frequency of Atlantic hurricanes have increased substantially in recent decades, though North American mainland land-falling hurricanes do not appear to have increased over the past century. Outside the tropics, storm tracks are shifting northward and the strongest storms are becoming even stronger. It is well established through formal attribution studies that the global

warming of the past 50 years is due primarily to human-induced increases in heat-trapping gases. Such studies have only recently been used to determine the causes of some changes in extremes at the scale of a continent. Certain aspects of observed increases in temperature extremes have been linked to human influences. The increase in heavy precipitation events is associated with an increase in water vapor, and the latter has been attributed to human-induced warming. No formal attribution studies for changes in drought severity in North America have been attempted. There is evidence suggesting a human contribution to recent changes in hurricane activity as well as in storms outside the tropics, though a confident assessment will require further study. In the future, with continued global warming, heat waves and heavy downpours are very likely to further increase in frequency and intensity. Substantial areas of North America are likely to have more frequent droughts of greater severity. Hurricane wind speeds, rainfall intensity, and storm surge levels are likely to increase. The strongest cold season storms are likely to become more frequent, with stronger winds and more extreme wave heights. Current and future impacts resulting from these changes depend not only on the changes in extremes, but also on responses by human and natural systems.

Report Number SAP 3.3
Report Type Synthesis and Assessment Product
Series Title Final Report of Synthesis and Assessment Product
Place US Climate Change Science Program
Date June 2008
Pages 162 p.
URL http://www.climatescience.gov/Library/sap/sap3-3/final-report/default.htm
Call Number 0000
Extra Lead agency: NOAA
Date Added Sat Aug 27 04:08:03 2011
Modified Sat Aug 27 15:53:11 2011

Synthesis and assessment product 4.2: Thresholds of climate change in ecosystems

Type Report
Author US CCSP
Author Subcommittee on Global Change Research
Author Daniel B. Fagre
Author Colleen W. Charles
Author Craig D. Allen
Author Charles Birkeland
Author F. Stuart Chapin III
Author Peter M. Groffman
Author Glenn R. Guntenspergen
Author Alan K. Knapp
Author A. David McGuire
Author Patrick J. Mulholland
Author Debra P.C. Peters
Author Daniel D. Roby
Author George Sugihara
Abstract Synopsis: As defined in this Synthesis and Assessment Report, ‘an ecological threshold is the point at which there is an abrupt change in an ecosystem quality, property, or phenomenon, or where small changes in one or more external conditions produce large and persistent responses in an ecosystem’. Ecological thresholds occur when external factors, positive feedbacks, or nonlinear instabilities in a system cause changes to propagate in a domino-like fashion that is potentially irreversible. This report reviews threshold changes in North American ecosystems that are potentially induced by climatic change and addresses the significant challenges these threshold crossings impose on resource and land managers. Sudden changes to ecosystems and the goods and services they provide are not well understood, but they are extremely important if natural resource managers are to succeed in developing adaptation strategies in a changing world. The report provides an overview of

what is known about ecological thresholds and where they are likely to occur. It also identifies those areas where research is most needed to improve knowledge and understand the uncertainties regarding them. The report suggests a suite of potential actions that land and resource managers could use to improve the likelihood of success for the resources they manage, even under conditions of incomplete understanding of what drives thresholds of change and when changes will occur. Key examples of climate-induced threshold changes are presented. This synthesis effort identified a suite of potential actions that, taken together or separately, can begin to improve the understanding of thresholds and increase the likelihood of success in developing management and adaptation strategies in a changing climate, before, during, and after thresholds are crossed. In general, it is essential to increase the resilience of ecosystems and thus to slow or prevent the crossing of thresholds; to identify early warning signals of impending threshold changes; and to employ adaptive management strategies to deal with new conditions, new successional trajectories and new combinations of species.

Report Number SAP 4.2
Report Type Synthesis and Assessment Product
Series Title Final Report of Synthesis and Assessment Product
Place US Climate Change Science Program
Date January 2009
Pages 156 p.
URL http://www.climatescience.gov/Library/sap/sap4-2/final-report/default.htm
Call Number 0000
Extra Lead agency: U.S. Geological Survey (USGS)
Date Added Sat Aug 27 04:08:03 2011
Modified Sat Aug 27 15:53:17 2011

Synthesis and assessment product 4.3: The effects of climate change on agriculture, land resources, water resources, and biodiversity in the United States

Type Report
Author US CCSP
Author Subcommittee on Global Change Research
Author Peter Backlund
Author Anthony Janetos
Author David Schimel
Series Editor Margaret Walsh
Abstract This report provides an assessment of the effects of climate change on U.S. agriculture, land resources, water resources, and biodiversity. It is one of a series of 21 Synthesis and Assessment Products (SAP) that are being produced under the auspices of the U.S. Climate Change Science Program (CCSP). This SAP builds on an extensive scientific literature and series of recent assessments of the historical and potential impacts of climate change and climate variability on managed and unmanaged ecosystems and their constituent biota and processes. It discusses the nation’s ability to identify, observe, and monitor the stresses that influence agriculture, land resources, water resources, and biodiversity, and evaluates the relative importance of these stresses and how they are likely to change in the future. It identifies changes in resource conditions that are now being observed, and examines whether these changes can be attributed in whole or part to climate change. The general time horizon for this report is from the recent past through the period 2030-2050, although longer-term results out to 2100 are also considered. There is robust scientific consensus that human-induced climate change is occurring. Records of temperature and precipitation in the United States show trends consistent with the current state of global-scale understanding and observations of change. Observations also show that climate change is currently impacting the nation’s ecosystems and services in significant ways, and those alterations are very likely to accelerate in the future, in some cases dramatically. Current observational capabilities are considered inadequate to fully understand and address the future scope and rate of change in all ecological sectors. Additionally, the complex interactions between change agents such as climate, land use alteration, and species invasion create dynamics that confound simple causal relationships and will severely complicate the development and assessment of mitigation and adaptation strategies. Even under the most optimistic CO_2 emission scenarios, important changes in sea level, regional and super-regional temperatures, and precipitation

patterns will have profound effects. Management of water resources will become more challenging. Increased incidence of disturbances such as forest fires, insect outbreaks, severe storms, and drought will command public attention and place increasing demands on management resources. Ecosystems are likely to be pushed increasingly into alternate states with the possible breakdown of traditional species relationships, such as pollinator/plant and predator/prey interactions, adding additional stresses and potential for system failures. Some agricultural and forest systems may experience near-term productivity increases, but over the long term, many such systems are likely to experience overall decreases in productivity that could result in economic losses, diminished ecosystem services, and the need for new, and in many cases significant, changes to management regimes.

Report Number	SAP 4.3
Report Type	Synthesis and Assessment Product
Series Title	Final Report of Synthesis and Assessment Product
Place	US Climate Change Science Program
Date	May 2008
Pages	240 p.
URL	http://www.sap43.ucar.edu/documents/SAP_4.3_6.18.pdf
Loc. in Archive	http://www.climatescience.gov/Library/sap/sap4-3/final-report/default.htm
Call Number	0000
Extra	Lead agency: U.S. Department of Agriculture (USDA)
Date Added	Sat Aug 27 04:08:03 2011
Modified	Sat Aug 27 15:53:14 2011

Synthesis of knowledge on the effects of fire and fire surrogates on wildlife in U.S. dry forests

Type	Report
Author	Patricia L. Kennedy
Author	Joseph B. Fontaine

Abstract Summary: Dry forests throughout the United States are fire-dependent ecosystems, and much attention has been given to restoring their ecological function. As such, land managers often are tasked with reintroducing fire via prescribed fire, wildland fire use, and fire-surrogate treatments such as thinning and mastication. During planning, managers frequently are expected to anticipate effects of management actions on wildlife species. This document represents a synthesis of existing knowledge on wildlife responses to fire and fire-surrogate treatments, presented in a useful, management-relevant format. Based on scoping meetings and dialogue with public lands managers from throughout the United States, we provide detailed, species-level, summary tables for project biologists and fire managers trying to anticipate the effects of fire and fire-surrogate treatments on local wildlife species. We performed an extensive survey of the published, peer-reviewed scientific literature on wildlife response to fire and fire-surrogate treatments. In total, we reviewed more than 150 articles, included 90 articles in our database, resulting in 4,937 records of 313 vertebrate species. We grouped the dry forests of the continental United States into six regions: pine east, pine west, interior mixed-conifer, Pacific mixed-conifer, eastern hardwood, and Great Lakes. Further, studies were categorized on the basis of the following: [1] Fire severity (in which low = 0-60% canopy mortality and high = more than 60% canopy mortality), and [2] Time since fire (expressed in ranges of 0-4 years, 5-9 years, and 10 years or more) Detailed tables summarizing published studies and individual species responses from each of the regions are in the appendixes. These are intended as "look up" tables for land managers engaged in planning. We found numerous peer-reviewed studies that provided examples of fire-adapted and fire-dependent wildlife species throughout dry forest types (Bachman's sparrow, black-backed woodpecker, gopher tortoise, etc.). These studies clearly showed that many species consistently respond positively to fire, supporting the assumption that these species have evolved with and are dependent on fire (of varying severities and extents) as a regular ecological process. However, not all species respond positively, and some species have no detectable response to the conditions created by fire or fire surrogates. Published literature was most available for birds and small mammals and least abundant for herpetofauna and large mammals (ungulates, carnivores). Moreover, often there were sampling issues associated with the wildlife literature, reducing the strength of inference in many cases. Regional coverage of studies was best for short-term effects of surface fires in eastern pine systems and high-severity fires in the interior mixed-conifer forests of the western United States. Major gaps in knowledge exist in the current scientific literature. Much ground has been gained by the Fire and Fire Surrogate system of

experiments with respect to stand-level knowledge of surface fire and fire surrogates. However, tremendous gaps persist with respect to mixed-severity fire, longer term response to mixed- and high severity fire, and the effects of repeated fire (all severities) on wildlife.

Report Number	SR-1096
Report Type	Special Report
Place	Corvallis, OR
Institution	Oregon State University, Agricultural Experiment Station
Date	September 2009
Pages	133 p.
URL	http://ir.library.oregonstate.edu/jspui/bitstream/1957/12625/1/SR1096.pdf
Archive	http://ir.library.oregonstate.edu/xmlui/handle/1957/12625
Extra	Keywords: forest animals -- effect of fires & effect of forest management; post-fire forest management; forests and forestry -- fire management; fire ecology; forest fires; arid regions forestry.
Date Added	Tue Aug 30 14:37:15 2011
Modified	Thu Sep 1 05:21:05 2011

Teleconnections in the geopotential height field during the Northern Hemisphere winter

Type	Journal Article
Author	John M. Wallace
Author	David S. Gutzler
Abstract	Contemporaneous correlations between geopotential heights on a given pressure surface at widely separated points on earth, referred to as teleconnections in this paper, are studied in an attempt to identify and document recurrent spatial patterns which might be indicative of standing oscillations in the planetary waves during the Northern Hemisphere winter, with time scales on the order of a month or longer. A review of existing literature on the subject reveals the existence of at least four such patterns: the North Atlantic and North Pacific Oscillations identified by Walker and Bliss (1932), a zonally symmetric seesaw between sea level pressures in polar and temperature latitudes, first noted by Lorenz (1951), and what we will refer to as the Pacific/North American pattern, which has been known to operational long-range forecasters in this country since the 1950's. A data set consisting of NMC monthly mean sea level pressure and 500 mb height analyses for a 15-year period is used as a basis for calculating the temporal correlation coefficients between all possible pairs of grid points. An objective method is used to identify and describe the strongest teleconnection patterns in this correlation matrix. The five leading patterns are compared with, and found to bear some similarity to, the leading eigenvectors of the correlation matrix. Certain of the above calculations are repeated on an independent data set in order to test the reproducibility of the patterns. The North Atlantic Oscillation and the Pacific/North American patterns are strongly evident in both data acts. The former is associated with fluctuations in the strength of the climatological mean jet stream over the western Atlantic. The Pacific/North American pattern includes a north–south seesaw in the central Pacific somewhat reminiscent of the North Pacific Oscillation mentioned by Walker and Bliss (1932) and Bjerknes (1969), together with centers of action over western Canada and the southeastern United States. Several other teleconnection patterns are revealed by the analysis of the primary data set, but are not found to be as reproducible in the independent data set. The sea level pressure statistics are dominated by negative correlations between the polar region and temperature latitudes, whereas the 500 mb statistics are dominated by patterns of a more regional scale, which display a nearly equivalent barotropic structure with amplitudes increasing with height. Most of the regional patterns have only one or two well-defined centers of action at the earth's surface, but at mid-tropospheric levels they are more wavelike in appearance and characterized by multiple centers of action; at these levels their structure resembles that of forced stationary wakes on a sphere.
Publication	Monthly Weather Review
Volume	109
Issue	4
Pages	784–812
Date	April 1981
Journal Abbr	Mon. Wea. Rev.

DOI 10.1175/1520-0493(1981)109<0784:TITGHF>2.0.CO;2
ISSN 1520-0493
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0493%281981%29109%3C0784%3ATITGHF%3E2.0.CO%3B2
Date Added Tue Aug 16 02:00:45 2011
Modified Wed Aug 31 00:57:50 2011

Temporal and spatial structure in a daily wildfire-start data set from the western United States (1986–96)

Type Journal Article
Author Patrick J. Bartlein
Author Steven W. Hostetler
Author Sarah L. Shafer
Author Justin O. Holman
Author Allen M. Solomon
Abstract The temporal and spatial structure of 332 404 daily fire-start records from the western United States for the period 1986 through 1996 is illustrated using several complimentary visualisation techniques. We supplement maps and time series plots with Hovmöller diagrams that reduce the spatial dimensionality of the daily data in order to reveal the underlying space–time structure. The mapped distributions of all lightning- and human-started fires during the 11-year interval show similar first-order patterns that reflect the broad-scale distribution of vegetation across the West and the annual cycle of climate. Lightning-started fires are concentrated in the summer half-year and occur in widespread outbreaks that last a few days and reflect coherent weather-related controls. In contrast, fires started by humans occur throughout the year and tend to be concentrated in regions surrounding large-population centres or intensive-agricultural areas. Although the primary controls of human-started fires are their location relative to burnable fuel and the level of human activity, spatially coherent, weather-related variations in their incidence can also be noted.
Publication International Journal of Wildland Fire
Volume 17
Issue 1
Pages 8-17
Date February 2008
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07022
ISSN 1049-8001
URL http://dx.doi.org/10.1071/WF07022
Extra Keywords: annual cycle of fires; fire incidence; Hovmöller diagram; human-caused fires; lightning-caused fires; time–space plots; time–space variation; US National Fire Occurrence Database; wildfire outbreaks.
Date Added Tue Aug 23 01:56:51 2011
Modified Wed Aug 24 04:42:02 2011

Terrestrial biosphere dynamics in the climate system: Past and future (Chapter 5)

Type Book Section
Author Jonathan T. Overpeck
Author Cathy Whitlock
Author Brian Huntley
Contributor Patrick J. Bartlein
Contributor Yvonne C. Collingham
Contributor Eric C. Grimm

Contributor Thompson Webb III
Contributor John W. Williams
Contributor Stephen G. Willis
Abstract no abstract
Book Title Paleoclimate, Global Change and the Future
Series The IGBP (International Geosphere-Biosphere Programme) Series
Edition 1st edition
Place Verlag, Berlin, Heidelberg
Publisher Springer
Date 2003
Pages 81-111
ISBN 3-540-42402-4
Short Title Terrestrial Biosphere Dynamics in the Climate System
URL http://www.ak-geomorphologie.de/data/pgcf/chapter5.pdf
Extra • Ak-Geomorphologie.de; • http://pages-142.unibe.ch/products/books/paleo_list.html
Date Added Sat Aug 27 18:47:36 2011
Modified Sat Aug 27 18:47:36 2011

Terrestrial biosphere: The burning issue

Type Journal Article
Author Andrew C. Scott
Abstract Wildfires have been a natural part of the Earth system for millions of years. A new charcoal database for the past two millennia shows that human activity increased biomass burning after AD 1750 and suppressed it after AD 1870.
Publication Nature Geoscience
Volume 1
Issue 10
Pages 643-644
Date October 2008
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo321
ISSN 1752-0894
Short Title Terrestrial biosphere
URL http://dx.doi.org/10.1038/ngeo321
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:19 2011

Terrestrial ecoregions of the world: A new map of life on Earth

Type Journal Article
Author David M. Olson
Author Eric Dinerstein
Author Eric D. Wikramanayake
Author Neil D. Burgess
Author George V. N. Powell
Author Emma C. Underwood
Author Jennifer A. D'amico

Author Illanga Itoua
Author Holly E. Strand
Author John C. Morrison
Author Colby J. Loucks
Author Thomas F. Allnutt
Author Taylor H. Ricketts
Author Yumiko Kura
Author John F. Lamoreux
Author Wesley W. Wettengel
Author Prashant Hedao
Author Kenneth R. Kassem
Abstract no abstract
Publication BioScience
Volume 51
Issue 11
Pages 933-938
Date November 2001
Journal Abbr BioScience
DOI 10.1641/0006-3568(2001)051[0933:TEOTWA]2.0.CO;2
ISSN 0006-3568
Short Title Terrestrial Ecoregions of the World
URL http://www.bioone.org/doi/abs/10.1641/0006-3568(2001)051%5B0933:TEOTWA%5D2.0.CO%3B2
Date Added Sat Aug 27 18:47:16 2011
Modified Sat Aug 27 18:47:16 2011

Testing disturbance theory with long-term data: Alternative life-history solutions to the distribution of events

Type Journal Article
Author James S. Clark
Abstract A model of disturbance effects on fire-dependent tree populations is developed, parameterized, and tested using long-term data from northwestern Minnesota to determine the extent to which disturbance controls species composition. The model assumes fires are necessary for recruitment, and they may cause mortality, depending on species. Reproductive success is estimated as an integral equation (analogous to Lotka's equation for R_0) taking into account fecundity schedules, mortality schedules, and age-specific disturbance effects. Life histories are parameterized for the three dominant fire-dependent tree taxa in the region, Pinus resinosa, Betula papyrifera, and Populus. Long-term disturbance regimes are summarized as density functions of intervals between fires parameterized from fire scars on trees and in sediment charcoal records. Changes in the density of fire intervals in the past are the basis for predictions that different taxa would dominate, depending on their life histories. Fossil pollen data indicate changing abundances of tree taxa and are used to test predictions of the model of reproductive success. Comparisons of model predictions with changing abundances of pollen indicate that the density of fire regimes is one of the important controls on composition. Pinus resinosa is limited by the high frequency of fire, but longevity is an advantage in the region for this species; Betula is limited by frequent fire, and longevity is of little advantage; and Populus is least sensitive to fire regime. Results show that knowing simply the frequency of fire can lead to naive interpretations of fire effects (or lack thereof). The higher moments of disturbance densities can be critical for understanding responses of species that require extended intervals to achieve resistance to fire. These extended intervals may be rare, in which case they are better described by the higher moments of the density than they are by the mean interval.
Publication The American Naturalist
Volume 148
Issue 6

Pages 976-996
Date December 1996
Journal Abbr Am. Nat.
ISSN 0003-0147
Short Title Testing Disturbance Theory with Long-Term Data
URL http://www.jstor.org/stable/2463558
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:58 2011

Text on the weather

Type Journal Article
Author Brian Lennon
Abstract no abstract
Publication The Iowa Review
Volume 30
Issue 2
Pages 101–113
Date Fall, 2000
Journal Abbr Iowa Rev.
ISSN 0021-065X
URL http://www.jstor.org/stable/20154832
Call Number 0000
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:15 2011

The 1978 national fire-danger rating system: technical documentation

Type Report
Author Larry S. Bradshaw
Author John E. Deeming
Author Robert E. Burgan
Author Jack D. Cohen
Abstract Description: The National Fire-Danger Rating System (NFDRS), implemented in 1972, has been revised and reissued as the 1978 NFDRS. This report describes the full developmental history of the NFDRS, including purpose, technical foundation, and structure. Includes an extensive bibliography and appendixes.
Report Number GTR-INT-169
Report Type General Technical Report
Place Ogden, UT
Institution US Dept. of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station
Date 1984
Pages 44 p.
Short Title The 1978 national fire-danger rating system
URL http://www.treesearch.fs.fed.us/pubs/29615
Call Number 0000
Extra Keywords: fire; fire danger rating; forest fire hazard; forest fire behavior; forest fire risk; technical documentation.
Date Added Wed Aug 24 12:09:36 2011

Modified Fri Aug 26 20:33:33 2011

Notes:

Citation:

Bradshaw, Larry S.; Deeming, John E.; Burgan, Robert E.; Cohen, Jack D., compilers 1984. The 1978 National Fire-Danger Rating System: technical documentation. General Technical Report INT-169. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 44 p.

The 2010 Amazon drought

Type Journal Article
Author Simon L. Lewis
Author Paulo M. Brando
Author Oliver L. Phillips
Author Geertje M. F. van der Heijden
Author Daniel Nepstad
Abstract In 2010, dry-season rainfall was low across Amazonia, with apparent similarities to the major 2005 drought. We analyzed a decade of satellite-derived rainfall data to compare both events. Standardized anomalies of dry-season rainfall showed that 57% of Amazonia had low rainfall in 2010 as compared with 37% in 2005 (≤–1 standard deviation from long-term mean). By using relationships between drying and forest biomass responses measured for 2005, we predict the impact of the 2010 drought as 2.2 × 1015 grams of carbon [95% confidence intervals (CIs) are 1.2 and 3.4], largely longer-term committed emissions from drought-induced tree deaths, compared with 1.6 ×1015 grams of carbon (CIs 0.8 and 2.6) for the 2005 event.
Publication Science
Volume 331
Issue 6017
Pages 554
Date 4 February 2011
Journal Abbr Science
DOI 10.1126/science.1200807
ISSN 0036-8075 (print), 1095-9203 (online)
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1200807
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:37:58 2011

The 2010 Pakistan flood and Russian heat wave: Teleconnection of hydrometeorologic extremes

Type Journal Article
Author William K. M. Lau
Author Kyu-Myong Kim
Abstract In this paper, we present preliminary results showing that the two record setting extreme events during 2010 summer, i.e., the Russian heat wave/wild fires and Pakistan flood were physically connected. We find that the Russian heat wave was associated with the development of an extraordinary strong and prolonged extratropical atmospheric blocking event, and excitation of a large-scale atmospheric Rossby wavetrain spanning western Russia, Kazakhstan, and northwestern China/Tibetan Plateau region. The southward penetration of upper level vorticity perturbations in the leading trough of the Rossby wave was instrumental in triggering anomalously heavy rain events over northern Pakistan and vicinity in mid-to-late July. Also shown are evidences that the Russian heat wave was amplified by a positive feedback through changes in surface energy fluxes between the atmospheric blocking pattern and an underlying extensive land region with below- normal soil moisture. The

Pakistan heavy rain events were amplified and sustained by strong anomalous southeasterly flow along the Himalayas foothills and abundant moisture transport from the Bay of Bengal in connection with the northward propagation of the monsoonal intraseasonal oscillation.

Publication Journal of Hydrometeorology
Volume Early Online Releases
Issue ?
Pages 31 p.
Date August 2011
Journal Abbr J. Hydrometeorol.
DOI 10.1175/JHM-D-11-016.1
ISSN 1525-755X
Short Title The 2010 Pakistan Flood and Russian Heat Wave
URL http://journals.ametsoc.org/doi/abs/10.1175/JHM-D-11-016.1
Call Number 0000
Date Added Thu Sep 22 04:03:11 2011
Modified Wed Sep 28 17:54:03 2011

The 8,000-year-old climate puzzle

Type Journal Article
Author Jeff Tollefson
Publication Nature
Volume Published online: Nature News
Date 25 March 2011
Journal Abbr Nature
DOI 10.1038/news.2011.184
ISSN 1476-4687
URL http://www.nature.com/doifinder/10.1038/news.2011.184
Call Number 0000
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:57 2011

The amount of carbon released from peat and forest fires in Indonesia during 1997

Type Journal Article
Author Susan E. Page
Author Florian Siegert
Author John O. Rieley
Author Hans-Dieter V. Boehm
Author Adi Jaya
Author Suwido Limin
Abstract Tropical peatlands are one of the largest near-surface reserves of terrestrial organic carbon, and hence their stability has important implications for climate change. In their natural state, lowland tropical peatlands support a luxuriant growth of peat swamp forest overlying peat deposits up to 20 metres thick. Persistent environmental change—in particular, drainage and forest clearing—threatens their stability, and makes them susceptible to fire. This was demonstrated by the occurrence of widespread fires throughout the forested peatlands of Indonesia during the 1997 El Niño event. Here, using satellite images of a 2.5 million hectare study area in Central Kalimantan, Borneo, from before and after the 1997 fires, we calculate that 32% (0.79 Mha) of the area had burned, of which peatland accounted for 91.5% (0.73 Mha). Using ground measurements of the burn depth

of peat, we estimate that 0.19–0.23 gigatonnes (Gt) of carbon were released to the atmosphere through peat combustion, with a further 0.05 Gt released from burning of the overlying vegetation. Extrapolating these estimates to Indonesia as a whole, we estimate that between 0.81 and 2.57 Gt of carbon were released to the atmosphere in 1997 as a result of burning peat and vegetation in Indonesia. This is equivalent to 13–40% of the mean annual global carbon emissions from fossil fuels, and contributed greatly to the largest annual increase in atmospheric CO_2 concentration detected since records began in 1957 (ref. 1).

Publication Nature
Volume 420
Issue 6911
Pages 61-65
Date 7 November 2002
Journal Abbr Nature
DOI 10.1038/nature01131
ISSN 1476-4687
URL http://www.nature.com/doifinder/10.1038/nature01131
Date Added Sun Aug 28 00:27:26 2011
Modified Wed Aug 31 23:23:19 2011

The Big Burn: Teddy Roosevelt and the fire that saved America

Type Book
Author Timothy Egan
Abstract Description: In THE WORST HARD TIME, Timothy Egan put the environmental disaster of the Dust Bowl at the center of a rich history, told through characters he brought to indelible life. Now he performs the same alchemy with the Big Burn, the largest-ever forest fire in America and the tragedy that cemented Teddy Roosevelt's legacy in the land. On the afternoon of August 20, 1910, a battering ram of wind moved through the drought-stricken national forests of Washington, Idaho, Montana, whipping the hundreds of small blazes burning across the forest floor into a roaring inferno that jumped from treetop to ridge as it raged, destroying towns and timber in an eyeblink. Forest rangers had assembled nearly ten thousand men -- college boys, day-workers, immigrants from mining camps -- to fight the fires. But no living person had seen anything like those flames, and neither the rangers nor anyone else knew how to subdue them. Egan narrates the struggles of the overmatched rangers against the implacable fire with unstoppable dramatic force, through the eyes of the people who lived it. Equally dramatic, though, is the larger story he tells of outsized president Teddy Roosevelt and his chief forester Gifford Pinchot. Pioneering the notion of conservation, Roosevelt and Pinchot did nothing less than create the idea of public land as our national treasure, owned by every citizen. The robber barons fought him and the rangers charged with protecting the reserves, but even as TR's national forests were smoldering they were saved: The heroism shown by those same rangers turned public opinion permanently in favor of the forests, though it changed the mission of the forest service with consequences felt in the fires of today. THE BIG BURN tells an epic story, paints a moving portrait of the people who lived it, and offers a critical cautionary tale for our time.
Edition 1st edition
Place New York, NY
Publisher Houghton Mifflin Harcourt
Date October 2009
# of Pages 336 p.
ISBN 0618968415, 978-0618968411
Short Title The Big Burn
URL http://search.barnesandnoble.com/The-Big-Burn/Timothy-Egan/e/9780618968411
Loc. in Archive http://www.amazon.com/Big-Burn-Teddy-Roosevelt-America/dp/0618968415
Library Catalog Amazon.com
Date Added Sun Aug 28 05:42:07 2011
Modified Sun Aug 28 05:42:07 2011

The changing effects of Alaska's boreal forests on the climate system

Type Journal Article

Author Eugenie S. Euskirchen
Author A. David McGuire
Author F. Stuart Chapin III
Author T. Scott Rupp

Abstract In the boreal forests of Alaska, recent changes in climate have influenced the exchange of trace gases, water, and energy between these forests and the atmosphere. These changes in the structure and function of boreal forests can then feed back to impact regional and global climates. In this manuscript, we examine the type and magnitude of the climate feedbacks from boreal forests in Alaska. Research generally suggests that the net effect of a warming climate is a positive regional feedback to warming. Currently, the primary positive climate feedbacks are likely related to decreases in surface albedo due to decreases in snow cover. Fewer negative feedbacks have been identified, and they may not be large enough to counterbalance the large positive feedbacks. These positive feedbacks are most pronounced at the regional scale and reduce the resilience of the boreal vegetation – climate system by amplifying the rate of regional warming. Given the recent warming in this region, the large variety of associated mechanisms that can alter terrestrial ecosystems and influence the climate system, and a reduction in the boreal forest resilience, there is a strong need to continue to quantify and evaluate the feedback pathways.

Publication Canadian Journal of Forest Research
Volume 40
Issue 7
Pages 1336-1346
Date July 2010
Journal Abbr Can. J. For. Res.
DOI 10.1139/X09-209
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/full/10.1139/X09-209
Date Added Sun Aug 28 05:42:07 2011
Modified Sun Aug 28 05:42:07 2011

The circumpolar Arctic vegetation map

Type Journal Article

Author Donald A. Walker
Author Martha K. Raynolds
Author Fred J. A. Daniëls
Author Eythor Einarsson
Author Arve Elvebakk
Author William A. Gould
Author Adrian E. Katenin
Author Sergei S. Kholod
Author Carl J. Markon
Author Evgeny S. Melnikov
Author Natalia G. Moskalenko
Author Stephen S. Talbot
Author Boris A. Yurtsev
Author The other members of the CAVM Team

Abstract • Question: What are the major vegetation units in the Arctic, what is their composition, and how are they distributed among major bioclimate subzones and countries? • Location: The Arctic tundra region, north of the tree line. • Methods: A photo-interpretive approach was used to delineate the vegetation onto an Advanced Very High Resolution Radiometer (AVHRR) base image. Mapping experts within nine Arctic regions prepared draft maps using geographic information technology (ArcInfo) of their portion of the Arctic, and these were later synthesized to make the final map. Area analysis of the map was done according to bioclimate subzones, and country. The integrated mapping procedures resulted in other maps of vegetation, topography, soils, landscapes, lake cover, substrate pH, and above-ground biomass. • Results: The final map was published at 1:7 500 000 scale map. Within the Arctic (total area = 7.11 × 106 km^2), about 5.05×10^6 km^2 is vegetated. The remainder is ice covered. The map legend generally portrays the zonal vegetation within each map polygon. About 26% of the vegetated area is erect shrublands, 18% peaty graminoid tundras, 13% mountain complexes, 12% barrens, 11% mineral graminoid tundras, 11% prostrate-shrub tundras, and 7% wetlands. Canada has by far the most terrain in the High Arctic mostly associated with abundant barren types and prostrate dwarf-shrub tundra, whereas Russia has the largest area in the Low Arctic, predominantly low-shrub tundra. • Conclusions: The CAVM is the first vegetation map of an entire global biome at a comparable resolution. The consistent treatment of the vegetation across the circumpolar Arctic, abundant ancillary material, and digital database should promote the application to numerous land-use, and climate-change applications and will make updating the map relatively easy.

Publication Journal of Vegetation Science
Volume 16
Issue 3
Pages 267-282
Date June 2005
Journal Abbr J. Veg. Sci.
DOI 10.1111/j.1654-1103.2005.tb02365.x
ISSN 1100-9233
URL http://doi.wiley.com/10.1111/j.1654-1103.2005.tb02365.x
Extra Keywords: AVHRR; bioclimate zone; geographic information system; plant functional type; radiometer; tundra.
Date Added Tue Aug 16 01:57:31 2011
Modified Tue Aug 16 01:57:44 2011

The climates of North America: According to a new classification

Type Journal Article
Author C. Warren Thornthwaite
Abstract no abstract
Publication Geographical Review
Volume 21
Issue 4
Pages 633–655
Date October 1931
Journal Abbr Geogr. Rev.
ISSN 0016-7428
Short Title The climates of North America
URL http://www.jstor.org/stable/209372
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:46 2011

The contemporary fire regime of the central Appalachian Mountains and its relation to climate

Type Journal Article

Author Charles W. Lafon
Author Jennifer A. Hoss
Author Henri D. Grissino-Mayer

Abstract This paper uses records of wildland fire to investigate the contemporary fire regime on federal lands in the central Appalachian Mountains of Virginia and West Virginia. During the study period (1970-2003), 1557 anthropogenic fires and 344 natural fires occurred on these lands. Most were small, low-intensity burns. However, fires of moderate to high intensity also occurred, and because of their larger sizes they were responsible for most of the area burned. Fire size also differed between natural and anthropogenic fires (median size 1.2 ha vs. 0.4 ha). A few of the anthropogenic fires were quite large, however (up to 6484 ha), whereas the largest natural fire measured only 1188 ha. Anthropogenic fires burned more area than natural fires and consequently they had a shorter fire cycle (1196 years for anthropogenic fires, 6138 years for natural fires). These fire cycles appear to be much longer than in the past, prior to fire suppression. Nonetheless, despite suppression efforts, a substantial amount of fire activity occurred during the study period when conditions were sufficiently dry. The dry conditions of spring and fall were especially favorable for burning. Moreover, on an interannual level, drought had a strong influence on the amount of fire activity.

Publication Physical Geography
Volume 26
Issue 2
Pages 126–146
Date March-April 2005
Journal Abbr Phys. Geogr.
DOI 10.2747/0272-3646.26.2.126
ISSN 0272-3646
URL http://bellwether.metapress.com/content/x454k19804715134/
Extra Keywords: anthropogenic fire; fire cycle; forest disturbance; lightning; natural fire; Virginia; West Virginia; wildland fire.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 11:26:49 2011

The decline of forest farming in southern Appalachia

Type Journal Article
Author John Solomon Otto
Abstract no abstract
Publication Journal of Forest History
Volume 27
Issue 1
Pages 18–27
Date January 1983
Journal Abbr Journal of Forest History
DOI 10.2307/4004858
ISSN 0094-5080
URL http://www.jstor.org/stable/4004858
Date Added Sat Aug 27 18:47:28 2011
Modified Sat Aug 27 18:48:25 2011

The definition of El Niño

Type Journal Article
Author Kevin E. Trenberth

Abstract A review is given of the meaning of the term “El Niño” and how it has changed in time, so there is no universal single definition. This needs to be recognized for scientific uses, and precision can only be achieved if the particular definition is identified in each use to reduce the possibility of misunderstanding. For quantitative purposes, possible definitions are explored that match the El Niños identified historically after 1950, and it is suggested that an El Niño can be said to occur if 5-month running means of sea surface temperature (SST) anomalies in the Niño 3.4 region (5°N–5°S, 120°–170°W) exceed 0.4°C for 6 months or more. With this definition, El Niños occur 31% of the time and La Niñas (with an equivalent definition) occur 23% of the time. The histogram of Niño 3.4 SST anomalies reveals a bimodal char- acter. An advantage of such a definition is that it allows the beginning, end, duration, and magnitude of each event to be quantified. Most El Niños begin in the northern spring or perhaps summer and peak from November to January in sea surface temperatures.

Publication Bulletin of the American Meteorological Society

Volume 78

Issue 12

Pages 2771–2777

Date December 1997

Journal Abbr BAMS

DOI 10.1175/1520-0477(1997)078<2771:TDOENO>2.0.CO;2

ISSN 1520-0477

URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0477%281997%29078%3C2771%3ATDOENO%3E2.0.CO%3B2

Date Added Sat Aug 27 06:05:17 2011

Modified Sat Aug 27 15:52:11 2011

The demise of fire and "mesophication" of forests in the eastern United States

Type Journal Article

Author Gregory J. Nowacki

Author Marc D. Abrams

Abstract A diverse array of fire-adapted plant communities once covered the eastern United States. European settlement greatly altered fire regimes, often increasing fire occurrence (e.g., in northern hardwoods) or substantially decreasing it (e.g., in tallgrass prairies). Notwithstanding these changes, fire suppression policies, beginning around the 1920s, greatly reduced fire throughout the East, with profound ecological consequences. Fire-maintained open lands converted to closed-canopy forests. As a result of shading, shade-tolerant, fire-sensitive plants began to replace heliophytic (sun-loving), fire-tolerant plants. A positive feedback cycle—which we term “mesophication”—ensued, whereby microenvironmental conditions (cool, damp, and shaded conditions; less flammable fuel beds) continually improve for shade-tolerant mesophytic species and deteriorate for shade-intolerant, fire-adapted species. Plant communities are undergoing rapid compositional and structural changes, some with no ecological antecedent. Stand-level species richness is declining, and will decline further, as numerous fire-adapted plants are replaced by a limited set of shade-tolerant, fire-sensitive species. As this process continues, the effort and cost required to restore fire-adapted ecosystems escalate rapidly.

Publication BioScience

Volume 58

Issue 2

Pages 123-138

Date February 2008

Journal Abbr BioScience

DOI 10.1641/B580207

ISSN 0006-3568

URL http://www.bioone.org/doi/full/10.1641/B580207

Extra Keywords: fire-adapted species; oak-pine; prescribed burning; forest floor; restoration.

Date Added Sat Aug 27 22:34:48 2011

Modified Sat Aug 27 22:36:55 2011

The diversification of Paleozoic fire systems and fluctuations in atmospheric oxygen concentration

Type Journal Article
Author Andrew C. Scott
Author Ian J. Glasspool
Abstract By comparing Silurian through end Permian [≈250 million years (Myr)] charcoal abundance with contemporaneous macroecological changes in vegetation and climate we aim to demonstrate that long-term variations in fire occurrence and fire system diversification are related to fluctuations in Late Paleozoic atmospheric oxygen concentration. Charcoal, a proxy for fire, occurs in the fossil record from the Late Silurian (≈420 Myr) to the present. Its presence at any interval in the fossil record is already taken to constrain atmospheric oxygen within the range of 13% to 35% (the "fire window"). Herein, we observe that, as predicted, atmospheric oxygen levels rise from ≈13% in the Late Devonian to ≈30% in the Late Permian so, too, fires progressively occur in an increasing diversity of ecosystems. Sequentially, data of note include: the occurrence of charcoal in the Late Silurian/Early Devonian, indicating the burning of a diminutive, dominantly rhyniophytoid vegetation; an apparent paucity of charcoal in the Middle to Late Devonian that coincides with a predicted atmospheric oxygen low; and the subsequent diversification of fire systems throughout the remainder of the Late Paleozoic. First, fires become widespread during the Early Mississippian, they then become commonplace in mire systems in the Middle Mississippian; in the Pennsylvanian they are first recorded in upland settings and finally, based on coal petrology, become extremely important in many Permian mire settings. These trends conform well to changes in atmospheric oxygen concentration, as predicted by modeling, and indicate oxygen levels are a significant control on long-term fire occurrence.
Publication Proceedings of the National Academy of Sciences
Volume 103
Issue 29
Pages 10861-10865
Date July 18, 2006
Journal Abbr PNAS
Language 1091-6490
DOI 10.1073/pnas.0604090103
URL http://www.pnas.org/content/103/29/10861.full
Extra Keywords: Earth system processes; global change; coal; charcoal; inertinite.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:08 2011

The early anthropogenic hypothesis: Challenges and responses

Type Journal Article
Author William F. Ruddiman
Abstract Ruddiman (2003) proposed that late Holocene anthropogenic intervention caused CH_4 and CO_2 increases that kept climate from cooling and that preindustrial pandemics caused CO_2 decreases and a small cooling. Every aspect of this early anthropogenic hypothesis has been challenged: the timescale, the issue of stage 11 as a better analog, the ability of human activities to account for the gas anomalies, and the impact of the pandemics. This review finds that the late Holocene gas trends are anomalous in all ice timescales; greenhouse gases decreased during the closest stage 11 insolation analog; disproportionate biomass burning and rice irrigation can explain the methane anomaly; and pandemics explain half of the CO_2 decrease since 1000 years ago. Only ~25% of the CO_2 anomaly can, however, be explained by carbon from early deforestation. The remainder must have come from climate system feedbacks, including a Holocene ocean that remained anomalously warm because of anthropogenic intervention.
Publication Reviews of Geophysics
Volume 45

Issue 4
Pages RG4001 (37 p.)
Date October 2007
Journal Abbr Rev. Geophys.
DOI 10.1029/2006RG000207
ISSN 8755-1209
URL http://www.agu.org/pubs/crossref/2007/2006RG000207.shtml
Extra Keywords: anthropogenic; deforestation; Holocene.
Date Added Mon Aug 29 00:48:23 2011
Modified Mon Aug 29 00:50:17 2011

The ecology of fire

Type Journal Article
Author Charles F. Cooper
Abstract Fires play a role in shaping the world's grasslands and forests. Attempts to eliminate fire have introduced problems fully as serious as those created by accidental conflagrations. A discussion of the historical role of fires in conifer forests is included in this paper, which explains the adaptations of Douglas-fir, jack pine, ponderosa pine and longleaf pine to fire.
Publication Scientific American
Volume 204
Issue 4
Pages 150-160
Date April 1961
Journal Abbr Sci. Am.
ISSN 0036-8733
URL http://www.forestencyclopedia.net/c/c9034
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:09:40 2011

The effect of fire season, fire frequency, rainfall and management on fire intensity in savanna vegetation in South Africa

Type Journal Article
Author Navashni Govender
Author Winston S. W. Trollope
Author Brian W. van Wilgen
Abstract Summary 1. Fire is important for the maintenance and conservation of African savanna ecosystems. Despite the importance of fire intensity as a key element of the fire regime, it is seldom measured or included in fire records. 2. We estimated fire intensity in the Kruger National Park, South Africa, by documenting fuel loads, fuel moisture contents, rates of fire spread and the heat yields of fuel in 956 experimental plot burns over 21 years. 3. Individual fires were conducted in five different months (February, April, August, October and December) and at five different return intervals (1, 2, 3, 4 and 6 years). Estimated fire intensities ranged from 28 to 17 905 kW m^{-1}. Fire season had a significant effect on fire intensity. Mean fire intensities were lowest in summer fires (1225 kW m^{-1}), increased in autumn fires (1724 kW m^{-1}) and highest in winter fires (2314 kW m^{-1}); they were associated with a threefold difference between the mean moisture content of grass fuels in winter (28%) and summer (88%). 4. Mean fuel loads increased with post-fire age, from 2964 kg ha^{-1} on annually burnt plots to 3972 kg ha^{-1} on biennial, triennial and quadrennial burnt plots (which did not differ significantly), but decreased to 2881 kg ha^{-1} on sexennial burnt plots. Fuel loads also increased with increasing rainfall over the previous 2 years. 5. Mean fire intensities showed no significant differences between annual

burns and burns in the biennial, triennial and quadrennial categories, despite lower fuel loads in annual burns, suggesting that seasonal fuel moisture effects overrode those of fuel load. Mean fire intensity in sexennial burns was less than half that of other burns (638 vs. 1969 kW m^{-1}). 6. We used relationships between season of fire, fuel loads and fire intensity in conjunction with the park's fire records to reconstruct broad fire intensity regimes. Changes in management from regular prescribed burning to 'natural' fires over the past four decades have resulted in a decrease in moderate-intensity fires and an increase in high-intensity fires. 7. The highest fire intensities measured in our study (11 000 – > 17 500 kW m^{-1}) were significantly higher than those previously reported for African savannas, but were similar to those in South American cerrado vegetation. The mean fire intensity for late dry season (winter) fires in our study was less than half that reported for late dry season fires in savannas in northern Australia. 8. Synthesis and applications. Fire intensity has important effects on savanna vegetation, especially on the dynamics of the tree layer. Fire intensity varies with season (because of differences in fuel moisture) as well as with fuel load. Managers of African savannas can manipulate fire intensity by choosing the season of fire, and further by burning in years with higher or lower fuel loads. The basic relationships described here can also be used to enhance fire records, with a view to building a long-term data set for the ongoing assessment of the effectiveness of fire management.

Publication Journal of Applied Ecology
Volume 43
Issue 4
Pages 748–758
Date August 2006
Journal Abbr J. Appl. Ecol.
DOI 10.1111/j.1365-2664.2006.01184.x
ISSN 1365-2664
URL http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2664.2006.01184.x/full
Extra Keywords: fire management; fuel loads; Kruger National Park; long-term ecological experiment.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:48 2011

The effect of fires on susceptibility of subalpine forests to a 19th century spruce beetle outbreak in western Colorado

Type Journal Article

Author Dominik Kulakowski
Author Thomas T. Veblen

Abstract In the subalpine forests of the Colorado Rocky Mountains, research on disturbances that have occurred over the past several decades has shown that prior occurrence of disturbances can alter the extent and severity of subsequent disturbances. In the current study, we consider how fire history affected stand susceptibility to a mid-19th century spruce beetle (Dendroctonus rufipennis Kirby 1837) outbreak. Twenty-one sites were randomly located in an Engelmann spruce - subalpine fir (Picea engelmannii Parry ex Engelm. - Abies lasiocarpa (Hook.) Nutt.) forest across ~2000 km² of the Grand Mesa area, Colorado. At each site, dendrochronological methods were used to reconstruct the history of severe fires and beetle outbreak. Stand-origin dates were estimated by collecting increment cores from 20-27 of the largest trees at each sample site. The beetle outbreak was reconstructed based on coincident releases among nonhost trees that survived the outbreak. Forest stands originated following severe fires in ca. 1790, ca. 1740, and ca. 1700. The 1840's outbreak affected 67% of these stands. Stands that initiated following the ca. 1790 fire were less susceptible to the outbreak than older stands. These findings indicate that stand-replacing fires have mitigated susceptibility to outbreaks of spruce beetles not only during recent outbreaks, but also over the past centuries.

Publication Canadian Journal of Forest Research
Volume 36
Issue 11
Pages 2974-2982
Date November 2006
Journal Abbr Can. J. For. Res.

DOI 10.1139/x06-182
ISSN 1208-6037
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x06-182
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:17:30 2011

The effects of surficial deposit–drainage combinations on spatial variations of fire cycles in the boreal forest of eastern Canada

Type Journal Article
Author Nicolas Mansuy
Author Sylvie Gauthier
Author André Robitaille
Author Yves Bergeron
Abstract Spatial variations in the fire cycle of a large territory (190 000 km²) located in the boreal forest of eastern Canada were assessed using random sampling points. Our main objective was to determine if regions characterised by a large proportion of dry surficial deposit–drainage (SDD) burn more frequently than regions with a smaller proportion. Through a regionalisation of the landscape units, we analysed the effects of SDD on spatial variations of the fire cycle. A discriminant analysis involving the SDD and other physical variables (precipitation, temperature, aridity index, water bodies, elevation and slope) made it possible to identify a combination of variables characterising each region. A considerable variation in fire cycle was observed among the different SDD types (from 144 to 425 years) and between regions (from 90 to 715 years). Through the discriminant analysis, this study suggests that a combination of possible climatic top-down (precipitation $R^2 = 0.727$, aridity index $R^2 = 0.663$ and temperature $R^2 = 0.574$) and bottom-up factors (xeric undifferentiated till $R^2 = 0.819$ and humid undifferentiated till $R^2 = 0.691$) could explain this variation at the regional scale. Implications of those results for forest protection against fire and regional development are briefly discussed.
Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 1083–1098
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09144
ISSN 1448-5516
URL http://www.publish.csiro.au/?paper=WF09144
Extra Keywords: climate; discriminant analyses; disturbance regime; drying potential; random sampling; regional scale; regionalisation; top-down and bottom-up factors.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:43:48 2011

The El Niño Southern Oscillation event in southeast Asia: Effects of drought and fire in tropical forest in eastern Borneo

Type Report
Author Mark Leighton
Report Type to the World Wildlife Fund
Place Cambridge, MA
Institution Department of Anthropology, Harvard University
Date 1984

Pages 31 p.
Short Title The El Nino Southern Oscillation Event in Southeast Asia
URL http://www.worldwildlife.org/home-full.html
Extra Unpublished report
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:06 2011

Notes:

Citation:

Leighton, M. 1984 The El Nino-southern oscillation event in Southeast Asia: effects of drought and fire in tropical forest in eastern Borneo. Unpublished report to the World Wildlife Fund, Department of Anthropology, Harvard University.

The emergence of the wildland-urban interface concept

Type Magazine Article
Author William T. Sommers
Abstract The Wildland Urban Interface (WUI) is a common story line in many of today's wildfire events. The WUI concept was formally introduced in 1987 Forest Service Research budget documents but was not acknowledged as a major component for federal fire management until the 2000 National Fire Plan. Although the 1987 introduction was meant to increase research focus on demographic factors influencing fire and other resource management, its California roots can be traced to post-World War II civil defense concerns about fire and water. The author offers a personal perspective on why the WUI concept was promoted by the Forest Service at an inauspicious time for fire research.
Publication Forest History Today
Date Fall 2008
Pages 12-18
URL http://www.foresthistory.org/publications/FHT/fhtfall2008.html
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:24 2011

The factor of scale in ecosystem mapping

Type Journal Article
Author Robert G. Bailey
Abstract Ecosystems come in many scales or relative sizes. The relationships between an ecosystem at one scale and ecosystems at smaller or larger scales must be examined in order to predict the effects of management prescriptions on resource outputs. A disturbance to an ecosystem may affect smaller component ecosystems, which are encompassed in larger systems that control the operation of the smaller systems. Environmental factors important in controlling ecosystem size change in nature with the scale of observation. This article reviews those environmental factors that are thought to be useful in recognizing and mapping ecosystems at various scales.
Publication Environmental Management
Volume 9
Issue 4
Pages 271-275
Date July 1985
Journal Abbr Environ. Manage.
DOI 10.1007/BF01867299
ISSN 0364-152X

URL http://dx.doi.org/10.1007/BF01867299
Extra Keywords: ecosystem; landscape ecology; resource surveys; mapping scale; maps.
Date Added Tue Aug 16 11:33:20 2011
Modified Tue Aug 16 11:33:28 2011

The fire history of an arid grassland: The influence of antecedent rainfall and ENSO

Type Journal Article
Author Aaron C. Greenville
Author Chris R. Dickman
Author Glenda M. Wardle
Author Mike Letnic
Abstract Implementing appropriate fire regimes has become an increasingly important objective for biodiversity conservation programs. Here, we used Landsat imagery from 1972 to 2003 to describe the recent fire history and current wildfire regime of the north-eastern Simpson Desert, Australia, within each of the region's seven main vegetation classes. We then explored the relationship between antecedent rainfall and El Niño–Southern Oscillation with wildfire area. Wildfires were recorded in 11 years between 1972 and 2003, each differing in size. In 1975, the largest wildfire was recorded, burning 55% (4561 km²) of the study region. Smaller fires in the intervening years burnt areas that had mostly escaped the 1975 fire, until 2002, when 31% (2544 km²) of the study region burnt again. Wildfires burnt disproportionally more spinifex (Triodia basedowii) than any other vegetation class. A total of 49% of the study area has burnt once since 1972 and 20% has burnt twice. Less than 1% has burnt three times and 36% has remained unaffected by wildfire since 1972. The mean minimum fire return interval was 26 years. Two years of cumulative rainfall before a fire event, rainfall during the year of a fire event, and the mean Southern Oscillation Index from June to November in the year before a fire event could together be used to successfully predict wildfire area. We use these findings to describe the current fire regime.
Publication International Journal of Wildland Fire
Volume 18
Issue 6
Pages 631-639
Date September 2009
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF08093
ISSN 1448-5516
Short Title The fire history of an arid grassland
URL http://dx.doi.org/10.1071/WF08093
Extra Keywords: arid zone; Australia; GIS; Landsat; Simpson Desert; spinifex; wildfire regime.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:32 2011

The forest that fire made

Type Journal Article
Author S. W. Greene
Publication American Forests
Volume 37
Issue 10
Pages 583–584, 618
Date October 1931
Journal Abbr Am. Forests

ISSN 0002-8541
URL http://www.forestencyclopedia.net/p/p844/?searchterm=S.%20W.%20Greene
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:40 2011

The FRAME Project-A collaborative modeling approach to natural resource management at Mesa Verde National Park

Type Book Section
Author C.E. Turner
Author W.H. Romme
Author J. Chew
Author M.E. Miller
Author L.F.H. Leavesley
Author G.S. Miguel
Author N. Cobb
Author R. Zirbes
Author R. Viger
Author K. Ironside
Book Title The Colorado Plateau III Integrating research and resources management for effective condervation
Place Tucson, AZ
Publisher University of Arizona Press
Date 2008
Pages 23-41
Call Number 0000
Date Added Thu Oct 6 11:55:48 2011
Modified Thu Oct 6 11:55:48 2011

The future of scenarios: Issues in developing new climate change scenarios

Type Journal Article
Author Hugh M. Pitcher
Abstract In September, 2007, the IPCC convened a workshop to discuss how a new set of scenarios to support climate model runs, mitigation analyses, and impact, adaptation and vulnerability research might be developed. The first phase of the suggested new approach is now approaching completion. This article discusses some of the issues raised by scenario relevant research and analysis since the last set of IPCC scenarios were created (IPCC SRES, 2000) that will need to be addressed as new scenarios are developed by the research community during the second phase. These include (1) providing a logic for how societies manage to transition from historical paths to the various future development paths foreseen in the scenarios, (2) long-term economic growth issues, (3) the appropriate GDP metric to use (purchasing power parity or market exchange rates), (4) ongoing issues with moving from the broad geographic and time scales of the emission scenarios to the finer scales needed for impacts, adaptation and vulnerability analyses and (5) some possible ways to handle the urgent request from the policy community for some guidance on scenario likelihoods. The challenges involved in addressing these issues are manifold; the reward is greater credibility and deeper understanding of an analytic tool that does much to form the context within which many issues in addition to the climate problem will need to be addressed.
Publication Environmental Research Letters
Volume 4
Issue 2

Pages 025002 (7 p.)
Date April-June 2009
Journal Abbr Environ. Res. Lett.
DOI 10.1088/1748-9326/4/2/025002
ISSN 1748-9326
URL http://stacks.iop.org/1748-9326/4/i=2/a=025002?key=crossref.c0ba3469acdec116bc2316daed87290b
Extra Keywords: climate change scenarios; transitions; downscaling; likelihood.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:27:26 2011

The general circulation of the atmosphere: A numerical experiment

Type Journal Article
Author Norman A. Phillips
Abstract A long-period numerical forecast is made with a two-level quasi-geostrophic model, starting with an atmosphere in relative rest. Both friction and non-adiabatic effects are included in the equations, the latter as a linear function of latitude. Principal empirical elements in the experiment are the intensity of the heating, the value of the vertical stability, and the type of frictional dissipation. The flow patterns which develop are quite realistic, including a jet and ZOMI surface westerlies in middle latitudes, and the growth of a large disturbance. The associated energy transformations are investigated, and demonstrate the important role of the disturbance in the development of the zonal currents. The meridional circulation is also studied, together with its contribution to the zonal momentum budgets of the lower and upper halves of the atmosphere. Truncation errors eventually put an end to the forecast by producing a large fictitious increase in energy.
Publication Quarterly Journal of the Royal Meteorological Society
Volume 82
Issue 352
Pages 123–164
Date April 1956
Journal Abbr Q. J. Royal Met. Soc.
DOI 10.1002/qj.49708235202
ISSN 0035-9009
URL http://onlinelibrary.wiley.com/doi/10.1002/qj.49708235202/abstract
Date Added Sun Aug 28 00:27:26 2011
Modified Wed Aug 31 01:09:47 2011

The geography of fire: A paleo perspective

Type Thesis
Author Jennifer R. Marlon
Abstract Fire is a fundamental, transforrnative, yet poorly understood process in the Earth system; it can radically reorganize ecosystems, alter regional carbon and energy balances, and change global climate. Short-telID fire histories can be reconstructed from satellite (seasonal- to interannual-scales), historical (decadal scales), or dendrochronological records (for recent centuries), but only sedimentary charcoal records enable an analysis of the complex interactions between climate, vegetation and people that drive fire activity over longer temporal scales. This dissertation describes the compilation, synthesis and analysis of a global paleofire dataset and its application to understanding past, current, and future changes in fire activity. Specifically, I co-led efforts to compile charcoal records around the world into a single database, and to conduct three meta-analyses to understand the controls on fire at multiple spatial and temporal scales. The first meta-analysis reconstructed global biomass burning since the Last Glacial Maximum (LGM) 21,000 years ago. Results from this study demonstrated that global fire activity is low when conditions are cool and high when conditions are warm. This

fundamental relationship between climate and fire is due in large part to associated changes in vegetation productivity. The second metaanalysis examined fire activity in North America during past abrupt climate changes and looked for evidence of continental-scale wildfires associated with a hypothesized comet impact ~13,000 years ago. This analysis found a correlation between increased fire activity and abrupt climate change, but provided no evidence for continental-scale wildfires. A final meta-analysis disentangled the climate and human influences on global biomass burning during the past 2000 years; it found a close relationship between climate change and biomass burning until ~1750 A.D., when human activities became a primary driver of global fire activity. Together, these three meta-analyses demonstrate that climate change is the primary control of global fire activity over long time scales. In general, global fire activity increases when the Earth's climate warms and decreases when climate cools. The paleofire data and analyses suggest that the rapid climate changes projected for coming decades will lead to widespread increases in fire frequency and biomass burning.

Type A dissertation presented to the Department of Geography and the Graduate School of the University of Oregon in partial fulfillment of the requirements for the degree of Doctor of Philosophy

University University of Oregon

Place Eugene, OR

Date September 2009

# of Pages 205 p.

URL http://hdl.handle.net/1794/10334

Library Catalog University of Oregon Libraries

Date Added Tue Aug 30 14:35:38 2011

Modified Wed Aug 31 00:21:47 2011

The global distribution of ecosystems in a world without fire

Type Journal Article

Author William J. Bond

Author F. Ian Woodward

Author Guy F. Midgley

Abstract Summary: • This paper is the first global study of the extent to which fire determines global vegetation patterns by preventing ecosystems from achieving the potential height, biomass and dominant functional types expected under the ambient climate (climate potential). • To determine climate potential, we simulated vegetation without fire using a dynamic global-vegetation model. Model results were tested against fire exclusion studies from different parts of the world. Simulated dominant growth forms and tree cover were compared with satellite-derived land- and tree-cover maps. • Simulations were generally consistent with results of fire exclusion studies in southern Africa and elsewhere. Comparison of global 'fire off' simulations with landcover and treecover maps show that vast areas of humid C_4 grasslands and savannas, especially in South America and Africa, have the climate potential to form forests. These are the most frequently burnt ecosystems in the world. Without fire, closed forests would double from 27% to 56% of vegetated grid cells, mostly at the expense of C_4 plants but also of C_3 shrubs and grasses in cooler climates. • C_4 grasses began spreading 6-8 Ma, long before human influence on fire regimes. Our results suggest that fire was a major factor in their spread into forested regions, splitting biotas into fire tolerant and intolerant taxa.

Publication New Phytologist

Volume 165

Issue 2

Pages 525–538

Date February 2005

Journal Abbr New Phytol.

DOI 10.1111/j.1469-8137.2004.01252.x

ISSN 1469-8137

URL http://onlinelibrary.wiley.com/doi/10.1111/j.1469-8137.2004.01252.x/full

Extra Keywords: climate-vegetation relationships; dynamic global vegetation models; fire ecology; global biomes; plant biogeography.

Date Added Tue Aug 23 02:55:12 2011

Modified Mon Aug 29 20:51:48 2011

The Great El Niño of 1789-93 and its global consequences: Reconstructing an extreme climate event in world environmental history

Type Journal Article
Author Richard H. Grove
Abstract This article explores the global dimensions of an extreme climatic anomaly characterised by a series of El Niño events observable during the late eighteenth century. While similar events, comparable in their extent and severity, can be detected during earlier centuries, archival and physical data available for a later period suggest that the consequences of the El Niño of 1788–96 were most dramatic. Reconstructing this event may be a useful analogue in understanding the effects of comparable phenomena further back in time, especially where data is sparse. This article investigates the shocks triggered off on a global scale by El Niño events that became part of a conjuncture affecting economic systems, intellectual and administrative responses to issues of environment, and popular unrest. The precise relationship between an anomalous climatic situation and revolutionary upheaval, as in the case of France in the late 1780s and 1790s, is still open to discussion. The study of climatic stresses is however important to be able to contextualise a historical phenomenon on a global matrix. It now appears that the history of the Great El Niño of the 1790s can help to illuminate a much larger picture of world history during the last 5,000 years, especially in understanding the connections between El Niño events and the shocks such anomalies have periodically administered to the world economic system.
Publication The Medieval History Journal
Volume 10
Issue 1-2
Pages 75-98
Date October 2007
Journal Abbr Medieval History Journal
DOI 10.1177/097194580701000203
ISSN 0971-9458
Short Title The Great El Niño of 1789 93 and its Global Consequences
URL http://mhj.sagepub.com/cgi/doi/10.1177/097194580701000203
Call Number 0006
Date Added Thu Sep 22 03:07:45 2011
Modified Wed Sep 28 17:53:44 2011

The historical foundations of prescribed burning for wildlife: A southeastern perspective

Type Report
Author A. Sydney Johnson
Author Philip E. Hale
Abstract Controlled burning has deep historical roots in the South, where the practice was quickly adopted from the Indians by early European settlers. It became used widely, primarily to improve forage conditions for free-ranging cattle and to improve visibility and access. Likewise, hunting is deeply imbedded in southern culture and was an attraction to visitors throughout the 19th Century. This was especially true of quail (Colinus virginianus) hunting, and after the Civil War wealthy northerners began to buy large plantations for hunting retreats. In the 1920's Herbert L. Stoddard documented the necessity of prescribed burning to maintain bobwhite quail habitat on these plantations. Opposition to the practice among foresters and public agencies was fierce, and Stoddard became an outspoken advocate of light winter burning in longleaf pine (Pinus palustris) and, later, certain other forest types. Use of prescribed fire in forestry and game management was gradually accepted. But, although some naturalists such as Stoddard were interested in the effects of fire on native flora and nongame wildlife, private landowners and public agencies generally showed little interest in managing specifically for nongame wildlife until the 1970's. By then, there was in the southern states a background of 50 years of research and many more years of practical experience in the use of fire that could be applied to this

new goal. Soon, any biologists and managers recognized that prescribed burning would play a nearly essential role in managing certain nongame species. And, as new management goals evolved, fire regimes other than light winter burning also came under scrutiny for potential use in restoration and maintenance of certain natural communities.

Report Number	GTR-NE-288
Report Type	General Technical Report
Place	Newtown Square, PA
Institution	U.S. Department of Agriculture, Forest Service, Northeastern Research Station
Date	2002
Pages	11-23
Short Title	The historical foundations of prescribed burning for wildlife
URL	http://www.treesearch.fs.fed.us/pubs/19091
Archive	http://www.treesearch.fs.fed.us/pubs/3164
Extra	In: Ford, W. Mark; Russell, Kevin R.; Moorman, Christopher E., eds. Proceedings: the role of fire for nongame wildlife management and community restoration: traditional uses and new directions.
Date Added	Sun Aug 28 03:05:14 2011
Modified	Sun Aug 28 03:05:14 2011

Notes:

Citation:

Johnson, A. Sydney; Hale, Philip E. 2002. The historical foundations of prescribed burning for wildlife: a southeastern perspective. In: Ford, W. Mark; Russell, Kevin R.; Moorman, Christopher E., eds. Proceedings: the role of fire for nongame wildlife management and community restoration: traditional uses and new directions. Gen. Tech. Rep. NE-288. Newtown Square, PA: U.S. Dept. of Agriculture, Forest Service, Northeastern Research Station. 11-23.

The history of fire in the southern United States

Type	Journal Article
Author	Cynthia Fowler
Author	Evelyn Konopik
Abstract	Anthropogenic fires have been a key form of disturbance in southern ecosystems for more than 10,000 years. Archaeological and ethnohistorical information reveal general patterns in fire use during the five major cultural periods in the South; these are Native American prehistory, early European settlement, industrialization, fire suppression, and fire management. Major shifts in cultural traditions are linked to significant transitions in fire regimes. A holistic approach to fire ecology is necessary for illuminating the multiple, complex links between the cultural history of the South and the evolution of southern ecosystems. The web of connections between history, society, politics, economy, and ecology are inherent to the phenomena of fire.
Publication	Human Ecology Review
Volume	14
Issue	2
Pages	165–176
Date	Winter 2007
Journal Abbr	Human Ecology Review
ISSN	1074-4827
URL	http://www.humanecologyreview.org/142.htm
Extra	Keywords: fire; culture; Native Americans; US South.
Date Added	Mon Aug 29 05:19:52 2011
Modified	Wed Aug 31 00:41:56 2011

The hot summer of 2010: Redrawing the temperature record map of Europe

Type Journal Article
Author David Barriopedro
Author Erich M. Fischer
Author Jürg Luterbacher
Author Ricardo M. Trigo
Author Ricardo Garcia-Herrera
Abstract The summer of 2010 was exceptionally warm in eastern Europe and large parts of Russia. We provide evidence that the anomalous 2010 warmth that caused adverse impacts exceeded the amplitude and spatial extent of the previous hottest summer of 2003. "Mega-heatwaves" such as the 2003 and 2010 events broke the 500-year-long seasonal temperature records over approximately 50% of Europe. According to regional multi-model experiments, the probability of a summer experiencing "mega-heatwaves" will increase by a factor of 5 to 10 within the next 40 years. However, the magnitude of the 2010 event was so extreme that despite this increase, the occurrence of an analogue over the same region remains fairly unlikely until the second half of the 21st century.
Publication Science
Volume 332
Issue 6026
Pages 220-224
Date 8 April 2011
Journal Abbr Science
DOI 10.1126/science.1201224
ISSN 0036-8075
URL http://www.sciencemag.org/content/332/6026/220.full
Date Added Tue Aug 23 01:55:33 2011
Modified Wed Aug 24 04:42:08 2011

The human dimension of fire regimes on Earth

Type Journal Article
Author David M. J. S. Bowman
Author Jennifer Balch
Author Paulo Artaxo
Author William J. Bond
Author Mark A. Cochrane
Author Carla M. D'Antonio
Author Ruth DeFries
Author Fay H. Johnston
Author Jon E. Keeley
Author Meg A. Krawchuk
Author Christian A. Kull
Author Michelle Mack
Author Max A. Moritz
Author Stephen Pyne
Author Christopher I. Roos
Author Andrew C. Scott
Author Navjot S. Sodhi
Author Thomas W. Swetnam

Abstract Humans and their ancestors are unique in being a fire-making species, but 'natural' (i.e. independent of humans) fires have an ancient, geological history on Earth. Natural fires have influenced biological evolution and global biogeochemical cycles, making fire integral to the functioning of some biomes. Globally, debate rages about the impact on ecosystems of prehistoric human-set fires, with views ranging from catastrophic to negligible. Understanding of the diversity of human fire regimes on Earth in the past, present and future remains rudimentary. It remains uncertain how humans have caused a departure from 'natural' background levels that vary with climate change. Available evidence shows that modern humans can increase or decrease background levels of natural fire activity by clearing forests, promoting grazing, dispersing plants, altering ignition patterns and actively suppressing fires, thereby causing substantial ecosystem changes and loss of biodiversity. Some of these contemporary fire regimes cause substantial economic disruptions owing to the destruction of infrastructure, degradation of ecosystem services, loss of life, and smoke-related health effects. These episodic disasters help frame negative public attitudes towards landscape fires, despite the need for burning to sustain some ecosystems. Greenhouse gas-induced warming and changes in the hydrological cycle may increase the occurrence of large, severe fires, with potentially significant feedbacks to the Earth system. Improved understanding of human fire regimes demands: (1) better data on past and current human influences on fire regimes to enable global comparative analyses, (2) a greater understanding of different cultural traditions of landscape burning and their positive and negative social, economic and ecological effects, and (3) more realistic representations of anthropogenic fire in global vegetation and climate change models. We provide an historical framework to promote understanding of the development and diversification of fire regimes, covering the pre-human period, human domestication of fire, and the subsequent transition from subsistence agriculture to industrial economies. All of these phases still occur on Earth, providing opportunities for comparative research.

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Volume first published online
Issue ?
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Date 14 September 2011
Journal Abbr J. Biogeogr.
DOI 10.1111/j.1365-2699.2011.02595.x
ISSN 0305-0270
URL http://doi.wiley.com/10.1111/j.1365-2699.2011.02595.x
Call Number 0000
Extra Keywords: fire and culture; fire management; fire regime; global environmental change; landscape fire; palaeoecology; prehistoric human impacts; pyrogeography.
Date Added Wed Sep 21 23:03:44 2011
Modified Wed Sep 28 17:53:48 2011

The impact of boreal forest fire on climate warming

Type Journal Article
Author James T. Randerson
Author Heping Liu
Author Mark G. Flanner
Author Scott D. Chambers
Author Yufang Jin
Author Peter G. Hess
Author Gabriele Pfister
Author Michelle C. Mack
Author Kathleen K. Treseder
Author Lisa R. Welp
Author F. Stuart Chapin
Author Jennifer W. Harden

Author Michael L. Goulden
Author Evan Lyons
Author Jason C. Neff
Author Edward Arthur George Schuur
Author Charles S. Zender
Abstract We report measurements and analysis of a boreal forest fire, integrating the effects of greenhouse gases, aerosols, black carbon deposition on snow and sea ice, and postfire changes in surface albedo. The net effect of all agents was to increase radiative forcing during the first year (34 ± 31 Watts per square meter of burned area), but to decrease radiative forcing when averaged over an 80-year fire cycle (−2.3 ± 2.2 Watts per square meter) because multidecadal increases in surface albedo had a larger impact than fire-emitted greenhouse gases. This result implies that future increases in boreal fire may not accelerate climate warming.
Publication Science
Volume 314
Issue 5802
Pages 1130-1132
Date 17 November 2006
Journal Abbr Science
DOI 10.1126/science.1132075
ISSN 0036-8075
URL http://www.sciencemag.org/content/314/5802/1130.full
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:24:47 2011

The impact of global warming on the tropical Pacific Ocean and El Nino

Type Journal Article
Author Mat Collins
Author Soon-Il An
Author Wenju Cai
Author Alexandre Ganachaud
Author Eric Guilyardi
Author Fei-Fei Jin
Author Markus Jochum
Author Matthieu Lengaigne
Author Scott Power
Author Axel Timmermann
Author Gabe Vecchi
Author Andrew Wittenberg
Abstract The El Niño–Southern Oscillation (ENSO) is a naturally occurring fluctuation that originates in the tropical Pacific region and affects ecosystems, agriculture, freshwater supplies, hurricanes and other severe weather events worldwide. Under the influence of global warming, the mean climate of the Pacific region will probably undergo significant changes. The tropical easterly trade winds are expected to weaken; surface ocean temperatures are expected to warm fastest near the equator and more slowly farther away; the equatorial thermocline that marks the transition between the wind-mixed upper ocean and deeper layers is expected to shoal; and the temperature gradients across the thermocline are expected to become steeper. Year-to-year ENSO variability is controlled by a delicate balance of amplifying and damping feedbacks, and one or more of the physical processes that are responsible for determining the characteristics of ENSO will probably be modified by climate change. Therefore, despite considerable progress in our understanding of the impact of climate change on many of the processes that contribute to El Niño variability, it is not yet possible to say whether ENSO activity will be enhanced or damped, or if the frequency of events will change.
Publication Nature Geoscience

Volume 3
Issue 6
Pages 391-397
Date June 2010
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo868
ISSN 1752-0894
URL http://dx.doi.org/10.1038/ngeo868
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:09:20 2011

The impact of pine beetle infestation on snow accumulation and melt in the headwaters of the Colorado River

Type Journal Article
Author Evan Pugh
Author Eric Small
Abstract The mountain pine beetle is killing many trees in Colorado's high-elevation forests. The thinned canopies found in dead tree stands should intercept less snow and transmit more radiation than canopies in living forests, altering snow accumulation and melt processes. We compare snow, forest, and meteorological properties beneath living and pine beetle-killed tree stands. Eight pairs of living and dead tree stands were monitored over two years along the headwaters of the Colorado River. During year one, all eight dead stands were in the red phase of tree death — the trees still retained needles. Snow accumulation was the same under living and red phase stands, but snow melt was more rapid in red phase stands. As a result, the snowpack was depleted one week earlier in the red phase stands. Canopy shortwave transmission was not higher in red phase stands. We hypothesize that the faster melt and earlier depletion in red phase stands was caused by accelerated needle loss which lowers the albedo of the snow surface. By year two, many of the dead trees had progressed to the needle-less grey phase of tree death. Snow accumulation in grey phase stands was 15% higher than in paired living stands. Snow in grey phase stands melted more rapidly than in living stands, likely as a result of increased canopy shortwave transmission. We combine our results with those from previous studies to develop a conceptual model that describes how beetle infestation affects snow accumulation and melt in the different stages of mortality.
Publication Ecohydrology
Volume Article first published online
Date 7 June 2011
Journal Abbr Ecohydrol.
DOI 10.1002/eco.239
ISSN 1936-0584
URL http://doi.wiley.com/10.1002/eco.239
Extra Keywords: forest snow hydrology; mountain pine beetle; snow accumulation; canopy interception; snowmelt; canopy transmission; tree death.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:31:31 2011

The Indian as an ecological factor in the northeastern forest

Type Journal Article
Author Gordon M. Day
Abstract no abstract
Publication Ecology

Volume 34
Issue 2
Pages 329–346
Date April 1953
Journal Abbr Ecology
DOI 10.2307/1930900
ISSN 0012-9658
URL http://www.jstor.org/stable/1930900
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:21 2011

The influence of aridity and fire on Holocene prairie communities in the eastern Prairie Peninsula

Type Journal Article

Author David M. Nelson
Author Feng Sheng Hu
Author Eric C. Grimm
Author B. Brandon Curry
Author Jennifer E. Slate

Abstract The role of climate and fire in the development, maintenance, and species composition of prairie in the eastern axis of the tallgrass Prairie Peninsula intrigued early North American ecologists. However, evaluation of the long-standing hypotheses about the region's environmental history has been hampered by the scarcity of paleorecords. We conducted multiproxy analyses on early and middle Holocene sediments from two Illinois, USA, lakes to assess long-term climatic, vegetational, and fire variability in the region. Sediment mineral composition, carbonate $\delta^{18}O$, ostracode assemblages, and diatom assemblages were integrated to infer fluctuations in moisture availability. Pollen and charcoal $\delta^{13}C$ were used to reconstruct vegetation composition, and charcoal influx was used to reconstruct fire. Results indicate that fire-sensitive trees (e.g., Ulmus, Ostrya, Fraxinus, and Acer saccharum) declined and prairie taxa expanded with increased aridity from 10000 yr BP to 8500 yr BP. Between 8500 yr BP and 6200 yr BP, aridity declined, and prairie coexisted with fire-sensitive and fire-tolerant (e.g., Quercus and Carya) trees. After 6200 yr BP, prairie taxa became dominant, although aridity was not more severe than it was around 8500 yr BP. Along with aridity, fire appears to have played an important role in the establishment and maintenance of prairie communities in the eastern Prairie Peninsula, consistent with the speculations of the early ecologists. Comparison of our data with results from elsewhere in the North American midcontinent indicates that spatial heterogeneity is a characteristic feature of climatic and vegetational variations on millennial time scales.

Publication Ecology
Volume 87
Issue 10
Pages 2523–2536
Date October 2006
Journal Abbr Ecology
DOI 10.1890/0012-9658(2006)87[2523:TIOAAF]2.0.CO;2
ISSN 0012-9658
URL http://www.jstor.org/stable/20069263
Call Number 0018
Extra Keywords: charcoal; climate change; fire; grasslands; Holocene; paleoecology; pollen; tallgrass Prairie Peninsula.
Date Added Mon Sep 5 01:47:17 2011
Modified Mon Sep 5 10:11:25 2011

The influence of land-use change and landscape dynamics on the climate system: Relevance to climate-change policy beyond the radiative effect of greenhouse gases

Type Journal Article
Author Roger A. Pielke Sr.
Author Gregg Marland
Author Richard A. Betts
Author Thomas N. Chase
Author Joseph L. Eastman
Author John O. Niles
Author Dev dutta S. Niyogi
Author Steven W. Running
Abstract Our paper documents that land-use change impacts regional and global climate through the surface-energy budget, as well as through the carbon cycle. The surface-energy budget effects may be more important than the carbon-cycle effects. However, land-use impacts on climate cannot be adequately quantified with the usual metric of 'global warming potential'. A new metric is needed to quantify the human disturbance of the Earth's surface-energy budget. This 'regional climate change potential' could offer a new metric for developing a more inclusive climate protocol. This concept would also implicitly provide a mechanism to monitor potential local-scale environmental changes that could influence biodiversity.
Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences
Volume 360
Issue 1797
Pages 1705-1719
Date 15 August 2002
Journal Abbr Phil. Trans. R. Soc. A
DOI 10.1098/rsta.2002.1027
ISSN 1364-503X
Short Title The influence of land-use change and landscape dynamics on the climate system
URL http://rsta.royalsocietypublishing.org/cgi/doi/10.1098/rsta.2002.1027
Extra Keywords: global climate change; regional climate change; landscape change; landscape dynamics; climate-system dynamics.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:30:32 2011

The influence of prehistoric human-set fires on oak-chestnut forests in the southern Appalachians

Type Journal Article
Author Paul A. Delcourt
Author Hazel R. Delcourt
Abstract Fossil pollen and charcoal in peat deposits and pond sediments from three sites in the southern Appalachians yielded evidence for a direct relationship between prehistoric Native American use of fire and increases in the importance of oak-chestnut forest between about 3,000 and 1,000 years ago. At Cliff Palace Pond on the Cumberland Plateau of southeastern Kentucky, Tuskegee Pond, in the Ridge and Valley of East Tennessee, and Horse Cove Bog in the Blue Ridge Mountains of western North Carolina, increases in fire frequency corresponded with the change in Native American activities from hunting and gathering in the Late Archaic cultural period toward more sedentary lifestyles and cultivation of native plants in the Woodland cultural period. Forests of oak and chestnut became dominant on upper slopes, with fire-adapted pines establishing on ridge tops and disturbance-adapted hardwoods invading abandoned Indian old fields. We speculate that prehistoric Native American use of fire would have been an intermediate-scale disturbance regime that would have heightened ecotonal contrast across plant community boundaries and would also have increased biological diversity across the landscape.

Publication Castanea
Volume 63
Issue 3
Pages 337–345
Date September 1998
Journal Abbr Castanea
ISSN 0008-7475
URL http://www.jstor.org/stable/4033982
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:43 2011

The interaction of fire, fuels, and climate across Rocky Mountain forests

Type Journal Article
Author Tania Schoennagel
Author Thomas T. Veblen
Author William H. Romme
Abstract Understanding the relative influence of fuels and climate on wildfires across the Rocky Mountains is necessary to predict how fires may respond to a changing climate and to define effective fuel management approaches to controlling wildfire in this increasingly populated region. The idea that decades of fire suppression have promoted unnatural fuel accumulation and subsequent unprecedentedly large, severe wildfires across western forests has been developed primarily from studies of dry ponderosa pine forests. However, this model is being applied uncritically across Rocky Mountain forests (e.g., in the Healthy Forests Restoration Act).We synthesize current research and summarize lessons learned from recent large wildfires (the Yellowstone, Rodeo-Chediski, and Hayman fires), which represent case studies of the potential effectiveness of fuel reduction across a range of major forest types. A "one size fits all" approach to reducing wildfire hazards in the Rocky Mountain region is unlikely to be effective and may produce collateral damage in some places.
Publication BioScience
Volume 54
Issue 7
Pages 661-676
Date July 2004
Journal Abbr BioScience
DOI 10.1641/0006-3568(2004)054[0661:TIOFFA]2.0.CO;2
ISSN 0006-3568
URL http://www.bioone.org/doi/full/10.1641/0006-3568%282004%29054%5B0661%3ATIOFFA%5D2.0.CO%3B2
Extra Keywords: fire ecology; forest management; forest health; Rocky Mountain forests; climate.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:26:14 2011

The Interaction of Fire, Fuels, and Climate across Rocky Mountain Forests

Type Journal Article
Author T Schoennagel
Author T.T. Veblen
Author W. H Romme
Abstract Understanding the relative influence of fuels and climate on wildfires across the Rocky Mountains is necessary to predict how fires may respond to a changing climate and to define effective fuel management approaches to controlling wildfire in this increasingly populated region. The idea that decades of fire suppression have promoted unnatural fuel accumulation and subsequent unprecedentedly large, severe wildfires across western

forests has been developed primarily from studies of dry ponderosa pine forests. However, this model is being applied uncritically across Rocky Mountain forests (e.g., in the Healthy Forests Restoration Act).We synthesize current research and summarize lessons learned from recent large wildfires (the Yellowstone, Rodeo-Chediski, and Hayman fires), which represent case studies of the potential effectiveness of fuel reduction across a range of major forest types. A "one size fits all" approach to reducing wildfire hazards in the Rocky Mountain region is unlikely to be effective and may produce collateral damage in some places. Keywords: fire ecology, forest management, forest health, Rocky Mountain forests, climate

Publication BioScience
Volume 54
Issue 7
Date 2004
Library Catalog Google Scholar
Call Number 0279
Date Added Mon Oct 10 11:01:14 2011
Modified Mon Oct 10 11:01:14 2011

The keystone role of bison in north american tallgrass prairie

Type Journal Article
Author Alan K. Knapp
Author John M. Blair
Author John M. Briggs
Author Scott L. Collins
Author David C. Hartnett
Author Loretta C. Johnson
Author E. Gene Towne
Abstract no abstract
Publication BioScience
Volume 49
Issue 1
Pages 39-50
Date January 1999
Journal Abbr BioScience
ISSN 0006-3568
URL http://www.jstor.org/stable/10.1525/bisi.1999.49.1.39
Archive http://temperate.lternet.edu/collins/biblio/keystone-role-bison-north-american-tallgrass-prairie
Date Added Tue Aug 30 15:41:06 2011
Modified Wed Aug 31 00:15:19 2011

The Köppen classification of climates in North America

Type Journal Article
Author Edward A. Ackerman
Abstract no abstract
Publication Geographical Review
Volume 31
Issue 1
Pages 105–111
Date January 1941

Journal Abbr Geogr. Rev.
ISSN 0016-7428
URL http://www.jstor.org/stable/210420
Date Added Mon Aug 15 22:31:10 2011
Modified Mon Aug 15 22:51:30 2011

The landscape ecology of fire

Type Book
Editor Donald McKenzie
Editor Carol S. Miller
Editor Donald A. Falk
Abstract Global warming is expected to change fire regimes, likely increasing the severity and extent of wildfires in many ecosystems around the world. What will be the landscape-scale effects of these altered fire regimes? Within what theoretical contexts can we accurately assess these effects? We explore the possible effects of altered fire regimes on landscape patch dynamics, dominant species (tree, shrub, or herbaceous) and succession, sensitive and invasive plant and animal species and communities, and ecosystem function. Ultimately, we must consider the human dimension: what are the policy and management implications of increased fire disturbance, and what are the implications for human communities?
Series Ecological Studies
Volume 213
Edition 1st edition
Place New York, NY
Publisher Springer Verlag
Date 2011
# of Pages 340 p.
ISBN 978-94-007-0300-1
URL http://www.springer.com/life+sciences/ecology/book/978-94-007-0300-1
Extra Keywords: climate change; ecosystem resilience; landscape fire; top-down and bottom-up controls.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:45:25 2011

The landscape ecology of western forest fire regimes

Type Journal Article
Author James K. Agee
Abstract Flre has had a major role in shaping the forested landscapes of the American West. In recent decades, major effort to quantify that role have been made, and characteristisc of historic fire regimes have been defined: frequency, magnitude, variability, seasonality, synergism, and extent. Together, these characterisrics also defined the historic landscape effects of fire in low-, moderate-, and high-severity fire regimes. Coarse-filter conservation strategies typically rely on knorwledge of natural disturbance regimes to define appropriate forest structure goals, both at the stand and landscape scale, and these will differ by fire regime. Historic patch size increased across the low- to high-severity spectrum, but edge was maximized in the moderate-severity fire regime. Fire exclusion in the 20th century has caused two major types of landscape change: loss of openings in once patchy landscapes, and imposition of high-severity landscape dynamic in areas where wildfires that escape suppression now burn. Effects of historical fire regimes may be in some cases either difficult to mimic or undesirable.
Publication Northwest Science
Volume 72
Issue Special Issue 1

Pages 24–34
Date 1998
Journal Abbr NW Sci.
ISSN 0029-344X
URL http://www.vetmed.wsu.edu/org_NWS/NWSci%20journal%20articles/1998%20files/1998%20Vol%2072.htm
Date Added Mon Aug 15 22:49:50 2011
Modified Tue Aug 23 02:22:46 2011

The late Quaternary climate of coastal California: Evidence for an ice age refugium

Type Journal Article
Author Donald Lee Johnson
Abstract The present Mediterranean climate of coastal California is unique in North America and reflects the interaction of several important synoptic controls, principally the North Pacific semipermanent anticyclone, and to a lesser extent the Aleutian low-pressure system and the cool California oceanic current. These synoptic climatic controls, key parts of the global air-sea circulation, were probably operative throughout late Quaternary time as shown by paleoecologic evidence. The thick accumulations of sediments in basins of offshore California indicate that while variable sedimentation regimes reflect changing climatic and oceanographic conditions, the Quaternary climate was probably semiarid as now, even during glacial maxima. Late Quaternary coastal dunes preserve former wind directions and show that prevailing late Quaternary winds were directionally equivalent to modern winds, which are controlled by the North Pacific anticyclone and by interactions between the North Pacific high and the interior basin low. These sand dunes contain buried, datable, carbonate-rich soils. Precipitation then, like the present rainfall regime, was not enough to leach the carbonates from the soils. Charcoal in buried dunes and soils shows that fire was environmentally important throughout the Quaternary, just as it is today. Fossil plants indicate that sclerophyllous vegetation and forest stands of conifers, adapted to a Mediterranean climate, were widely distributed during late Quaternary time. Fossil pollen in the Sierra Nevada indicates the influence of the North Pacific high. The historical precipitation record overlaps a late Holocene tree-ring record permitting extrapolation of the precipitation curve back nearly 600 years. Well-defined wet and dry trends in the precipitation pattern characterized this time span, and provide a possible analog to the earlier Holocene and Pleistocene precipitation regime. The paleoecologic record shows that the late Quaternary climate of coastal California was characterized by regimes similar to those prevailing today. The persistence of a Mediterranean climate in California during the last glaciation contrasts with dramatic climatic changes experienced in glaciated parts of North America. California thus was an Ice Age refugium for animals and cold-sensitive plants.
Publication Quaternary Research
Volume 8
Issue 2
Pages 154-179
Date September 1977
Journal Abbr Quaternary Res.
DOI 10.1016/0033-5894(77)90043-6
ISSN 0033-5894
Short Title The late Quaternary climate of coastal California
URL http://www.sciencedirect.com/science/article/pii/0033589477900436
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:12:04 2011

The longleaf pine ecosystem: Ecology, silviculture, and restoration

Type Book
Editor Shibu Jose

Editor Eric J. Jokela
Editor Deborah L. Miller
Abstract Description: This book unites a wealth of current information on the ecology, silviculture and restoration of the Longleaf Pine ecosystem. The book includes a discussion of the significant historical, social and political aspects of ecosystem management, making it a valuable resource for students, land managers, ecologists, private landowners, government agencies, consultants and the forest products industry.
Series Springer Series on Environmental Management
Edition 1st edition
Place New York, NY
Publisher Springer
Date May 2006
# of Pages 450 p.
ISBN 0387296557, 978-038729655-5
URL http://www.springer.com/life+sciences/ecology/book/978-0-387-29655-5
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:12:24 2011

The Native population of the Americas in 1492

Type Book
Editor William M. Denevan
Abstract no abstract
Edition 2nd revised edition, illustrated
Place Madison, WI
Publisher University of Wisconsin Press
Date March 1992
# of Pages 386 p.
ISBN 0299134342, 9780299134341
URL http://uwpress.wisc.edu/books/0289.htm
Archive http://books.google.com/books?id=5m4VQFRzh_gC&
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:39:36 2011

Notes:

Table of Contents:

The nature and influence of fire in Carboniferous ecosystems

Type Journal Article
Author Andrew C. Scott
Author Timothy P. Jones

Abstract Fusain occurs widely in Carboniferous coals and sediments. It is now recognised to represent charcoal and be the product of wildfire. The occurrence of fire is partly constrained by atmospheric oxygen levels, availability and nature of fuel and by aspects of climate (rainfall and seasonability in particular). The majority of fires in the Carboniferous were probably started by lightning strikes or by volcanic activity. Experiments on the charring of modern plants has shown that the reflectance of charcoal (and hence fusain) is directly related to temperature of formation. Different fire types may yield fusain assemblages of differing reflectance spectrums, but it may be significant that many modern charcoal assemblages yield only semifusinites (as seen by reflectance microscopy). The significance of these findings is assessed in relation to the use of fusinites and semifusinites as depositional indicators, as interpreted from coal petrology. Fires may have a dramatic effect on ecosystems, not only causing changes in vegetational succession but also severe erosion can occur following a major fire which can be traced in depositional systems. In this paper we document three major Carboniferous sedimentary systems affected by fire: clastic sedimentary systems, using extensive fusain deposits in mid-Lower Carboniferous, near-shore sediments in Donegal, Ireland; volcanic systems using late Early Carboniferous, volcaniclastic sequences in the Midland Valley of Scotland; and coal and coal-bearing sequences in the Upper Carboniferous (Westphalian B) of the Pennine Basin, England. In the later settings the influence of fire in peat formation and succession is assessed. In addition, data on the vegetational composition of charcoal assemblages is considered. It is concluded that fire plays a major role in many Carboniferous ecosystems.

Publication Palaeogeography, Palaeoclimatology, Palaeoecology
Volume 106
Issue 1-4
Pages 91–112
Date January 1994
Journal Abbr PALAEO
DOI 10.1016/0031-0182(94)90005-1
ISSN 0031-0182
URL http://www.sciencedirect.com/science/article/pii/0031018294900051
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:03 2011

The nature and origin of fusain

Type Journal Article
Author Colin Hayter Crickmay
Abstract no abstract
Publication American Midland Naturalist
Volume 16
Issue 1
Pages 94–98
Date January 1935
Journal Abbr Am. Midl. Nat.
ISSN 0003-0031
URL http://www.jstor.org/stable/2419879
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:35:31 2011

The nature and theory of the general circulation of the atmosphere

Type Book
Author Edward N. Lorenz
Abstract no abstract

Series Issue 218 of World Meteorological Organization publications
Edition 1st edition
Place Geneva, Switzerland
Publisher World Meteorological Organization
Date 1967
# of Pages 161 p.
ISBN ASIN: B0006CHWHG
URL http://eapsweb.mit.edu/research/Lorenz/publications.htm
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:37:58 2011

Notes:

Citation:

Lorenz, E.N., 1967: The nature and theory of the general circulation of the atmosphere. WMO-No. 218, TP 115, 161 pp.

The next generation of scenarios for climate change research and assessment

Type Journal Article
Author Richard H. Moss
Author Jae A. Edmonds
Author Kathy A. Hibbard
Author Martin R. Manning
Author Steven K. Rose
Author Detlef P. van Vuuren
Author Timothy R. Carter
Author Seita Emori
Author Mikiko Kainuma
Author Tom Kram
Author Gerald A. Meehl
Author John F. B. Mitchell
Author Nebojsa Nakicenovic
Author Keywan Riahi
Author Steven J. Smith
Author Ronald J. Stouffer
Author Allison M. Thomson
Author John P. Weyant
Author Thomas J. Wilbanks
Abstract Advances in the science and observation of climate change are providing a clearer understanding of the inherent variability of Earth's climate system and its likely response to human and natural influences. The implications of climate change for the environment and society will depend not only on the response of the Earth system to changes in radiative forcings, but also on how humankind responds through changes in technology, economies, lifestyle and policy. Extensive uncertainties exist in future forcings of and responses to climate change, necessitating the use of scenarios of the future to explore the potential consequences of different response options. To date, such scenarios have not adequately examined crucial possibilities, such as

climate change mitigation and adaptation, and have relied on research processes that slowed the exchange of information among physical, biological and social scientists. Here we describe a new process for creating plausible scenarios to investigate some of the most challenging and important questions about climate change confronting the global community.

Publication Nature
Volume 463
Issue 7282
Pages 747-756
Date 11 February 2010
Journal Abbr Nature
DOI 10.1038/nature08823
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature08823
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:47:45 2011

The origin of the savanna biome

Type Journal Article
Author David J. Beerling
Author Colin P. Osborne
Abstract Savannas are a major terrestrial biome, comprising of grasses with the C_4 photosynthetic pathway and trees with the C_3 type. This mixed grass–tree biome rapidly appeared on the ecological stage 8 million years ago with the near-synchronous expansion of C_4 grasses around the world. We propose a new hypothesis for this global event based on a systems analysis that integrates recent advances in how fire influences cloud microphysics, climate and savanna ecology in a low carbon dioxide (CO_2) world. We show that fire accelerates forest loss and C4 grassland expansion through multiple positive feedback loops that each promote drought and more fire. A low CO_2 atmosphere amplifies this cycle by limiting tree recruitment, allowing the ingress of C_4 grasses to greatly increase ecosystem flammability. Continued intensification of land use could enhance or moderate the network of feedbacks that have initiated, promoted and sustained savannas for millions of years. We suggest these alterations will overprint the effects of anthropogenic atmospheric change in coming decades.
Publication Global Change Biology
Volume 12
Issue 11
Pages 2023-2031
Date November 2006
Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1365-2486.2006.01239.x
ISSN 1354-1013
URL http://doi.wiley.com/10.1111/j.1365-2486.2006.01239.x
Extra Keywords: carbon dioxide; C_4 photosynthesis; cloud physics; feedbacks; fire; smoke; systems analysis.
Date Added Tue Aug 23 02:09:50 2011
Modified Wed Aug 24 04:41:29 2011

The past is a guide to the future? Comparing Middle Pliocene vegetation with predicted biome distributions for the twenty-first century

Type Journal Article
Author Ulrich Salzmann
Author Alan M. Haywood

Author Daniel J. Lunt

Abstract During the Middle Pliocene, the Earth experienced greater global warmth compared with today, coupled with higher atmospheric CO_2 concentrations. To determine the extent to which the Middle Pliocene can be used as a 'test bed' for future warming, we compare data and model-based Middle Pliocene vegetation with simulated global biome distributions for the mid- and late twenty-first century. The best agreement is found when a Middle Pliocene biome reconstruction is compared with a future scenario using 560 ppmv atmospheric CO_2. In accordance with palaeobotanical data, all model simulations indicate a generally warmer and wetter climate, resulting in a northward shift of the taiga–tundra boundary and a spread of tropical savannahs and woodland in Africa and Australia at the expense of deserts. Our data–model comparison reveals differences in the distribution of polar vegetation, which indicate that the high latitudes during the Middle Pliocene were still warmer than its predicted modern analogue by several degrees. However, our future scenarios do not consider multipliers associated with 'long-term' climate sensitivity. Changes in global temperature, and thus biome distributions, at higher atmospheric CO_2 levels will not have reached an equilibrium state (as is the case for the Middle Pliocene) by the end of this century.

Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences

Volume 367

Issue 1886

Pages 189-204

Date 13 January 2009

Journal Abbr Phil. Trans. R. Soc. A

DOI 10.1098/rsta.2008.0200

ISSN 1364-503X

URL http://rsta.royalsocietypublishing.org/cgi/doi/10.1098/rsta.2008.0200

Extra Keywords: climate change; vegetation; Pliocene; palaeobotany; general circulation model.

Date Added Sun Aug 28 17:22:12 2011

Modified Wed Aug 31 00:25:51 2011

The persistently variable "background" stratospheric aerosol layer and global climate change

Type Journal Article

Author Susan Solomon

Author John S. Daniel

Author Ryan R. Neely III

Author Jean-Paul Vernier

Author Ellsworth G. Dutton

Author Larry W. Thomason

Abstract Recent measurements demonstrate that the "background" stratospheric aerosol layer is persistently variable rather than constant, even in the absence of major volcanic eruptions. Several independent data sets show that stratospheric aerosols have increased in abundance since 2000. Near-global satellite aerosol data imply a negative radiative forcing due to stratospheric aerosol changes over this period of about –0.1 watt per square meter, reducing the recent global warming that would otherwise have occurred. Observations from earlier periods are limited but suggest an additional negative radiative forcing of about –0.1 watt per square meter from 1960 to 1990. Climate model projections neglecting these changes would continue to overestimate the radiative forcing and global warming in coming decades if these aerosols remain present at current values or increase.

Publication Science

Volume 333

Issue 6044

Pages 866-870

Date 12 August 2011

Journal Abbr Science

DOI 10.1126/science.1206027

ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1206027
Call Number 0000
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:29:36 2011

The Peshtigo fire, October 8, 1871: Calamity and response

Type Thesis
Author Nathan Flesch
Abstract On October 8, 1871 a fire raged through northeastern Wisconsin burning over 1.5 million acres of land and killing between one and two thousand people. Because of the extent of the fire it is difficult to even determine how many people perished in the fire but it is considered to be the deadliest fire in American history. The fire is named after Peshtigo because the town experienced the worst but many other towns were affected. The circumstances surrounding the Peshtigo fire were unique for several reasons. In some areas the fire left nothing for miles. In addition, the on the very same evening a fire burned down much of Chicago. The paper focuses on the accounts of the witnesses and survivors and the state and nationwide relief effort.
Type History B.A. Theses
University University of Wisconsin
Place Madison, WI
Date Jul 14, 2009
# of Pages 30 p.
Short Title The Peshtigo Fire, October 8, 1871
URL http://digital.library.wisc.edu/1793/35448
Loc. in Archive University of Wisconsin
Call Number 0000
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:21 2011

The potential to narrow uncertainty in regional climate predictions

Type Journal Article
Author Ed Hawkins
Author Rowan Sutton
Abstract Faced by the realities of a changing climate, decision makers in a wide variety of organizations are increasingly seeking quantitative predictions of regional and local climate. An important issue for these decision makers, and for organizations that fund climate research, is what is the potential for climate science to deliver improvements—especially reductions in uncertainty—in such predictions? Uncertainty in climate predictions arises from three distinct sources: internal variability, model uncertainty, and scenario uncertainty. Using data from a suite of climate models, we separate and quantify these sources. For predictions of changes in surface air temperature on decadal timescales and regional spatial scales, we show that uncertainty for the next few decades is dominated by sources (model uncertainty and internal variability) that are potentially reducible through progress in climate science. Furthermore, we find that model uncertainty is of greater importance than internal variability. Our findings have implications for managing adaptation to a changing climate. Because the costs of adaptation are very large, and greater uncertainty about future climate is likely to be associated with more expensive adaptation, reducing uncertainty in climate predictions is potentially of enormous economic value. We highlight the need for much more work to compare (a) the cost of various degrees of adaptation, given current levels of uncertainty and (b) the cost of new investments in climate science to reduce current levels of uncertainty. Our study also highlights the importance of targeting climate science investments on the most promising opportunities to reduce prediction uncertainty.
Publication Bulletin of the American Meteorological Society

Volume 90
Issue 8
Pages 1095–1107
Date August 2009
Journal Abbr BAMS
DOI 10.1175/2009BAMS2607.1
ISSN 0003-0007 (print), 1520-0477 (online)
URL http://journals.ametsoc.org/doi/abs/10.1175/2009BAMS2607.1
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 21:22:55 2011

The prairie-deciduous forest ecotone in the upper Middle West

Type Journal Article
Author Anthony M. Davis
Abstract The prairie-deciduous forest ecotone changes from a distinct boundary in northern Minnesota to a fragmented mosaic type in Wisconsin, Iowa, and Illinois. The differences largely can be attributed to topography and fire, but edaphic factors, the survival of disjunct relicts, and the differential migration rates of some taxa are contributory. Fossil pollen spectra from the Driftless Area attest to the persistence of the mosaic character throughout the Holocene. Modern surface spectra illustrate the difficulties of recognizing vegetation changes along and across the ecotone.
Publication Annals of the Association of American Geographers
Volume 67
Issue 2
Pages 204-213
Date June 1977
Journal Abbr Ann. Assoc. Am. Geogr.
DOI 10.1111/j.1467-8306.1977.tb01133.x
ISSN 0004-5608
URL http://www.jstor.org/stable/2561860
Call Number 0047
Date Added Sun Sep 4 02:45:48 2011
Modified Mon Sep 5 10:11:03 2011

The Pre-Quaternary history of fire

Type Journal Article
Author Andrew C. Scott
Abstract Although evidence for land vegetation comes from the Silurian, and maybe even earlier, the first record of fossil charcoal (fusain) is from the late Devonian. For this period there are only one or two isolated records. Not until the Early Carboniferous is there a record of extensive charcoal deposits, mainly preserved in near-shore clastic sediments, which provide evidence of significant and widespread wildfires. By the late Carboniferous charcoal was common or abundant in a wide range of facies, including tropical wetland peats. Wildfire played an important role in shaping the environment at this time. The latest Palaeozoic and early Mesozoic records of charcoal are fewer, whereas important deposits of late Mesozoic age are found worldwide. The occurrence of charcoal at the Cretaceous–Tertiary Boundary has been highlighted as evidence for a global fire following a meteorite impact, but this interpretation is questionable. Charcoal has been widely reported from Tertiary sediments and its appearance in the Quaternary and Recent is not solely as a result of human impact. Through the past 400 million years there have been major changes in atmospheric oxygen levels that affected fire intensity and frequency. Fire systems thus have a long history and their impact on shaping the environment is assessed.

Publication Palaeogeography, Palaeoclimatology, Palaeoecology
Volume 164
Issue 1-4
Pages 281-329
Date December 2000
Journal Abbr PALAEO
DOI 10.1016/S0031-0182(00)00192-9
ISSN 0031-0182
URL http://www.sciencedirect.com/science/article/B6V6R-41N5G8T-R/2/c503b3495d5e82c031673f363315776a
Extra Keywords: charcoal; fire; fossil; fusain; palaeoecology.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:21 2011

The predictability of interdecadal changes in ENSO activity and ENSO teleconnections

Type Journal Article
Author Scott Power
Author Malcolm Haylock
Author Rob Colman
Author Xiangdong Wang
Abstract El Niño–Southern Oscillation (ENSO) in a century-long integration of a Bureau of Meteorology Research Centre (BMRC) coupled general circulation model (CGCM) drives rainfall and temperature changes over Australia that are generally consistent with documented observational changes: dry/hot conditions occur more frequently during El Niño years and wet/mild conditions occur more frequently during La Niña years. The relationship between ENSO [as measured by Niño-4 or the Southern Oscillation index (SOI), say] and all-Australia rainfall and temperature is found to be nonlinear in the observations and in the CGCM during June–December: a large La Niña sea surface temperature (SST) anomaly is closely linked to a large Australian response (i.e., Australia usually becomes much wetter), whereas the magnitude of an El Niño SST anomaly is a poorer guide to how dry Australia will actually become. Australia tends to dry out during El Niño events, but the degree of drying is not as tightly linked to the magnitude of the El Niño SST anomaly. Nonlinear or asymmetric teleconnections are also evident in the western United States/northern Mexico. The implications of asymmetric teleconnections for prediction services are discussed. The relationship between ENSO and Australian climate in both the model and the observations is strong in some decades, but weak in others. A series of decadal-long perturbation experiments are used to show that if these interdecadal changes are predictable, then the level of predictability is low. The model's Interdecadal Pacific Oscillation (IPO), which represents interdecadal ENSO-like SST variability, is statistically linked to interdecadal changes in ENSO's impact on Australia during June–December when ENSO's impact on Australia is generally greatest. A simple stochastic model that incorporates the nonlinearity above is used to show that the IPO [or the closely related Pacific Decadal Oscillation (PDO)] can appear to modulate ENSO teleconnections even if the IPO–PDO largely reflect unpredictable random changes in, for example, the relative frequency of El Niño and La Niña events in a given interdecadal period. Note, however, that predictability in ENSO-related variability on decadal time scales might be either underestimated by the CGCM, or be too small to be detected by the modest number of perturbation experiments conducted. If there is a small amount of predictability in ENSO indices on decadal time scales, and there may be, then the nonlinearity described above provides a mechanism via which ENSO teleconnections could be modulated on decadal time scales in a partially predictable fashion.
Publication Journal of Climate
Volume 19
Issue 19
Pages 4755–4771
Date October 2006
Journal Abbr J. Climate
DOI 10.1175/JCLI3868.1
ISSN 0894-8755

URL http://journals.ametsoc.org/doi/abs/10.1175/JCLI3868.1
Call Number 0000
Extra Keywords: ENSO; interdecadal variability; teleconnections; coupled models; general circulation model.
Date Added Thu Sep 22 05:18:11 2011
Modified Wed Sep 28 17:53:42 2011

The presettlement forest and natural disturbance cycle of northeastern Maine

Type Journal Article
Author Craig G. Lorimer
Abstract Land survey records of 1793—1827 containing forest data for 1.65 x 10^6 ha of northern Maine were analyzed for species composition, successional status, and frequency of large—scale disturbance. Quantitative data consists of 1,448 sample trees spaced 1.6 km apart along a 9.7— x 9.7—km grid. Species which each comprised > 10% of the total were Picea spp., Fagus grandifolia, Abies balsamea, Thuja occidentalis, and Betula lutea. These forests appeared to be largely in a climax state as indicated by the dominance of shade—tolerance species and the small percentage (8%) of intolerant or early successional species. However, 9.3% of the tract was burned land and birch—aspen forest at the time of the survey, mostly the result of large fires in 1803 and 1825. Windfalls occurred along 2.6% of the surveyed distance. If the amount of disturbed forest at this time was typical of the natural disturbance regime, then the average recurrence interval of fire and large—scale windthrow for a given site would be 800 and 1,150 years, respectively. Data on the structure of remnant virgin stands in the region likewise suggest that the time interval between severe disturbances was much longer than that needed to attain a climax, all—aged structure.
Publication Ecology
Volume 58
Issue 1
Pages 139–148
Date January 1977
Journal Abbr Ecology
DOI 10.2307/1935115
ISSN 0012-9658
URL http://www.jstor.org/stable/1935115
Extra Keywords: climax; disturbance; fire; forest structure; insect epidemics; Maine; presettlement forests; windthrow.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:54 2011

The problem of pattern and scale in ecology: The Robert H. MacArthur award lecture

Type Journal Article
Author Simon A. Levin
Abstract It is argued that the problem of pattern and scale is the central problem in ecology, unifying population biology and ecosystems science, and marrying basic and applied ecology. Applied challenges, such as the prediction of the ecological causes and consequences of global climate change, require the interfacing of phenomena that occur on very different scales of space, time, and ecological organization. Furthermore, there is no single natural scale at which ecological phenomena should be studied; systems generally show characteristic variability on a range of spatial, temporal, and organizational scales. The observer imposes a perceptual bias, a filter through which the system is viewed. This has fundamental evolutionary significance, since every organism is an "observer" of the environment, and life history adaptations such as dispersal and dormancy alter the perceptual scales of the species, and the observed variability. It likewise has fundamental significance for our own study of ecological systems, since the patterns that are unique to any range of scales will have unique causes and biological consequences. The key to prediction and understanding lies in the elucidation of mechanisms underlying observed patterns. Typically, these mechanisms operate at different scales than those

on which the patterns are observed; in some cases, the patterns must be understood as emerging form the collective behaviors of large ensembles of smaller scale units. In other cases, the pattern is imposed by larger scale constraints. Examination of such phenomena requires the study of how pattern and variability change with the scale of description, and the development of laws for simplification, aggregation, and scaling. Examples are given from the marine and terrestrial literatures.

Publication Ecology
Volume 73
Issue 6
Pages 1943–1967
Date December 1992
Journal Abbr Ecology
DOI 10.2307/1941447
ISSN 0012-9658
Short Title The problem of pattern and scale in ecology
URL http://www.jstor.org/stable/1941447
Extra Keywords: heterogeneity; patchiness; pattern; scale; variability.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:26 2011

The relationship between land-use change and climate change

Type Journal Article
Author Virginia H. Dale
Abstract Land-use change is related to climate change as both a causal factor and a major way in which the effects of climate change are expressed. As a causal factor, land use influences the flux of mass and energy, and as land-cover patterns change, these fluxes are altered. Projected climate alterations will produce changes in land-cover patterns at a variety of temporal and spatial scales, although human uses of the land are expected to override many effects. A review of the literature dealing with the relationship between land-use change and climate change clearly shows that (1) in recent centuries land-use change has had much greater effects on ecological variables than has climate change; (2) the vast majority of land-use changes have little to do with climate change or even climate; and (3) humans will change land use, and especially land management, to adjust to climate change and these adaptations will have some ecological effects. Therefore, an understanding of the nonclimatic causes of land-use change (e.g., socioeconomics and politics) are nec- essary to manage ecological functions effec-tively on regional and global scales.
Publication Ecological Applications
Volume 7
Issue 3
Pages 753–769
Date August 1997
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(1997)007[0753:TRBLUC]2.0.CO;2
ISSN 1051-0761
URL http://www.jstor.org/stable/2269433
Extra Keywords: climate change, relation to land-use changes; forests, affected by climate change; global circulation models; global models of vegetation change; greenhouse gases, sources of; human- induced climate change; land-cover changes; land-use changes, non-climatic causes; land-use change and climate change; modeling carbon flux.
Date Added Tue Aug 30 04:16:19 2011
Modified Tue Aug 30 04:24:26 2011

The relative impact of harvest and fire upon landscape-level dynamics of older forests: Lessons from the Northwest Forest Plan

Type Journal Article
Author Sean P. Healey
Author Warren B. Cohen
Author Thomas A. Spies
Author Melinda Moeur
Author Dirk Pflugmacher
Author M. German Whitley
Author Michael Lefsky
Abstract Interest in preserving older forests at the landscape level has increased in many regions, including the Pacific Northwest of the United States. The Northwest Forest Plan (NWFP) of 1994 initiated a significant reduction in the harvesting of older forests on federal land. We used historical satellite imagery to assess the effect of this reduction in relation to: past harvest rates, management of non-federal forests, and the growing role of fire. Harvest rates in non-federal large-diameter forests (LDF) either decreased or remained stable at relatively high rates following the NWFP, meaning that harvest reductions on federal forests, which cover half of the region, resulted in a significant regional drop in the loss of LDF to harvest. However, increased losses of LDF to fire outweighed reductions in LDF harvest across large areas of the region. Elevated fire levels in the western United States have been correlated to changing climatic conditions, and if recent fire patterns persist, preservation of older forests in dry ecosystems will depend upon practical and coordinated fire management across the landscape.
Publication Ecosystems
Volume 11
Issue 7
Pages 1106-1119
Date November 2008
Journal Abbr Ecosystems
DOI 10.1007/s10021-008-9182-8
ISSN 1432-9840
Short Title The Relative Impact of Harvest and Fire upon Landscape-Level Dynamics of Older Forests
URL http://www.springerlink.com/content/027220017657k848/
Extra Keywords: disturbance; fire; landsat; forest management; Northwest Forest Plan; old growth.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:29 2011

The relative importance of fuels and weather on fire behavior in subalpine forests

Type Journal Article
Author W. C. Bessie
Author Edward A. Johnson
Abstract Surface fire intensity (kilowatts per metre) and crown fire initiation were predicted using Rothermel's 1972 and Van Wagner's 1977 fire models with fuel data from 47 upland subalpine conifer stands varying in age from 22—258 yr and 35 yr of daily weather data (fuel moisture and wind speeds). Rothermel's intensity model was divided into a fuel component variable and weather component variable, which were then used to examine the relative roles of fuel and weather on surface fire intensity (kilowatts per metre). Similar variables were defined in the crown fire initiation model of Van Wagner. Both surface fire intensity and crown fire initiation were strongly related to the weather components and weakly related to the fuel components, due to much greater variability in weather than fuel, and stronger relationship to the fire behavior mechanisms for weather than for fuel. Fire intensity was correlated to annual area burned; large area burned years had higher fire intensity predictions than smaller area burned years. The reason for this difference was attributed directly to the weather

variable frequency distribution, which was shifted towards more extreme values in years in which large areas burned. During extreme weather conditions, the relative importance of fuels diminishes since all stands achieve the threshold required to permit crown fire development. This is important since most of the area burned in subalpine forests has historically occurred during very extreme weather (i.e., drought coupled to high winds). The fire behavior relationships predicted in the models support the concept that forest fire behavior is determined primarily by weather variation among years rather than fuel variation associated with stand age.

Publication Ecology
Volume 76
Issue 3
Pages 747-762
Date April 1995
Journal Abbr Ecology
DOI 10.2307/1939341
ISSN 0012-9658
URL http://www.jstor.org/stable/1939341
Extra Keywords: Abies lasiocarpa; crown fire initiation; fire behavior; fire ecology; fire weather; fuel accumulation; Picea engelmannii; Pinus contorta var. latifolia; Populus tremuloides; Rothermel's fire behavior model; surface fire intensity; Van Wagner's crown fire model.
Date Added Tue Aug 23 02:20:12 2011
Modified Wed Aug 24 04:40:20 2011

The report of the ecological society of America committee on the scientific basis for ecosystem management

Type Journal Article

Author Norman L. Christensen
Author Ann M. Bartuska
Author James H. Brown
Author Stephen Carpenter
Author Carla D'Antonio
Author Rober Francis
Author Jerry F. Franklin
Author James A. MacMahon
Author Reed F. Noss
Author David J. Parsons
Author Charles H. Peterson
Author Monica G. Turner
Author Robert G. Woodmansee

Abstract Ecosystem management is management driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure, and function. In recent years, sustainability has become an explicitly stated, even legislatively mandated, goal of natural resource management agencies. In practice, however, management approaches have often focused on maximizing short-term yield and economic gain rather than long-term sustainability. Several obstacles contribute to this disparity, including: (1) inadequate information on the biological diversity of environments; (2) widespread ignorance of the function and dynamics of ecosystems; (3) the openness and interconnectedness of ecosystems on scales that transcend management boundaries; (4) a prevailing public perception that the immediate economic and social value of supposedly renewable resources outweighs the risk of future ecosystem damage or the benefits of alternative management approaches. The goal of ecosystem management is to overcome these obstacles. Ecosystem management includes the following elements: (1) Sustainability. Ecosystem management does not focus primarily on deliverables" but rather regards intergenerational sustainability as a precondition. (2) Goals. Ecosystem management establishes measurable goals that specify future processes and outcomes

necessary for sustainability. (3) Sound ecological models and understanding. Ecosystem management relies on research performed at all levels of ecological organization. (4) Complexity and connectedness. Ecosystem management recognizes that biological diversity and structural complexity strengthen ecosystems against disturbance and supply the genetic resources necessary to adapt to long-term change. (5) The dynamic character of ecosystems. Recognizing that change and evolution are inherent in ecosystem sustainability, ecosystem management avoids attempts to freeze" ecosystems in a particular state or configuration. (6) Context and scale. Ecosystem processes operate over a wide range of spatial and temporal scales, and their behavior at any given location is greatly affected by surrounding systems. Thus, there is no single appropriate scale or time frame for management. (7) Humans as ecosystem components. Ecosystem management values the active role of humans in achieving sustainable management goals. (8) Adaptability and accountability. Ecosystem management acknowledges that current knowledge and paradigms of ecosystem function are provisional, incomplete, and subject to change. Management approaches must be viewed as hypotheses to be tested by research and monitoring programs. The following are fundamental scientific precepts for ecosystem management. (1) Spatial and temporal scale are critical. Ecosystem function includes inputs, outputs, cycling of materials and energy, and the interactions of organisms. Boundaries defined for the study or management of one process are often inappropriate for the study of others; thus, ecosystem management requires a broad view. (2) Ecosystem function depends on its structure, diversity, and integrity. Ecosystem management seeks to maintain biological diversity as a critical component in strengthening ecosystems against disturbance. Thus, management of biological diversity requires a broad perspective and recognition that the complexity and function of any particular location is influenced heavily by the surrounding system. (3) Ecosystems are dynamic in space and time. Ecosystem management is challenging in part because ecosystems are constantly changing. Over time scales of decades or centuries, many landscapes are altered by natural disturbances that lead to mosaics of successional patches of different ages. Such patch dynamics are critical to ecosystem structure and function. (4) Uncertainty, surprise, and limits to knowledge. Ecosystem management acknowledges that, given sufficient time and space, unlikely events are certain to occur. Adaptive management addresses this uncertainty by combining democratic principles, scientific analysis, education, and institutional learning to increase our understanding of ecosystem processes and the consequences of management interventions, and to improve the quality of data upon which decisions must be made. Ecosystem management requires application of ecological science to natural resource actions. Moving from concepts to practice is a daunting challenge and will require the following steps and actions. (1) Defining sustainable goals and objectives. Sustainable strategies for the provision of ecosystem goods and services cannot take as their starting points statements of need or want such as mandated timber supply, water demand, or arbitrarily set harvests of shrimp or fish. Rather, sustainability must be the primary objective, and levels of commodity and amenity provision must be adjusted to meet that goal. (2) Reconciling spatial scales. Implementation of ecosystem management would be greatly simplified if management jurisdictions were spatially congruent with the behavior of ecosystem processes. Given the variation in spatial domain among processes, one perfect fit for all processes is virtually impossible; rather, ecosystem management must seek consensus among the various stakeholders within each ecosystem. (3) Reconciling temporal scales. Whereas management agencies are often forced to make decisions on a fiscal-year basis, ecosystem management must deal with time scales that transcend human lifetimes. Ecosystem management requires long-term planning and commitment. (4) Making the system adaptable and accountable. Successful ecosystem management requires institutions that are adaptable to changes in ecosystem characteristics and in our knowledge base. Adaptive management by definition requires the scientist's ongoing interaction with managers and the public. Communication must flow in both directions, and scientists must be willing to prioritize their research with regard to critical management needs. Scientists have much to offer in the development of monitoring programs, particularly in creating sampling approaches, statistical analyses, and scientific models. As our knowledge base evolves, scientists must develop new mechanisms to communicate research and management results. More professionals with an understanding of scientific, management, and social issues, and the ability to communicate with scientists, managers, and the public are needed. Ecosystem management is not a rejection of an anthropocentric for a totally biocentric worldview. Rather it is management that acknowledges the importance of human needs while at the same time confronting the reality that the capacity of our world to meet those needs in perpetuity has limits and depends on the functioning of ecosystems.

Publication Ecological Applications
Volume 6
Issue 3
Pages 665-691
Date August 1996
Journal Abbr Ecol. Appl.

DOI 10.2307/2269460
ISSN 1051-0761
URL http://www.jstor.org/stable/2269460
Call Number 0000
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 00:34:38 2011

The response of the climate system to very high greenhouse gas emission scenarios

Type Journal Article
Author Benjamin M. Sanderson
Author Brian C. O'Neill
Author Jeffrey T. Kiehl
Author Gerald A. Meehl
Author Reto Knutti
Author Warren M. Washington
Abstract Well informed decisions on climate policy necessitate simulation of the climate system for a sufficiently wide range of emissions scenarios. While recent literature has been devoted to low emissions futures, the potential for very high emissions has not been thoroughly explored. We specify two illustrative emissions scenarios that are significantly higher than the A1FI scenario, the highest scenario considered in past IPCC reports, and simulate them in a global climate model to investigate their climate change implications. Relative to the A1FI scenario, our highest scenario results in an additional 2 K of global mean warming above A1FI levels by 2100, a complete loss of arctic summer sea-ice by 2070 and an additional 43% sea level rise due to thermal expansion above A1FI levels by 2100. Regional maximum temperature increases from late 20th century values are 50–100% greater than A1FI increases, with some regions such as the Central US, the Tibetan plateau and Alaska showing a 300–400% increase above A1FI levels.
Publication Environmental Research Letters
Volume 6
Issue 3
Pages 034005 (11 p.)
Date July-September 2011
Journal Abbr Environ. Res. Lett.
DOI 10.1088/1748-9326/6/3/034005
ISSN 1748-9326
URL http://stacks.iop.org/1748-9326/6/i=3/a=034005?key=crossref.b4bbe968cf1ce6acf7f7df2fb7fa6900
Extra Keywords: climate; emissions scenarios; impacts.
Date Added Sun Aug 28 17:22:36 2011
Modified Sun Aug 28 17:22:36 2011

The role of carbon dioxide in climate forcing from 1979 to 2004: Introduction of the Annual Greenhouse Gas Index

Type Journal Article
Author David J. Hofmann
Author James H. Butler
Author Edward J. Dlugokencky
Author James W. Elkins
Author Kenneth Masarie

Author Stephen A. Montzka
Author Pieter Tans

Abstract High-precision measurements of CO_2, CH_4, N_2O, CFC-12, CFC-11 (major greenhouse gases) and 10 minor halogenated gases from a globally distributed network of air sampling sites are used to calculate changes in radiative climate forcing since the pre-industrial era (1750) for the period of measurement, 1979–2004. The five major greenhouse gases account for about 97% of the direct radiative forcing by long-lived gases. The fraction of the sum of radiative forcings by all long-lived gases that is due to CO_2 has grown from 60% to 63% over this time. Though the long-term increase in this sum is due primarily to increased anthropogenic emissions of these radiatively important gases, interannual variations in the growth rate of radiative forcing due to CO_2 are large and likely related to natural phenomena such as volcanic eruptions and ENSO events. The annual value of the total global radiative forcing of the long-lived gases is used to define an Annual Greenhouse Gas Index (AGGI). The AGGI is normalized to 1990, the Kyoto Protocol baseline year.

Publication Tellus B
Volume 58
Issue 5
Pages 614-619
Date November 2006
Journal Abbr Tellus B
DOI 10.1111/j.1600-0889.2006.00201.x
ISSN 0280-6509
URL http://doi.wiley.com/10.1111/j.1600-0889.2006.00201.x
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:34:50 2011

The role of climate and vegetation change in shaping past and future fire regimes in the northwestern US and the implications for ecosystem management

Type Journal Article

Author Cathy Whitlock
Author Sarah L. Shafer
Author Jennifer Marlon

Abstract Fire is an important part of the disturbance regimes of northwestern US forests and its role in maintaining and altering forest vegetation is evident in the paleoecological record of the region. Long-term reconstructions of Holocene fire regimes, provided by the analysis of charcoal, pollen, and other fire proxies in a network of lake records, indicate that the Pacific Northwest and summer-dry regions of the northern Rocky Mountains experienced their highest fire activity in the early Holocene (11,000–7000 years ago) and during the Medieval Warm Period (ca. 1000 years ago) when drought conditions were more severe than today. In contrast, in summer-wet areas of the northern Rocky Mountains, the period of highest fire activity was registered in the last 7000 years when dry woodland vegetation developed. When synthesized across the entire northwestern US, the paleoecological record reveals that past and present fire regimes are strongly controlled by climate changes occurring on multiple time scales. The scarcity of fires in the 20th century in some northwestern US ecosystems may be the result of successful fire suppression policies, but in wetter forests this absence is consistent with long-term fire regime patterns. In addition, simulations of potential future climate and vegetation indicate that future fire conditions in some parts of the northwestern US could be more severe than they are today. The Holocene record of periods of intensified summer drought is used to assess the nature of future fire–climate–vegetation linkages in the region.

Publication Forest Ecology and Management
Volume 178
Issue 1-2
Pages 5-21
Date 3 June 2003
Journal Abbr Forest Ecol. Manag.

DOI 10.1016/S0378-1127(03)00051-3
ISSN 0378-1127
URL http://linkinghub.elsevier.com/retrieve/pii/S0378112703000513
Extra Keywords: fire history; charcoal records; Holocene climate change; future fire conditions; Western US.
Date Added Sat Aug 27 00:55:16 2011
Modified Thu Sep 15 20:26:04 2011

The role of climate change in interpreting historical variability

Type Journal Article
Author Constance I. Millar
Author Wallace B. Woolfenden
Abstract Significant climate anomalies have characterized the last 1000 yr in the Sierra Nevada, California, USA. Two warm, dry periods of 150- and 200-yr duration occurred during AD 900–1350, which were followed by anomalously cold climates, known as the Little Ice Age, that lasted from AD 1400 to 1900. Climate in the last century has been significantly warmer. Regional biotic and physical response to these climatic periods occurred. Climate variability presents challenges when interpreting historical variability, including the need to accommodate climate effects when comparing current ecosystems to historical conditions, especially if comparisons are done to evaluate causes (e.g., human impacts) of differences, or to develop models for restoration of current ecosystems. Many historical studies focus on ‘‘presettlement’’ periods, which usually fall within the Little Ice Age. Thus, it should be assumed that ecosystems inferred for these historical periods responded to different climates than those at present, and management implications should be adjusted accordingly. The warmer centuries before the Little Ice Age may be a more appropriate analogue to the present, although no historic period is likely to be better as a model than an understanding of what conditions would be at present without intervention. Understanding the climate context of historical reconstruction studies, and adjusting implications to the present, should strengthen the value of historical variability research to management.
Publication Ecological Applications
Volume 9
Issue 4
Pages 1207-1216
Date November 1999
Journal Abbr Ecol. Appl.
DOI 10.1890/1051-0761(1999)009[1207:TROCCI]2.0.CO;2
ISSN 1051-0761
URL http://www.esajournals.org/doi/abs/10.1890/1051-0761%281999%29009%5B1207%3ATROCCI%5D2.0.CO%3B2?journalCode=ecap
Extra Keywords: climate change; forest management; historical variation, use in ecosystem management; natural variability; paleoecology.
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:22:54 2011

The role of fire disturbance for global vegetation dynamics: coupling fire into a Dynamic Global Vegetation Model

Type Journal Article
Author Kirsten Thonicke
Author Sergey Venevsky
Author Stephen Sitch
Author Wolfgang Cramer

Abstract 1. Disturbances from fire, wind-throw, insects and other herbivores are, besides climate, CO_2, and soils, critical factors for composition, structure and dynamics of most vegetation. To simulate the influence of fire on the dynamic equilibrium, as well as on potential change, of vegetation at the global scale, we have developed a fire model, running inside the modular framework of the Lund–Potsdam–Jena Dynamic Global Vegetation Model (LPJ-DGVM). 2. Estimated litter moisture is the main driver of day-to-day fire probability. The length of the fire season is used to estimate the fractional area of a grid cell which is burnt in a given year. This affected area is converted into an average fire return interval which can be compared to observations. 3. When driven by observed climate for the 20th century (at a 0.5° longitude/latitude resolution), the model yielded fire return intervals in good agreement with observations for many regions (except parts of semiarid Africa and boreal Siberia). We suggest that further improvement for these regions must involve additional process descriptions such as permafrost and fuel/fire dynamics.

Publication Global Ecology and Biogeography

Volume 10

Issue 6

Pages 661–677

Date November 2001

Journal Abbr Global Ecol. Biogeogr.

DOI 10.1046/j.1466-822X.2001.00175.x

ISSN 1466-822X

Short Title The role of fire disturbance for global vegetation dynamics

URL http://www.jstor.org/stable/3182693

Extra Keywords: disturbance; dynamic global vegetation model; fire model; fire return intervals; fire season; plant functional types; vegetation dynamics.

Date Added Sat Aug 27 06:05:17 2011

Modified Sat Aug 27 15:51:40 2011

The role of fire during climate change in an eastern deciduous forest at Devil's Bathtub, New York

Type Journal Article

Author James S. Clark

Author P. Daniel Royall

Author Craig Chumbley

Abstract Annual records of charcoal and sedimentation rate were compared with fossil pollen to investigate the role of fire in eastern deciduous forest around Devil's Bathtub, New York, USA. Changes in peak and background charcoal suggest that changes in fire regime have accompanied the principal vegetation and climatic changes of the last 10 400 yr. A distribution of return times (50—200—yr intervals) similar to parts of modern boreal Canada prevailed when late—Glacial spruce woodland dominated the site. Expansion of Pinus banksiana appears to have altered the fire regime to one of crown fires with high particulate emissions, but return intervals similar to those of the preceding Picea forest. Expansion of Pinus strobus might be linked to change in fire occurrence, but the broad dispersal of Pinus pollen makes interpretation difficult. If Pinus strobus expansion around the site is reflected in its pollen curve, then that expansion coincides with a time of frequent fire. Alternatively, if increasing pollen abundance precedes the local expansion of trees, as has been observed elsewhere, then local expansion might correspond to an abrupt decline in fire frequency and in regional importance of fire. An abrupt decline in background charcoal follows a fire and coincides (±100 yr) with the expansion of hardwood taxa such as Fagus. The decline in background charcoal occurs over several years, suggesting that it may be linked to effects of hardwood expansion on fuels. Fires do not appear to have occurred during the time of hardwood dominance, suggesting that fire may not be an explanation for maintenance of species diversity in this deciduous forest. However, frequent occurrence of thick varves during the latter half of the Holocene suggests that the frequency of other types of disturbance may have increased.

Publication Ecology

Volume 77

Issue 7

Pages 2148–2166

Date October 1996
Journal Abbr Ecology
DOI 10.2307/2265709
ISSN 0012-9658
URL http://www.jstor.org/stable/2265709
Extra Keywords: charcoal analysis; climate change; eastern deciduous forest; fire history; forest dynamics; pollen analysis; western New York state.
Date Added Tue Aug 30 02:03:25 2011
Modified Tue Aug 30 02:08:51 2011

The role of fire in altering the species composition of forests in Rhode Island

Type Journal Article
Author James H. Brown Jr.
Abstract no abstract
Publication Ecology
Volume 41
Issue 2
Pages 310–316
Date April 1960
Journal Abbr Ecology
DOI 10.2307/1930221
ISSN 0012-9658
URL http://www.jstor.org/stable/1930221
Call Number 0000
Date Added Wed Aug 24 12:35:36 2011
Modified Fri Aug 26 20:34:46 2011

The role of fire in pinyon and juniper woodlands: a descriptive analysis

Type Conference Paper
Author R.F. Miller
Author R.J. Tausch
Abstract Among the most pronounced vegetation changes in the past 130 years has been the increase in both distribution and density of juniper (Juniperus spp.) and pinyon (Pinus spp.) across the Intermountain West. Juniper and pinyon species between the Canadian and Mexican borders occupy over 30 million ha throughout this region. Prior to European settlement, woodland species were primarily confined to rocky ridges or surfaces where sparse vegetation limited fire. Woodlands now occupy more productive sites with deeper well-drained soils. Woodland species began their unprecedented and ongoing rates of increase during the late 1800s. Replacement of sagebrush shrub steppe, riparian, and aspen (Populus spp.) communities by pinyon and juniper species is largely attributed to the reduced occurrence of fire. An important sagebrush type that has been impacted by recent woodland expansion is mountain big sagebrush (Artemisia tridentata var. vaseyana). Prior to settlement, mean fire return intervals for a large portion of this cover type were 12–25 years. At present, fire return intervals in this cover type have increased to .100 years. As trees gain dominance and shrubs and herbaceous vegetation decline, fuel structure changes, which contributes to significant increases in the length of mean fire return intervals. Fire-safe communities successionally replace fire-dependent communities. However, in the central and southern portions of the Intermountain West, particularly where pinyon is dominant, dense tree-canopied woodlands are now becoming susceptible to intense crown fires. The intensity of these fires can lead to dominance by exotics, further altering the successional dynamics of the site. During the past, juniper and pinyon woodlands have been treated to control the expansion. However, wildlife and environmental concerns, and different perceptions of the intrinsic values of these environments have recently limited treatment

of woodlands, including the use of prescribed fire. During the early to middle stages of development when woodlands contain understories of native shrubs and herbs, they can successfully be treated by various methods, particularly fire. However, once communities become tree-dominated woodlands, treatment becomes difficult and expensive.

Date 2000

Proceedings Title Proceedings of the invasive species workshop: the role of fire in the control and spread of invasive species. Fire Conference

Pages 15–30

Short Title The role of fire in pinyon and juniper woodlands

Library Catalog Google Scholar

Call Number 0083

Date Added Mon Oct 10 11:11:08 2011

Modified Mon Oct 10 11:11:08 2011

The role of fire in southern Scandinavian forests during the late Holocene

Type Journal Article

Author Richard H. W. Bradshaw

Author Matts Lindbladh

Author Gina E. Hannon

Abstract Charcoal fragments preserved in small, wet basins are used to characterise the fire regime of temperate and mixed boreal forest (hemiboreal) zones of southern Scandinavia during the last 3500 years. There was far less charcoal recorded from the temperate zone than the hemiboreal zone during the last 3500 years, yet the low temperate zone values showed a clear trend of continuous increase until 1500 AD, after which the values decreased sharply. The record from the hemiboreal region showed a greater temporal variability with far higher charcoal influx values than in the temperate zone. There were significant positive correlations between charcoal influx and Betula, Calluna and Pinus pollen abundance and negative correlations with pollen indicators of anthropogenic impact such as Rumex and Cerealia. Charcoal influx in the temperate zone showed a strong association with the period of major anthropogenic impact, whereas the hemiboreal data reacted more to climatic change. The temporal and spatial pattern of charcoal influx was only a minor explanatory factor for vegetation composition at a regional scale in southern Scandinavia. The fire return interval was often long and irregular in most of the region and anthropogenic factors such as grazing, mowing and establishment of arable fields were probably more important than fire as drivers of vegetation change.

Publication International Journal of Wildland Fire

Volume 19

Issue 8

Pages 1040–1049

Date December 2010

Journal Abbr Int. J. Wildland Fire

DOI 10.1071/WF09108

ISSN 1448-5516

URL http://www.publish.csiro.au/?paper=WF09108

Extra Keywords: charcoal analysis; fire history; hemiboreal forest zone; palaeoecology; temperate forest zone.

Date Added Fri Aug 26 21:42:30 2011

Modified Wed Aug 31 00:33:49 2011

The role of increasing temperature variability in European summer heatwaves

Type Journal Article

Author Christoph Schär

Author Pier Luigi Vidale
Author Daniel Lüthi
Author Christoph Frei
Author Christian Häberli
Author Mark A. Liniger
Author Christof Appenzeller

Abstract Instrumental observations and reconstructions of global and hemispheric temperature evolution reveal a pronounced warming during the past ~150 years. One expression of this warming is the observed increase in the occurrence of heatwaves. Conceptually this increase is understood as a shift of the statistical distribution towards warmer temperatures, while changes in the width of the distribution are often considered small. Here we show that this framework fails to explain the record-breaking central European summer temperatures in 2003, although it is consistent with observations from previous years. We find that an event like that of summer 2003 is statistically extremely unlikely, even when the observed warming is taken into account. We propose that a regime with an increased variability of temperatures (in addition to increases in mean temperature) may be able to account for summer 2003. To test this proposal, we simulate possible future European climate with a regional climate model in a scenario with increased atmospheric greenhouse-gas concentrations, and find that temperature variability increases by up to 100%, with maximum changes in central and eastern Europe.

Publication Nature
Volume 427
Issue 6972
Pages 332-336
Date 22 January 2004
Journal Abbr Nature
DOI 10.1038/nature02300
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature02300
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:26:03 2011

The role of interactions in a world implementing adaptation and mitigation solutions to climate change

Type Journal Article

Author Rachel Warren

Abstract The papers in this volume discuss projections of climate change impacts upon humans and ecosystems under a global mean temperature rise of 4°C above preindustrial levels. Like most studies, they are mainly single-sector or single-region-based assessments. Even the multi-sector or multi-region approaches generally consider impacts in sectors and regions independently, ignoring interactions. Extreme weather and adaptation processes are often poorly represented and losses of ecosystem services induced by climate change or human adaptation are generally omitted. This paper addresses this gap by reviewing some potential interactions in a 4°C world, and also makes a comparison with a 2°C world. In a 4°C world, major shifts in agricultural land use and increased drought are projected, and an increased human population might increasingly be concentrated in areas remaining wet enough for economic prosperity. Ecosystem services that enable prosperity would be declining, with carbon cycle feedbacks and fire causing forest losses. There is an urgent need for integrated assessments considering the synergy of impacts and limits to adaptation in multiple sectors and regions in a 4°C world. By contrast, a 2°C world is projected to experience about one-half of the climate change impacts, with concomitantly smaller challenges for adaptation. Ecosystem services, including the carbon sink provided by the Earth's forests, would be expected to be largely preserved, with much less potential for interaction processes to increase challenges to adaptation. However, demands for land and water for biofuel cropping could reduce the availability of these resources for agricultural and natural systems. Hence, a whole system approach to mitigation and adaptation, considering interactions, potential human and species migration, allocation of land and water resources and ecosystem services, will be important in either a 2°C or a 4°C world.

Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences
Volume 369

Issue 1934
Pages 217-241
Date 13 January 2011
Journal Abbr Phil. Trans. R. Soc. A.
DOI 10.1098/rsta.2010.0271
ISSN 1364-503X
URL http://rsta.royalsocietypublishing.org/cgi/doi/10.1098/rsta.2010.0271
Extra Keywords: climate change; integrated assessment modelling; adaptation; extreme weather events; ecosystem services; biodiversity.
Date Added Tue Aug 16 02:08:14 2011
Modified Tue Aug 16 02:08:22 2011

The Santa Ana winds of California

Type Journal Article
Author Marilyn N. Raphael
Abstract A 33-yr, numerical dataset of the occurrence of Santa Ana winds for the period 1968–2000 has been created and validated. Daily Weather Maps were examined to identify the days when a surface high pressure system existed over the Great Basin simultaneously with a surface low pressure system offshore of southern California, and the prevailing wind over southern California was from the northeast quadrant. The dates of these occurrences, as well as the wind speed, temperature, and dewpoint temperature among other variables, were extracted and tabulated. The frequency of Santa Ana events derived from the weather maps was compared to events defined by wind direction only and there is agreement between the two. Preliminary results show that the Santa Ana event is limited to the period September–April and that the month of peak occurrence is December. The average frequency of events is 20 yr^{-1} and the average duration of an event is 1.5 days. Humidity levels are not uniform across Santa Ana events; the driest months are the months with the highest frequency of events. The frequency of Santa Ana events is usually lower than average during El Niño events. These preliminary results indicate that the dataset is useful for in depth study of the local phenomenon and its effect on the region within the context of the large-scale circulation.
Publication Earth Interactions
Volume 7
Issue 8
Pages 1-13
Date August 2003
Journal Abbr Earth Interact.
DOI 10.1175/1087-3562(2003)007<0001:TSAWOC>2.0.CO;2
ISSN 1087-3562
URL http://journals.ametsoc.org/doi/abs/10.1175/1087-3562%282003%29007%3C0001%3ATSAWOC%3E2.0.CO%3B2
Extra Keywords: Santa Ana winds.
Date Added Mon Aug 29 00:48:23 2011
Modified Mon Aug 29 00:49:30 2011

The seminal importance of fire in ecosystem management-impetus for this publication

Type Conference Paper
Author Stephen F. Arno
Abstract no abstract
Date June 1996
Proceedings Title The Use of Fire in Forest Restoration

Conference Name 1995 Annual Meeting of the Society for Ecological Restoration
Place University of Washington, Seattle, September 14-16, 1995.
Publisher U.S. Department of Agriculture, Forest Service, Intermountain Research Station: Ogden, UT
Pages 3–5
Series General Technical Report INT-341
URL http://www.treesearch.fs.fed.us/pubs/28478
Extra Keywords: fire ecology; fire regimes; forest restoration; disturbance; prescribed fire.
Date Added Tue Aug 16 00:09:53 2011
Modified Tue Aug 16 09:38:59 2011

Notes:

Citation:

Arno, S.F. 1996. The seminal importance of fire in ecosystem management -- impetus for this publication. In: Hardy, Colin C.; Arno, Stephen F., eds. The use of fire in forest restoration. Gen. Tech. Rep. INT-GTR-341. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. p. 3-5.

In: Hardy, Colin C.; Arno, Stephen F., eds. 1996. The use of fire in forest restoration. Gen. Tech. Rep. INT-GTR-341. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. ----- The 26 papers in this document address the current knowledge of fire as a disturbance agent, fire history and fire regimes, applications of prescribed fire for ecological restoration, and the effects of fire on the various forested ecosystems of the north-western United States. The main body of this document is organized in three sections: Assessing Needs for Fire in Restoration; Restoration of Fire in Inland Forests; and Restoration in Pacific Westside Forests.

Related

- Fire regimes and approaches for determining fire history

The sensitivity of the Palmer Drought Severity Index and Palmer's Z-Index to their calibration coefficients including potential evapotranspiration

Type Journal Article
Author Thomas R. Karl
Abstract The Palmer Drought Severity Index (PDSI) is routinely made available by NOAA for operational use, and it has also been calculated across the United States on a historical basis back to 1895 (Karl et al., 1983). Traditionally, the coefficients used in the calculation of the PDSI have been based on an anomalously hot and dry period across much of the United States (1931–60). By changing the base period used to calibrate the coefficients, the magnitude and the sign of the PDSI change significantly in many areas of the United States. Often the changes are larger than those that occur when the potential evapotranspiration is forced to a constant equal to the long-term monthly mean potential evapotranspiration. This sensitivity to base period calibration has important implications in the interpretation of operational or hindcast values of the PDSI for forest fire danger and other applications. The less frequently used Palmer moisture anomaly index (Z-index) is much less sensitive to changes in the calibration periods, and also has some desirable characteristics which may make it preferable to the PDSI for some agricultural and forest fire applications, i.e., it is more responsive to short-term moisture anomalies.
Publication Journal of Climate and Applied Meteorology
Volume 25
Issue 1
Pages 77-86
Date January 1986
Journal Abbr J. Climate Appl. Meteor.

DOI 10.1175/1520-0450(1986)025<0077:TSOTPD>2.0.CO;2
ISSN 0733-3021
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0450%281986%29025%3C0077%3ATSOTPD%3E2.0.CO%3B2
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:17:59 2011

The shapes of adaptation: Historical ecology of anthropogenic landscapes in the southeastern United States

Type Journal Article
Author Julia E. Hammett
Abstract Native inhabitants of the Southeastern United States traditionally practiced land management strategies, including burning and clearing, that created ‘anthropogenic landscapes’. From the viewpoint of landscape ecology, analysis of historic documents including drawings and deerskin maps from the sixteenth, seventeenth and eighteenth centuries depicted the Native Southeastern landscape as a series of circular patches surrounded by buffer areas. This character contrasted sharply with early European coastal settlements which were more typically rectangular in shape. Differences between Native American and European land use patterns and implied perceptions of the landscape reflect distinct differences in their respective cultural models and intentionality.
Publication Landscape Ecology
Volume 7
Issue 2
Pages 121-135
Date June 1992
Journal Abbr Landscape Ecol.
DOI 10.1007/BF02418943
ISSN 0921-2973
Short Title The shapes of adaptation
URL http://www.springerlink.com/content/l32mw455r432157u/
Extra Keywords: historical ecology; Native North Americans; anthropogenic landscapes; corridors; patches.
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:33:09 2011

The solar influence on the probability of relatively cold UK winters in the future

Type Journal Article
Author Michael Lockwood
Author R. Giles Harrison
Author Matt J. Owens
Author Luke Barnard
Author Tim Woollings
Author Friedhelm Steinhilber
Abstract Recent research has suggested that relatively cold UK winters are more common when solar activity is low (Lockwood et al 2010 Environ. Res. Lett. 5 024001). Solar activity during the current sunspot minimum has fallen to levels unknown since the start of the 20th century (Lockwood 2010 Proc. R. Soc. A 466 303–29) and records of past solar variations inferred from cosmogenic isotopes (Abreu et al 2008 Geophys. Res. Lett. 35 L20109) and geomagnetic activity data (Lockwood et al 2009 Astrophys. J. 700 937–44) suggest that the current grand solar maximum is coming to an end and hence that solar activity can be expected to continue to decline. Combining cosmogenic isotope data with the long record of temperatures measured in central England,

we estimate how solar change could influence the probability in the future of further UK winters that are cold, relative to the hemispheric mean temperature, if all other factors remain constant. Global warming is taken into account only through the detrending using mean hemispheric temperatures. We show that some predictive skill may be obtained by including the solar effect.

Publication Environmental Research Letters
Volume 6
Issue 3
Pages 034004 (11 p.)
Date July-September 2011
Journal Abbr Environ. Res. Lett.
DOI 10.1088/1748-9326/6/3/034004
ISSN 1748-9326
URL http://iopscience.iop.org/1748-9326/6/3/034004/fulltext
Extra Keywords: regional climate; solar variability; blocking.
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:37:58 2011

The Sun's role in climate variations

Type Journal Article
Author David Rind
Abstract Is the Sun the controller of climate changes, only the instigator of changes that are mostly forced by the system feedbacks, or simply a convenient scapegoat for climate variations lacking any other obvious cause? This question is addressed for suggested solar forcing mechanisms operating on time scales from billions of years to decades. Each mechanism fails to generate the expected climate response in important respects, although some relations are found. The magnitude of the system feedbacks or variability appears as large or larger than that of the solar forcing, making the Sun's true role ambiguous. As the Sun provides an explicit external forcing, a better understanding of its cause and effect in climate change could help us evaluate the importance of other climate forcings (such as past and future greenhouse gas changes).
Publication Science
Volume 296
Issue 5568
Pages 673-677
Date 26 April 2002
Journal Abbr Science
DOI 10.1126/science.1069562
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1069562
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:09 2011

The theory and use of two fire history models

Type Journal Article
Author Edward A. Johnson
Author Charles E. Van Wagner
Abstract The objective of this paper is to explain the distributions, assumptions, interpretations, and relationships of the two compatible, stochastic models of fire history: the negative exponential and the Weibull. For each model the "fire interval" and "time-sinee-fire" distributions are given. Both models apply to homogenous stationary stochastic processes. The negative exponential states that the instantaneous fire hazard rate is constant for all

stand ages. The Weibull states that the instantaneous fire hazard rate increases with stand age when the shape parameter is >1 (the negative exponential is a special ease of the Weibull when shape=1). An empirical method is given for separating from an observed fire history distribution, the pre- and post-fire suppression distributions. Four relationships are derived from the models and defined per study region (per stand): (i) the fire cycle (average fire interval), (ii) the annual percent burned area (fire frequency), (iii) the average age of the vegetation (average prospective life-time), and (iv) the renewal rate.

Publication	Canadian Journal of Forest Research
Volume	15
Issue	1
Pages	214-220
Date	February 1985
Journal Abbr	Can. J. For. Res.
DOI	10.1139/x85-039
ISSN	0045-5067
URL	http://www.nrcresearchpress.com/doi/abs/10.1139/x85-039
Date Added	Sun Aug 28 03:05:14 2011
Modified	Sun Aug 28 03:05:14 2011

The twentieth century reanalysis project

Type	Journal Article
Author	Gilbert P. Compo
Author	Jeffrey S. Whitaker
Author	Prashant D. Sardeshmukh
Author	Nobuki Matsui
Author	Robert J. Allan
Author	Xungang Yin
Author	Byron E. Gleason
Author	Russell S. Vose
Author	Glenn Rutledge
Author	Pierre Bessemoulin
Author	Stefan Brönnimann
Author	Manola Brunet
Author	Richard I. Crouthamel
Author	Andrea N. Grant
Author	Pavel Y. Groisman
Author	Philip D. Jones
Author	Michael C. Kruk
Author	Andries C. Kruger
Author	Gareth J. Marshall
Author	Maurizio Maugeri
Author	Hing Y. Mok
Author	Øyvind Nordli
Author	Thomas F. Ross
Author	Ricardo M. Trigo
Author	Xiaolan L. Wang
Author	Scott D. Woodruff
Author	Steven J. Worley

Abstract The Twentieth Century Reanalysis (20CR) project is an international effort to produce a comprehensive global atmospheric circulation dataset spanning the twentieth century, assimilating only surface pressure reports and using observed monthly sea-surface temperature and sea-ice distributions as boundary conditions. It is chiefly motivated by a need to provide an observational dataset with quantified uncertainties for validations of climate model simulations of the twentieth century on all time-scales, with emphasis on the statistics of daily weather. It uses an Ensemble Kalman Filter data assimilation method with background 'first guess' fields supplied by an ensemble of forecasts from a global numerical weather prediction model. This directly yields a global analysis every 6 hours as the most likely state of the atmosphere, and also an uncertainty estimate of that analysis. The 20CR dataset provides the first estimates of global tropospheric variability, and of the dataset's time-varying quality, from 1871 to the present at 6-hourly temporal and 2° spatial resolutions. Intercomparisons with independent radiosonde data indicate that the reanalyses are generally of high quality. The quality in the extratropical Northern Hemisphere throughout the century is similar to that of current three-day operational NWP forecasts. Intercomparisons over the second half-century of these surface-based reanalyses with other reanalyses that also make use of upper-air and satellite data are equally encouraging. It is anticipated that the 20CR dataset will be a valuable resource to the climate research community for both model validations and diagnostic studies. Some surprising results are already evident. For instance, the long-term trends of indices representing the North Atlantic Oscillation, the tropical Pacific Walker Circulation, and the Pacific–North American pattern are weak or non-existent over the full period of record. The long-term trends of zonally averaged precipitation minus evaporation also differ in character from those in climate model simulations of the twentieth century.

Publication Quarterly Journal of the Royal Meteorological Society
Volume 137
Issue 654
Pages 1-28
Date January 2011 Part A
Journal Abbr Q. J. Royal Met. Soc.
DOI 10.1002/qj.776
ISSN 0035-9009
URL http://doi.wiley.com/10.1002/qj.776
Call Number 0000
Extra Keywords: data assimilation; Ensemble Kalman Filter; state estimation; surface pressure; sea-level pressure.
Date Added Tue Aug 30 02:03:25 2011
Modified Wed Aug 31 01:09:26 2011

The United States forest policy

Type Book
Author John Ise
Abstract no abstract
Edition 1st edition
Place New Haven, CT
Publisher Yale University Press
Date 1920
# of Pages 396 p.
ISBN 0405045115
URL http://ir.library.oregonstate.edu/xmlui/handle/1957/9959?show=full
Loc. in Archive Oregon State University
Date Added Sun Aug 28 03:05:14 2011
Modified Sun Aug 28 03:05:14 2011

The untold story of pyrocumulonimbus

Type	Journal Article
Author	Michael Fromm
Author	Daniel T. Lindsey
Author	René Servranckx
Author	Glenn Yue
Author	Thomas Trickl
Author	Robert Sica
Author	Paul Doucet
Author	Sophie Godin-Beekmann
Abstract	When fires initiate or intensify towering thunderstorms, they can inject aerosols into the lower stratosphere that were once thought to originate only from volcanic plumes.
Publication	Bulletin of the American Meteorological Society
Volume	91
Issue	9
Pages	1193-1209
Date	September 2010
Journal Abbr	BAMS
DOI	10.1175/2010BAMS3004.1
ISSN	1520-0477
URL	http://journals.ametsoc.org/doi/abs/10.1175/2010BAMS3004.1
Date Added	Mon Aug 29 05:19:52 2011
Modified	Mon Aug 29 05:28:20 2011

The unusual nature of recent snowpack declines in the North American cordillera

Type	Journal Article
Author	Gregory T. Pederson
Author	Stephen T. Gray
Author	Connie A. Woodhouse
Author	Julio L. Betancourt
Author	Daniel B. Fagre
Author	Jeremy S. Littell
Author	Emma Watson
Author	Brian H. Luckman
Author	Lisa J. Graumlich
Abstract	In western North America, snowpack has declined in recent decades, and further losses are projected through the 21st century. Here, we evaluate the uniqueness of recent declines using snowpack reconstructions from 66 tree-ring chronologies in key runoff-generating areas of the Colorado, Columbia, and Missouri River drainages. Over the past millennium, late 20th century snowpack reductions are almost unprecedented in magnitude across the northern Rocky Mountains and in their north-south synchrony across the cordillera. Both the snowpack declines and their synchrony result from unparalleled springtime warming that is due to positive reinforcement of the anthropogenic warming by decadal variability. The increasing role of warming on large-scale snowpack variability and trends foreshadows fundamental impacts on streamflow and water supplies across the western United States.
Publication	Science
Volume	333
Issue	6040
Pages	332-335

Date 15 July 2011
Journal Abbr Science
DOI 10.1126/science.1201570
ISSN 1095-9203
URL http://www.sciencemag.org/content/333/6040/332.full
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:27:26 2011

The use of the multi-model ensemble in probabilistic climate projections

Type Journal Article
Author Claudia Tebaldi
Author Reto Knutti
Abstract Recent coordinated efforts, in which numerous climate models have been run for a common set of experiments, have produced large datasets of projections of future climate for various scenarios. Those multi-model ensembles sample initial condition, parameter as well as structural uncertainties in the model design, and they have prompted a variety of approaches to quantify uncertainty in future climate in a probabilistic way. This paper outlines the motivation for using multi-model ensembles, reviews the methodologies published so far and compares their results for regional temperature projections. The challenges in interpreting multi-model results, caused by the lack of verification of climate projections, the problem of model dependence, bias and tuning as well as the difficulty in making sense of an ‘ensemble of opportunity’, are discussed in detail.
Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences
Volume 365
Issue 1857
Pages 2053-2075
Date 15 August 2007
Journal Abbr Phil. Trans. R. Soc. A
DOI 10.1098/rsta.2007.2076
ISSN 1364-503X
URL http://rsta.royalsocietypublishing.org/cgi/doi/10.1098/rsta.2007.2076
Extra Keywords: regional climate change; probabilistic projections; multi-model ensembles; global climate models; structural uncertainty; performance-based weighting
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:51:31 2011

The value of weather forecasts in the problem of protecting forests from fire

Type Journal Article
Author Edward A. Beals
Abstract no abstract
Publication Monthly Weather Review
Volume 42
Issue 2
Pages 111-119
Date February 1914
Journal Abbr Mon. Wea. Rev.
DOI 10.1175/1520-0493(1914)42<111:TVOWFI>2.0.CO;2
ISSN 1520-0493
URL http://dx.doi.org/10.1175%2F1520-0493%281914%2942%3C111%3ATVOWFI%3E2.0.CO%3B2

Date Added Tue Aug 23 02:03:25 2011
Modified Wed Aug 24 04:41:44 2011

The vegetational history of the Middle West

Type Journal Article
Author Henry Allan Gleason
Abstract This Article does not have an abstract.
Publication Annals of the Association of American Geographers
Volume 12
Issue 1
Pages 39–85
Date 1922
Journal Abbr Ann. Assoc. Am. Geogr.
DOI 10.1080/00045602209356938
ISSN 1467-8306 (online), 0004-5608 (paper)
URL http://www.jstor.org/stable/2560590
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:12 2011

The WCRP CMIP3 multimodel dataset: A new era in climate change research

Type Journal Article
Author Gerald A. Meehl
Author Curt Covey
Author Thomas Delworth
Author Mojib Latif
Author Bryant McAvaney
Author John F. B. Mitchell
Author Ronald J. Stouffer
Author Karl E. Taylor
Abstract A coordinated set of global coupled climate model [atmosphere–ocean general circulation model (AOGCM)] experiments for twentieth- and twenty-first-century climate, as well as several climate change commitment and other experiments, was run by 16 modeling groups from 11 countries with 23 models for assessment in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4). Since the assessment was completed, output from another model has been added to the dataset, so the participation is now 17 groups from 12 countries with 24 models. This effort, as well as the subsequent analysis phase, was organized by the World Climate Research Programme (WCRP) Climate Variability and Predictability (CLIVAR) Working Group on Coupled Models (WGCM) Climate Simulation Panel, and constitutes the third phase of the Coupled Model Intercomparison Project (CMIP3). The dataset is called the WCRP CMIP3 multimodel dataset, and represents the largest and most comprehensive international global coupled climate model experiment and multimodel analysis effort ever attempted. As of March 2007, the Program for Climate Model Diagnostics and Intercomparison (PCMDI) has collected, archived, and served roughly 32 TB of model data. With oversight from the panel, the multimodel data were made openly available from PCMDI for analysis and academic applications. Over 171 TB of data had been downloaded among the more than 1000 registered users to date. Over 200 journal articles, based in part on the dataset, have been published so far. Though initially aimed at the IPCC AR4, this unique and valuable resource will continue to be maintained for at least the next several years. Never before has such an extensive set of climate model simulations been made available to the international climate science community for study. The ready access to the multimodel dataset opens up these types of model analyses to researchers, including students, who previously could not obtain state-of-the-art climate model output, and thus represents a new era in climate change research. As a direct consequence, these ongoing

studies are increasing the body of knowledge regarding our understanding of how the climate system currently works, and how it may change in the future.

Publication Bulletin of the American Meteorological Society
Volume 88
Issue 9
Pages 1383–1394
Date September 2007
Journal Abbr BAMS
DOI 10.1175/BAMS-88-9-1383
ISSN 0003-0007
URL http://journals.ametsoc.org/doi/abs/10.1175/BAMS-88-9-1383
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:45:34 2011

Three centuries of fire in montane pine-oak stands on a temperate forest landscape

Type Journal Article
Author Serena R. Aldrich
Author Charles W. Lafon
Author Henri D. Grissino-Mayer
Author Georgina G. DeWeese
Author Jennifer A. Hoss
Abstract • Question: What was the role of fire in montane pine-oak (Pinus-Quercus) stands under changing human land uses on a temperate forest landscape in eastern North America? • Location: Mill Mountain in the central Appalachian Mountains, Virginia, US. • Methods: A dendroecological reconstruction of fire history was generated for four stands dominated by xerophytic pine and oak species. The fire chronology began under presettlement conditions following aboriginal depopulation. Subsequent land uses included European settlement, iron mining, logging, and US Forest Service acquisition and fire protection. • Results: Fires occurred approximately every 5 years until 1930 without any evidence of a temporal trend in fire frequency. Burning ceased after 1930. Area-wide fires affecting multiple pine stands were common, occurring at intervals of approximately 16 years. Most living pines became established during the late 1800s and early 1900s. Dead pines indicated that an older cohort established ca. 1730. Most hardwoods were established between the 1920s and 1940s. • Conclusions: Except for fire protection, changes in land use had no discernible influence on fire frequency. Lightning ignitions and/or large fire extent may have been important for maintaining frequent burning in the 1700s, while fuel recovery may have constrained fire frequency during later periods. The disturbance regime appears to be characterized by frequent surface fires and occasional severe fires, insect outbreaks or other disturbances followed by pine recruitment episodes. Industrial disturbances appear to have had little influence on the pine stands. The greatest impact of industrial society is fire exclusion, which permitted hardwood establishment.
Publication Applied Vegetation Science
Volume 13
Issue 1
Pages 36-46
Date February 2010
Journal Abbr Appl. Veg. Sci.
DOI 10.1111/j.1654-109X.2009.01047.x
ISSN 1402-2001, 1654-109X
URL http://doi.wiley.com/10.1111/j.1654-109X.2009.01047.x
Call Number 0005
Extra Keywords: Appalachian Mountains; dendroecology; disturbance; fire history; Pinus pungens; Table Mountain pine; tree ring.
Date Added Wed Sep 21 22:26:02 2011

Modified Wed Sep 28 17:53:59 2011

Three kinds of heterogeneity in fire regimes: At the crossroads of fire history and landscape ecology

Type Journal Article
Author Ken Lertzman
Author Joseph Fall
Author Brigitte Dorner
Abstract Understanding the large-scale dynamics of fire in forest ecosystems is hampered by the substantial heterogeneity that fire regimes display over multiple scales of space and time. In this paper we discuss temporal and spatial heterogeneity in fire regimes along with heterogeneity internal to individual fires. We examine how these sources of variability challenge our ability to make inferences from the kind of data typically available in empirical studies. We built a simple, spatially explicit, stochastic simulation, based on a Poisson model of fire occurrence, and used it to create a series of scenarios that differ in their assumptions about variability in fire interval, size, and shape. Our purpose was to produce data sets similar to those collected in the f ield. However, we are able to assess the effectiveness of standard methods for analyzing such data because we have perfect knowledge of the dynamics and variables driving the fire regimes. Our analyses demonstrate that the reconstructed parameters of a fire regime can exhibit substantial variability, even in the absence of an underlying ecological or physical pattern. Consequently, we recommend caution in attributing causality to apparent temporal or spatial differences in fire regime parameters that are not motivated by independently generated hypotheses. Furthermore, modest temporal variability in fire frequency can induce significant fluctuations in forest age structure over time, calling in to question inferences that assume a steady-state age distribution. Our discussion highlights the irnportance of heterogeneity in forest landscapes, the need to understand the lirnits of our analytical methods, and the challenges of incorporating these ideas into management.
Publication Northwest Science
Volume 72
Issue Special Issue 1
Pages 4–23
Date 1998
Journal Abbr NW Sci.
ISSN 0029-344X
Short Title Three kinds of heterogeneity in fire regimes
URL http://www.vetmed.wsu.edu/org_nws/NWSci%20journal%20articles/1998%20files/1998%20Vol%2072.htm
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:17 2011

Tongue-Tied: Confused meanings for common fire terminology can lead to fuels mismanagement. A new framework is needed to clarify and communicate the concepts.

Type Magazine Article
Author Theresa B. Jain
Author Russell T. Graham
Abstract no abstract
Publication WILDFIRE magazine
Issue July/August
Date July 2004
Pages 22-26
URL http://wildfiremag.com/command/tonguetied/
Date Added Sun Aug 28 03:05:14 2011

Modified Sun Aug 28 03:05:14 2011

Topographic solar radiation models for GIS

Type Journal Article

Author Ralph Dubayah

Author M. Paul Rich

Abstract Incident solar radiation at the Earth's surface is the result of a complex interaction of energy between the atmosphere and the surface. Recently much progress has been made towards the creation of accurate, physically-based solar radiation formulations that can model this interaction over topographic and other surfaces (such as plant canopies) for a large range of spatial and temporal scales. In this paper we summarize our current work on solar radiation models and their implementation within both GIS and image processing systems. An overview of the effects of topography and plant canopies on solar radiation is presented along with a discussion of various options for obtaining the data necessary to drive specific solar radiation models. Examples are given from our own work using two models, ATM (Atmospheric and Topographic Model), a model based within an image processing framework, and SOLARFLUX, a GIS-based model. We consider issues of design, including GIS implementation and interface, computational problems, and error propagation.

Publication International Journal of Geographical Information Science

Volume 9

Issue 4

Pages 405-419

Date July 1995

Journal Abbr Int. J. Geogr. Inf. Sci.

DOI 10.1080/02693799508902046

ISSN 1365-8816

URL http://www.tandfonline.com/doi/abs/10.1080/02693799508902046

Call Number 0000

Date Added Tue Aug 30 04:16:19 2011

Modified Wed Aug 31 00:39:57 2011

Toward understanding and predicting monsoon patterns

Type Journal Article

Author Eugene R. Wahl

Author Carrie Morrill

Abstract Much of the world's population lives in monsoon Asia and depends on monsoon rainfall for water and agricultural fertility. The monsoon also affects climate in other parts of the world (1). It results from an interplay between the ocean, atmosphere, and land surface (see the figure). Many factors thus affect its strength, including sea surface temperatures (SSTs) in the Indian and Pacific Oceans; variations in solar output; land snow cover and soil moisture over the Asian continent; and the position and strength of prevailing winds (1). The links between these factors and the monsoon appear to wax and wane over time, and the observational record is too short to explain this longer-term variability (2). This lack of information makes it difficult to forecast and plan for anomalous monsoon activity, and to predict how the Asian monsoon may be affected by global climate change. This situation is now changing: On page 486 of this issue, Cook et al. (3) report a Monsoon Asia Drought Atlas (MADA) that contains reconstructions of summer dryness and wetness for the region since 1300 C.E., based on tree-ring data.

Publication Science

Volume 328

Issue 5977

Pages 437-438

Date 23 April 2010

Journal Abbr Science
DOI 10.1126/science.1188926
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/doi/10.1126/science.1188926
Call Number 0001
Date Added Thu Sep 22 06:14:01 2011
Modified Wed Sep 28 17:53:57 2011

Transient middle Eocene atmospheric CO_2 and temperature variations

Type Journal Article
Author Peter K. Bijl
Author Alexander J. P. Houben
Author Stefan Schouten
Author Steven M. Bohaty
Author Appy Sluijs
Author Gert-Jan Reichart
Author Jaap S. Sinninghe Damste
Author Henk Brinkhuis
Abstract The long-term warmth of the Eocene (~56 to 34 million years ago) is commonly associated with elevated partial pressure of atmospheric carbon dioxide (ρCO_2). However, a direct relationship between the two has not been established for short-term climate perturbations. We reconstructed changes in both ρCO_2 and temperature over an episode of transient global warming called the Middle Eocene Climatic Optimum (MECO; ~40 million years ago). Organic molecular paleothermometry indicates a warming of southwest Pacific sea surface temperatures (SSTs) by 3° to 6°C. Reconstructions of ρCO_2 indicate a concomitant increase by a factor of 2 to 3. The marked consistency between SST and ρCO_2 trends during the MECO suggests that elevated ρCO_2 played a major role in global warming during the MECO.
Publication Science
Volume 330
Issue 6005
Pages 819-821
Date 5 November 2010
Journal Abbr Science
DOI 10.1126/science.1193654
ISSN 0036-8075
URL http://www.sciencemag.org/cgi/content/abstract/330/6005/819
Date Added Tue Aug 23 02:30:38 2011
Modified Wed Aug 31 16:07:57 2011

Tree-ring analysis of fire history of a post oak savanna in the Missouri Ozarks

Type Journal Article
Author Richard P. Guyette
Author Bruce E. Cutter
Abstract Fire scars from 43 trees were dated by dendrochronological methods to reconstruct the extent and frequency of fire in an area of post oak savannas in southern Missouri. Post oak (Quercus stellata Wang.), shortleaf pine (Pinus echinata Mill.), and eastern red cedar (Juniperus virginiana L.) trees from the Caney Mountain Wildlife Refuge were used to construct two fire-scar chronologies. Fire frequency and extent was found to be greatest between 1700 and 1810 on post oak savannas. The mean fire-free interval during the pre-1810 period was 4.3 years for an area of post oak savanna of approximately 2.5 km². Evidence for several fires at least 6 km² in

extent was found from trees scarred in the years 1785, 1796, and 1806.

Publication	Natural Areas Journal
Volume	11
Issue	2
Pages	93–99
Date	1991
Journal Abbr	Nat. Areas J.
ISSN	0885-8608
URL	http://md1.csa.com/partners/viewrecord.php?requester=gs&collection=ENV&…
Date Added	Mon Aug 29 06:17:09 2011
Modified	Mon Aug 29 15:42:29 2011

Tree-ring reconstructions of fire and climate history in the Sierra Nevada and Southwestern United States (Chapter 6)

Type	Book Section
Author	Thomas W. Swetnam
Author	Christopher H. Baisan
Abstract	no abstract
Book Title	Fire and Climatic Change in Temperate Ecosystems of the Western Americas
Series	Ecological Studies
Volume	160
Edition	1st edition
Place	New York, NY
Publisher	Springer-Verlag
Date	2003
Pages	158-195
ISBN	978-0-387-95455-4
URL	http://www.springerlink.com/content/p430866050633485/
Date Added	Sun Aug 28 17:26:59 2011
Modified	Wed Aug 31 00:28:08 2011

Notes:

Citation:

Swetnam, T. W. and C. H. Baisan. 2003. Tree-ring reconstructions of fire and climate history in the Sierra Nevada and Southwestern United States. Pages 158-195 in T. T. Veblen, W. L. Baker, G. Montenegro, and T. W. Swetnam, editors. Fire and climatic change in temperate ecosystems of the western Americas. Ecological Studies 160. Springer-Verlag, New York.

Trends in Atmospheric Carbon Dioxide

Type	Web Page
Author	NOAA US Department of Commerce
Website Title	Earth System Research Laboratory Global Monitoring Division
Website Type	data
Date	2010
URL	http://www.esrl.noaa.gov/gmd/ccgg/trends/

Rights NOAA

Extra The NOAA Earth System Research Laboratory was formed to observe and understand the Earth system and to develop products, through a commitment to research that will advance the National Oceanic and Atmopsheric Administration's environmental information and services on global to local scales.

Date Added Sat Aug 27 04:08:03 2011

Modified Sat Aug 27 04:08:03 2011

Trends in midlatitude cyclone frequency and occurrence during fire season in the Northern Rockies: 1900–2004

Type Journal Article

Author Paul A. Knapp

Author Peter T. Soulé

Abstract We examined changes in the timing and frequency of major midlatitude cyclones (MLCs) during August through October for eight climate stations in the Northern Rockies from 1900–2004. As MLCs can effectively diminish fire activity through both cooler temperatures and higher humidity/precipitation, we also determined if area burned by wildfires from 1940–2004 was correlated with the timing and frequency of these events. Our results indicate that: (1) significant long-term trends in MLCs exist, as the timing of the first MLC has occurred later in the year during the past century, with a marked upward shift post-mid-1980s; (2) MLC frequency has significantly declined since 1900, with a pronounced decrease also beginning in the mid-1980s; (3) the relationships between the timing of the first MLC and frequency of MLCs with forest area burned are significant; and (4) mid-tropospheric ridging upstream from the Northern Rockies that blocks MLCs has become more pronounced.

Publication Geophysical Research Letters

Volume 34

Issue 20

Pages L20707 (5 p.)

Date October 2007

Journal Abbr Geophys. Res. Lett.

DOI 10.1029/2007GL031216

ISSN 0094-8276

Short Title Trends in midlatitude cyclone frequency and occurrence during fire season in the Northern Rockies

URL http://www.agu.org/pubs/crossref/2007/2007GL031216.shtml

Extra Keywords: midlatitude cyclones; forest wildfires; Northern Rockies; United States.

Date Added Tue Aug 30 14:37:15 2011

Modified Wed Aug 31 00:16:23 2011

Trends in the sources and sinks of carbon dioxide

Type Journal Article

Author Corinne Le Quéré

Author Michael R. Raupach

Author Josep G. Canadell

Author Gregg Marland

Author Laurent Bopp

Author Philippe Ciais

Author Thomas J. Conway

Author Scott C. Doney

Author Richard A. Feely

Author Pru Foster
Author Pierre Friedlingstein
Author Kevin Gurney
Author Richard A. Houghton
Author Johanna I. House
Author Chris Huntingford
Author Peter E. Levy
Author Mark R. Lomas
Author Joseph Majkut
Author Nicolas Metzl
Author Jean P. Ometto
Author Glen P. Peters
Author I. Colin Prentice
Author James T. Randerson
Author Steven W. Running
Author Jorge L. Sarmiento
Author Ute Schuster
Author Stephen Sitch
Author Taro Takahashi
Author Nicolas Viovy
Author Guido R. van der Werf
Author F. Ian Woodward
Abstract Efforts to control climate change require the stabilization of atmospheric CO_2 concentrations. This can only be achieved through a drastic reduction of global CO_2 emissions. Yet fossil fuel emissions increased by 29% between 2000 and 2008, in conjunction with increased contributions from emerging economies, from the production and international trade of goods and services, and from the use of coal as a fuel source. In contrast, emissions from land-use changes were nearly constant. Between 1959 and 2008, 43% of each year's CO_2 emissions remained in the atmosphere on average; the rest was absorbed by carbon sinks on land and in the oceans. In the past 50 years, the fraction of CO_2 emissions that remains in the atmosphere each year has likely increased, from about 40% to 45%, and models suggest that this trend was caused by a decrease in the uptake of CO_2 by the carbon sinks in response to climate change and variability. Changes in the CO_2 sinks are highly uncertain, but they could have a significant influence on future atmospheric CO_2 levels. It is therefore crucial to reduce the uncertainties.
Publication Nature Geoscience
Volume 2
Issue 12
Pages 831-836
Date December 2009
Journal Abbr Nature Geosci.
DOI 10.1038/ngeo689
ISSN 1752-0894
URL http://www.nature.com/ngeo/journal/v2/n12/full/ngeo689.html
Call Number 0000
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 16:10:34 2011

Trends Online: A compendium of data on global change

Type Web Page
Author CDIAC

Abstract Carbon Dioxide Information Analysis Center. 2003. Trends Online: A Compendium of Data on Global Change. Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee. This document provides synopses of frequently used time series of global-change data: • historical and modern records (from ice cores and current monitoring stations) of atmospheric concentrations of carbon dioxide (CO_2) • atmospheric concentrations of methane • isotopic measurements (^{14}C et al.) for atmospheric greenhouse gases • estimates of global, regional, and national CO_2 emissions from the combustion of fossil fuels, gas flaring, and the production of cement • global emissions estimates for methane (CH_4) • carbon flux from land-cover change • long-term temperature records, whose spatial coverage ranges from individual sites to the entire globe and from the Earth's surface to the lower stratosphere • total cloud amount over China • ecosystems (area and carbon content) Data records are presented in multipage formats, each dealing with a specific site, region, or emissions species. The data records include tables; graphs; discussions of methods for collecting, measuring, and reporting the data; trends in the data, and references to literature providing further information. Instructions for citing specific data in Trends Online are provided for each compiled data set. All data appearing in Trends Online are available, on request, on digital media from CDIAC at no cost.

Website Title Trends Online Contents

Website Type data provide

Date 2003

URL http://cdiac.ornl.gov/trends/trends.htm

Extra Keywords: atmospheric chemistry; atmospheric measurements; carbon cycle; carbon dioxide; carbon isotopes; climate; climate change; climatology; clouds; Earth atmosphere; emissions; fossil fuels; gas flaring; global warming; greenhouse effect; meteorology; methane; natural gas; radiosondes; paleoclimatology; regional analysis; temperature monitoring; trace gases.

Date Added Tue Aug 30 02:03:25 2011

Modified Wed Aug 31 21:53:31 2011

Trends, rhythms, and aberrations in global climate 65 Ma to present

Type Journal Article

Author James Zachos

Author Mark Pagani

Author Lisa Sloan

Author Ellen Thomas

Author Katharina Billups

Abstract Since 65 million years ago (Ma), Earth's climate has undergone a significant and complex evolution, the finer details of which are now coming to light through investigations of deep-sea sediment cores. This evolution includes gradual trends of warming and cooling driven by tectonic processes on time scales of 10^5 to 10^7 years, rhythmic or periodic cycles driven by orbital processes with 10^4- to 10^6-year cyclicity, and rare rapid aberrant shifts and extreme climate transients with durations of 10^3 to 10^5 years. Here, recent progress in defining the evolution of global climate over the Cenozoic Era is reviewed. We focus primarily on the periodic and anomalous components of variability over the early portion of this era, as constrained by the latest generation of deep-sea isotope records. We also consider how this improved perspective has led to the recognition of previously unforeseen mechanisms for altering climate.

Publication Science

Volume 292

Issue 5517

Pages 686-693

Date 27 April 2001

Journal Abbr Science

DOI 10.1126/science.1059412

ISSN 0036-8075

URL http://www.sciencemag.org/content/292/5517/686.full

Date Added Tue Aug 16 01:17:24 2011

Modified Tue Aug 16 01:17:24 2011

Tropical cyclones and permanent El Niño in the early Pliocene epoch

Type Journal Article
Author Alexey V. Fedorov
Author Christopher M. Brierley
Author Kerry Emanuel
Abstract Tropical cyclones (also known as hurricanes and typhoons) are now believed to be an important component of the Earth's climate system. In particular, by vigorously mixing the upper ocean, they can affect the ocean's heat uptake, poleward heat transport, and hence global temperatures. Changes in the distribution and frequency of tropical cyclones could therefore become an important element of the climate response to global warming. A potential analogue to modern greenhouse conditions, the climate of the early Pliocene epoch (approximately 5 to 3 million years ago) can provide important clues to this response. Here we describe a positive feedback between hurricanes and the upper-ocean circulation in the tropical Pacific Ocean that may have been essential for maintaining warm, El Niño-like conditions during the early Pliocene. This feedback is based on the ability of hurricanes to warm water parcels that travel towards the Equator at shallow depths and then resurface in the eastern equatorial Pacific as part of the ocean's wind-driven circulation. In the present climate, very few hurricane tracks intersect the parcel trajectories; consequently, there is little heat exchange between waters at such depths and the surface. More frequent and/or stronger hurricanes in the central Pacific imply greater heating of the parcels, warmer temperatures in the eastern equatorial Pacific, warmer tropics and, in turn, even more hurricanes. Using a downscaling hurricane model, we show dramatic shifts in the tropical cyclone distribution for the early Pliocene that favour this feedback. Further calculations with a coupled climate model support our conclusions. The proposed feedback should be relevant to past equable climates and potentially to contemporary climate change.
Publication Nature
Volume 463
Issue 7284
Pages 1066-1070
Date 25 February 2010
Journal Abbr Nature
DOI 10.1038/nature08831
ISSN 0028-0836
URL http://dx.doi.org/10.1038/nature08831
Date Added Sun Aug 28 05:42:07 2011
Modified Sun Aug 28 05:45:52 2011

Tropical Pacific – mid-latitude teleconnections in medieval times

Type Journal Article
Author Nicholas E. Graham
Author Malcolm K. Hughes
Author Caspar M. Ammann
Author Kim M. Cobb
Author Martin P. Hoerling
Author Douglas J. Kennett
Author James P. Kennett
Author Bert Rein
Author Lowell Stott
Author Peter E. Wigand
Author Taiyi Xu
Abstract Terrestrial and marine late Holocene proxy records from the western and central US suggest that climate between approximately 500 and 1350 a.d. was marked by generally arid conditions with episodes of severe

centennial-scale drought, elevated incidence of wild fire, cool sea surface temperatures (SSTs) along the California coast, and dune mobilization in the western plains. This Medieval Climate Anomaly (MCA) was followed by wetter conditions and warming coastal SSTs during the transition into the "Little Ice Age" (LIA). Proxy records from the tropical Pacific Ocean show contemporaneous changes indicating cool central and eastern tropical Pacific SSTs during the MCA, with warmer than modern temperatures in the western equatorial Pacific. This pattern of mid-latitude and tropical climate conditions is consistent with the hypothesis that the dry MCA in the western US resulted (at least in part) from tropically forced changes in winter NH circulation patterns like those associated with modern La Niña episodes. We examine this hypothesis, and present other analyses showing that the imprint of MCA climate change appears in proxy records from widely distributed regions around the planet, and in many cases is consistent with a cool medieval tropical Pacific. One example, explored with numerical model results, is the suggestion of increased westerlies and warmer winter temperatures over northern Europe during medieval times. An analog technique for the combined use of proxy records and model results, Proxy Surrogate Reconstruction (PSR), is introduced.

Publication Climatic Change
Volume 83
Issue 1-2
Pages 241-285
Date July 2007
Journal Abbr Climatic Change
DOI 10.1007/s10584-007-9239-2
ISSN 0165-0009
URL http://www.springerlink.com/index/10.1007/s10584-007-9239-2
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:32:59 2011

Tropospheric temperature trends: History of an ongoing controversy

Type Journal Article
Author Peter W. Thorne
Author John R. Lanzante
Author Thomas C. Peterson
Author Dian J. Seidel
Author Keith P. Shine
Abstract Changes in atmospheric temperature have a particular importance in climate research because climate models consistently predict a distinctive vertical profile of trends. With increasing greenhouse gas concentrations, the surface and troposphere are consistently projected to warm, with an enhancement of that warming in the tropical upper troposphere. Hence, attempts to detect this distinct 'fingerprint' have been a focus for observational studies. The topic acquired heightened importance following the 1990 publication of an analysis of satellite data which challenged the reality of the projected tropospheric warming. This review documents the evolution over the last four decades of understanding of tropospheric temperature trends and their likely causes. Particular focus is given to the difficulty of producing homogenized datasets, with which to derive trends, from both radiosonde and satellite observing systems, because of the many systematic changes over time. The value of multiple independent analyses is demonstrated. Paralleling developments in observational datasets, increased computer power and improved understanding of climate forcing mechanisms have led to refined estimates of temperature trends from a wide range of climate models and a better understanding of internal variability. It is concluded that there is no reasonable evidence of a fundamental disagreement between tropospheric temperature trends from models and observations when uncertainties in both are treated comprehensively.
Publication Wiley Interdisciplinary Reviews: Climate Change
Volume 2
Issue 1
Pages 66-88
Date January/February 2011
Journal Abbr WIREs Clim. Change

DOI 10.1002/wcc.80
ISSN 1757-7780
URL http://doi.wiley.com/10.1002/wcc.80
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 16:43:30 2011

Tundra burning in Alaska: Linkages to climatic change and sea ice retreat

Type Journal Article
Author Feng Sheng Hu
Author Philip E. Higuera
Author John E. Walsh
Author William L. Chapman
Author Paul A. Duffy
Author Linda B. Brubaker
Author Melissa L. Chipman
Abstract Recent climatic warming has resulted in pronounced environmental changes in the Arctic, including shrub cover expansion and sea ice shrinkage. These changes foreshadow more dramatic impacts that will occur if the warming trend continues. Among the major challenges in anticipating these impacts are “surprises” stemming from changes in system components that have remained relatively stable in the historic record. Tundra burning is potentially one such component. Here we report paleoecological evidence showing that recent tundra burning is unprecedented in the central Alaskan Arctic within the last 5000 years. Analysis of lake sediment cores reveals peak values of charcoal accumulation corresponding to the Anaktuvuk River Fire in 2007, with no evidence of other fire events throughout the past five millennia in that area. Atmospheric reanalysis suggests that the fire was favored by exceptionally warm and dry weather conditions in summer and early autumn. Boosted regression tree modeling shows that such conditions also explain 95% of the interannual variability in tundra area burned throughout Alaska over the past 60 years and that the response of tundra burning to climatic warming is nonlinear. These results contribute to an emerging body of evidence suggesting that tundra ecosystems can burn more frequently under suitable climatic and fuel conditions. The Anaktuvuk River Fire coincides with extreme sea ice retreat, and tundra area burned in Alaska is moderately correlated with sea ice extent from 1979 to 2009 ($r = -0.43$, $p = 0.02$). Recurrences of large tundra fires as a result of sea ice disappearance may represent a novel manifestation of coupled marine-terrestrial responses to climatic warming.
Publication Journal of Geophysical Research
Volume 115
Issue G4
Pages G04002 (8 p.)
Date October 2010
Journal Abbr J. Geophys. Res.
DOI 10.1029/2009JG001270
ISSN 0148-0227
Short Title Tundra burning in Alaska
URL http://www.agu.org/pubs/crossref/2010/2009JG001270.shtml
Extra Keywords: Arctic; charcoal records; climatic warming; paleoecology; sea ice retreat; tundra fire.
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:35:37 2011

Turbulent kinetic energy during wildfires in the north central and north-eastern U.S.

Type Journal Article

Author Warren E. Heilman
Author Xindi Bian

Abstract The suite of operational fire-weather indices available for assessing the atmospheric potential for extreme fire behaviour typically does not include indices that account for atmospheric boundary-layer turbulence or wind gustiness that can increase the erratic behaviour of fires. As a first step in testing the feasibility of using a quantitative measure of turbulence as a stand-alone fire-weather index or as a component of a fire-weather index, simulations of the spatial and temporal patterns of turbulent kinetic energy during major recent wildfire events in the western Great Lakes and northeastern US regions were performed. Simulation results indicate that the larger wildfires in these regions of the US were associated with episodes of significant boundary-layer ambient turbulence. Case studies of the largest recent wildfires to occur in these regions indicate that the periods of most rapid fire growth were generally coincident with occurrences of the product of the Haines Index and near-surface turbulent kinetic energy exceeding a value of $15 m^2 s^{-2}$, a threshold indicative of a highly turbulent boundary layer beneath unstable and dry atmospheric layers, which is a condition that can be conducive to erratic fire behaviour.

Publication International Journal of Wildland Fire
Volume 19
Issue 3
Pages 346–363
Date May 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF08076
ISSN 1448-5516
URL http://www.publish.csiro.au/?paper=WF08076
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:33:51 2011

U.S. National Forests adapt to climate change through Science–Management partnerships

Type Journal Article

Author Jeremy S. Littell
Author David L. Peterson
Author Constance I. Millar
Author Kathy A. O’Halloran

Abstract Developing appropriate management options for adapting to climate change is a new challenge for land managers, and integration of climate change concepts into operational management and planning on United States national forests is just starting. We established science–management partnerships on the Olympic National Forest (Washington) and Tahoe National Forest (California) in the first effort to develop adaptation options for specific national forests. We employed a focus group process in order to establish the scientific context necessary for understanding climate change and its anticipated effects, and to develop specific options for adapting to a warmer climate. Climate change scientists provided the scientific knowledge base on which adaptations could be based, and resource managers developed adaptation options based on their understanding of ecosystem structure, function, and management. General adaptation strategies developed by national forest managers include: (1) reduce vulnerability to anticipated climate-induced stress by increasing resilience at large spatial scales, (2) consider tradeoffs and conflicts that may affect adaptation success, (3) manage for realistic outcomes and prioritize treatments that facilitate adaptation to a warmer climate, (4) manage dynamically and experimentally, and (5) manage for structure and composition. Specific adaptation options include: (1) increase landscape diversity, (2) maintain biological diversity, (3) implement early detection/rapid response for exotic species and undesirable resource conditions, (4) treat large-scale disturbance as a management opportunity and integrate it in planning, (5) implement treatments that confer resilience at large spatial scales, (6) match engineering of infrastructure to expected future conditions, (7) promote education and awareness about climate change among resource staff and local publics, and (8) collaborate with a variety of partners on adaptation strategies and to promote ecoregional management. The process described here can quickly elicit a large amount of information relevant for adaptation to climate change, and can be emulated for other national forests,

groups of national forests with similar resources, and other public lands. As adaptation options are iteratively generated for additional administrative units on public lands, management options can be compared, tested, and integrated into adaptive management. Science-based adaptation is imperative because increasing certainty about climate impacts and management outcomes may take decades.

Publication Climatic Change
Volume Published online
Date 10 May 2011
Journal Abbr Climatic Change
DOI 10.1007/s10584-011-0066-0
ISSN 0165-0009
URL http://www.springerlink.com/content/yp28647842x040p6/
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:42:42 2011

U.S. natural resources and climate change: Concepts and approaches for management adaptation

Type Journal Article
Author Jordan M. West
Author Susan H. Julius
Author Peter Kareiva
Author Carolyn Enquist
Author Joshua J. Lawler
Author Brian Petersen
Author Ayana E. Johnson
Author M. Rebecca Shaw
Abstract Public lands and waters in the United States traditionally have been managed using frameworks and objectives that were established under an implicit assumption of stable climatic conditions. However, projected climatic changes render this assumption invalid. Here, we summarize general principles for management adaptations that have emerged from a major literature review. These general principles cover many topics including: (1) how to assess climate impacts to ecosystem processes that are key to management goals; (2) using management practices to support ecosystem resilience; (3) converting barriers that may inhibit management responses into opportunities for successful implementation; and (4) promoting flexible decision making that takes into account challenges of scale and thresholds. To date, the literature on management adaptations to climate change has mostly focused on strategies for bolstering the resilience of ecosystems to persist in their current states. Yet in the longer term, it is anticipated that climate change will push certain ecosystems and species beyond their capacity to recover. When managing to support resilience becomes infeasible, adaptation may require more than simply changing management practices—it may require changing management goals and managing transitions to new ecosystem states. After transitions have occurred, management will again support resilience—this time for a new ecosystem state. Thus, successful management of natural resources in the context of climate change will require recognition on the part of managers and decisions makers of the need to cycle between “managing for resilience” and “managing for change.”
Publication Environmental Management
Volume 44
Issue 6
Pages 1001-1021
Date December 2009
Journal Abbr Environ. Manage.
DOI 10.1007/s00267-009-9345-1
ISSN 0364-152X
URL http://www.springerlink.com/index/10.1007/s00267-009-9345-1
Extra Keywords: climate change; adaptation; resource management; ecosystems; resilience; uncertainty; triage; thresholds.

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Modified Tue Aug 16 23:27:27 2011

Uncertainties in regional climate change prediction: A regional analysis of ensemble simulations with the HADCM2 coupled AOGCM

Type Journal Article
Author Filippo Giorgi
Author Raquel Francisco
Abstract We analyze ensembles (four realizations) of historical and future climate transient experiments carried out with the coupled atmosphere-ocean general circulation model (AOGCM) of the Hadley Centre for Climate Prediction and Research, version HADCM2, with four scenarios of greenhouse gas (GHG) and sulfate forcing. The analysis focuses on the regional scale, and in particular on 21 regions covering all land areas in the World (except Antarctica). We examine seasonally averaged surface air temperature and precipitation for the historical period of 1961–1990 and the future climate period of 2046–2075. Compared to previous AOGCM simulations, the HADCM2 model shows a good performance in reproducing observed regional averages of summer and winter temperature and precipitation. The model, however, does not reproduce well observed interannual variability. We find that the uncertainty in regional climate change predictions associated with the spread of different realizations in an ensemble (i.e. the uncertainty related to the internal model variability) is relatively low for all scenarios and regions. In particular, this uncertainty is lower than the uncertainty due to inter-scenario variability and (by comparison with previous regional analyses of AOGCMs) with inter-model variability. The climate biases and sensitivities found for different realizations of the same ensemble were similar to the corresponding ensemble averages and the averages associated with individual realizations of the same ensemble did not differ from each other at the 5% confidence level in the vast majority of cases. These results indicate that a relatively small number of realizations (3 or 4) is sufficient to characterize an AOGCM transient climate change prediction at the regional scale.
Publication Climate Dynamics
Volume 16
Issue 2-3
Pages 169-182
Date February 2000
Journal Abbr Clim. Dyn.
DOI 10.1007/PL00013733
ISSN 0930-7575
Short Title Uncertainties in regional climate change prediction
URL http://www.springerlink.com/content/v25xnvukfpdm8lhd/
Date Added Mon Aug 29 06:17:09 2011
Modified Mon Aug 29 06:19:55 2011

Uncertainty estimates in regional and global observed temperature changes: A new data set from 1850

Type Journal Article
Author Philip Brohan
Author John J. Kennedy
Author Ian Harris
Author Simon F. B. Tett
Author Phil D. Jones
Abstract The historical surface temperature data set HadCRUT provides a record of surface temperature trends and variability since 1850. A new version of this data set, HadCRUT3, has been produced, benefiting from recent improvements to the sea surface temperature data set which forms its marine component, and from improvements to the station records which provide the land data. A comprehensive set of uncertainty estimates

has been derived to accompany the data: Estimates of measurement and sampling error, temperature bias effects, and the effect of limited observational coverage on large-scale averages have all been made. Since the mid twentieth century the uncertainties in global and hemispheric mean temperatures are small, and the temperature increase greatly exceeds its uncertainty. In earlier periods the uncertainties are larger, but the temperature increase over the twentieth century is still significantly larger than its uncertainty.

Publication Journal of Geophysical Research
Volume 111
Issue 12
Pages D12106 (21 p.)
Date June 2006
Journal Abbr J. Geophys. Res.
DOI 10.1029/2005JD006548
ISSN 0148-0227
URL http://www.agu.org/pubs/crossref/2006/2005JD006548.shtml
Extra Index Terms: global change; climate variability; regional climate change.
Date Added Wed Aug 24 12:15:59 2011
Modified Fri Aug 26 20:34:07 2011

Uncertainty in estimating carbon emissions from boreal forest fires

Type Journal Article
Author Nancy H. F. French
Author Pierre Goovaerts
Author Eric S. Kasischke
Abstract The uncertainty in carbon emissions from fire was estimated for the boreal region of Alaska over the 50 years of recorded wildfire. Building on previous work where carbon emissions were estimated using a geographic information systems-based model, the uncertainty attached to the different parameters of the basic equation was assessed and propagated through the equation using Monte Carlo simulation. The result is a distribution of possible values for total carbon and three carbon-based gases (CO_2, CO, and CH_4) that provides a measure of the uncertainty in the output estimates. Additionally, the relative impact of each input parameter on the output uncertainty has been quantified (sensitivity analysis). Assumptions were made in building the uncertainty model regarding the shape of the distribution of each model parameter since this information is unavailable. Because of the lack of information on the precision of input parameter estimates, a range of possible spread values for the probability distributions, as defined by the coefficient of variation (CV; standard deviation/mean), was considered. Using the “best guess” values for input CVs, the resulting estimate of total annual carbon emission can be as high as 10.6 TgC or as low as 1.1 TgC, a CV of 24%. Lowering the input CVs to 5% results in an output CV of 4.2% for total carbon emissions. For the three carbon-based gases the CV of simulated carbon distributions for the “best guess” scenario ranges from 23 to 27%. The sensitivity analysis reveals that ground-layer fraction consumed, βg , is the most important parameter in terms of output uncertainty. The results of this work emphasize that current estimates of carbon emission from biomass burning are not well constrained because input data sets are incomplete and lack adequate error information. Furthermore, we conclude that although burn area estimates are improving, more effort is needed in quantifying fuel and consumption variables at fire sites if accurate estimates of carbon emissions from fire are to be made.
Publication Journal of Geophysical Research
Volume 109
Issue 14
Pages D14S08 (12 p.)
Date May 2004
Journal Abbr J. Geophys. Res.
DOI 10.1029/2003JD003635
ISSN 0148-0227
URL http://www.agu.org/pubs/crossref/2004/2003JD003635.shtml

Extra Keywords: biomass burning; carbon cycling; Monte Carlo simulations.
Date Added Mon Aug 29 05:19:52 2011
Modified Wed Aug 31 00:41:12 2011

Uncertainty in predictions of the climate response to rising levels of greenhouse gases

Type Journal Article
Author David A. Stainforth
Author Tolu Aina
Author Carl Christensen
Author Mat Collins
Author Nick Faull
Author Dave J. Frame
Author Jamie A. Kettleborough
Author Sylvia Knight
Author Andrew Martin
Author James M. Murphy
Author Claudio Piani
Author David Sexton
Author Leonard A. Smith
Author Robert A. Spicer
Author Alan J. Thorpe
Author Myles R. Allen
Abstract The range of possibilities for future climate evolution needs to be taken into account when planning climate change mitigation and adaptation strategies. This requires ensembles of multi-decadal simulations to assess both chaotic climate variability and model response uncertaint. Statistical estimates of model response uncertainty, based on observations of recent climate change admit climate sensitivities—defined as the equilibrium response of global mean temperature to doubling levels of atmospheric carbon dioxide —substantially greater than 5 K. But such strong responses are not used in ranges for future climate change because they have not been seen in general circulation models. Here we present results from the 'climateprediction.net' experiment, the first multi-thousand-member grand ensemble of simulations using a general circulation model and thereby explicitly resolving regional details. We find model versions as realistic as other state-of-the-art climate models but with climate sensitivities ranging from less than 2 K to more than 11 K. Models with such extreme sensitivities are critical for the study of the full range of possible responses of the climate system to rising greenhouse gas levels, and for assessing the risks associated with specific targets for stabilizing these levels.
Publication Nature
Volume 433
Issue 7024
Pages 403–406
Date 27 January 2005
Journal Abbr Nature
DOI 10.1038/nature03301
ISSN 1476-4687
URL http://www.nature.com/nature/journal/v433/n7024/full/nature03301.html
Date Added Sun Aug 28 17:26:59 2011
Modified Sun Aug 28 17:31:53 2011

Uncertainty in surface-fire history: The case of ponderosa pine forests in the western United States

Type Journal Article
Author William L. Baker
Author Donna Ehle
Abstract Present understanding of fire ecology in forests subject to surface fires is based on fire-scar evidence. We present theory and empirical results that suggest that fire-history data have uncertainties and biases when used to estimate the population mean fire interval (FI) or other parameters of the fire regime. First, the population mean FI is difficult to estimate precisely because of unrecorded fires and can only be shown to lie in a broad range. Second, the interval between tree origin and first fire scar estimates a real fire-free interval that warrants inclusion in mean-FI calculations. Finally, inadequate sampling and targeting of multiple-scarred trees and high scar densities bias mean FIs toward shorter intervals. In ponderosa pine (Pinus ponderosa Dougl. ex P. & C. Laws.) forests of the western United States, these uncertainties and biases suggest that reported mean FIs of 2-25 years significantly underestimate population mean FIs, which instead may be between 22 and 308 years. We suggest that uncertainty be explicitly stated in fire-history results by bracketing the range of possible population mean FIs. Research and improved methods may narrow the range, but there is no statistical or other method that can eliminate all uncertainty. Longer mean FIs in ponderosa pine forests suggest that (i) surface fire is still important, but less so in maintaining forest structure, and (ii) some dense patches of trees may have occurred in the pre-Euro-American landscape. Creation of low-density forest structure across all parts of ponderosa pine landscapes, particularly in valuable parks and reserves, is not supported by these results.
Publication Canadian Journal of Forest Research
Volume 31
Issue 7
Pages 1205–1226
Date July 2001
Journal Abbr Can. J. For. Res.
DOI 10.1139/cjfr-31-7-1205
ISSN 1208-6037
Short Title Uncertainty in surface-fire history
URL http://www.nrcresearchpress.com/doi/abs/10.1139/x01-046
Date Added Tue Aug 23 01:43:03 2011
Modified Wed Aug 24 04:42:43 2011

Uncertainty, judgment, and error in prediction

Type Book Section
Author Thomas R. Stewart
Abstract no abstract
Book Title Prediction: Science, decision making, and the future of nature
Edition 1st edition
Place Washington, DC
Publisher Island Press
Date 2000
Pages 41-57
ISBN 1559637765, 9781559637763
URL http://www.albany.edu/cpr/stewart/Papers/StewartPrediction-2000cap.pdf
Date Added Sun Aug 28 17:26:59 2011
Modified Wed Aug 31 00:28:24 2011

Notes:

Citation:

Stewart, T. R. (2000). Uncertainty, Judgment, and Error in Prediction. In D. Sarewitz & R. A. Pielke & R. Byerly (Eds.), Prediction:

Science, Decision Making, and the Future of Nature (First ed., pp.41-57). Washington, DC: Island Press.

Undaunted courage: Meriwether Lewis, Thomas Jefferson, and the opening of the American West

Type Book

Author Stephen E. Ambrose

Abstract In this sweeping adventure story, Stephen E. Ambrose, the bestselling author od D-Day, presents the definitive account of one of the most momentous journeys in American history. Ambrose follows the Lewis and Clark Expedition from Thomas Jefferson's hope of finding a waterway to the Pacific, through the heart-stopping moments of the actual trip, to Lewis's lonely demise on the Natchez Trace. Along the way, Ambrose shows us the American West as Lewis saw it -- wild, awsome, and pristinely beautiful. Undaunted Courage is a stunningly told action tale that will delight readers for generations. (Publisher's Description)

Edition 1st edition, illustrated

Place New York, NY

Publisher Simon and Schuster

Date February 1996

# of Pages 512 p.

ISBN 0684811073, 9780684811079

Short Title Undaunted courage

URL http://books.simonandschuster.com/Undaunted-Courage/Stephen-E-Ambrose/9780684811079

Date Added Mon Aug 15 23:16:14 2011

Modified Mon Aug 15 23:16:14 2011

Notes:

Book Overview:

From the bestselling author of the definitive book on D-Day comes the definitive book on the most momentous expedition in American history and one of the great adventure stories of all time.

In 1803 President Thomas Jefferson selected his personal secretary, Captain Meriwether Lewis, to lead a voyage up the Missouri River to the Rockies, over the mountains, down the Columbia River to the Pacific Ocean, and back. Lewis was the perfect choice. He endured incredible hardships and saw incredible sights, including vast herds of buffalo and Indian tribes that had had no previous contact with white men. He and his partner, Captain William Clark, made the first map of the trans-Mississippi West, provided invaluable scientific data on the flora and fauna of the Louisiana Purchase territory, and established the American claim to Oregon, Washington, and Idaho. Ambrose has pieced together previously unknown information about weather, terrain, and medical knowledge at the time to provide a colorful and realistic backdrop for the expedition. Lewis saw the North American continent before any other white man; Ambrose describes in detail native peoples, weather, landscape, science, everything the expedition encountered along the way, through Lewis's eyes.

Lewis is supported by a rich variety of colorful characters, first of all Jefferson himself, whose interest in exploring and acquiring the American West went back thirty years. Next comes Clark, a rugged frontiersman whose love for Lewis matched Jefferson's. There are numerous Indian chiefs, and Sacagawea, the Indian girl who accompanied the expedition, along with the French-Indian hunter Drouillard, the great naturalists of Philadelphia, the French and Spanish fur traders of St. Louis, John Quincy Adams, and many more leading political, scientific, and military figures of the turn of the century.

This is a book about a hero. This is a book about national unity. But it is also a tragedy. When Lewis returned to Washington in the fall of 1806, he was a national hero. But for Lewis, the expedition was a failure. Jefferson had hoped to find an all-water route to the Pacific with a short hop over the Rockies-Lewis discovered there was no such passage. Jefferson hoped the Louisiana Purchase would provide endless land to support farming-but Lewis discovered that the Great Plains were too dry. Jefferson hoped there was a river flowing from Canada into the Missouri-but Lewis reported there was no such river, and thus no U.S. claim to the Canadian prairie. Lewis discovered the Plains Indians were hostile and would block settlement and trade up the Missouri. Lewis took to drink, engaged in land speculation, piled up debts he could not pay, made jealous political enemies, and suffered severe depression.

High adventure, high politics, suspense, drama, and diplomacy combine with high romance and personal tragedy to make this outstanding work of scholarship as readable as a novel.

Understanding the science of climate change: Talking points - Impacts to western mountains and forests

Type Report
Author Rachel Loehman
Author Greer Anderson
Abstract Climate change presents significant risks to our nation's natural and cultural resources. Although climate change was once believed to be a future problem, there is now unequivocal scientific evidence that our planet's climate system is warming (IPCC 2007a). While many people understand that human emissions of greenhouse gases have caused recent observed climate changes, fewer are aware of the specific impacts these changes will bring. This document is part of a series of bioregional summaries that provide key scientific findings about climate changes in and impacts to protected areas. The information is intended to provide a basic understanding of the science of climate change, known and expected impacts to resources and visitor experience, and actions that can be taken to mitigate and adapt to change. The statements may be used to communicate with managers, frame interpretive programs, and answer general questions to the public and the media. They also provide helpful information to consider in the developing sustainability strategies and long-term management plans.
Report Number NPS/NRPC/NRR - 2009/090
Report Type Natural Resource Report
Place Fort Collins, CO
Institution U.S. Department of the Interior, National Park Service, Natural Resources Program Center
Date February 2009
Pages 30 p.
Short Title Understanding the science of climate change
URL http://www.fs.fed.us/rm/pubs_other/rmrs_2009_loehman_r001.pdf
Archive http://www.treesearch.fs.fed.us/pubs/33773
Call Number 0000
Extra Keywords: climate change; emissions; greenhouse gases.
Date Added Tue Aug 30 14:37:58 2011
Modified Wed Aug 31 00:20:44 2011

Notes:

Citation:

Loehman, Rachel; Anderson, Greer 2009. Understanding the science of climate change: Talking points - impacts to western mountains and forests. Natural Resource Report NPS/NRPC/NRR - 2009/090. Fort Collins, CO: U.S. Department of the Interior, National Park Service, Natural Resources Program Center. 30 p.

United States drought of 2007: Historical perspectives

Type Journal Article
Author Justin T. Maxwell
Author Peter T. Soulé
Abstract The impacts of the United States drought of 2007 to both society and wcosystems were substantive and included multi-billion dollar agricultural losses and the second worst wildfire season on record. The purpose of this paper is to place the 2007 drought in historical perspective relative to the climate record from 1895–2007 to increase our understanding of this hazard and contribute to improvements of drought mitigation plans. We

compared the 2007 drought historically against the climatic record (1895–2007) using the Palmer Drought Severity Index (PDSI). We then examined the temporal progression of the 2007 drought and placed the peak month of drought severity (November) in historical perspective using rankings of severity and statistical recurrence intervals. Moreover, we examined the climatic factors (e.g. geopotential height anomalies) that contributed to both abnormally dry and wet conditions recorded within the continental United States. While there were regions that experienced the worst drought on record both annually and in November during the calendar year 2007, this year was not as severe as other notable drought years. November 2007 ties (with 5 other years) for the 12th worst on record in terms of the number of climatic divisions experiencing the worst November drought. Statistically, drought/wetness conditions in November 2007 were not exceptionally extreme, with almost all of the calculated statistical recurrence intervals being much less than the 113 year period of record.

Publication Climate Research
Volume 38
Issue 2
Pages 95-104
Date February 2009
Journal Abbr Clim. Res.
DOI 10.3354/cr00772
ISSN 0936-577X
Short Title United States drought of 2007
URL http://www.int-res.com/abstracts/cr/v38/n2/p95-104/
Extra Keywords: PDSI; historical rank; recurrence interval; media; geopotential height; anomalies.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:45:03 2011

US Weather Bureau Chief Willis Moore and the reimagination of uncertainty in long-range forecasting

Type Journal Article
Author Jamie L. Pietruska
Abstract This article examines competing modes of knowledge production in the context of long-range weather forecasting in the United States at the turn of the twentieth century. The US Weather Bureau, a newly constituted civilian organisation in 1891, sought to build its institutional reputation based on authoritative short-term 24-hour forecasts by discrediting the popular and ubiquitous 'weather prophets' who made long-range predictions. Chief Willis L. Moore, at the helm of the Weather Bureau from 1895 to 1913, initially condemned long-range forecasting as superstition and quackery inherently inferior to professional meteorological expertise. But the Weather Bureau, which began issuing its own weekly forecasts in 1908, reimagined long-range forecasting to accept the very indeterminacy it had formerly denounced, thereby rationalising the uncertainty of weather prediction into its weekly forecasts and into its vision of modern scientific meteorology.
Publication Environment and History
Volume 17
Issue 1
Pages 79-105
Date February 2011
Journal Abbr Environ. Hist.
DOI 10.3197/096734011X12922359172970
ISSN 0967-3407
URL http://www.erica.demon.co.uk/EH/EH1705.html
Extra Keywords: US Weather Bureau; Willis Moore; weather prophets; weather forecasting; professionalisation; science and the public; knowledge production; uncertainty; prediction.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:27:26 2011

Use of controlled fire in southeastern upland game management

Type Journal Article
Author Herbert L. Stoddard
Abstract no abstract
Publication Journal of Forestry
Volume 33
Issue 3
Pages 346–351
Date March 1935
Journal Abbr J. Forest
ISSN 0022-1201
URL http://saf.publisher.ingentaconnect.com/content/saf/jof/1935/00000033/00000003/art00034
Date Added Sun Aug 28 17:26:59 2011
Modified Sun Aug 28 17:32:28 2011

Use of models in detection and attribution of climate change

Type Journal Article
Author Gabriele Hegerl
Author Francis Zwiers
Abstract Most detection and attribution studies use climate models to determine both the expected ‘fingerprint’ of climate change and the uncertainty in the estimated magnitude of this fingerprint in observations, given the climate variability. This review discusses the role of models in detection and attribution, the associated uncertainties, and the robustness of results. Studies that use observations only make substantial assumptions to separate the components of observed changes due to radiative forcing from those due to internal climate variability. Results from observation-only studies are broadly consistent with those from fingerprint studies. Fingerprint studies evaluate the extent to which patterns of response to external forcing (fingerprints) from climate model simulations explain observed climate change in observations. Fingerprints are based on climate models of various complexities, from energy balance models to full earth system models. Statistical approaches range from simple comparisons of observations with model simulations to multi-regression methods that estimate the contribution of several forcings to observed change using a noise-reducing metric. Multi-model methods can address model uncertainties to some extent and we discuss how remaining uncertainties can be overcome. The increasing focus on detecting and attributing regional climate change and impacts presents both opportunities and challenges. Challenges arise because internal variability is larger on smaller scales, and regionally important forcings, such as from aerosols or land-use change, are often uncertain. Nevertheless, if regional climate change can be linked to external forcing, the results can be used to provide constraints on regional climate projections.
Publication Wiley Interdisciplinary Reviews: Climate Change
Volume 2
Issue 4
Pages 570–591
Date July/August 2011
Journal Abbr WIREs Clim. Change
DOI 10.1002/wcc.121
ISSN 1757-7780
URL http://doi.wiley.com/10.1002/wcc.121
Call Number 0000
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:19 2011

Use of NOAA ESRL data (CO_2)

Type Web Page
Contributor Pieter Tans
Contributor C. David Keeling
Abstract These data are made freely available to the public and the scientific community in the belief that their wide dissemination will lead to greater understanding and new scientific insights. The availability of these data does not constitute publication of the data. NOAA relies on the ethics and integrity of the user to assure that ESRL receives fair credit for their work. If the data are obtained for potential use in a publication or presentation, ESRL should be informed at the outset of the nature of this work. If the ESRL data are essential to the work, or if an important result or conclusion depends on the ESRL data, co-authorship may be appropriate. This should be discussed at an early stage in the work. Manuscripts using the ESRL data should be sent to ESRL for review before they are submitted for publication so we can insure that the quality and limitations of the data are accurately represented.
Website Type ftp
URL ftp://ftp.cmdl.noaa.gov/ccg/co2/trends/co2_mm_mlo.txt
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 06:05:17 2011

Attachments

- Scripps CO2 Program - Home

Using bigcone Douglas-fir fire scars and tree rings to reconstruct interior chaparral fire history

Type Journal Article
Author KJ Lombardo
Author TW Swetnam
Author CH Baisan
Author MI Borchert
Abstract Bigcone Douglas-fir (Pseudotsuga macrocarpa [Vasey] Mayr) is a long-lived, fire-adapted conifer that is endemic to the Transverse Ranges of southern California. At the lower and middle reaches of its elevational distribution, isolated stands of bigcone Douglas-fir are surrounded by extensive stands of chaparral. Our dendrochronology investigations have revealed that these ancient trees commonly record multiple past fires as fire scars in their lower boles. We hypothesized that the fire-scar record found within and among bigcone Douglas-fir stands reflects the temporal and spatial patterns of fire in the surrounding chaparral. We compared the fire scar results with independent, twentieth century fire atlas data to assess our interpretations. Using fire scars and ring-growth changes, we reconstructed fire history in Los Padres National Forest and investigated changes in fire regime characteristics over the past several centuries. Our analyses confirm that the tree-ring record can be used to accurately reconstruct past fire occurrence and extent patterns both within bigcone Douglas-fir stands and surrounding chaparral stands. Many extensive fires were apparent in both the pre- and post-twentieth century period indicating that such events were a natural component of the system. However, many smaller fires were also evident in the tree-ring record, and more of these types of events occurred during the nineteenth century (and earlier) than during the twentieth century. We also identified a shift after the late nineteenth century to potentially more severe fires within and among stands, and by inference the surrounding chaparral. These findings suggest that land management policies, rates of human-set fires, or climatic variations may have played a role in shaping the contemporary fire regime, and that this recent period is different in some respects from the pre-twentieth century regime. Replication of this work in other mountain ranges, in addition to comparisons with climate and human histories, will provide valuable insights into our understanding of the relative roles of humans versus climate in changing bigcone Douglas-fir and chaparral fire regimes.
Publication Fire Ecology
Volume 5
Issue 3
Pages 35–56

Date	2009
Library Catalog	Google Scholar
Call Number	0003
Date Added	Thu Oct 6 11:53:56 2011
Modified	Mon Oct 10 11:10:55 2011

Using simulation to map fire regimes: An evaluation of approaches, strategies, and limitations

Type	Journal Article
Author	Robert E. Keane
Author	Geoffrey J. Cary
Author	Russell Parsons
Abstract	Spatial depictions of fire regimes are indispensable to fire management because they portray important characteristics of wildland fire, such as severity, intensity, and pattern, across a landscape that serves as important reference for future treatment activities. However, spatially explicit fire regime maps are difficult and costly to create requiring extensive expertise in fire history sampling, multivariate statistics, remotely sensed image classification, fire behaviour and effects, fuel dynamics, landscape ecology, simulation modelling, and geographical information systems (GIS). This paper first compares three common strategies for predicting fire regimes (classification, empirical, and simulation) using a 51000 ha landscape in the Selway-Bitterroot Wilderness Area of Montana, USA. Simulation modelling is identified as the best overall strategy with respect to developing temporally deep spatial fire patterns, but it has limitations. To illustrate these problems, we performed three simulation experiments using the LANDSUM spatial model to determine the relative importance of (1) simulation time span; (2) fire frequency parameters; and (3) fire size parameters on the simulation of landscape fire return interval. The model used to simulate fire regimes is also very important, so we compared two spatially explicit landscape fire succession models (LANDSUM and FIRESCAPE) to demonstrate differences between model predictions and limitations of each on a neutral landscape. FIRESCAPE was developed for simulating fire regimes in eucalypt forests of south-eastern Australia. Finally, challenges for future simulation and fire regime research are presented including field data, scale, fire regime variability, map obsolescence, and classification resolution.
Publication	International Journal of Wildland Fire
Volume	12
Issue	4
Pages	309-322
Date	2003
Journal Abbr	Int. J. Wildland Fire
DOI	10.1071/WF03017
ISSN	1049-8001
Short Title	Using simulation to map fire regimes
URL	http://dx.doi.org/10.1071/WF03017
Call Number	0032
Extra	Keywords: mapping; GIS; LANDSUM; FIRESCAPE; simulation modelling; landscape modelling.
Date Added	Sun Sep 4 04:06:25 2011
Modified	Mon Sep 5 10:11:12 2011

Using size-frequency distributions to analyze fire regimes in Florida

Type	Conference Paper
Author	Thomas P. Holmes
Author	Jeffrey P. Prestemon
Author	John M. Pye

Author David T. Butry
Author D. Evan Mercer
Author Karen L. Abt

Abstract Wildfire regimes in natural forest ecosystems have been characterized with power–law distributions. In this paper, we evaluated whether wildfire regimes in a human-dominated landscape were also consistent with power–law distributions. Our case study focused on wildfires in Florida, a state with rapid population growth and consequent rapid alteration of forest ecosystems and natural fire regimes. We found that all fire size–frequency distributions evaluated in this study were consistent with power–law distributions, but the power–law distributions were piece-wise linear. A kink in the power–law distributions occurred at about 640 ha for flatwoods fires and at about 290 ha for swamp fires. Above these levels, fires "exploded" into a catastrophic regime. If the kink represents the level at which fires become immune to fire suppression effort, we would expect that the location of the kink would occur at smaller fire sizes during extreme fire years due to the increased flammability of fuels and the relative scarcity of fire suppression resources. We found this result for three of four extreme fire years in flatwoods ecosystems and for all four extreme fire years in swamps. These results suggest that catastrophic fires may not be possible to prevent and that suppression efforts during extreme fire years may be best applied to strategic areas that decrease the connectivity of fuels.

Date 2004
Proceedings Title Fire in Temperate, Boreal, and Montane Ecosystems
Conference Name Proceedings 22nd Tall Timbers Fire Ecology Conference: Fire in Temperate, Boreal, and Montane Ecosystems, Kananaskis, Alberta, Canada, 15-18 October 2001
Place Tallahassee, Florida
Publisher Tall Timbers Research Station
Pages 88-94
Series Fire Ecology Conference Proceedings
URL http://www.treesearch.fs.fed.us/pubs/7813
Archive http://www.talltimbers.org/publications4sale.html#FECP
Extra Keywords: fire regime; fire suppression; Florida; power–law distributions; self-organization; size–frequency distribution.
Date Added Mon Aug 29 17:30:07 2011
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Notes:

Citation:

Holmes, Thomas P.; Prestemon, Jeffrey P.; Pye, John M.; Butry, David T.; Mercer, D. Evan; Abt, Karen L. 2004. Using Size-Frequency Distributions to Analyze Fire Regimes in Florida. Pages 88-94 in R.T. Engstrom, K.E.M. Galley, and W.J. de Groot (eds.). Proceedings of the 22nd Tall Timbers Fire Ecology Conference: Fire in Temperate, Boreal, and Montane Ecosystems. Tall Timbers Research Station, Tallahassee, FL.

Variability in fire–climate relationships in ponderosa pine forests in the Colorado Front Range

Type Journal Article

Author Rosemary L. Sherriff
Author Thomas T. Veblen

Abstract Understanding the interactions of climate variability and wildfire has been a primary objective of recent fire history research. The present study examines the influence of El Niño–Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO) and Atlantic Multidecadal Oscillation (AMO) on fire occurrence using fire-scar evidence from 58 sites from the lower ecotone to the upper elevational limits of ponderosa pine (Pinus ponderosa) in northern Colorado. An important finding is that at low v. high elevations within the montane zone, climatic patterns conducive to years of widespread fire are different. Differences in fire–climate relationships are manifested primarily in antecedent year climate. Below ~2100 m, fires are dependent on antecedent moister conditions that favour fine fuel accumulation 2 years before dry fire years. In the upper montane zone, fires are dependent primarily on drought rather than an increase in fine fuels. Throughout the

montane zone, fire is strongly linked to variations in moisture availability that in turn is linked to climate influences of ENSO, PDO and AMO. Fire occurrence is greater than expected during the phases of each index associated with drought. Regionally widespread fire years are associated with specific phase combinations of ENSO, PDO and AMO. In particular, the combination of La Niña, negative PDO and positive AMO is highly conducive to widespread fire.

Publication International Journal of Wildland Fire
Volume 17
Issue 1
Pages 50-59
Date February 2008
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF07029
ISSN 1049-8001
URL http://www.publish.csiro.au/nid/114/paper/WF07029.htm
Extra Keywords: Atlantic Multidecadal Oscillation; El Niño–Southern Oscillation; fire history; Pacific Decadal Oscillation; Pinus ponderosa.
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:04 2011

Variability in the El Niño-Southern Oscillation through a glacial-interglacial cycle

Type Journal Article

Author Alexander W. Tudhope
Author Colin P. Chilcott
Author Malcolm T. McCulloch
Author Edward R. Cook
Author John Chappell
Author Robert M. Ellam
Author David W. Lea
Author Janice M. Lough
Author Graham B. Shimmield

Abstract The El Niño–Southern Oscillation (ENSO) is the most potent source of interannual climate variability. Uncertainty surrounding the impact of greenhouse warming on ENSO strength and frequency has stimulated efforts to develop a better understanding of the sensitivity of ENSO to climate change. Here we use annually banded corals from Papua New Guinea to show that ENSO has existed for the past 130,000 years, operating even during "glacial" times of substantially reduced regional and global temperature and changed solar forcing. However, we also find that during the 20th century ENSO has been strong compared with ENSO of previous cool (glacial) and warm (interglacial) times. The observed pattern of change in amplitude may be due to the combined effects of ENSO dampening during cool glacial conditions and ENSO forcing by precessional orbital variations.

Publication Science
Volume 291
Issue 5508
Pages 1511-1517
Date 23 February 2001
Journal Abbr Science
DOI 10.1126/science.1057969
ISSN 1095-9203
URL http://www.sciencemag.org/content/291/5508/1511.short
Date Added Sat Aug 27 06:05:17 2011
Modified Sat Aug 27 15:52:32 2011

Variability in the Southern Annular Mode determines wildfire activity in Patagonia

Type Journal Article

Author Andrés Holz

Author Thomas T. Veblen

Abstract Under the current global warming trend, wildfire activity is expected to decrease in biomass-limited fire regimes but increase in drought-limited fire regimes with abundant biomass. We examined the effects of the Southern Annular Mode (SAM) on interannual variability in wildfire activity in xeric woodland and temperate rainforest ecosystems across a latitudinal range of 10° in temperate southwestern South America (SSA). Based on 42 fire history sites based on nearly 600 fire-scarred trees (the largest available dataset of annually resolved tree-ring records of fire activity in the Southern Hemisphere), we show that years of widespread fire in both xeric woodland and rainforest ecosystems are associated with positive departures of SAM. The association of positive SAM with increased fire activity is explained by the teleconnection of SAM to spring drought across most of SSA. During the late 20th century, only the rainforest ecosystem shows a strong increase in fire activity, which is consistent both with upward trends in SAM and with warming conditions. We attribute the lack of increased burning in the xeric woodland environment to socioeconomic factors and fire behavior (low severity) that facilitate more effective fire suppression in the xeric woodland habitat. Given projected future increases in SAM and the associated warm-dry trend, wildfire activity in much of SSA is likely to increase during the 21st century. Key Points: • SAM determines interannual variability in wildfire activity • Regardless of vegetation type, SAM controls variation of years of large fires • Warmer and dryer conditions and longer fire seasons are the local mechanisms

Publication Geophysical Research Letters

Volume 38

Issue 14

Pages L14710 (6 p.)

Date July 2011

Journal Abbr Geophys. Res. Lett.

DOI 10.1029/2011GL047674

ISSN 0094-8276

URL http://www.agu.org/pubs/crossref/2011/2011GL047674.shtml

Extra Keywords: drought; southern South America; temperate rainforests; wildfires; xeric woodland.

Date Added Mon Aug 29 17:30:07 2011

Modified Wed Aug 31 00:31:05 2011

Variability of planetary waves as a signature of possible climatic changes

Type Journal Article

Author Alexander I. Pogoreltsev

Author Anna Yu. Kanukhina

Author Ekaterina V. Suvorova

Author Elena N. Savenkova

Abstract The long-term variability of stationary and traveling planetary waves in the lower stratosphere has been investigated using the data of NCEP/NCAR reanalysis. The results obtained show that during the last decades winter-mean amplitude of the stationary planetary wave with zonal wave number 1 (SPW1) increases at the higher middle latitudes of the Northern Hemisphere. It has been suggested that the observed increase in the SPW1 amplitude should be accompanied by the growth in the magnitude of the stratospheric vacillations. The analysis of the SPW1 behavior in the NCEP/NCAR data set supports this suggestion and shows a noticeable increase with time in the SPW1 intra-seasonal variability. The amplitudes of the long-period normal atmospheric modes, the so-called 5-, 10- and 16-day waves, diminish. It is supposed that one of the possible reasons for this decrease can be a growth of radiative damping rate caused, for instance, by the increase of CO_2. To investigate a possible climatic change of the middle atmosphere dynamics caused by observed changes in the tropospheric temperature, two sets of runs (using zonally averaged temperature distributions in the troposphere typical for January 1960 and 2000) with the middle and upper atmosphere model (MUAM) have been performed. The results obtained show that on average the calculated amplitude of the SPW1 in the stratosphere increased in 2000 and there is also an increase of its intra-seasonal variability conditioned by nonlinear interaction with the mean flow. This increase in the amplitudes of stratospheric vacillations during the last four decades allows us to suggest that stratospheric dynamics becomes more stochastic.

Publication Journal of Atmospheric and Solar-Terrestrial Physics
Volume 71
Issue 14-15
Pages 1529-1539
Date October 2009
Journal Abbr J. Atmos. Sol-Terr Phy.
DOI 10.1016/j.jastp.2009.05.011
ISSN 1364-6826
URL http://www.sciencedirect.com/science/article/B6VHB-4WKKTV3-2/2/23bc2bbacfeebb442e2b14d191733a14
Extra Keywords: planetary wave; climatic variability; middle atmosphere; Stratospheric vacillations; normal atmospheric modes.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:30:57 2011

Variation in intra-annual radial growth (xylem formation) of Picea mariana (Pinaceae) along a latitudinal gradient in western Quebec, Canada

Type Journal Article
Author Jian-Guo Huang
Author Yves Bergeron
Author Lihong Zhai
Author Bernhard Denneler
Abstract • Premise of the study: Climate warming might have resulted in altered initiation and termination dates of stem xylem growth in boreal stands. A systematic understanding of intra-annual xylem formation is thus needed for precise simulation of future growth in the context of sustainable forest management. • Methods: A recently developed novel microsampling approach was employed over two growing seasons (2005–2006) to investigate the intra-annual stem xylem formation of Picea mariana at three sites along a latitudinal gradient (approximately 47.5–50°N) in western Quebec, Canada. The critical timings of xylem cell formation were determined and compared among sites/years. The relationships between xylem cell formation and meteorological variables were examined. • Key results: From south to north, the onset of xylem cell production was detected on 20 May (SD ±3) at Angliers, 24 May (SD ±3) at Chicobi and 24 May (SD±4) at Muskuchii in 2005, and on 12 May (SD ±4) at Angliers, 14 May (SD ±3) at Chicobi and 20 May (SD ±3) at Muskuchii in 2006, respectively. Xylem cell production at each respective site terminated on 11 August (SD ±4), 7 August (SD ±3), and 7 August (SD ±4) in 2005, and on 8 August (SD ±4), 4 August (SD ±4), and 4 August (SD ±4) in 2006, respectively. • Conclusion: Our study implies that despite the expected occurrence of earlier phenological development due to early spring climate warming, boreal trees like P. mariana might not be producing wider rings if cold temperatures occur later in the growing season in June to August. These results may challenge the view that boreal trees could be benefiting from spring warming to enhance growth.
Publication American Journal of Botany
Volume 98
Issue 5
Pages 792-800
Date May 2011
Journal Abbr Am. J. Bot.
DOI 10.3732/ajb.1000074
ISSN 0002-9122
URL http://www.amjbot.org/cgi/doi/10.3732/ajb.1000074
Call Number 0000

Extra Keywords: boreal forest; climate change; Gompertz function; growing season; intra-annual xylem formation; Picea mariana; wood anatomy.
Date Added Mon Aug 29 17:30:07 2011
Modified Wed Aug 31 00:31:00 2011

Variation in local weather explains differences in fire regimes within a Québec south-eastern boreal forest landscape

Type Journal Article
Author Igor Drobyshev
Author Mike D. Flannigan
Author Yves Bergeron
Author Martin P. Girardin
Author Byambagere Suran
Abstract Variation in natural disturbance regime within a landscape is important for species population dynamics, because it controls spatial arrangement of sites providing regeneration and survival opportunities. In this study, we examine the differences in fire regime and evaluate possible sources of its variation between the surrounding mainland and the islands of Lake Duparquet (44.5 km²), a typical boreal lake in north-western Quebec, Canada. Dendrochronological reconstructions suggest that fires were frequent and of variable intensity on the islands, whereas fires were less frequent on the adjacent mainland, but were usually large and intense. Islands were significantly drier and warmer than the mainland, and maximum values of Fire Weather Index were significantly higher on the islands during both the early part of the fire season (May–June) and the whole fire season (May–September). The lightning density within the lake perimeter was significantly higher than in the surrounding mainland (0.63 v. 0.48 year⁻¹km² respectively). This pattern was a result of the differences in lightning density during the first half of the lightning season. The study suggests that more fire-prone local weather and higher frequency of lightning strikes could cause a higher frequency of low-intensity fires on the islands, compared with the mainland.
Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 1073–1082
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09101
ISSN 1448-5516
URL http://www.publish.csiro.au/?paper=WF09101
Extra Keywords: climate variability; fire hazard; fire history; fire weather; island ecosystems; natural disturbance; Quebec Clay Belt; red pine.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:40:01 2011

Variations in a regional fire regime related to vegetation type in San Diego County, California (USA)

Type Journal Article
Author Michael L. Wells
Author John F. O'Leary
Author Janet Franklin
Author Joel Michaelsen
Author David E. McKinsey

Abstract This study considers variations in a regional fire regime that are related to vegetation structure. Using a Geographic Information System, the vegetation of San Diego County, Southern coastal California USA is divided into six generalized classes based on dominant plant form and include: herbaceous, sage scrub, chaparral, hardwood forest, conifer forest and desert. Mapped fire occurrences for the 20th century are then overlain to produce records of stand age, fire frequency and transitional stability for each of the vegetation classes. A 'Manhattan' similarity index is used to compare and group transition matrices for the six classes of vegetation. This analysis groups herbaceous, hardwood and conifer forests in one group, sage scrub and chaparral in a second, and desert in a third. In general, sage scrub and chaparral have burned more frequently than other vegetation types during the course of the 20th century. Temporal trends suggest that the rate of burning in shrub-dominated vegetation is either stable (chaparral) or increasing (sage scrub), while the rate of burning in both hardwood and conifer forest is declining. This is consistent with a pattern of increased fire ignitions along the relatively low elevation urbanwildland interface, and an increase in the efficiency of fire suppression in high elevation forests.

Publication Landscape Ecology
Volume 19
Issue 2
Pages 139–152
Date March 2004
Journal Abbr Landscape Ecol.
DOI 10.1023/B:LAND.0000021713.81489.a7
ISSN 0921-2973 (Print) 1572-9761 (Online)
URL http://www.springerlink.com/content/xx00155q65147l45/
Extra Keywords: GIS-coupled modeling; landscape-scale vegetation change; regional fire regime; similarity index; Southern California vegetation; spatial variability; transition matrices; vegetation classification.
Date Added Tue Aug 16 02:11:43 2011
Modified Tue Aug 16 22:47:44 2011

Variations in fire frequency and climate over the past 17 000 yr in central Yellowstone National Park

Type Journal Article

Author Sarah H. Millspaugh
Author Cathy Whitlock
Author Patrick J. Bartlein

Abstract Macroscopic charcoal particles were tallied from contiguous 1 cm samples of a 6.69-m-long core, and the data were converted to charcoal-accumulation rates at evenly spaced time intervals. Intervals of high charcoal-accumulation rates were interpreted as local fire events on the basis of information obtained from modern charcoal-calibration studies in the Yellowstone region. The record indicates that fire frequency was moderate (4 fires/1000 yr) during the late glacial period, reached highest values in the early Holocene (>10 fires/1000 yr), and decreased after 7000 calendar yr B.P. The present fire regime (2–3 fires/1000 yr) was established in the past 2000 yr. The charcoal stratigraphy correlates well with variations in July insolation through time, which suggests that regional climate changes are responsible for the long-term variations in fire frequency. In the early Holocene, summer insolation was near its maximum, which resulted in warmer, effectively drier conditions throughout the northwestern United States. At this time, the fire frequency near Cygnet Lake was at its highest. After 7000 calendar yr B.P., summer insolation decreased to present values, the regional climate became cooler and wetter, and fires were less frequent. The Cygnet Lake record suggests that long-term fire frequencies have varied continuously with climate change, even when the vegetation has remained constant.

Publication Geology
Volume 28
Issue 3
Pages 211-214
Date March 2000
Journal Abbr Geology
DOI 10.1130/0091-7613(2000)28<211:VIFFAC>2.0.CO;2

ISSN 0091-7613
URL http://geology.gsapubs.org/content/28/3/211.full
Extra Keywords: fire history; charcoal analysis; Yellowstone; Holocene.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:46:39 2011

Vegetation and fire history since the Late Pleistocene from the Trinity Mountains, northwestern California, USA

Type Journal Article
Author Mark L. Daniels
Author R. Scott Anderson
Author Cathy Whitlock
Abstract A 267-cm sediment core spanning the past c. 15 200 cal. yr was recovered from Mumbo Lake, in the Trinity Mountains of northwestern California's Klamath Region. Plant macrofossils and pollen detail local and extra-local vegetation history, while high-resolution charcoal analysis provides details on local fire history. For the first c. 3000 years, climate was colder and drier than present, and supported an open, subalpine parkland vegetation, with low fire frequencies and fuel biomass. From c. 12 100 to 9800 cal. yr BP increasing moisture and soil development led to a woodland community with three new pine species invading the basin. Fire frequencies remained low, but individual fires may have been more intense because of increased fuel loads. Between c. 9800 and 7200 cal. yr BP, climate warmed and dried considerably, allowing for the expansion of oak and other chaparral species. Fire frequencies increased in the early Holocene, but low charcoal accumulation rates suggest a frequent, relatively low-intensity fire regime. From c. 7200 to 3800 cal. yr BP, the climate became cooler and moister again. Many conifer species appeared for the first time, although chaparral species maintained a strong presence. The fire record shows a dramatic increase in charcoal accumulation rates as well as an increase in fire frequency. From c. 3800 cal. yr BP to present, more conifer species enter the record, and abundance of chaparral species gradually diminishes to present levels.
Publication The Holocene
Volume 15
Issue 7
Pages 1062-1071
Date November 2005
Journal Abbr Holocene
DOI 10.1191/0959683605hl878ra
ISSN 1477-0911
URL http://hol.sagepub.com/content/15/7/1062.short
Extra Keywords: Klamath; pollen; charcoal; fire; climatic change; vegetation change; Trinity Mountains; California; Late Pleistocene; Holocene.
Date Added Tue Aug 30 04:16:19 2011
Modified Wed Aug 31 00:38:27 2011

Vegetation and wildland fire: Implications of global climate change

Type Journal Article
Author Kevin C. Ryan
Abstract Climate, vegetation, and fire are interrelated so that any change in one will affect the others. Increases in greenhouse gases, especially carbon dioxide, are expected to increase average surface temperatures and alter precipitation patterns. These changes will alter numerous biochemical processes of vegetative communities. Changes in growth rates, carbon allocation patterns, nutrient cycling, and competitive interactions will lead to direct changes in the structure and species composition of many plant communities. Major shifts in vegetation zones will occur in many regions. Climate change will affect fire potential by influencing the frequency and

severity of weather favorable for fire. Climate-driven changes in the structure and composition of plant communities will also affect fire potential by altering the physical and chemical properties of fuels. Changes in timing and severity of fire will modify the rate at which communities respond to climate change. This in turn will alter fuel properties, further modifying fire potential. Changes in fire regimes will directly affect the chemistry of the atmosphere by modifying vegetation and emitting gases and particulate matter. The expected rate and magnitude of these changes raises questions for the continued integrity, vitality, and stability of current ecosystems.

Publication Environment International
Volume 17
Issue 2-3
Pages 169-178
Date 1991
Journal Abbr Environ. Int.
DOI 10.1016/0160-4120(91)90099-C
ISSN 0160-4120
Short Title Vegetation and wildland fire
URL http://www.sciencedirect.com/science/article/pii/016041209190099C
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:48 2011

Vegetation changes in Yosemite Valley, Yosemite National Park, California, during the protohistoric period

Type Journal Article
Author R. Scott Anderson
Author Scott L. Carpenter
Abstract The sediments of Woski Pond, Yosemite Valley in Yosemite National Park, record paleoenvironmental change spanning the last 1550 years. Closed conifer forest, consisting primarily of ponderosa pine, white fir, incense cedar and Douglas fir, existed around the pond until ca. 650 years ago. After 650 years ago more open canopy vegetation types such as oaks, sage and shrubs were found. Ethnographic records taken at the time of contact indicate that the aboriginal inhabitants regularly burned the Valley. The rapid decline in pine and increase in oak, coupled with elevated charcoal concentrations, indications of increased erosion and great expansion of aboriginal populations and cultural technologies are highly suggestive of vegetation manipulation for increased food resources by the early inhabitants of the Valley. These findings have implications for management of assumed natural vegetation types.
Publication Madroño
Volume 38
Issue 1
Pages 1–13
Date January-March 1991
Journal Abbr Madroño
ISSN 0024-9637
URL http://mercedriverwatershed.org/biblio/biosys/ref85
Date Added Mon Aug 15 23:28:30 2011
Modified Mon Aug 15 23:28:30 2011

Vegetation mediated the impacts of postglacial climate change on fire regimes in the south-central Brooks Range, Alaska

Type Journal Article

Author Philip E. Higuera
Author Linda B. Brubaker
Author Patricia M. Anderson
Author Feng Sheng Hu
Author Thomas A. Brown

Abstract We examined direct and indirect impacts of millennial-scale climate change on fire regimes in the south-central Brooks Range, Alaska, USA, using four lake sediment records and existing paleoclimate interpretations. New techniques were introduced to identify charcoal peaks semi-objectively and to detect statistical differences between fire regimes. Peaks in charcoal accumulation rates provided estimates of fire return intervals (FRIs), which were compared among vegetation zones identified by fossil pollen and stomata. Climatic warming between ca. 15000–9000 yr BP (calendar years before Common Era [CE] 1950) coincided with shifts in vegetation from herb tundra to shrub tundra to deciduous woodlands, all novel species assemblages relative to modern vegetation. Two sites cover this period and show decreased FRIs with the transition from herb to Betula-dominated shrub tundra ca. 13300–14300 yr BP (FRImean = 144 yr; 95% CI = 120–169 yr), when climate warmed but remained cooler than present. Although warming would have favored shorter FRIs in the shrub tundra, the shift to more continuous, flammable fuels relative to herb tundra was probably a more important cause of increased burning. Similarly, a vegetation shift to Populus-dominated deciduous woodlands overrode the influence of warmer- and drier-than-present summers, resulting in lower fire activity from ca. 10 300–8250 yr BP (FRImean = 251 yr; 95% CI = 156–347 yr). Three sites record the mid-to-late Holocene, when climatic cooling and moistening allowed Picea glauca forest–tundra and P. mariana boreal forests to establish ca. 8000 and 5500 yr BP, respectively. FRIs in forest–tundra were either similar to or shorter than those in the deciduous woodlands (FRImean range = 131–238 yr). The addition of P. mariana ca. 5500 yr BP increased landscape flammability, overrode the effects of climatic cooling and moistening and resulted in lower FRIs (FRImean = 145 yr; 95% CI = 130–163). Overall, shifts in fire regimes were strongly linked to changes in vegetation, which were responding to millennial-scale climate change. We conclude that shifts in vegetation can amplify or override the direct influence of climate change on fire regimes, when vegetation shifts significantly modify landscape flammability. Our findings emphasize the importance of biophysical feedbacks between climate, fire, and vegetation in determining the response of ecosystems to past, and by inference, future climate change.

Publication Ecological Monographs
Volume 79
Issue 2
Pages 201–219
Date May 2009
Journal Abbr Ecol. Monogr.
DOI 10.1890/07-2019.1
ISSN 0012-9615
URL http://www.esajournals.org/doi/abs/10.1890/07-2019.1
Extra Keywords: Alaska (USA); arctic; boreal forest; charcoal analysis; climate change; deciduous woodland; fire history; landscape flammability; pollen analysis; shrub tundra; tundra.
Date Added Thu Sep 15 18:32:58 2011
Modified Thu Sep 15 18:33:13 2011

Vegetation, fire, and climate history of the northwestern Great Basin during the last 14,000 years

Type Journal Article

Author Thomas A. Minckley
Author Cathy Whitlock
Author Patrick J. Bartlein

Abstract The northwestern Great Basin lies in the transition zone between the mesic Pacific Northwest and xeric intermountain West. The paleoenvironmental history based on pollen, macroscopic charcoal, and plant macrofossils from three sites in the northwestern Great Basin was examined to understand the relationships among the modern vegetation, fire disturbance and climate. The vegetation history suggests that steppe and

open forest communities were present at high elevations from ca 11,000 to 7000 cal yr BP, and were replaced by forests composed of white fir, western white pine, and whitebark pine in the late Holocene. Over the last 11,000 years, fires were more frequent in mid-elevation forests (10-25 fire episodes/1000 years) and rare in high-elevation forests (2-5 fire episodes/1000 years). Applying modern pollen-climate relationships to the fossil pollen spectra provided a means to interpret past climate changes in this region. In the past 9000 years summer temperatures decreased from 1 to 4 °C, and annual precipitation has increased 7-15%. These results indicate that the millennial-scale climate forcing driving vegetation changes can be quantified within the intermountain West in general and northwestern Great Basin in particular. In addition, fire can be considered an important component of these ecosystems, but it does not appear to be a forcing mechanism for vegetation change at the resolution of these records.

Publication	Quaternary Science Reviews
Volume	26
Issue	17-18
Pages	2167-2184
Date	September 2007
Journal Abbr	Quaternary Sci. Rev.
DOI	10.1016/j.quascirev.2007.04.009
ISSN	0277-3791
URL	http://www.sciencedirect.com/science/article/pii/S0277379107001059
Date Added	Tue Aug 30 14:35:38 2011
Modified	Wed Aug 31 00:23:09 2011

Vegetational history of the Central Plains

Type	Book Section
Author	Herbert E. Wright Jr
Book Title	Pleistocene and Recent Environments of the Central Great Plains
Series	Department of Geology, University of Kansas. Special publication 3
Edition	1st edition
Place	Lawrence
Publisher	University Press of Kansas
Date	1970
Pages	157–172
ISBN	0700600639
URL	http://www.lib.muohio.edu/multifacet/record/mu3ugb1619026
Date Added	Sat Aug 27 00:55:16 2011
Modified	Wed Aug 31 00:26:34 2011

Notes:

Citation:

Wright, H.E., Jr., 1970, Vegetational history of the Central Plains, In: Dort Jr., W. and Jones Jr., J.K. (eds.). Pleistocene and recent environments of the Great Plains. University of Kansas Press, Lawrence, pp. 157-172.

Volcanic and solar forcing of climate change during the preindustrial era

Type Journal Article
Author Drew T. Shindell
Author Gavin A. Schmidt
Author Ron L. Miller
Author Michael E. Mann
Abstract The climate response to variability in volcanic aerosols and solar irradiance, the primary forcings during the preindustrial era, is examined in a stratosphere-resolving general circulation model. The best agreement with historical and proxy data is obtained using both forcings, each of which has a significant effect on global mean temperatures. However, their regional climate impacts in the Northern Hemisphere are quite different. While the short-term continental winter warming response to volcanism is well known, it is shown that due to opposing dynamical and radiative effects, the long-term (decadal mean) regional response is not significant compared to unforced variability for either the winter or the annual average. In contrast, the long-term regional response to solar forcing greatly exceeds unforced variability for both time averages, as the dynamical and radiative effects reinforce one another, and produces climate anomalies similar to those seen during the Little Ice Age. Thus, long-term regional changes during the preindustrial appear to have been dominated by solar forcing.
Publication Journal of Climate
Volume 16
Issue 24
Pages 4094-4107
Date December 2003
Journal Abbr J. Climate
ISSN 1520-0442
URL http://journals.ametsoc.org/doi/full/10.1175/1520-0442%282003%29016%3C4094%3AVASFOC%3E2.0.CO%3B2
Date Added Sun Aug 28 17:26:09 2011
Modified Wed Aug 31 00:30:10 2011

Volcanism, mass extinction, and carbon isotope fluctuations in the Middle Permian of China

Type Journal Article
Author Paul B. Wignall
Author Yadong Sun
Author David P. G. Bond
Author Gareth Izon
Author Robert J. Newton
Author Stéphanie Védrine
Author Mike Widdowson
Author Jason R. Ali
Author Xulong Lai
Author Haishui Jiang
Author Helen Cope
Author Simon H. Bottrell
Abstract The 260-million-year-old Emeishan volcanic province of southwest China overlies and is interbedded with Middle Permian carbonates that contain a record of the Guadalupian mass extinction. Sections in the region thus provide an opportunity to directly monitor the relative timing of extinction and volcanism within the same locations. These show that the onset of volcanism was marked by both large phreatomagmatic eruptions and extinctions amongst fusulinacean foraminifers and calcareous algae. The temporal coincidence of these two phenomena supports the idea of a cause-and-effect relationship. The crisis predates the onset of a major negative carbon isotope excursion that points to subsequent severe disturbance of the ocean-atmosphere carbon cycle.
Publication Science

Volume 324
Issue 5931
Pages 1179-1182
Date 29 May 2009
Journal Abbr Science
DOI 10.1126/science.1171956
ISSN 0036-8075
URL http://www.sciencemag.org/content/324/5931/1179.full
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:11 2011

Vulnerability of carbon storage in North American boreal forests to wildfires during the 21st century

Type Journal Article
Author Michael S. Balshi
Author A. David McGuire
Author Paul Duffy
Author Michael Flannigan
Author David W. Kicklighter
Author Jerry Melillo
Abstract The boreal forest contains large reserves of carbon. Across this region, wildfires influence the temporal and spatial dynamics of carbon storage. In this study, we estimate fire emissions and changes in carbon storage for boreal North America over the 21st century. We use a gridded data set developed with a multivariate adaptive regression spline approach to determine how area burned varies each year with changing climatic and fuel moisture conditions. We apply the process-based Terrestrial Ecosystem Model to evaluate the role of future fire on the carbon dynamics of boreal North America in the context of changing atmospheric carbon dioxide (CO_2) concentration and climate in the A2 and B2 emissions scenarios of the CGCM2 global climate model. Relative to the last decade of the 20th century, decadal total carbon emissions from fire increase by 2.5–4.4 times by 2091–2100, depending on the climate scenario and assumptions about CO_2 fertilization. Larger fire emissions occur with warmer climates or if CO_2 fertilization is assumed to occur. Despite the increases in fire emissions, our simulations indicate that boreal North America will be a carbon sink over the 21st century if CO_2 fertilization is assumed to occur in the future. In contrast, simulations excluding CO_2 fertilization over the same period indicate that the region will change to a carbon source to the atmosphere, with the source being 2.1 times greater under the warmer A2 scenario than the B2 scenario. To improve estimates of wildfire on terrestrial carbon dynamics in boreal North America, future studies should incorporate the role of dynamic vegetation to represent more accurately post-fire successional processes, incorporate fire severity parameters that change in time and space, account for human influences through increased fire suppression, and integrate the role of other disturbances and their interactions with future fire regime.
Publication Global Change Biology
Volume 15
Issue 6
Pages 1491-1510
Date June 2009
Journal Abbr Glob. Change Biol.
DOI 10.1111/j.1365-2486.2009.01877.x
ISSN 1354-1013
URL http://blackwell-synergy.com/doi/abs/10.1111/j.1365-2486.2009.01877.x
Extra Keywords: boreal carbon dynamics; climate change; fire emissions.
Date Added Tue Aug 23 01:45:31 2011
Modified Wed Aug 24 04:42:38 2011

Vulnerability of land systems to fire: Interactions among humans, climate, the atmosphere, and ecosystems

Type	Journal Article
Author	Sandra Lavorel
Author	Mike D. Flannigan
Author	Eric F. Lambin
Author	Mary C. Scholes
Abstract	Fires are critical elements in the Earth System, linking climate, humans, and vegetation. With 200–500 Mha burnt annually, fire disturbs a greater area over a wider variety of biomes than any other natural disturbance. Fire ignition, propagation, and impacts depend on the interactions among climate, vegetation structure, and land use on local to regional scales. Therefore, fires and their effects on terrestrial ecosystems are highly sensitive to global change. Fires can cause dramatic changes in the structure and functioning of ecosystems. They have significant impacts on the atmosphere and biogeochemical cycles. By contributing significantly to greenhouse gas (e.g., with the release of 1.7 – 4.1 Pg of carbon per year) and aerosol emissions, and modifying surface properties, they affect not only vegetation but also climate. Fires also modify the provision of a variety of ecosystem services such as carbon sequestration, soil fertility, grazing value, biodiversity, and tourism, and can hence trigger land use change. Fires must therefore be included in global and regional assessments of vulnerability to global change. Fundamental understanding of vulnerability of land systems to fire is required to advise management and policy. Assessing regional vulnerabilities resulting from biophysical and human consequences of changed fire regimes under global change scenarios requires an integrated approach. Here we present a generic conceptual framework for such integrated, multidisciplinary studies. The framework is structured around three interacting (partially nested) subsystems whose contribute to vulnerability. The first subsystem describes the controls on fire regimes (exposure). A first feedback subsystem links fire regimes to atmospheric and climate dynamics within the Earth System (sensitivity), while the second feedback subsystem links changes in fire regimes to changes in the provision of ecological services and to their consequences for human systems (adaptability). We then briefly illustrate how the framework can be applied to two regional cases with contrasting ecological and human context: boreal forests of northern America and African savannahs.
Publication	Mitigation and Adaptation Strategies for Global Change
Volume	12
Issue	1
Pages	33-53
Date	January 2007
Journal Abbr	Mitig. Adapt. Strat. Glob. Change
DOI	10.1007/s11027-006-9046-5
ISSN	1381-2386
URL	http://www.springerlink.com/index/10.1007/s11027-006-9046-5
Extra	Keywords: climate; Earth system feedback; ecosystem services; emissions; fire regime; global change; human-environment system; land use; vulnerability analysis.
Date Added	Tue Aug 30 14:37:58 2011
Modified	Wed Aug 31 00:19:50 2011

Warm season subseasonal variability and climate extremes in the Northern Hemisphere: The role of stationary Rossby waves

Type	Journal Article
Author	Siegfried Schubert
Author	Hailan Wang
Author	Max Suarez

Abstract This study examines the nature of boreal summer subseasonal atmospheric variability based on the new NASA Modern-Era Retrospective analysis for Research and Applications (MERRA) for the period 1979-2010. An analysis of the June, July and August subseasonal 250hPa v-wind anomalies shows distinct Rossby wave-like structures that appear to be guided by the mean jets. On monthly subseasonal time scales, the leading waves (the first 10 rotated empirical orthogonal functions or REOFs of the 250hPa v-wind) explain about 50% of the Northern Hemisphere v-wind variability, and account for more than 30% (60%) of the precipitation (surface temperature) variability over a number of regions of the northern middle and high latitudes, including the U.S. northern Great Plains, parts of Canada, Europe, and Russia. The first REOF in particular, consists of a Rossby wave that extends across northern Eurasia where it is a dominant contributor to monthly surface temperature and precipitation variability, and played an important role in the 2003 European and 2010 Russian heat waves. While primarily subseasonal in nature, the Rossby waves can at times have a substantial seasonal mean component. This is exemplified by REOF 4 which played a major role in the development of the most intense anomalies of the U.S. 1988 drought (during June) and the 1993 flooding (during July), though differed in the latter event by also making an important contribution to the seasonal mean anomalies. A stationary wave model (SWM) is used to reproduce some of the basic features of the observed waves and provide insight into the nature of the forcing. In particular, the responses to a set of idealized forcing functions are used to map the optimal forcing patterns of the leading waves. Also, experiments to reproduce the observed waves with the SWM using MERRA-based estimates of the forcing indicate that the wave forcing is dominated by sub-monthly vorticity transients.

Publication Journal of Climate
Volume Submitted to the Journal of Climate
Issue MERRA Special Issue
Pages 54 p.
Date 2011
Journal Abbr J. Climate
ISSN 0894-8755
Short Title Warm Season Subseasonal Variability and Climate Extremes in the Northern Hemisphere
URL http://gmao.gsfc.nasa.gov/pubs/docs/Schubert452.pdf
Call Number 0001
Date Added Thu Sep 22 05:44:29 2011
Modified Wed Sep 28 17:54:04 2011

Warm, not super-hot, temperatures in the early Eocene subtropics

Type Journal Article
Author Caitlin R. Keating-Bitonti
Author Linda C. Ivany
Author Hagit P. Affek
Author Peter Douglas
Author Scott D. Samson
Abstract The early Eocene (ca. 55–48 Ma) encompasses one of the warmest intervals of the past 65 m.y. and is characterized by an unusually low equator-to-pole thermal gradient. Recent proxy studies suggest temperatures well in excess of 30 °C even at high latitudes, but conflicting interpretations derived from different types of data leave considerable uncertainty about actual early Eocene temperatures. A robust comparison among new paleotemperature proxies may provide insight into possible biases in their temperature estimates, and additional detail on the spatial distribution of temperatures will further resolve the early Eocene meridional temperature gradient. We use a suite of paleotemperature proxies based on the chemistry of bivalve shell carbonate and associated sedimentary organic matter from the United States Gulf Coastal Plain to constrain climate at a subtropical site during this key interval of Earth history. Oxygen isotope and clumped isotope analyses of shell carbonate and two tetraether lipid analyses of sedimentary organic carbon all yield temperatures of ~27 °C. High-resolution, intraannual oxygen isotope data reveal a consistent, large range of seasonal variation, but clumped isotope data suggest that seasonality is due primarily to precipitation, not to temperature. These paleotemperature estimates are 2–3 °C warmer than the northern Gulf of Mexico today, and generally consistent with early Eocene temperature estimates from other low and mid-latitude locations, but are

significantly cooler than contemporaneous estimates from high southern latitudes.

Publication Geology
Volume 39
Issue 8
Pages 771-774
Date August 2011
Journal Abbr Geology
DOI 10.1130/G32054.1
ISSN 0091-7613
URL http://geology.gsapubs.org/cgi/doi/10.1130/G32054.1
Call Number 0000
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:18:16 2011

Warm, warm on the range

Type Journal Article
Author Jerry M. Melillo
Abstract Global warming is a very real phenomenon and most agree that human activities have contributed to an increase in the minimum daily temperature. In this issue, Alward et al . demonstrate that this increase in minimum temperature causes a distinct change in the mix of plants found in a prairie grassland in the Midwestern United States. In his Perspective, Mellilo describes other examples of warming's effect on ecological systems and explains how we can best study these changes.
Publication Science
Volume 283
Issue 5399
Pages 183-184
Date 8 January 1999
Journal Abbr Science
DOI 10.1126/science.283.5399.183
ISSN 0036-8075 (print), 1095-9203 (online)
URL http://www.sciencemag.org/content/283/5399/183.full
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 00:22:31 2011

Warming and earlier spring increase western U.S. forest wildfire activity

Type Journal Article
Author Anthony L. Westerling
Author Hugo G. Hidalgo
Author Daniel R. Cayan
Author Thomas W. Swetnam
Abstract Western United States forest wildfire activity is widely thought to have increased in recent decades, yet neither the extent of recent changes nor the degree to which climate may be driving regional changes in wildfire has been systematically documented. Much of the public and scientific discussion of changes in western United States wildfire has focused instead on the effects of 19thand 20th-century land-use history. We compiled a comprehensive database of large wildfires in western United States forests since 1970 and compared it with hydroclimatic and land-surface data. Here, we show that large wildfire activity increased suddenly and markedly in the mid-1980s, with higher large-wildfire frequency, longer wildfire durations, and longer wildfire seasons. The greatest increases occurred in mid-elevation, Northern Rockies forests, where land-use histories

have relatively little effect on fire risks and are strongly associated with increased spring and summer temperatures and an earlier spring snowmelt.

Publication Science
Volume 313
Issue 5789
Pages 940-943
Date 18 August 2006
Journal Abbr Science
DOI 10.1126/science.1128834
ISSN 0036-8075
URL http://www.sciencemag.org/content/313/5789/940.full
Date Added Sat Aug 27 00:55:16 2011
Modified Wed Aug 31 00:27:52 2011

Warming caused by cumulative carbon emissions towards the trillionth tonne

Type Journal Article
Author Myles R. Allen
Author David J. Frame
Author Chris Huntingford
Author Chris D. Jones
Author Jason A. Lowe
Author Malte Meinshausen
Author Nicolai Meinshausen
Abstract Global efforts to mitigate climate change are guided by projections of future temperatures. But the eventual equilibrium global mean temperature associated with a given stabilization level of atmospheric greenhouse gas concentrations remains uncertain, complicating the setting of stabilization targets to avoid potentially dangerous levels of global warming. Similar problems apply to the carbon cycle: observations currently provide only a weak constraint on the response to future emissions. Here we use ensemble simulations of simple climate-carbon-cycle models constrained by observations and projections from more comprehensive models to simulate the temperature response to a broad range of carbon dioxide emission pathways. We find that the peak warming caused by a given cumulative carbon dioxide emission is better constrained than the warming response to a stabilization scenario. Furthermore, the relationship between cumulative emissions and peak warming is remarkably insensitive to the emission pathway (timing of emissions or peak emission rate). Hence policy targets based on limiting cumulative emissions of carbon dioxide are likely to be more robust to scientific uncertainty than emission-rate or concentration targets. Total anthropogenic emissions of one trillion tonnes of carbon (3.67 trillion tonnes of CO_2), about half of which has already been emitted since industrialization began, results in a most likely peak carbon-dioxide-induced warming of 2 °C above pre-industrial temperatures, with a 5–95% confidence interval of 1.3–3.9 °C.
Publication Nature
Volume 458
Issue 7242
Pages 1163-1166
Date 30 April 2009
Journal Abbr Nature
DOI 10.1038/nature08019
ISSN 0028-0836
URL http://www.nature.com/doifinder/10.1038/nature08019
Date Added Mon Aug 15 23:02:25 2011
Modified Mon Aug 15 23:02:36 2011

Wave-maintained annular modes of climate variability*

Type Journal Article
Author Varavut Limpasuvan
Author Dennis L. Hartmann
Abstract The leading modes of month-to-month variability in the Northern and Southern Hemispheres are examined by comparing a 100-yr run of the Geophysical Fluid Dynamics Laboratory GCM with the NCEP–NCAR reanalyses of observations. The model simulation is a control experiment in which the SSTs are fixed to the climatological annual cycle without any interannual variability. The leading modes contain a strong zonally symmetric or annular component that describes an expansion and contraction of the polar vortex as the midlatitude jet shifts equatorward and poleward. This fluctuation is strongest during the winter months. The structure and amplitude of the simulated modes are very similar to those derived from observations, indicating that these modes arise from the internal dynamics of the atmosphere. Dynamical diagnosis of both observations and model simulation indicates that variations in the zonally symmetric flow associated with the annular modes are forced by eddy fluxes in the free troposphere, while the Coriolis acceleration associated with the mean meridional circulation maintains the surface wind anomalies against friction. High-frequency transients contribute most to the total eddy forcing in the Southern Hemisphere. In the Northern Hemisphere, stationary waves provide most of the eddy momentum fluxes, although high-frequency transients also make an important contribution. The behavior of the stationary waves can be partly explained with index of refraction arguments. When the tropospheric westerlies are displaced poleward, Rossby waves are refracted equatorward, inducing poleward momentum fluxes and reinforcing the high-latitude westerlies. Planetary Rossby wave refraction can also explain why the stratospheric polar vortex is stronger when the tropospheric westerlies are displaced poleward. When planetary wave activity is refracted equatorward, it is less likely to propagate into the stratosphere and disturb the polar vortex.
Publication Journal of Climate
Volume 13
Issue 24
Pages 4414-4429
Date December 2000
Journal Abbr J. Climate
DOI 10.1175/1520-0442(2000)013<4414:WMAMOC>2.0.CO;2
ISSN 0894-8755
URL http://journals.ametsoc.org/doi/abs/10.1175/1520-0442%282000%29013%3C4414%3AWMAMOC%3E2.0.CO%3B2
Date Added Tue Aug 30 14:37:58 2011
Modified Tue Aug 30 14:42:38 2011

Weak climatic control of stand-scale fire history during the Late Holocene

Type Journal Article
Author Daniel G. Gavin
Author Feng Sheng Hu
Author Kenneth Lertzman
Author Peter Corbett
Abstract Forest fire occurrence is affected by multiple controls that operate at local to regional scales. At the spatial scale of forest stands, regional climatic controls may be obscured by local controls (e.g., stochastic ignitions, topography, and fuel loads), but the long-term role of such local controls is poorly understood. We report here stand-scale (,100 ha) fire histories of the past 5000 years based on the analysis of sediment charcoal at two lakes 11 km apart in southeastern British Columbia. The two lakes are today located in similar subalpine forests, and they likely have experienced the same late-Holocene climatic changes because of their close proximity. We evaluated two independent properties of fire history: (1) fire-interval distribution, a measure of the overall incidence of fire, and (2) fire synchroneity, a measure of the co-occurrence of fire (here, assessed at centennial to millennial time scales due to the resolution of sediment records). Fire-interval distributions

differed between the sites prior to, but not after, 2500 yr before present. When the entire 5000-yr period is considered, no statistical synchrony between fire-episode dates existed between the two sites at any temporal scale, but for the last 2500 yr marginal levels of synchrony occurred at centennial scales. Each individual fire record exhibited little coherency with regional climate changes. In contrast, variations in the composite record (average of both sites) matched variations in climate evidenced by late-Holocene glacial advances. This was probably due to the increased sample size and spatial extent represented by the composite record (up to 200 ha) plus increased regional climatic variability over the last several millennia, which may have partially overridden local, non-climatic controls. We conclude that (1) over past millennia, neighboring stands with similar modern conditions may have experienced different fire intervals and asynchronous patterns in fire episodes, likely because local controls outweighed the synchronizing effect of climate; (2) the influence of climate on fire occurrence is more strongly expressed when climatic variability is relatively great; and (3) multiple records from a region are essential if climate–fire relations are to be reliably described.

Publication Ecology
Volume 87
Issue 7
Pages 1722-1732
Date July 2006
Journal Abbr Ecology
DOI 10.1890/0012-9658(2006)87[1722:WCCOSF]2.0.CO;2
ISSN 0012-9658
URL http://www.esajournals.org/doi/abs/10.1890/0012-9658%282006%2987%5B1722%3AWCCOSF%5D2.0.CO%3B2?journalCode=ecol
Extra Keywords: bivariate Ripley K function; British Columbia; charcoal; climatic change; fire history; fire regime; landscape connectivity; late Holocene; synchrony.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:27 2011

Weather and forest inflammability in the Southern Appalachians

Type Journal Article
Author Edwin F. McCarthy
Abstract no abstract. The study of forest-fire weather in the Southern Appalachian region has been carried on by the Appalachian Forest Experiment. Station at intervals since the fall of 1922. During this time two general phases of the subject have received attention—the relation of current weather conditions to forest-fire occurrence, and the rate of drying forest fuels under different conditions of weather. Two papers have been published on the first phase of this subject.
Publication Monthly Weather Review
Volume 55
Issue 3
Pages 119-122
Date March 1927
Journal Abbr Mon. Wea. Rev.
DOI 10.1175/1520-0493(1927)55<119:WAFIIT>2.0.CO;2
ISSN 1520-0493
URL http://dx.doi.org/10.1175%2F1520-0493%281927%2955%3C119%3AWAFIIT%3E2.0.CO%3B2
Date Added Tue Aug 30 14:35:38 2011
Modified Wed Aug 31 21:37:57 2011

Weather prediction by numerical process

Type Book
Author Lewis Fry Richardson
Abstract Description: The idea of forecasting the weather by calculation was first dreamt of by Lewis Fry Richardson. He set out in this book a detailed algorithm for systematic numerical weather prediction. The method of computing atmospheric changes, which he mapped out in great detail in this book, is essentially the method used today. He was greatly ahead of his time because, before his ideas could bear fruit, advances in four critical areas were needed: better understanding of the dynamics of the atmosphere; stable computational algorithms to integrate the equations; regular observations of the free atmosphere; and powerful automatic computer equipment. Over the ensuing years, progress in numerical weather prediction has been dramatic. Weather prediction and climate modelling have now reached a high level of sophistication, and are witness to the influence of Richardson's ideas. This new edition contains a new foreword by Peter Lynch that sets the original book in context.
Series Cambridge Mathematical Library
Edition 2nd edition
Place London
Publisher Cambridge University Press
Date 1922
# of Pages 250 p.
ISBN 9780521680448
URL http://www.cambridge.org/catalogue/catalogue.asp?isbn=9780521680448
Archive http://www.archive.org/details/weatherpredictio00richrich
Date Added Mon Aug 29 00:48:23 2011
Modified Wed Aug 31 00:25:07 2011

Notes:

Contents :

What you need to know: Twenty questions and answers about climate change

Type Book
Author Climate Central

Author Sally Ride Science

Abstract This book represents a joint effort between the scientists and communicators at Climate Central and Sally Ride Science. Using straightforward language, we divide the issue of climate change into three parts—The Science, The Impacts, and The Solutions. In part one, we present an overview of what scientists know about the nature of climate change. In part two, we present the likely impacts of climate change and what could be in store in the future. And in part three, we review a range of possible solutions. We hope that this approach enables readers to better see the ever-growing risks associated with climate change and better know what solutions are available to them. Climate change is a problem, by its very nature, that will require a long-term strategy.

Edition 1st edtion

Place San Diego, CA

Publisher Sally Ride Science

Date 2010

# of Pages 48 p.

ISBN 978-1-933798-40-0

URL http://www.sallyridestore.com/what-you-need-to-know-twenty-questions-and-answers-about-climate-change-p-108.html

Archive http://www.climatecentral.org/images/uploads/breaking/feature_faq_book.pdf

Date Added Tue Aug 30 02:03:25 2011

Modified Tue Aug 30 02:03:25 2011

When could global warming reach 4° C?

Type Journal Article

Author Richard A. Betts

Author Matthew Collins

Author Deborah L. Hemming

Author Chris D. Jones

Author Jason A. Lowe

Author Michael G. Sanderson

Abstract The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) assessed a range of scenarios of future greenhouse-gas emissions without policies to specifically reduce emissions, and concluded that these would lead to an increase in global mean temperatures of between 1.6°C and 6.9°C by the end of the twenty-first century, relative to pre-industrial. While much political attention is focused on the potential for global warming of 2°C relative to pre-industrial, the AR4 projections clearly suggest that much greater levels of warming are possible by the end of the twenty-first century in the absence of mitigation. The centre of the range of AR4-projected global warming was approximately 4°C. The higher end of the projected warming was associated with the higher emissions scenarios and models, which included stronger carbon-cycle feedbacks. The highest emissions scenario considered in the AR4 (scenario A1FI) was not examined with complex general circulation models (GCMs) in the AR4, and similarly the uncertainties in climate–carbon-cycle feedbacks were not included in the main set of GCMs. Consequently, the projections of warming for A1FI and/or with different strengths of carbon-cycle feedbacks are often not included in a wider discussion of the AR4 conclusions. While it is still too early to say whether any particular scenario is being tracked by current emissions, A1FI is considered to be as plausible as other non-mitigation scenarios and cannot be ruled out. (A1FI is a part of the A1 family of scenarios, with 'FI' standing for 'fossil intensive'. This is sometimes erroneously written as A1F1, with number 1 instead of letter I.) This paper presents simulations of climate change with an ensemble of GCMs driven by the A1FI scenario, and also assesses the implications of carbon-cycle feedbacks for the climate-change projections. Using these GCM projections along with simple climate-model projections, including uncertainties in carbon-cycle feedbacks, and also comparing against other model projections from the IPCC, our best estimate is that the A1FI emissions scenario would lead to a warming of 4°C relative to pre-industrial during the 2070s. If carbon-cycle feedbacks are stronger, which appears less likely but still credible, then 4°C warming could be reached by the early 2060s in projections that are consistent with the IPCC's 'likely range'.

Publication Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences

Volume 369

Issue 1934
Pages 67-84
Date 13 January 2011
Journal Abbr Phil. Trans. R. Soc. A
DOI 10.1098/rsta.2010.0292
ISSN 1364-503X
URL http://rsta.royalsocietypublishing.org/cgi/doi/10.1098/rsta.2010.0292
Extra Keywords: climate modelling; climate-change projections; 4°C; global warming; dangerous climate change.
Date Added Tue Aug 23 02:29:51 2011
Modified Wed Aug 24 04:40:17 2011

When the mountrains roared: Stories of the 1910 fire

Type Book
Author Elers Koch
Abstract Introduction... If history is not written it is soon forgotten. The 1910 forest fire in the Northern Rocky Mountain Region is an episode which has had much to do with shaping the fire policy not only of that region but the whole United States. The tragic and disastrous culmination of that battle to save the forests shocked the nation into a realization of the necessity of a better system of fire control. It is now thirty-two years since that memorable summer. The men who took part in the campaign are getting older each year and before many more years have elapsed the 1910 fire season will be only a tradition. For this reason the writer who, as Supervisor of the Lolo Forest, had some small part in the campaign and the background of a current knowledge of the regional situation through those trying days, has undertaken to compile an informal record of the fire history of that year. This is not written for publication, but primarily as a record for the Forest Service, so that the story will not be lost. A large mass of historical material was assembled under the direction of Mr. Fred Morrell in 1926, and free use has been made of these records.
Edition R1-78-30
Place Idaho
Publisher United States Department of Agriculture, Forest Service, Idaho Panhandle National Forests
Date 1978
# of Pages 41 p.
ISBN ASIN: B0013CJ1KO
URL http://www.foresthistory.org/ASPNET/Publications/region/1/1910_fires/index.htm
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:37:15 2011

Notes:

Table of Contents:

Widespread decline in greenness of Amazonian vegetation due to the 2010 drought

Type Journal Article

Author Liang Xu
Author Arindam Samanta
Author Marcos H. Costa
Author Sangram Ganguly
Author Ramakrishna R. Nemani
Author Ranga B. Myneni

Abstract During this decade, the Amazon region has suffered two severe droughts in the short span of five years – 2005 and 2010. Studies on the 2005 drought present a complex, and sometimes contradictory, picture of how these forests have responded to the drought. Now, on the heels of the 2005 drought, comes an even stronger drought in 2010, as indicated by record low river levels in the 109 years of bookkeeping. How has the vegetation in this region responded to this record-breaking drought? Here we report widespread, severe and persistent declines in vegetation greenness, a proxy for photosynthetic carbon fixation, in the Amazon region during the 2010 drought based on analysis of satellite measurements. The 2010 drought, as measured by rainfall deficit, affected an area 1.65 times larger than the 2005 drought – nearly 5 million km² of vegetated area in Amazonia. The decline in greenness during the 2010 drought spanned an area that was four times greater (2.4 million km²) and more severe than in 2005. Notably, 51% of all drought-stricken forests showed greenness declines in 2010 (1.68 million km²) compared to only 14% in 2005 (0.32 million km²). These declines in 2010 persisted following the end of the dry season drought and return of rainfall to normal levels, unlike in 2005. Overall, the widespread loss of photosynthetic capacity of Amazonian vegetation due to the 2010 drought may represent a significant perturbation to the global carbon cycle.

Publication Geophysical Research Letters
Volume 38
Issue 7
Pages L07402 (4 p.)
Date April 2011
Journal Abbr Geophys. Res. Lett.
DOI 10.1029/2011GL046824
ISSN 0094–8276

URL http://www.agu.org/pubs/crossref/2011/2011GL046824.shtml
Extra Keywords: Amazon; rain forest; drought.
Date Added Tue Aug 16 01:35:52 2011
Modified Tue Aug 16 01:36:02 2011

Widespread increase of tree mortality rates in the western United States

Type Journal Article
Author Philip E. van Mantgem
Author Nathan L. Stephenson
Author John C. Byrne
Author Lori D. Daniels
Author Jerry F. Franklin
Author Peter Z. Fulé
Author Mark E. Harmon
Author Andrew J. Larson
Author Jeremy M. Smith
Author Alan H. Taylor
Author Thomas T. Veblen
Abstract Persistent changes in tree mortality rates can alter forest structure, composition, and ecosystem services such as carbon sequestration. Our analyses of longitudinal data from unmanaged old forests in the western United States showed that background (noncatastrophic) mortality rates have increased rapidly in recent decades, with doubling periods ranging from 17 to 29 years among regions. Increases were also pervasive across elevations, tree sizes, dominant genera, and past fire histories. Forest density and basal area declined slightly, which suggests that increasing mortality was not caused by endogenous increases in competition. Because mortality increased in small trees, the overall increase in mortality rates cannot be attributed solely to aging of large trees. Regional warming and consequent increases in water deficits are likely contributors to the increases in tree mortality rates.
Publication Science
Volume 323
Issue 5913
Pages 521-524
Date 23 January 2009
Journal Abbr Science
DOI 10.1126/science.1165000
ISSN 0036-8075
URL http://www.sciencemag.org/content/323/5913/521.full
Date Added Sat Aug 27 02:07:29 2011
Modified Sat Aug 27 15:53:41 2011

Widespread Upper Triassic to Lower Jurassic wildfire records from Poland: Evidence from charcoal and pyrolytic polycyclic aromatic hydrocarbons

Type Journal Article
Author Leszek Marynowski
Author Bernd R. T. Simoneit
Abstract Laboratory tests indicate that 15% O_2, instead of 12%, is required for the propagation of a widespread forest fire, a 3% increase from what was previously assumed. The presence of widespread wildfire records in the Upper Triassic and Lower Jurassic of Central Europe suggests that the lower limit for O_2 during this time was

at least 15%. Wildfire records are based on the co-occurrence of charcoal fragments and elevated concentrations of pyrolytic polycyclic aromatic hydrocarbons (PAHs). In all samples charcoal fragments are large to medium-sized and angular, suggesting that they were transported by rivers only short distances after charcoalification. Calculated combustion temperatures vary with stratigraphic position and average 295–377 °C, which is characteristic for ground or near-surface wildfires. The most extensive wildfires occurred in the earliest Jurassic and their intensities successively decreased with time. Average concentrations of the sum of pyrolytic PAHs for the lowermost Jurassic Zagaje Formation reached ~1253 μg/g total organic carbon (TOC), whereas for the Upper Triassic–Lower Jurassic Skloby Formation they did not exceed ~16 μg/g TOC. Charcoal-bearing sequences were also characterized by the presence of phenyl-PAHs (Ph-PAHs) and oxygen-containing aromatic compounds. The dominance of the more stable Ph-PAH isomers in these immature to low-maturity sedimentary rocks supports their pyrolytic origin. The oxygenated PAHs may also be derived from combustion processes.

Publication PALAIOS
Volume 24
Issue 12
Pages 785-798
Date December 2009
Journal Abbr PALAIOS
DOI 10.2110/palo.2009.p09-044r
ISSN 0883-1351
URL http://palaios.sepmonline.org/cgi/doi/10.2110/palo.2009.p09-044r
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:35:38 2011

Wilderness fire science: A state-of-knowledge review

Type Conference Paper
Author James K. Agee
Abstract Wilderness fire science has progressed since the last major review of the topic, but it was significantly affected by the large fire events of 1988. Strides have been made in both fire behavior and fire effects, and in the issues of scaling, yet much of the progress has not been specifically tied to wilderness areas or funding. Although the management of fire in wilderness has been slow to recover from the fires of 1988, science has progressed most significantly in its ability to deal with fire at a landscape level. Major challenges include better understanding of the regional context and function of wilderness areas, as well as understanding and incorporating fire patchiness, variability and synergistic disturbance factors into predictive models. If more precise models are to be applied accurately in wilderness, better weather databases are essential.
Date 2000
Proceedings Title USDA Forest Service Proceedings RMRS-P-15-2000
Conference Name Wilderness science in a time of change
Place Missoula, MT
Publisher U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station
Volume VOL-5.Wilderness ecosystems, threats, and management
Pages 5-22
Short Title Wilderness Fire Science
URL http://www.treesearch.fs.fed.us/pubs/21843
Extra Keywords: wilderness; fire behavior; fire effects.
Date Added Mon Aug 15 22:33:24 2011
Modified Mon Aug 15 22:33:58 2011

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Citation:

Agee, James K. 2000. Wilderness fire science: A state of knowledge review. In: Cole, David N.; McCool, Stephen F.; Borrie, William T.; O'Loughlin, Jennifer, comps. 2000. Wilderness science in a time of change conference-Volume 5: Wilderness ecosystems, threats, and management; 1999 May 23~27; Missoula, MT. Proceedings RMRS-P-15-VOL-5. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. p. 5-22.

Wildfire management in the United States: The evolution of a policy failure

Type Journal Article
Author George Busenberg
Abstract Wildland fires constitute a major crisis in American environmental policy, a crisis created by a longstanding policy failure. This article explores the political processes that generated and reinforced this policy failure over time. The concepts of bounded rationality, punctuated equilibria, and selfreinforcing mechanisms are applied to study the evolution of American wildfire policy between 1905 and the present. This study finds that a self-defeating wildfire suppression policy was established in the period 1905 through 1911, and subsequently reinforced for more than five decades. This policy did not include a complementary program to counteract the gradual accumulation of flammable organic materials (fuels) that occurred in many ecosystems when fires were suppressed. The resulting fuel accumulations have greatly increased the risk of damaging, high-intensity wildfires in a range of American wildlands. A combination of fire suppression and fuel reduction programs will be needed to manage this risk in the future.
Publication Review of Policy Research
Volume 21
Issue 2
Pages 145–156
Date March 2004
Journal Abbr Rev. Policy Res.
DOI 10.1111/j.1541-1338.2004.00066.x
ISSN 1541-1338
Short Title Wildfire management in the United States
URL http://onlinelibrary.wiley.com/doi/10.1111/j.1541-1338.2004.00066.x/full
Extra environmental policy
Date Added Thu Aug 25 10:47:25 2011
Modified Wed Aug 31 00:33:56 2011

Wildfire responses to abrupt climate change in North America

Type Journal Article
Author Jennifer R. Marlon
Author Patrick J. Bartlein
Author Megan K. Walsh
Author Sandy P. Harrison
Author Kendrick J. Brown
Author Mary E. Edwards
Author Philip E. Higuera
Author Mitchell J. Power
Author R. Scott Anderson
Author Christy Briles
Author Andrea Brunelle
Author Christopher Carcaillet
Author Mark Daniels
Author Feng Sheng Hu

Author Martin Lavoie
Author Colin J. Long
Author Thomas Minckley
Author Pierre J. H. Richard
Author Andrew C. Scott
Author David S. Shafer
Author Willy Tinner
Author Charles E. Umbanhowar Jr.
Author Cathy Whitlock

Abstract It is widely accepted, based on data from the last few decades and on model simulations, that anthropogenic climate change will cause increased fire activity. However, less attention has been paid to the relationship between abrupt climate changes and heightened fire activity in the paleorecord. We use 35 charcoal and pollen records to assess how fire regimes in North America changed during the last glacial–interglacial transition (15 to 10 ka), a time of large and rapid climate changes. We also test the hypothesis that a comet impact initiated continental-scale wildfires at 12.9 ka; the data do not support this idea, nor are continent-wide fires indicated at any time during deglaciation. There are, however, clear links between large climate changes and fire activity. Biomass burning gradually increased from the glacial period to the beginning of the Younger Dryas. Although there are changes in biomass burning during the Younger Dryas, there is no systematic trend. There is a further increase in biomass burning after the Younger Dryas. Intervals of rapid climate change at 13.9, 13.2, and 11.7 ka are marked by large increases in fire activity. The timing of changes in fire is not coincident with changes in human population density or the timing of the extinction of the megafauna. Although these factors could have contributed to fire-regime changes at individual sites or at specific times, the charcoal data indicate an important role for climate, and particularly rapid climate change, in determining broad-scale levels of fire activity.

Publication Proceedings of the National Academy of Sciences
Volume 106
Issue 8
Pages 2519–2524
Date February 24, 2009
Journal Abbr PNAS
DOI 10.1073/pnas.0808212106
ISSN 1091-6490
URL www.pnas.org/cgi/doi/10.1073/pnas.0808212106
Extra Keywords: biomass burning; charcoal; comet; Younger Dryas.
Date Added Tue Aug 30 14:35:38 2011
Modified Tue Aug 30 14:35:38 2011

Wildfires in boreal ecosystems: Past, present and some emerging trends

Type Journal Article
Author Martin P. Girardin
Author Adam A. Ali
Author Christelle Hély

Abstract With the emergence of a new forest management paradigm based on the emulation of natural disturbance regimes, interest in fire-related studies has increased in the boreal forest management community. A key issue in this regard is the improvement of our understanding of the variability in past disturbances and its linkages with climate and ecosystems. The surge in research activity has further been exacerbated by the increasing awareness of climate change, which has already exposed boreal forests to greater fire risk in recent decades. It is anticipated that further warming and drying will further enhance fire frequency and area burned in many boreal forests. Better predictions of future fire activity will contribute to better long-term forest planning in managed boreal forests. The 12 papers presented in this special issue exemplify this increased research activity by bringing together studies from diverse disciplines and presenting the latest advances regarding methodological approaches for reconstruction and modelling of past, present and future fire activity. Here we aim to summarise, evaluate and set into context some of the new insights arising from these studies and also to discuss some considerations to be taken into account in future research activities

Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 991–995
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WFv19n8_FO
ISSN 1448-5516
Short Title Wildfires in boreal ecosystems
URL http://www.publish.csiro.au/?paper=WFv19n8_FO
Call Number 0000
Extra Keywords: biomass burning; carbon emissions; charcoal analysis; fire history; palaeoecology; simulation model.
Date Added Mon Aug 29 06:17:09 2011
Modified Wed Aug 31 00:33:17 2011

Wildfires, complexity, and highly optimized tolerance

Type Journal Article
Author M. A. Moritz
Abstract Recent, large fires in the western United States have rekindled debates about fire management and the role of natural fire regimes in the resilience of terrestrial ecosystems. This real-world experience parallels debates involving abstract models of forest fires, a central metaphor in complex systems theory. Both real and modeled fire-prone landscapes exhibit roughly power law statistics in fire size versus frequency. Here, we examine historical fire catalogs and a detailed fire simulation model; both are in agreement with a highly optimized tolerance model. Highly optimized tolerance suggests robustness tradeoffs underlie resilience in different fire-prone ecosystems. Understanding these mechanisms may provide new insights into the structure of ecological systems and be key in evaluating fire management strategies and sensitivities to climate change.
Publication Proceedings of the National Academy of Sciences
Volume 102
Pages 17912-17917
Date 2005-12-13
DOI 10.1073/pnas.0508985102
ISSN 0027-8424, 1091-6490
Short Title From the Cover
URL http://www.pnas.org/cgi/doi/10.1073/pnas.0508985102
Accessed Wed Oct 5 14:52:16 2011
Library Catalog CrossRef
Call Number 0048
Date Added Thu Oct 6 11:54:11 2011
Modified Thu Oct 6 11:54:11 2011

Wildland fire hazard and risk: Problems, definitions, and context

Type Journal Article
Author Colin C. Hardy

Abstract The risks, hazards, and relative severity of wildland fires are presented here within the ecological context of historical natural fire regimes, time, space, and process. As the public dialogue on the role and impacts of wildland fire increases, it is imperative for all partners to converge on clear and concise terminology that defines risk, hazard, and the characteristic (or uncharacteristic) nature of wildland fire. These terms must be defined in the context of scale--both spatial and temporal. The concept of historical natural fire regimes involves a classification of the characteristic, or "natural" processes and effects associated with wildland fire occurring in sustainable ecosystems. When a wildland fire occurs within the time, space, and severity parameters of the historical natural fire regime, the fire can be called natural, or "characteristic". The milieu of disturbance effects we call catastrophic, such as economic losses, damages to communities and structures, or impacts on short-term aesthetic values involve social, cultural, and economic values and risks--none is directly associated with ecological values, damages, or risks. In the context of technical risk assessments, the term "risk" considers not only the probability of an event, but also includes values and expected losses. However, within the fire community it refers only to the probability of ignition (both man- and lightning-caused). `Hazard' refers to the state of the fuel, exclusive of weather or the environs in which the fuel is found. Unlike many common uses of the term `severity', fire severity refers specifically to the effect a fire has on wildland systems. It is inappropriate to use the term severity to describe the behavior of the fire phenomenon itself. Instead, we should confine its use to that relating only to a fire's effect. Finally, I discuss the limitations and conflicts to integrating all social, cultural, economic, health, and safety values in our public and policy-forming dialogue relating to fire risk, hazard, and severity. Typical risk assessments consider all relevant endpoints, including socio-economic, management, as well as ecological elements. Herein, I use the Black Mountain 2 Fire from August 2003 in the northern Rockies to illustrate the spatiotemporal extent of fire's impacts on the endpoints. When expressed over all affected spatiotemporal scales, the overlay of all endpoints from this synthetic scenario results in a "decision space" ranging in time from an hour to a century, and in space ranging from a few square meters to the continent.

Publication Forest Ecology and Management
Volume 211
Issue 1-2
Pages 73-82
Date June 6, 2005
Journal Abbr Forest Ecol. Manag.
DOI 10.1016/j.foreco.2005.01.029
ISSN 0378-1127
Short Title Wildland fire hazard and risk
URL http://www.sciencedirect.com/science/article/pii/S037811270500040X
Extra Keywords: fire terminology; fire hazard; fire severity; fire risk; fire regime; risk assessment.
Date Added Mon Aug 29 17:30:07 2011
Modified Mon Aug 29 17:58:49 2011

Wildland fire in ecosystems: Effects of fire on air

Type Report
Author David V. Sandberg
Author Roger D. Ottmar
Author Janice L. Peterson
Author John Core
Abstract This state-of-knowledge review about the effects of fire on air quality can assist land, fire, and air resource managers with fire and smoke planning, and their efforts to explain to others the science behind fire-related program policies and practices to improve air quality. Chapter topics include air quality regulations and fire; characterization of emissions from fire; the transport, dispersion, and modeling of fire emissions; atmospheric and plume chemistry; air quality impacts of fire; social consequences of air quality impacts; and recommendations for future research.
Report Number RMRS-GTR-42-vol. 5
Report Type General Technical Report

Place Ogden, UT
Institution U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station
Date December 2002
Pages 79 p.
URL http://www.treesearch.fs.fed.us/pubs/5247
Call Number 0000
Extra Keywords: smoke; air quality; fire effects; smoke management; prescribed fire; wildland fire; wildfire; biomass emissions; smoke dispersion.
Date Added Sun Aug 28 17:22:21 2011
Modified Wed Aug 31 00:25:53 2011

Wildland fire in ecosystems: Effects of fire on flora

Type Report
Author James K. Brown
Author Jane Kapler Smith
Abstract This state-of-knowledge review about the effects of fire on flora and fuels can assist land managers with ecosystem and fire management planning and in their efforts to inform others about the ecological role of fire. Chapter topics include fire regime classification, autecological effects of fire, fire regime characteristics and postfire plant community developments in ecosystems throughout the United States and Canada, global climate change, ecological principles of fire regimes, and practical considerations for managing fire in an ecosytem context.
Report Number RMRS-GTR-42-vol. 2
Report Type General Technical Report
Place Ogden, UT
Institution U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station
Date December 2000
Pages 257 p.
Short Title Wildland fire in ecosystems
URL http://www.treesearch.fs.fed.us/pubs/4554
Extra Keywords: ecosystem; fire effects; fire management; fire regime; fire severity; fuels; habitat; plant response; plants; succession; vegetation.
Date Added Wed Aug 24 12:31:32 2011
Modified Fri Aug 26 20:34:27 2011

Will climate change drive 21st century burn rates in Canadian boreal forest outside of its natural variability: Collating global climate model experiments with sedimentary charcoal data

Type Journal Article
Author Yves Bergeron
Author Dominic Cyr
Author Martin P. Girardin
Author Christopher Carcaillet
Abstract Natural ecosystems have developed within ranges of conditions that can serve as references for setting conservation targets or assessing the current ecological integrity of managed ecosystems. Because of their climate determinism, forest fires are likely to have consequences that could exacerbate biophysical and socioeconomical vulnerabilities in the context of climate change. We evaluated future trends in fire activity under climate change in the eastern Canadian boreal forest and investigated whether these changes were included in the variability observed during the last 7000 years from sedimentary charcoal records from three lakes. Prediction of future annual area burned was made using simulated Monthly Drought Code data collected

from an ensemble of 19 global climate model experiments. The increase in burn rate that is predicted for the end of the 21st century (0.45% $year^{-1}$ with 95% confidence interval (0.32, 0.59) falls well within the long-term past variability (0.37 to 0.90% $year^{-1}$). Although our results suggest that the predicted change in burn rates per se will not move this ecosystem to new conditions, the effects of increasing fire incidence cumulated with current rates of clear-cutting or other low-retention types of harvesting, which still prevail in this region, remain preoccupying.

Publication International Journal of Wildland Fire
Volume 19
Issue 8
Pages 1127–1139
Date December 2010
Journal Abbr Int. J. Wildland Fire
DOI 10.1071/WF09092
ISSN 1448-5516
Short Title Will climate change drive 21st century burn rates in Canadian boreal forest outside of its natural variability
URL http://www.publish.csiro.au/?paper=WF09092
Date Added Tue Aug 23 02:15:01 2011
Modified Wed Aug 24 04:41:11 2011

Will climate change overwhelm fire management capacity?

Type Journal Article
Author Justin Podur
Author Michael Wotton
Abstract Using anomalies calculated from General Circulation Model (GCM) climate predictions we developed scenarios of future fire weather, fuel moisture and fire occurrence and used these as the inputs to a fire growth and suppression simulation model for the province of Ontario, Canada. The goal of this study was to combine GCM predictions with the fire growth and suppression model to examine potential changes in area burned in Ontario due to climate change, while accounting for the large fire suppression activities of the Ontario Ministry of Natural Resources (OMNR). Results indicate a doubling of area burned in the Intensive and Measured fire management zones of Ontario by the decade of 2040 and an eightfold increase in area burned by the end of the 21st century in the Intergovernmental Panel on Climate Change Special Report on Emissions Scenarios (IPCC SRES) A2 scenario; smaller increases were found for the A1b and B1 scenarios. These changes are driven by increased fire weather conducive to large fire growth, and increases in the number of fires escaping initial attack: for the Canadian GCM's business-as-usual (A2) scenario, escaped fire frequency increased by 34% by 2040 and 92% by the end of the 21st century. Incorporating more detail on large fire growth than previous studies, our model predicts higher area burned under climate change than do these previous studies, as large numbers of high-intensity fires overwhelm suppression capacity.
Publication Ecological Modelling
Volume 221
Issue 9
Pages 1301–1309
Date 10 May 2010
Journal Abbr Ecol. Model
DOI 10.1016/j.ecolmodel.2010.01.013
ISSN 0304-3800
URL http://www.sciencedirect.com/science/article/pii/S0304380010000529
Extra Keywords: forest fires; climate change; general circulation model; area burned; fire suppression.
Date Added Sun Aug 28 00:27:26 2011
Modified Sun Aug 28 00:30:53 2011

Winter cold of eastern continental boundaries induced by warm ocean waters

Type Journal Article
Author Yohai Kaspi
Author Tapio Schneider
Abstract In winter, northeastern North America and northeastern Asia are both colder than other regions at similar latitudes. This has been attributed to the effects of stationary weather systems set by elevated terrain (orography), and to a lack of maritime influences from the prevailing westerly winds. However, the differences in extent and orography between the two continents suggest that further mechanisms are involved. Here we show that this anomalous winter cold can result in part from westward radiation of large-scale atmospheric waves—nearly stationary Rossby waves—generated by heating of the atmosphere over warm ocean waters. We demonstrate this mechanism using simulations with an idealized general circulation model3, 4, 5, with which we show that the extent of the cold region is controlled by properties of Rossby waves, such as their group velocity and its dependence on the planetary rotation rate. Our results show that warm ocean waters contribute to the contrast in mid-latitude winter temperatures between eastern and western continental boundaries not only by warming western boundaries, but also by cooling eastern boundaries.
Publication Nature
Volume 471
Issue 7340
Pages 621-624
Date 31 March 2011
Journal Abbr Nature
DOI 10.1038/nature09924
ISSN 1476-4687
URL http://www.nature.com/doifinder/10.1038/nature09924
Date Added Tue Aug 30 14:37:15 2011
Modified Tue Aug 30 14:39:25 2011

World Data Center for Paleoclimatology - Data Sets Listing

Type Web Page
Author NCDC NOAA
Abstract NOAA Paleoclimatology is a branch of NOAA's National Climatic Data Center. Paleo data come from natural sources such as tree rings, ice cores, corals, and ocean and lake sediments-- and extend the archive of weather and climate back hundreds to millions of years. NOAA Paleo provides data and information scientists need to understand natural climate variability and future climate change. We also operate the World Data Center for Paleoclimatology which distributes data contributed by scientists around the world.
Website Title NOAA Paleoclimatology
Website Type Data Sets Listing
Short Title NOAA Paleo Data
URL http://www.ncdc.noaa.gov/paleo/datalist.html
Date Added Sat Aug 27 22:34:48 2011
Modified Sat Aug 27 22:34:48 2011

World map of the Köppen-Geiger climate classification updated

Type Journal Article
Author Markus Kottek
Author Jürgen Grieser
Author Christoph Beck

Author Bruno Rudolf
Author Franz Rubel
Abstract The most frequently used climate classification map is that ofWladimir Köppen, presented in its latest version 1961 by Rudolf Geiger. A huge number of climate studies and subsequent publications adopted this or a former release of the Köppen-Geiger map. While the climate classification concept has been widely applied to a broad range of topics in climate and climate change research as well as in physical geography, hydrology, agriculture, biology and educational aspects, a well-documented update of the world climate classification map is still missing. Based on recent data sets from the Climatic Research Unit (CRU) of the University of East Anglia and the Global Precipitation Climatology Centre (GPCC) at the German Weather Service, we present here a new digital Köppen-Geiger world map on climate classification, valid for the second half of the 20th century.
Publication Meteorologische Zeitschrift
Volume 15
Issue 3
Pages 259–263
Date June 2006
Journal Abbr Meteorol. Z.
DOI 10.1127/0941-2948/2006/0130
ISSN 0941-2948
URL http://www.ingentaconnect.com/content/schweiz/mz/2006/00000015/00000003/art00001?token=005c1eea4b0fe0b1285d355a666f3a7b6c7a40444d2c6b415276783b49264f655d375c6b6876305021c62461519f
Date Added Tue Aug 30 14:37:15 2011
Modified Wed Aug 31 00:17:12 2011

World of change: Global temperatures : Feature articles

Type Web Page
Author The Earth Observatory NASA
Website Title World of Change: Decadal Temperatures
Website Type Features
URL http://earthobservatory.nasa.gov/Features/WorldOfChange/decadaltemp.php
Rights EOS Project Science Office, NASA GSFC
Date Added Tue Aug 30 17:16:39 2011
Modified Tue Aug 30 17:16:39 2011

Worlds in the making; The evolution of the universe

Type Book
Author Svante Arrhenius
Translator H. Borns
Abstract no abstract
Edition Illustrated
Place New York, London
Publisher Harper & Brothers Publishers
Date 1908
# of Pages 230 p.
Short Title Worlds in the making; the evolution of the universe
URL http://www.archive.org/details/worldsinmakingev00arrhrich
Date Added Tue Aug 16 00:35:05 2011
Modified Tue Aug 16 00:35:05 2011

Notes:

Table of Contents:

conclusions.

Year of the fires: The story of the Great Fires of 1910

Type	Book
Author	Stephen J. Pyne
Abstract	Description: The wildfires of the summer of 1910 scorched millions of acres in the western states, depositing soot as far away as Greenland. Through the experiences and words of rangers, soldiers, politicians, scientists, and the volunteers who fought the fires and were forever scarred by them, acclaimed historian and former forest fire fighter Stephen Pyne tells the story of that catastrophic year and its indelible legacy on the firefighting policies of today. Not only does Pyne explain how wildfires happen and how they are fought, he also chronicles the ongoing debate on the relative merits of firefighting versus "light burning." More than a memorable adventure tale, Year of the Fires is the story of a profound event that continues to shape American life. (from: http://www.indiebound.org/book/9780142001172) The Great Fires of 1910 were great not because they were big - which they were - but because they collided with American culture in spectacular ways. They happened within a highly politicized context and traumatized the fledgling U.S. Forest Service. They killed 78 firefighters in six scattered settings, overran budgets by a million 1910 dollars, and personally affected four generations of chief foresters. That agency's response created the context within which America established its wildland fire policies and programs. But while that larger context is what made the fires significant, their core remains the stories of crews caught in the flames. Some survived, some succumbed. (from:http://www.stephenpyne.com/year_of_the_fires__the_story_of_the_ great_fires_of_1910_92911.htm)
Edition	Illustrated edition
Place	New York, NY
Publisher	Viking Adult
Date	May 2001
# of Pages	322 p.
ISBN	0670899909, 9780670899906
Short Title	Year of the Fires
URL	http://www.stephenpyne.com/year_of_the_fires__the_story_of_the_great_fires_of_1910_92911.htm
Extra	Natural Disasters, United States - 20th Century (1900-1945)
Date Added	Sun Aug 28 00:27:26 2011
Modified	Thu Sep 1 04:15:55 2011