

Appendix B – Glossary of Terms

This Glossary of Terms provided below is a limited selection of terms accessed from:

- Glossary of Terms used in the IPCC Fourth Assessment Report, Intergovernmental Panel on Climate Change (IPCC) 2007 (<http://www.ipcc.ch/pdf/glossary/ar4-wg1.pdf>)
- Glossary of Wildland Fire Terminology, PMS 205, National Wildfire Coordinating Group (NWCG) 2011 (<http://www.nwcg.gov/pms/pubs/glossary/index.htm>)
- Glossary of Meteorology, Second Edition, American Meteorological Society (AMS) 2000 (http://www.ametsoc.org/memb/onlinemembervices/online_glossary.cfm)

We recommend that readers access those original sources for terms not included below or for more in depth descriptions of terminology.

Aerosols A collection of airborne solid or liquid particles, with a typical size between 0.01 and 10 μm that reside in the atmosphere for at least several hours. Aerosols may be of either natural or anthropogenic origin. Aerosols may influence climate in several ways: directly through scattering and absorbing radiation, and indirectly by acting as cloud condensation nuclei or modifying the optical properties and lifetime of clouds (see Indirect aerosol effect).

Albedo The fraction of *solar radiation* reflected by a surface or object, often expressed as a percentage. Snow-covered surfaces have a high albedo, the surface albedo of soils ranges from high to low, and vegetation-covered surfaces and oceans have a low albedo. The Earth's planetary albedo varies mainly through varying cloudiness, snow, ice, leaf area and land cover changes.

Atlantic Multi-decadal Oscillation (AMO) A multi-decadal (65 to 75 year) fluctuation in the North Atlantic, in which *sea surface temperatures* showed warm phases during roughly 1860 to 1880 and 1930 to 1960 and cool phases during 1905 to 1925 and 1970 to 1990 with a range of order 0.4°C.

Anthropogenic Emissions Emissions (see **Emissions** below) to the atmosphere of gases (*and aerosols*) as a result of human activity.

Atmosphere The gaseous envelope surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen (78.1% *volume mixing ratio*) and oxygen (20.9% *volume mixing ratio*), together with a number of trace gases, such as argon (0.93% *volume mixing ratio*), helium and radiatively active *greenhouse gases* such as *carbon dioxide* (0.035% *volume mixing ratio*) and *ozone*. In addition, the atmosphere contains the greenhouse gas water vapor, whose amounts are highly variable but typically around 1% *volume mixing ratio*. The atmosphere also contains clouds and *aerosols*.

Available Fuel That portion of the total fuel that would actually burn under various environmental conditions.

Biomass The total mass of living organisms in a given area or volume; dead plant material can be included as dead biomass.

Biome A biome is a major and distinct regional element of the *biosphere*, typically consisting of several *ecosystems* (e.g. *forests*, rivers, ponds, swamps within a *region*). Biomes are characterized by typical communities of plants and animals.

Black carbon (BC) Operationally defined *aerosol* species based on measurement of light absorption and chemical reactivity and/or thermal stability; consists of *soot*, *charcoal* and/or possible light absorbing refractory organic matter

Burn Severity A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts.

Carbon cycle The term used to describe the flow of carbon (in various forms, e.g., as *carbon dioxide*) through the *atmosphere*, ocean, terrestrial *biosphere* and *lithosphere*.

Carbon dioxide (CO₂) A naturally occurring gas, also a by-product of burning fossil fuels from fossil carbon deposits, such as oil, gas and coal, of burning *biomass* and of *land use* changes and other industrial processes. It is the principal *anthropogenic greenhouse gas* that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a *Global Warming Potential* of 1.

Carbon Dioxide (CO₂) A colorless, odorless, nonpoisonous gas, which results from fuel combustion and is normally a part of the ambient air.

Charcoal Material resulting from charring of *biomass*, usually retaining some of the microscopic texture typical of plant tissues; chemically it consists mainly of carbon with a disturbed graphitic structure, with lesser amounts of oxygen and hydrogen (Charlson and Heintzenberg, 1995, p. 402). See *Black carbon*; *Soot*.

Climate Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the *climate system*. In various chapters in this report different averaging periods, such as a period of 20 years, are also used.

Climate The prevalent or characteristic meteorological conditions of any place or region, and their extremes.

Climate The slowly varying aspects of the atmosphere–hydrosphere–land surface system. It is typically characterized in terms of suitable averages of the [climate system](#) over periods of a month or more, taking into consideration the [variability](#) in time of these averaged quantities. Climatic classifications include the spatial [variation](#) of these time-averaged variables. Beginning with the view of local climate as little more than the annual course of long-term averages of [surface temperature](#) and [precipitation](#), the concept of climate has broadened and evolved in recent decades in response to the increased understanding of the underlying processes that determine climate and its variability. See also [climate system](#), [climatology](#), [climate change](#), [climatic classification](#).

Climate Class In NFDRS, one of four classifications of general climate of an area.

Climate change Climate change refers to a change in the state of the *climate* that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists 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; Detection and Attribution*.

Climate change Any systematic change in the long-term statistics of climate elements (such as temperature, pressure, or winds) sustained over several decades or longer. Climate change may be due to natural external forcings, such as changes in solar emission or slow changes in the earth's orbital elements; natural internal processes of the climate system; or anthropogenic forcing.

Climate model (spectrum or hierarchy) A numerical representation of the *climate system* based on the physical, chemical and biological properties of its components, their interactions and *feedback* processes, and accounting for all or some of its known properties. The climate system can be represented by models of varying complexity, that is, for any one component or combination of components a *spectrum* or *hierarchy* of models can be identified, differing in such aspects as the number of spatial dimensions, the extent to which physical, chemical or biological processes are explicitly represented, or the level at which empirical *parametrizations* are involved. Coupled Atmosphere-Ocean General Circulation Models (AOGCMs) provide a representation of the climate system that is near the most comprehensive end of the spectrum currently available. There is an evolution towards more complex models with interactive chemistry and biology (see Chapter 8). Climate models are applied as a research tool to study and simulate the climate, and for operational purposes, including monthly, seasonal and interannual *climate predictions*.

Climate prediction A climate prediction or *climate forecast* is the result of an attempt to produce an estimate of the actual evolution of the *climate* in the future, for example, at seasonal, interannual or long-term time scales. Since the future evolution of the *climate system* may be highly sensitive to initial conditions, such predictions are usually probabilistic in nature. See also *Climate projection*; *Climate scenario*; *Predictability*.

Climate projection A *projection* of the response of the *climate system* to *emission or concentration scenarios* of *greenhouse gases* and *aerosols*, or *radiative forcing* scenarios, often based upon simulations by *climate models*. Climate projections are distinguished from *climate predictions* in order to emphasize that climate projections depend upon the emission/concentration/radiative forcing scenario used, which are based on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realised and are therefore subject to substantial *uncertainty*.

Climate scenario A plausible and often simplified representation of the future *climate*, based on an internally consistent set of climatological relationships that has been constructed for explicit use in investigating the potential consequences of *anthropogenic climate change*, often serving as input to impact models. *Climate projections* often serve as the raw material for constructing climate scenarios, but climate scenarios usually require additional information such as about the observed current climate. A *climate change scenario* is the difference between a climate scenario and the current climate.

Climate shift or climate regime shift An abrupt shift or jump in mean values signalling a change in *regime*. Most widely used in conjunction with the 1976/1977 climate shift that seems to correspond to a change in *El Niño-Southern Oscillation* behavior.

Climate system The climate system is the highly complex system consisting of five major components: the *atmosphere*, the *hydrosphere*, the *cryosphere*, the land surface and the *biosphere*, and the interactions between them. The climate system evolves in time under the influence of its own internal dynamics and because of *external forcings* such as volcanic eruptions, solar variations and *anthropogenic forcings* such as the changing composition of the atmosphere and *land use change*.

Climate system The system, consisting of the atmosphere, hydrosphere, lithosphere, and biosphere, determining the earth's climate as the result of mutual interactions and responses to external influences (forcing). Physical, chemical, and biological processes are involved in the interactions among the components of the climate system.

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 *spatial and temporal 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*.

Climate variability The temporal variations of the atmosphere– ocean system around a mean state. Typically, this term is used for timescales longer than those associated with synoptic weather events (i.e., months to millennia and longer). The term “natural climate variability” is further used to identify climate variations that are not attributable to or influenced by any activity related to humans.

Combustion The rapid oxidation of fuel in which heat and usually flame are produced. Combustion can be divided into four phases: preignition, flaming, smoldering, and glowing.

Combustion Efficiency The relative amount of time a fire burns in the flaming phase of combustion, as compared to smoldering combustion. A ratio of the amount of fuel that is consumed in flaming combustion compared to the amount of fuel consumed during the smoldering phase, in which more of the fuel material is emitted as smoke particles because it is not turned into carbon dioxide and water.

Combustion Period Total time required for a specified fuel component to be completely consumed.

Combustion Rate Rate of heat release per unit of burning area per unit of time. *see also*: Reaction Intensity

Condition Class Depiction of the degree of departure from historical fire regimes, possibly resulting in alternations of key ecosystem components. These classes categorize and describe vegetation composition and structure conditions that currently exist inside the Fire Regime Groups. Based on the coarse-scale national data, they serve as generalized wildfire rankings. The risk of loss of key ecosystem components from wildfires increases from Condition Class 1 (lowest risk) to Condition Class 3 (highest risk). *synonym*: Fire Regime Current Condition Class

Condition of Vegetation Stage of growth or degree of flammability of vegetation that forms part of a fuel complex. Herbaceous stage is at times used when referring to herbaceous vegetation alone. In grass areas minimum qualitative distinctions for stages of annual growth are usually green, curing, and dry or cured.

Consumption The amount of a specified fuel type or strata that is removed through the fire process, often expressed as a percentage of the preburn weight.

Continental Climate Climate that is characteristic of the interior of a land mass of continental size, marked by large annual diurnal and day-to-day ranges of temperature, low relative humidity and irregular precipitation.

Crown Cover The ground area covered by the crown of a tree as delimited by the vertical projection of its outermost perimeter.

Crown Fire A fire that advances from top to top of trees or shrubs more or less independent of a surface fire. Crown fires are sometimes classed as running or dependent to distinguish the degree of independence from the surface fire.

Drought In general terms, drought is a ‘prolonged absence or marked deficiency of precipitation, a deficiency that results in water shortage for some activity or for some group’, or a ‘period of abnormally dry weather sufficiently prolonged for the lack of precipitation to cause a serious hydrological imbalance’ (Heim, 2002). Drought has been defined in a number of ways. *Agricultural drought* relates to moisture deficits in the topmost 1 meter or so of soil (the root zone) that affect crops, *meteorological drought* is mainly a prolonged deficit of precipitation, and *hydrologic drought* is related to below-normal streamflow, lake and groundwater levels. A *megadrought* is a long drawn out and pervasive drought, lasting much longer than normal, usually a decade or more.

Ecosystem An interacting natural system including all the component organisms together with the abiotic environment and processes affecting them.

El Niño-Southern Oscillation (ENSO) The term *El Niño* was initially used to describe a warm-water current that periodically flows along the coast of Ecuador and Perú, disrupting the local fishery. It has since become identified with a basin-wide warming of the tropical Pacific Ocean east of the dateline. This oceanic event is associated with a fluctuation of a global-scale tropical and subtropical surface pressure pattern called the Southern Oscillation. This coupled *atmosphere*-ocean phenomenon, with preferred time scales of two to about seven years, is collectively known as the El Niño-Southern Oscillation (ENSO). It is often measured by the surface pressure anomaly difference between Darwin and Tahiti and the *sea surface temperatures* in the central and eastern equatorial Pacific. During an ENSO event, the prevailing trade winds weaken, reducing upwelling and altering ocean currents such that the sea surface temperatures warm, further weakening the trade winds. This event has a great impact on the wind, sea surface temperature and precipitation patterns in the tropical Pacific. It has climatic effects throughout the Pacific *region* and in many other parts of the world, through global *teleconnections*. The cold phase of ENSO is called *La Niña*.

Emission A release of combustion gases and aerosols into the atmosphere.

Emission Factor (EFp) The mass of particulate matter produced per unit mass of fuel consumed (pounds per ton, grams per kilogram).

Emission scenario A plausible representation of the future development of emissions of substances that are potentially radiatively active (e.g., *greenhouse gases*, *aerosols*), based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socioeconomic development, technological change) and their key relationships. *Concentration scenarios*, derived from emission scenarios, are used as input to a *climate model* to compute *climate projections*. In IPCC (1992) a set of emission scenarios was presented which were used as a basis for the climate projections in IPCC (1996). These emission scenarios are referred to as the IS92 scenarios. In the IPCC Special Report on Emission Scenarios (Nakićenović and Swart, 2000) new emission scenarios, the so-called SRES scenarios, were published, some of which were used, among others, as a basis for the climate projection. For the meaning of some terms related to these scenarios, see *SRES scenarios*.

Emission Rate The amount, or mass of smoke produced per unit of time. For example: Emission Rate = Available Fuel x Burning Rate x Emission Factor.

Ensemble A group of parallel model simulations used for *climate projections*. Variation of the results across the ensemble members gives an estimate of *uncertainty*. Ensembles made with the same model but different initial conditions only characterize the uncertainty associated with internal *climate variability*, whereas multi-model ensembles including simulations by several models also include the impact of model differences. Perturbed parameter ensembles, in which model parameters are varied in a systematic manner, aim to produce a more objective estimate of modelling uncertainty than is possible with traditional multi-model ensembles.

Energy Release Component (ERC) The computed total heat release per unit area (British thermal units per square foot) within the flaming front at the head of a moving fire.

External forcing External forcing refers to a forcing agent outside the *climate system* causing a change in the climate system. Volcanic eruptions, solar variations and *anthropogenic* changes in the composition of the *atmosphere* and *land use change* are external forcings.

Fine Fuels Fast-drying dead or live fuels, generally characterized by a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a timelag of one hour or less. These fuels (grass, leaves, needles, etc.) ignite readily and are consumed rapidly by fire when dry. *see also*: Flash Fuels

Fire Rapid oxidation, usually with the evolution of heat and light; heat fuel, oxygen and interaction of the three.

Fire Behavior The manner in which a fire reacts to the influences of fuel, weather, and topography.

Fire Business The characterization of fire occurrence in an area, described in terms of total number of fires and acres per year; and number of fires by time, size, cause, fire-day, large fire-day, and multiple fire-day.

Fire Climate Composite pattern of weather elements over time that affect fire behavior in a given region.

Fire Climax Plant community maintained by periodic fires.

Fire Concentration (Complex) Generally, a situation in which numerous fires are burning in a locality. 2 More specifically, the number of fires per unit area or locality for a given period, generally a year.

Fire Danger Sum of constant danger and variable danger factors affecting the inception, spread, and resistance to control, and subsequent fire damage; often expressed as an index.

Fire Danger Index A relative number indicating the severity of wildland fire danger as determined from burning conditions and other variable factors of fire danger.

Fire Danger Rating A fire management system that integrates the effects of selected fire danger factors into one or more qualitative or numerical indices of current protection needs.

Fire Danger Rating System The complete program necessary to produce and apply fire danger ratings, including data collection, data processing, fire danger modeling, communications, and data storage. *see also*: National Fire Danger Rating System

Fire Dependent Plants and vegetation communities which have evolved adaptations such as a reliance on fire as a disturbance agent, protection as a species against the effects of wildland fire, or even a strengthening or enhancement by it.

Fire Ecology The study of the effects of fire on living organisms and their environment.

Fire Effects The physical, biological, and ecological impacts of fire on the environment.

Fire Environment The surrounding conditions, influences, and modifying forces of topography, fuel, and weather that determine fire behavior.

Fire Frequency A general term referring to the recurrence of fire in a given area over time.

Fire Interval The number of years between two successive fire events for a given area; also referred to as fire-free interval or fire-return interval.

Fire Management Activities required for the protection of burnable wildland values from fire and the use of prescribed fire to meet land management objectives.

Fire Planning Systematic technological and administrative management process of designing organization, facilities, and procedures, including fire use, to protect wildland from fire.

Fire Potential The likelihood of a wildland fire event measured in terms of anticipated occurrence of fire(s) and management's capability to respond. Fire potential is influenced by a sum of factors that includes fuel conditions (fuel dryness and/or other inputs), ignition triggers, significant weather triggers, and resource capability.

Fire Regime Description of the patterns of fire occurrences, frequency, size, severity, and sometimes vegetation and fire effects as well, in a given area or ecosystem. A fire regime is a generalization based on fire histories at individual sites. Fire regimes can often be described as cycles because some parts of the histories usually get repeated, and the repetitions can be counted and measured, such as fire return interval. *see also*: Fire Regime Groups

Fire Regime Current Condition Class A qualitative measure classified into three classes describing the relative 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. *see also*: Condition Class

Fire Regime Groups A classification of fire regimes into a discrete number of categories based on frequency and severity. The national, coarse-scale classification of fire regime groups commonly used includes five groups: I - frequent (0-35 years), low severity; II - frequent (0-35 years), stand replacement severity; III - 35-100+ years, mixed severity; IV - 35-100+ years, stand replacement severity; and V - 200+ years, stand replacement severity. *see also*: Fire Regime

Fire Risk 1. The chance of fire starting, as determined by the presence and activity of causative agents. 2 A causative agent. 3 A number related to the potential number of firebrands to which a given area will be exposed during the rating day (National Fire Danger Rating System).

Fire Scar 1. A healing or healed injury or wound to woody vegetation, caused or accentuated by a fire. 2 The mark left on a landscape by fire.

Fire Scar Analysis Analysis of one or more fire scars to determine individual tree fire frequency or mean fire intervals for specified areas.

Fire Season 1. Period(s) of the year during which wildland fires are likely to occur, spread, and affect resources values sufficient to warrant organized fire management activities. 2 A legally enacted time during which burning activities are regulated by federal, state or local authority.

Fire Severity Degree to which a site has been altered or disrupted by fire; loosely, a product of fire intensity and residence time. *see also*: Burn Severity

Fire Triangle Instructional aid in which the sides of a triangle are used to represent the three factors (oxygen, heat, fuel) necessary for combustion and flame production; removal of any of the three factors causes flame production to cease.

Fire Weather Weather conditions which influence fire ignition, behavior, and suppression.

Fire Weather Weather variables, especially wind, temperature, relative humidity, and precipitation, that influence fire starts, fire behavior, or fire suppression.

Fire Weather Forecast A weather prediction specially prepared for use in wildland fire operations and prescribed fire.

Fire Weather Index (FWI) A numerical rating in the Canadian fire danger rating system, based on meteorological measurements of fire intensity in a standard fuel type. (The standard fuel type is representative of jack pine and lodgepole pine.) The FWI is comprised of three fuel moisture codes, covering classes of forest fuel of different drying rates, and two indices that represent rate of spread and the amount of available fuel.

Fireline Intensity 1 The product of the available heat of combustion per unit of ground and the rate of spread of the fire, interpreted as the heat released per unit of time for each unit length of fire edge. The primary unit is Btu

per second per foot (Btu/sec/ft) of fire front. 2 The rate of heat release per unit time per unit length of fire front. Numerically, it is the product of the heat yield, the quantity of fuel consumed in the fire front, and the rate of spread.

Foehn Wind A warm, dry and strong general wind that flows down into the valleys when stable, high pressure air is forced across and then down the lee slopes of a mountain range. The descending air is warmed and dried due to adiabatic compression producing critical fire weather conditions. Locally called by various names such as Santa Ana winds, Devil winds, North winds, Mono winds, etc.

Forest Fire Various defined for legal purposes (e.g., the State of California Public Resources Code: uncontrolled fire on lands covered wholly or in part by timber, brush, grass, grain, or other flammable vegetation). Types of fires are ground, surface, and crown.

Fuel Any combustible material, especially petroleum-based products and wildland fuels.

Fuel Condition Relative flammability of fuel as determined by fuel type and environmental conditions.

Fuel Management Act or practice of controlling flammability and reducing resistance to control of wildland fuels through mechanical, chemical, biological, or manual means, or by fire, in support of land management objectives.

General Circulation Model (GCM) See *Climate model*.

Geologic Time Time as considered in terms of the history of the earth. It is divided into geologic eras, periods, and epochs. Depending on the part of the geologic time scale, increments are as long as tens of millions of years or as short as hundreds of years. In general, geologic time is more finely divided closer to the present.

Greenhouse Effect the heating of the earth's surface by both atmospheric infrared radiation and incoming solar radiation.

Greenhouse effect *Greenhouse gases* effectively absorb *thermal infrared radiation*, emitted by the Earth's surface, by the *atmosphere* itself due to the same gases, and by clouds. Atmospheric radiation is emitted to all sides, including downward to the Earth's surface. Thus, greenhouse gases trap heat within the surface-*troposphere* system. This is called the *greenhouse effect*. Thermal infrared radiation in the troposphere is strongly coupled to the temperature of the atmosphere at the altitude at which it is emitted. In the troposphere, the temperature generally decreases with height. Effectively, infrared radiation emitted to space originates from an altitude with a temperature of, on average, -19°C , in balance with the net incoming *solar radiation*, whereas the Earth's surface is kept at a much higher temperature of, on average, $+14^{\circ}\text{C}$. An increase in the concentration of greenhouse gases leads to an increased infrared opacity of the atmosphere, and therefore to an effective radiation into space from a higher altitude at a lower temperature. This causes a *radiative forcing* that leads to an enhancement of the greenhouse effect, the so-called *enhanced greenhouse effect*.

Greenhouse gas (GHG) Greenhouse gases are those gaseous constituents of the *atmosphere*, both natural and *anthropogenic*, that absorb and emit radiation at specific wavelengths within the spectrum of *thermal infrared radiation* emitted by the Earth's surface, the atmosphere itself, and by clouds. This property causes the *greenhouse effect*. Water vapour (H_2O), *carbon dioxide* (CO_2), nitrous oxide (N_2O), methane (CH_4) and *ozone* (O_3) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely human made greenhouse gases in the atmosphere, such as the *halocarbons* and other chlorine- and bromine-containing substances, dealt with under the *Montreal Protocol*. Beside CO_2 , N_2O and CH_4 , the *Kyoto Protocol* deals with the greenhouse gases sulphur hexafluoride (SF_6), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

Greenhouse gases Those gases, such as water vapor, carbon dioxide, ozone, methane, nitrous oxide, and chlorofluorocarbons, that are fairly transparent to the short wavelengths of solar radiation but efficient at absorbing the longer wavelengths of the infrared radiation emitted by the earth and atmosphere. The trapping of

heat by these gases controls the earth's surface temperature despite their presence in only trace concentrations in the atmosphere. Anthropogenic emissions are important additional sources for all except water vapor. Water vapor, the most important greenhouse gas, is thought to increase in concentration in response to increased concentrations of the other greenhouse gases as a result of feedbacks in the climate system.

Haines Index An atmospheric index used to indicate the potential for wildfire growth by measuring the stability and dryness of the air over a fire.

Holocene The Holocene geological epoch is the latter of two *Quaternary* epochs, extending from about 11.6 ka to and including the present.

Incident An occurrence either human-caused or natural phenomenon, that requires action or support by emergency service personnel to prevent or minimize loss of life or damage to property and/or natural resources.

Industrial revolution A period of rapid industrial growth with far reaching social and economic consequences, beginning in Britain during the second half of the eighteenth century and spreading to Europe and later to other countries including the United States. The invention of the steam engine was an important trigger of this development. The industrial revolution marks the beginning of a strong increase in the use of fossil fuels and emission of, in particular, fossil *carbon dioxide*. In this report the terms *pre-industrial* and *industrial* refer, somewhat arbitrarily, to the periods before and after 1750, respectively.

Keetch-Byram Drought Index (KBDI) An estimate (0-800) of the amount of precipitation (in 100ths of inches) needed to bring the top 8 inches of soil back to saturation. A value of 0 is complete saturation of the soil, a value of 800 means 8.00 inches of precipitation would be needed for saturation. In the 1988 version of NFDRS, outputs of KBDI are used to adjust live and dead fuel loadings.

Land Use Plan A set of decisions that establish management direction for land within an administrative area; an assimilation of land-use-plan-level decisions developed through the planning process regardless of the scale at which the decisions were developed.

Land/Resource Management Plan (L/RMP) A document prepared with public participation and approved by an agency administrator that provides general guidance and direction for land and resource management activities for an administrative area. The L/RMP identifies the need for fire's role in a particular area and for a specific benefit. The objectives in the L/RMP provide the basis for the development of fire management objective and the fire management program in the designated area.

Large Fire For statistical purposes, a fire burning more than a specified area of land e.g., 300 acres. 2 A fire burning with a size and intensity such that its behavior is determined by interaction between its own convection column and weather conditions above the surface.

Lightning Fire Wildfire caused directly or indirectly by lightning.

Long-Range Forecast Fire weather forecast for a period greater than five days in advance.

Long-Term Fire Danger The results of those factors in fire danger affecting long-term planning; involves consideration of past records and conditions and probable future trends.

Long wave (also called planetary wave) With regard to atmospheric circulation, a wave in the major belt of westerlies that is characterized by large length and significant amplitude. The wave length is typically longer than that of the rapidly moving individual cyclonic and anticyclonic disturbances of the lower troposphere. The angular wave number of long waves is generally taken to be from 1 to 5. Compare short wave; see Rossby wave

Macroclimate General large-scale climate of a large area or country as distinguished from smaller scale mesoclimate and microclimate.

Mathematical Model A model that is a quantitative and mathematical representation or simulation which attempts to describe the characteristics or relationship of physical events.

Model A simplified or generalized representation of reality; a description, analogy, picture, or hypothesis to help visualize something that cannot be directly observed.

Medieval Warm Period (MWP) An interval between AD 1000 and 1300 in which some Northern Hemisphere *regions* were warmer than during the *Little Ice Age* that followed.

Modes of climate variability Natural variability of the *climate system*, in particular on seasonal and longer time scales, predominantly occurs with preferred spatial patterns and time scales, through the dynamical characteristics of the atmospheric circulation and through interactions with the land and ocean surfaces. Such patterns are often called *regimes*, *modes* or *teleconnections*. Examples are the *North Atlantic Oscillation* (NAO), the *Pacific-North American pattern* (PNA), the *El Niño-Southern Oscillation* (ENSO), the *Northern Annular Mode* (NAM; previously called Arctic Oscillation, AO) and the *Southern Annular Mode* (SAM; previously called the Antarctic Oscillation, AAO). Many of the prominent modes of climate variability are discussed in section 3.6. See also *Patterns of climate variability*.

National Fire Danger Rating System (NFDRS) A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels. *see also*: Fire Danger Rating System

Normal Fire Season 1 A season when weather, fire danger, and number and distribution of fires are about average. 2 Period of the year that normally comprises the fire season based on historical fire occurrence.

Normalized Difference Vegetation Index (NDVI) A satellite observation-derived value that is sensitive to vegetative growth, measured at 1.1 km (0.6 mile) spatial and 1 week temporal scales.

North Atlantic Oscillation (NAO) The North Atlantic Oscillation consists of opposing variations of barometric pressure near Iceland and near the Azores. It therefore corresponds to fluctuations in the strength of the main westerly winds across the Atlantic into Europe, and thus to fluctuations in the embedded cyclones with their associated frontal systems

Organic Matter That fraction of the soil that includes plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synthesized by the soil population.

Organic Soil Any soil or soil horizon containing at least 30% organic matter (e.g., muck, peat).

Orographic Pertaining to, or caused by mountains.

Pacific decadal variability Coupled decadal-to-inter-decadal variability of the atmospheric circulation and underlying ocean in the Pacific Basin. It is most prominent in the North Pacific, where fluctuations in the strength of the winter Aleutian Low pressure system co-vary with North Pacific *sea surface temperatures*, and are linked to decadal variations in atmospheric circulation, sea surface temperatures and ocean circulation throughout the whole Pacific Basin. Such fluctuations have the effect of modulating the *El Niño-Southern Oscillation* cycle. Key measures of Pacific decadal variability are the *North Pacific Index (NPI)*, the *Pacific Decadal Oscillation (PDO)* index and the *Inter-decadal Pacific Oscillation (IPO)* index

Palaeoclimate *Climate* during periods prior to the development of measuring instruments, including historic and geologic time, for which only *proxy* climate records are available.

Paleoclimate (Or geological climate) Climate for periods prior to the development of measuring instruments, including historic and geologic time, for which only proxy climate records are available.

Palmer Drought Severity Index (PDSI) An index formulated by Palmer (1965) that compares the actual amount of precipitation received in an area during a specified period with the normal or average amount expected during that same period. The PDSI is based on a procedure of hydrologic or water balance accounting by which excesses or deficiencies in moisture are determined in relation to average climatic values. Values taken into account in the calculation of the index include precipitation, potential and actual evapotranspiration, infiltration of water into a given soil zone, and runoff. This index builds on Thornthwaite's work (1931, 1948), adding 1) soil depth zones to better represent regional change in soil water-holding capacity; and 2) movement between soil zones and, hence, plant moisture stress, that is, too wet or too dry.

Permafrost A short term for "permanently frozen ground"; any part of the earth's crust, bedrock, or soil mantle that remains below 32° F (0° C) continuously for a number of years.

Projection A projection is a potential future evolution of a quantity or set of quantities, often computed with the aid of a model. Projections are distinguished from *predictions* in order to emphasize that projections involve assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realised, and are therefore subject to substantial *uncertainty*.

Radiative forcing Radiative forcing is the change in the net, downward minus upward, irradiance (expressed in $W m^{-2}$) at the *tropopause* due to a change in an external driver of *climate change*, such as, for example, a change in the concentration of *carbon dioxide* or the output of the Sun. Radiative forcing is computed with all tropospheric properties held fixed at their unperturbed values, and after allowing for stratospheric temperatures, if perturbed, to readjust to radiative-dynamical equilibrium. Radiative forcing is called *instantaneous* if no change in stratospheric temperature is accounted for. For the purposes of this report, radiative forcing is further defined as the change relative to the year 1750 and, unless otherwise noted, refers to a global and annual average value. Radiative forcing is not to be confused with *cloud radiative forcing*, a similar terminology for describing an unrelated measure of the impact of clouds on the irradiance at the top of the *atmosphere*.

Rate of Spread The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history.

Red Flag Warning Term used by fire weather forecasters to alert forecast users to an ongoing or imminent critical fire weather pattern.

Regime A regime is preferred states of the *climate system*, often representing one phase of dominant patterns or *modes of climate variability*.

Risk 1 The chance of fire starting as determined by the presence and activity of causative agents. 2 A chance of suffering harm or loss. 3 A causative agent. 4 (NFDRS) A number related to the potential of firebrands to which a given area will be exposed during the rating day.

Risk Management (RM) A continuous, five-step process that provides a systematic method for identifying and managing the risks associated with any operation.

Rossby wave (Also called planetary wave) A wave on a uniform current in a two-dimensional nondivergent fluid system, rotating with varying angular speed about the local vertical (beta plane). A stationary Rossby wave is thus of the order of the distance between the large-scale semipermanent troughs and ridges in the middle troposphere. The Rossby wave moves westward relative to the current, in effect slowing the eastward movement of long-wave components relative to the short-wave components in a barotropic flow. See long wave.

Scenario A plausible and often simplified description of how the future may develop, based on a coherent and internally consistent set of assumptions about driving forces and key relationships. Scenarios may be derived from *projections*, but are often based on additional information from other sources, sometimes combined with a *narrative storyline*. See also *SRES scenarios*; *Climate scenario*; *Emission scenario*.

Significant Fire Event An event measured by the occurrence of fire(s) that requires mobilization of additional resources from outside the fire event area.

Significant Fire Potential The likelihood a wildland fire event will require mobilization of additional resources from outside the area in which the fire situation originates.

SRES scenarios SRES scenarios are *emission scenarios* developed by Nakićenović and Swart (2000) and used, among others, as a basis for some of the *climate projections*.

Solar radiation Electromagnetic radiation emitted by the Sun. It is also referred to as *shortwave radiation*. Solar radiation has a distinctive range of wavelengths (spectrum) determined by the temperature of the Sun, peaking in visible wavelengths. See also: *Thermal infrared radiation*, *Insolation*.

Stand Replacing Fire Fire which kills all or most of the living overstory trees in a forest and initiates forest succession or regrowth. Also explicitly describes the nature of fire in grasslands and some shrublands.

Synoptic Literally, at one time. Thus, in meteorological usage, the weather conditions over a large area at a given point in time.

Synoptic 1. In general, pertaining to or affording an overall view. In meteorology, this term has become somewhat specialized in referring to the use of meteorological data obtained simultaneously over a wide area for the purpose of presenting a comprehensive and nearly instantaneous picture of the state of the atmosphere. Thus, to a meteorologist, “synoptic” takes on the additional connotation of simultaneity. 2. A specific scale of atmospheric motion with a typical range of many hundreds of kilometers, including such phenomena as cyclones and tropical cyclones.

Synoptic Chart In meteorology, any chart or map on which data and analyses are presented that describe the state of the atmosphere over a large area at a given moment in time.

Teleconnection 1. A linkage between weather changes occurring in widely separated regions of the globe. 2. A significant positive or negative correlation in the fluctuations of a field at widely separated points. Most commonly applied to variability on monthly and longer timescales, the name refers to the fact that such correlations suggest that information is propagating between the distant points through the atmosphere.

Total solar irradiance (TSI) The amount of *solar radiation* received outside the Earth’s *atmosphere* on a surface normal to the incident radiation, and at the Earth’s mean distance from the Sun. Reliable measurements of solar radiation can only be made from space and the precise record extends back only to 1978. The generally accepted value is 1,368 W m⁻² with an accuracy of about 0.2%. Variations of a few tenths of a percent are common, usually associated with the passage of *sunspots* across the solar disk. The *solar cycle* variation of TSI is of the order of 0.1% (AMS, 2000). See also *Insolation*.

Uncertainty An expression of the degree to which a value (e.g., the future state of the *climate system*) is unknown. Uncertainty can result from lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from quantifiable errors in the data to ambiguously defined concepts or terminology, or uncertain *projections* of human behaviour. Uncertainty can therefore be represented by quantitative measures, for example, a range of values calculated by various models, or by qualitative

statements, for example, reflecting the judgment of a team of experts (see Moss and Schneider, 2000; Manning et al., 2004).

United Nations Framework Convention on Climate Change (UNFCCC) The Convention was adopted on 9 May 1992 in New York and signed at the 1992 Earth Summit in Rio de Janeiro by more than 150 countries and the European Community. Its ultimate objective is the 'stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'. It contains commitments for all Parties. Under the Convention, Parties included in Annex I (all OECD countries and countries with economies in transition) aim to return *greenhouse gas* emissions not controlled by the *Montreal Protocol* to 1990 levels by the year 2000. The convention entered in force in March 1994.

Variable Any changing characteristic; in statistics, a measurable characteristic of an experimental unit.

Wave A disturbance that transfers energy from one point to another point and may take the form of a deformation of pressure or temperature. In the atmosphere such disturbances may result in major storms or merely result in changes in cloud, wind and temperature conditions. Development of a wave on a front usually slows the advance of the front due to transfer of energy to the wave development and movement.

Wildfire An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out. *see also*: Uncontrolled Fire Wildland Fire

Wildland An area in which development is essentially non-existent, except for roads, railroads, powerlines, and similar transportation facilities. Structures, if any, are widely scattered.

Wildland Fire Any non-structure fire that occurs in the wildland. Three distinct types of wildland fire have been defined and include wildfire, wildland fire use, and prescribed fire. *see also*: Prescribed Fire Wildfire Wildland Fire Use

Wildland Urban Interface (WUI) The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Younger Dryas A period 12.9 to 11.6 kya, during the deglaciation, characterized by a temporary return to colder conditions in many locations, especially around the North Atlantic.