Insights from Long-term, regional to Global Fire History:
Progress in Using Tree Rings & Charcoal Paleofire Proxies

Invited Presentation at AAAS Meeting, San Diego CA, February 18,2010

Thomas W. Swetnam

Professor and Director, Laboratory of Tree-Ring Research, University of Arizona, Tucson, AZ, USA.

Abstract:

Extensive networks of regional- to global-scale fire histories are useful for understanding past fire climatology and assessing modern changes within a long-term context. These perspectives are increasingly important as the planet is warming and broad-scale patterns of biomass burning are changing. Studies using modern history data sets indicate that rising areas burned and incidence of "megafires" in recent decades is probably linked with warming trends and droughts. The strongest evidence to date for these linkages is from regions of Canada and the western United Sates. Recent warming, drought and fire trends are probably also related in Australia, Siberia and the Mediterranean region. Long-term studies ("paleofire") involving fire scar/tree-ring or charcoal/sediment records can be very useful in improving our understanding of fire regime responses to climate variability and human land uses. Paleofire network studies are particularly effective for these purposes. New studies of a global network of charcoal concentrations in sediments (from lakes, bogs, and soils) indicate rising trends of biomass burning over the past millennium, and peaking during the past century (Power et al. 2008, Marlon et al. 2009). The most extensive fire-scar/tree-ring network analyzed so far is a set of 238 chronologies from western North America (Kitzberger et al., 2007). To further advance fire climatology "multiproxy" paleofire studies are needed, wherein charcoal and tree-ring records are used as multiple lines of evidence, and fire climate relations are tested at resolutions of years to millennia. A recent comparison of this sort, using fire scars in giant sequoias and charcoal in wet meadows from the Sierra Nevada, California, indicates a multi-millennia-scale fire frequency maxima occurred during a warm, drought-prone period from circa 800 to 1300 C.E.

Thomas W. Swetnam
Professor & Director
Laboratory of Tree-Ring Research
University of Arizona
Tucson, AZ, USA 85721
Phone: 520-621-2112
Email: tswetnam@ltrr.arizona.edu