OCCURRENCE OF SEVERE DROUGHT CONDITIONS IN COASTAL SOUTHERN CALIFORNIA DURING THE MEDIEVAL CLIMATE ANOMALY INFERRED FROM POLLEN DEPOSITED IN THE SANTA BARBARA BASIN SINCE ~AD 800

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Pollen analyses of the upper 3.95 m from ODP Site 893B from the Santa Barbara Basin (SBB) provide proxy evidence for major climate-driven changes in the vegetation onshore between ~AD 800 and AD 1800. Dominance of plant communities adapted to drought conditions of hot, dry southern California summers (chamise chaparral and coastal sage scrub) corresponds with increases in the duration and severity of western U.S. drought identified by Stine (1994) and Cook et al. (2004) and with MacDonald and Case's (2005) interpretation of more negative Pacific Decadal Oscillation variability during the Medieval Climate Anomaly. Extreme drought conditions occur during a period of multi-decadal drought recorded by the high resolution-Ti record between AD 1000-1100 (^{14}C corrected) (Hendy et al., 2011). The shift toward wetter, cooler conditions at ~AD 1400 (an increase in more mesic oak and pine communities such as scrub oak and pine woodland chaparral, or more open grass woodland) coincides with temperature changes in the waters offshore. Correlative diatom and planktonic foraminifera deposited in the SBB during the Little Ice Age suggest increased seasonal sea surface temperature changes with cooler winters and warmer springs, respectively (Barron et al., 2010; Fisler and Hendy, 2008). The distinctive signature of the 19th and 20th century pollen assemblages reflects agricultural and residential impact on the natural vegetation of southern coastal California following European settlement.

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TWENTY-FIVE YEARS OF CO-EVOLUTION OF DENDROCLIMATOLOGY AND PACLIM

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Referring to the late 1970s, Hughes et al. (2011) recently wrote that "From today's viewpoint, it is difficult to imagine how little was known about interannual- to century-scale variability in the climate system at that time, with published sketches of the spectrum of climate variability exhibiting little or no power between bidecadal and millennial frequencies". The first of what became the PACLIM multidisciplinary workshops was held at Asilomar just a few years later in 1984. The scientific programs of these workshops track a rapid evolution of understanding of the climate system on time-scales of relevance to society, the landscape, the oceans and ecological systems. The pioneering dendroclimatological work of Harold Fritts, dealt with geographic and time domains of interest to PACLIM. In the past 25 years, Fritts' contributions have been built upon by his students and colleagues. Not only has this approach been expanded to cover much of the globe, and enhanced to provide more process-based understanding of climate and its impacts, but it has provided an example of the multidisciplinary approach so characteristic of PACLIM. Drought, streamflow, fire climatology, circulation indices, and extreme climatic events have all figured in the contributions dendroclimatology has made to understanding of the climate system and its interactions with society, the biosphere, and the geosphere over the Pacific-Western Americas domain.

Hughes, M.K., Swetnam, T.S., Diaz, H.F., ed. 2011. Dendroclimatology: Progress and Prospects: Springer, Dordrecht, xii + 365 pp.

ENVIRONMENTAL AND BIOTIC CHANGE AT THE NANODIAMOND DATUM: THE YOUNGER DRYAS BOUNDARY IMPACT HYPOTHESIS

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The onset of the Younger Dryas (YD) cool episode is marked by a diverse assemblage of abundant nanodiamonds at the YD boundary layer (YDB) that forms a widely correlated datum across North America and Western Europe. This evidence is consistent with a high-temperature cosmic impact event at 12,900 +/− 100 cal yr BP The YDB is marked by a complex and broad array of abrupt and potentially linked changes in atmospheric and oceanic circulation, ice sheets, North American continental hydrosphere, the biosphere including extinctions, and human adaptations, and possible population reductions and reorganization. The cause of the YD is controversial and currently debated, yet any causal hypothesis needs to account for these changes. We will review and challenge recent contributions that have questioned evidence for an impact event at the YD onset. Younger Dryas cooling is enigmatic in its timing, magnitude and abruptness at near-peak insolation. Such cooling episodes with YD characteristics and timing in earlier terminations appear more affiliated with terminal glacial episodes. Younger Dryas onset is also outstanding because of close collective association with major, abrupt continental-scale ecological reorganization, megafaunal extinction, and human adaptive and population change.
Climate change at the YD onset was remarkably abrupt (~one year) suggesting atmospheric climate response preceded oceanic change. A major North American hydrographic reorganization, apparently associated with destabilization of ice sheet margins, was marked by abrupt switch in flow from the south to northern oceans. This outburst flooding may have coincided with major drainage of Lake Agassiz. Associated outburst floods affected widely separated areas of the Arctic. The most pronounced oceanic effect was change in meridional overturning.
Major responses recorded in temperate environments include widespread evidence of biomass burning, changes in sediment deposition including a layer with diverse exotic materials interpreted to be of cosmic impact origin, broad continental vegetation disruption, abrupt megafaunal extinction, and genetic bottlenecks reflecting population declines and/or animal migrations. The North American human record suggests abrupt disappearance of the Clovis culture, a human genetic bottleneck, and a widespread archeological gap during the early centuries of the YD cooling episode.

EFFECTS OF BASELINE CONDITIONS ON THE SIMULATED HYDROLOGIC RESPONSE TO PROJECTED CLIMATE CHANGE: A CASE STUDY OF THE ALMANOR CATCHMENT, NORTH FORK OF THE FEATHER RIVER BASIN, CALIFORNIA

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