The October 2007 Southern California Fires and Global Warming: Setting the Record Straight

In the wake of the news regarding the catastrophic Southern California fires and the CBS News *60 Minutes* feature entitled "The Age Of Mega-Fires," which aired Sunday, October 21, 2007, we have received many requests for information regarding the connection between global warming and the ongoing California fires. In this fact sheet, we set forth our best understanding.

No clear associations between temperature and wildfire occurrence in Southern California's coastal *chaparral* ecosystems have been demonstrated. The recent and tragic Southern California fires in chaparral-dominated landscapes cannot yet be unambiguously related to climate change, given our current understanding of climate science. At present, the connection between global warming, Santa Ana winds, and extremely low Southern California precipitation last winter are not known with sufficient certainty to conclusively link global warming with this disaster.

The connection between global warming and the long-term increase in fire activity is relatively strong across the mid-elevation *forests* of Alaska, Canada, and parts of the western United States, where observed data show clear temperature and fire trends. For Southern California's coastal *chaparral* ecosystems, however, the fire record shows occasional large fire years, but no statistically significant trends. As described in the August 2006 research article by Westerling et al. (*Science,* Volume 313), there is a strong connection, at the broad scale of the western United States, between observed increases in spring through fall temperatures and more frequent large forest fires – that is, fires burning more than 1,000 acres. The connection is strongest in the northern half of the West. Furthermore, most large forest fire occurrences are closely associated with earlier springtime snowmelt in western mountain ranges.

A possible connection between Southern California fires over the past decade, including the current fires, and climate change depends on the extent to which the ongoing drought in the greater Southwest may be related to climate change. Some researchers suggest that the extent and severity of the recent drought may be related to warming-driven early snowmelt, northward retreat of winter storm tracks, and expansion of desiccating subtropical high pressure into the southern mid-latitude locations, such as the southwestern United States (Seagar et al. 2007; *Science*, Volume 316). Climate model projections suggest that with rising greenhouse gas concentrations in the atmosphere, these phenomena will become increasingly likely in the future.

A 2006 study suggests that Santa Ana wind occurrences may become more frequent in November and December, given further temperature increases associated with continued high rates of greenhouse gas emissions (Miller and Shlegel; *Geophysical Research Letters,* Volume 33). Modeling experiments in this study showed that when compared to the historical record, the frequency of *October* Santa Ana wind conditions increased only in some projected greenhouse gas/warming scenarios.

These recent events highlight how development in or near wildland areas is increasing vulnerability to wildfire at a time when changes in climate may lead to increased wildfire risks in many ecosystems.

Submitted by Thomas Swetnam (University of Arizona), Anthony Westerling (University of California, Merced), and Gregg Garfin (University of Arizona).