



Research Brief for Resource Managers

Release:

September 2012

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Model Forecasts of a Seasonal Shift in Santa Ana Winds

Miller, N. L. and N. J. Schlegel. 2006. Climate change projected fire weather sensitivity: California Santa Ana wind occurrence. *Geophysical Research Letters* 33:L15711.

In this study, two atmosphere-ocean general circulation models (AOGCM) were used, one low temperature sensitive and one middle temperature sensitive, each under both low and high future emissions scenarios: atmospheric CO₂ levels of 550 ppm (B1) & 830 ppm (A2). Modeling three time periods from 2005 – 2034, 2035-2064, and 2069 – 2098, researchers from the University of California, Berkeley, found shifts in the number of Santa Ana Occurrences (SAO) from fall to wintertime.

Foehn winds like the Santa Anas in southern California and the Diablo winds in northern California happen predominately in the fall, from September to December. They typically occur when there is 20hPa difference in pressure between the centers of a high-pressure system over the great Basin and an offshore Pacific low.

The results of a higher emission scenario (830 ppm CO₂) and a mid-temperature sensitivity model (Fig. 3) indicate a shift in such winds with decreases in occurrence from September through October, and a slight increase in December by the latter part of the 21st century. More specifically, there is a decrease modeled for December from 2005 to 2034, but a significant increase from 2070 to 2099. The other scenarios showed similar trends.

Management Implications

- With increased emissions and higher temperatures, Santa Ana Occurrences (SAO) are modeled to shift from fall to winter. The net effect of a seasonal shift in SAO on wildfire occurrence will depend on the interaction with other climate changes in temperature, precipitation, and live fuel moisture.

The authors speculate on potential impacts of such a shift on future wildfires, suggesting a significant increase in wildfire losses [editor’s note: alternatively, future losses may be much less since later winds would increase the probability of fall rains occurring before Santa Ana winds and thus diminish fire hazard.

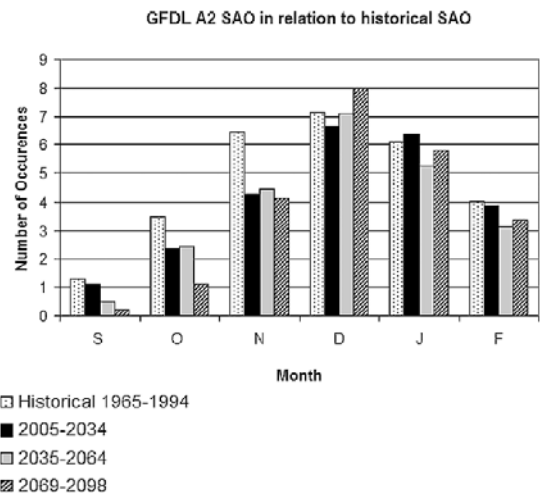


Figure 3. AOGCM-derived SAO sensitivity with GFDL A2 pressure and humidity for 2005–2034, 2035–2064, and 2070–2099 compared to 1965–1994.