

# La Niña Stokes Southwestern Forest Fires

As wildfires rage through the western United States each year, officials long for a way to determine months in advance whether the next fire season will bring severe blazes. In years to come, forest managers in the Southwest may look for such a warning in the middle of the Pacific Ocean.

Two researchers have found a strong correlation between Pacific weather conditions and the spread of fires months later in Arizona and New Mexico. The most extensive forest fires in this region have struck predominantly during a weather phenomenon known as a La Niña, which occurs when surface water in the central Pacific turns unusually cold for a year or more. In contrast, relatively minor southwestern fires have developed

during El Niño periods, when the mid-Pacific turns warmer than normal, report Thomas W. Swetnam from the University of Arizona and Julio L. Betancourt from the U.S. Geological Survey.

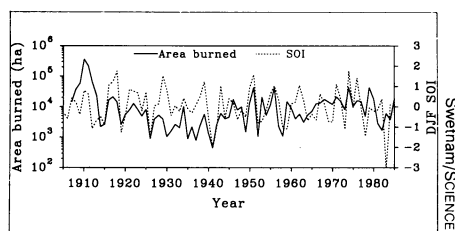
The Tucson-based scientists sifted through fire statistics going back to 1905 for national forests in the Southwest and compared them with wintertime fluctuations in the Southern Oscillation — a record of air pressure over the central Pacific that can serve as an indicator for El Niño or La Niña conditions.

To gauge the extent of pre-1905 fires, the researchers also studied fire scars on 315 trees throughout the Southwest, obtaining a biological record stretching back to 1700. Since the Southern Oscillation record goes back no farther than the

1860s, they used historical information from Peru (typically pounded by heavy rains during an El Niño) to identify El Niño periods before that.

The Southern Oscillation strongly influences weather in the tropics, and its effects ripple through many other parts of the world. During El Niño years, the Southwest usually experiences wet falls and wet springs, with reduced burning during late spring, when fires are most common there. Conversely, the region often suffers severe winter-spring droughts followed by extensive fires during strong La Niña years, the researchers report in the Aug. 31 SCIENCE.

The La Niña-fire connection does not hold up perfectly for each year, they note. For example, the Southwest suffered abnormally large fires this year even though the Pacific air pressure pattern remained near normal last winter. But Swetnam says the relationship can still prove useful for officials planning “prescribed burns” or organizing fire-fighting efforts. “If we have a La Niña situation in winter months, I would say caution is advisable,” he asserts.



The area (in hectares) of forest burned each spring in Arizona and New Mexico closely matches the winter Southern Oscillation Index. Fires burned the most area when the index was high, indicating a La Niña. Less area burned when the index was low, marking an El Niño.

Daniel Winner, assistant director of fire management for the U.S. Forest Service in Albuquerque, N.M., agrees that the Southern Oscillation may help officials prepare. “It looks like this will give us more lead time to predict severe conditions,” he says. With the advance warning, managers might have ample time to request increased funding and resources, he notes.

Swetnam says the new findings also have important implications for theories about the development of forests and other ecosystems. Traditionally, ecologists have maintained that a forest’s character depends largely on internal factors, such as competition among tree species. But this study and others suggest that external factors, such as climate, also play a significant role in shaping an ecological community. — R. Monastersky

## Three Mile Island: Cancer risk ambiguous

A court-ordered study finds no “convincing evidence” of increased cancer risk among people exposed to radiation from the Three Mile Island nuclear power plant. But the long-awaited findings fall short of settling the issue.

The study looked for cancers possibly linked to the Pennsylvania facility, either from routine radioactive emissions since 1975 or from the 1979 accident there. The results remain statistically ambiguous: The authors don’t rule out a cancer correlation, nor do they find a significant rise in the cancers most likely to appear soon after radiation exposure.

Antinuclear activists, as well as many of the more than 2,000 lawsuit-filing area residents who claim the accident damaged their health, maintain the study has serious flaws. Some suspect that many radiation-linked cancers have yet to develop. But the researchers claim the data strongly suggest that belated increases, if any, will be very small.

The findings are “consistent with all the medical and scientific evidence we have so far,” says physicist Jacob I. Fabrikant of the University of California, Berkeley, who served on the staff of the 1979 presidential commission that investigated the accident. That panel concluded that the amount of radiation released during the mishap was a fraction of the region’s normal annual background radiation from cosmic and geologic sources, and it predicted a maximum of one excess cancer death from the accident.

The new study, financed by a court-appointed fund created in the accident’s aftermath, was led by Maureen C. Hatch of the Columbia University School of Public Health in New York City. Her team used a mathematical model and dosime-

ter readings to estimate neighborhood radiation exposures for the nearly 160,000 people living within a 10-mile radius of the plant. They also obtained regional hospital records documenting 5,493 cancer diagnoses between 1975 and 1985.

High-exposure areas did not show significant increases in adult leukemias or in any childhood cancers. But because of the small numbers of people with some cancers, the true risk remains “indeterminate,” the researchers say. Indeed, because of statistical uncertainties, the study’s cancer risk estimates “are compatible with no association as well as with quite strong associations” in some categories, they write in the September AMERICAN JOURNAL OF EPIDEMIOLOGY.

Unexpectedly, the study reveals that high-exposure areas show significant increases in non-Hodgkins lymphoma, a cancer not generally associated with radiation exposure. It also reveals higher-than-expected rates of lung cancer — which, unlike leukemia and childhood cancers, usually takes many years to develop. The researchers suggest both increases are probably due to statistical flukes or to unrelated factors such as radon exposure or occupational hazards.

Activists and some scientists note that because the study relied on data from area hospitals, it may have missed substantial numbers of people who became ill after moving away from the region or who sought care in distant cancer centers. Critics also say that by lumping as many as 9,500 people in some exposure categories, the study may have diluted evidence of small cancer “hotspots.”

So far, no funds have been allocated for a more detailed analysis or longer follow-up, Hatch says. — R. Weiss