

## West Coast erosion -- a sign of warming?

*The entire U.S. West Coast took a dramatic beating from the El Niño episode that ended last year, a new study reveals, as powerful waves gouged away chunks of shoreline at far higher levels than previously measured.*

**Pat Brennan, Orange County Register, 7-13-11**

The entire U.S. West Coast took a dramatic beating from the El Niño episode that ended last year, a new study reveals, as powerful waves gouged away chunks of shoreline at far higher levels than previously measured.

And while El Niño remains a regional phenomenon, the study's lead author says such episodes, along with strong waves and high water, could become more frequent as the planet warms in the decades ahead.

"What we're really saying is that this is a glimpse of what could be coming in terms of the severity of winter waves of the future," said the author, U.S. Geological Survey coastal geologist Patrick Barnard. "We need obviously to be prepared."

The study relied on "lidar" measurements – laser readings taken by plane – as well as ground measurements in several of the study sites to compare the effects of the 2009-10 El Niño to those of another such episode in 1997-98.

Researchers from USGS, the Scripps Institution of Oceanography, the University of California, Santa Cruz and Oregon State University, among others, supplied enough data for the 13-year period to profile the coast from San Diego to Seattle.

They found that winter wave energy was 20 percent larger on average for the period, shoreline erosion 36 percent larger.

Orange County beaches were not directly measured, although Barnard said he was confident O.C. experienced similar levels of beach erosion as the rest of the West Coast based on proxy measurements from Camp Pendleton and Torrey Pines to the south.

The culprit was a "pseudo El Niño," also known by the Japanese term, Modoki El Niño. In such an episode, central equatorial Pacific waters warm, while a classic El Niño warms the waters of the eastern equatorial Pacific.

The link between Modoki El Niño episodes and global climate change is so far uncertain, Barnard said, though there are indications of a connection.

"A lot of research suggests this is related to global warming," he said. "The general consensus is that these events will become more frequent."

In any case, the effects are no less damaging.

"Is the central-equatorial El Niño just as severe as the classic ones?" he said. "What we've shown, by comparing the effects, is that it's even more severe, especially in California."

Among the most serious effects detailed in the study was the erosion of Ocean Beach in San Francisco, where the shoreline retreated some 184 feet – 75 percent more than in a typical winter.

It caused part of a roadway to collapse, requiring \$5 million in repairs.

Southern California beaches recovered moderately well from the erosion, Barnard said, though they recovered poorly farther north.

The El Niño Modoki pattern could push sea level 20 centimeters higher – perhaps intensifying effects from sea level rise as well as a possible increase in storm frequency that climate scientists say could result from the expected warming in decades to come.

"So, say, 50 years from now, the baseline could be some tens of centimeters higher," he said.

The measurements over 13 years leave little doubt that the erosion is real, he said.

"There are so many measurements over such a wide area, we're very confident it's representative of what's happening," he said. "It's not just a local site behaving in a funky way. We have a bunch of sites showing the same thing."

The study was published July 9 in the science journal, "Geophysical Research Letters."