

Why Sea Levels Fell, Only to Rise Again

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Douglas Main, OurAmazingPlanet, 10-10-12

From the beginning of 2010 until mid-2011, the average level of the world's oceans dropped by 0.2 inches (5 millimeters). But how could this happen when average sea levels have been rising for decades?

A study published Oct. 4 in the journal *Geophysical Research Letters* found that the decline was due to an enormous increase in the amount of rainfall in Australia, northern South America and Southeast Asia, which transferred a significant amount of water from the oceans to the land.

This increase in rainfall was in turn driven by a return to La Niña conditions, the climate pattern marked by cooler-than-average surface temperatures in the tropical Pacific, which has far-reaching consequences for climate and weather patterns around the globe.

No ordinary La Niña

Typically, much of the globe's rainfall happens over the ocean and evaporated seawater returns from whence it came. But thanks to La Niña, much of that rain fell over land during the time the climate pattern was in place, said study author Carmen Boening, a researcher at NASA's Jet Propulsion Laboratory in Pasadena, Calif.

And this was no ordinary La Niña — it was the strongest this weather pattern has been in the last six decades, Boening told *OurAmazingPlanet*. Scientists don't know exactly why it was so much stronger than usual, but they've been able to see some of the impacts of that strength, including its effects on U.S. weather patterns and global sea levels.

The temporary fall in sea levels over the 2010-2011 time period led to abundant speculation by climate contrarians that sea level rise may not be a concern. But this study found that the decline in sea levels was temporary, and levels are already rising at the same average rate as before.

"It is important to recognize that this was a temporary effect," said John Church, an Australian climate scientist who wasn't involved in the study. "Much of this flood water has returned to the ocean and sea level has now returned to the trend line and globally the ocean volume is increasing at a rate of (0.1 inches) 3.1 millimeters per year," the same as before the decline.

The size of the decrease did surprise Boening and Church, however, and will help researchers better recognize the temporary changes in sea level that increased land-bound rainfall can render.

As Church said, rainfall returns to the sea rather quickly, usually in a year's time or less.

Satellites measure global average sea levels by bouncing microwaves off of the ocean at many points around the globe. A pair of twin satellites used for the study can also measure masses of water over land. The GRACE satellites, as they're known, follow an identical orbit around the Earth, and are tugged by minute changes in Earth's gravity fields, which are affected by large changes in mass like those caused by floods and droughts. By

Sea level rise is primarily driven by higher temperatures, which cause water to expand and melt glaciers and land ice around the world, increasing ocean volume, Boening said.

The most recent La Niña cycle first emerged in June 2010 and had a substantial impact on the extreme winter weather of 2010-2011. It finally ended in May 2011, but re-emerged at the end of summer and gathered strength as this past winter approached.

This summer, weather patterns returned to a neutral state, but there's a greater than 50 percent chance that weak El Niño conditions will develop this fall, according to the National Oceanic and Atmospheric Administration. El Niño is the counterpart to La Niña, characterized by warmer-than-average surface temperatures in the tropical Pacific. El Niño is linked to warmer and drier winters in the northern United States.