

EL NIÑO: WILL 2014 BE THE NEW 1997

Every ten days, the NASA/French Space Agency Jason-2 satellite maps all the world's oceans, monitoring changes in sea surface height, a measure of heat in the upper layers of the water. Because our planet is more than 70% ocean, this information is crucial to global forecasts of weather and climate.

Lately, Jason-2 has seen something brewing in the Pacific—and it looks a lot like a repeat of 1997. A pattern of sea surface heights and temperatures has formed that look similar to the way the Pacific looked in the spring of 1997 and that turned out to be the precursor of a big El Niño. What Jason-2 has been seeing is a series of "Kelvin waves"—massive ripples in sea level that travel across the Pacific from Australia to South America. Forecasters are paying close attention because these waves could be a herald of El Niño.

The two phenomena, Kelvin waves and El Niño, are linked by wind. **Pacific trade winds blow from east to west, pushing sun-warmed surface waters toward Indonesia. As a result, the sea level near Indonesia is normally 45 cm higher than it is near Ecuador.** Researchers call that area the "warm pool"—it is the largest reservoir of warm water on our planet.

Sometimes, however, trade winds falter for a few days or weeks, and some of that excess sea level ripples back toward the Americas. It is not unusual to see a couple of these Kelvin wave every winter.

El Niño happens when trade winds falter not just for days, but for many months. Then the Kelvin waves cross the Pacific like a caravan, raising sea level and leaving warmer equatorial waters in their wake.

We can't yet say for sure that an El Niño will develop in 2014, or how big it might be," cautions Mike McPhaden of NOAA's Pacific Environmental Research Laboratories in Seattle, "but the Jason-2 data support the El Niño Watch issued last month by NOAA."

In 1997/98 sea surface maps showed a whitish bump, indicating a sea level some 10 centimetres higher than usual, moving along the equator from Australia to South America. The same pattern appears to be repeating in 2014. A series of Kelvin waves generated by localized west wind bursts in the western Pacific that began in mid-January 2014 and are headed east. And a third weakening of the Pacific trade winds happened in mid-April.

Ocean and atmospheric scientists at NOAA and NASA are carefully monitoring the Pacific trade winds. The tipping point for declaring a significant El Niño will be an even longer lasting, larger collapse in Pacific trade winds, possibly signalling a shift in weather all around our planet. The downwelling phase of a strong oceanic Kelvin wave that began in January greatly increased the oceanic heat content during March and April, and produced large positive subsurface temperature anomalies across the central and eastern Pacific.

Collectively these atmospheric and oceanic conditions indicate a continued evolution toward El Niño.

AK, from NASA Notes

