# Tree rings open door on 1100 years of El Nino

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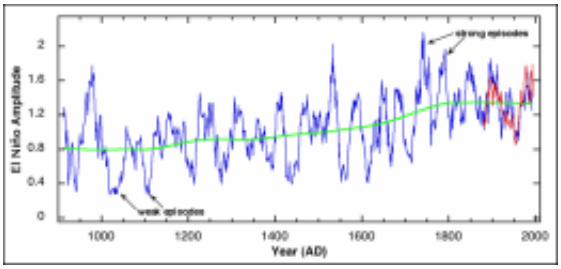


El Niño amplitude derived from North American tree rings (blue) and instrumental measurements (red). The green curve represents the long-term trend in El Niño strength. Amplitudes above 1.0 indicate periods of strong El Niño activity, which occurred about every 50-90 years.

(PhysOrg.com) -- El Nino and La Nina, the periodic shifts in Pacific Ocean temperatures, affect weather around the globe, and many scientists have speculated that a warming planet will make those fluctuations more volatile, bringing more intense drought or extreme rainfall to various regions.

Now, scientists have used tree-ring data from the American Southwest to reconstruct a 1,100-year history of the cycle that backs up that assertion. The researchers found a 50-90-year cycle of waxing and waning El Niño intensity that shows that, when the earth warms, the climate acts up.

“Our work revealed that the towering trees on the mountain slopes of the

U.S. Southwest and the colorful corals in the tropical Pacific both listen to the music of El Niño, which shows its signature in their yearly growth rings," explains Jinbao Li, the paper's lead author and a former PhD Student at Lamont-Doherty Earth Observatory.

The research, published May 6 in Nature Climate Change, will improve scientists' ability to predict future climate and the effects of global warming, the scientists say.

Bristlecone pines, such as this over 1,000-year-old tree in the Great Basin National Park, contributed to the tree ring record on El Niño. Credit: Gisela Speidel, IPRC

The temperature of the eastern tropical Pacific fluctuates between relative warm (El Niño) and relatively cold (La Niña) every 2 to 8 years, based on well-known instrumental records from the recent past. This is coupled with shifts in air surface pressure in the western Pacific – the Southern Oscillation. The patterns have a strong impact on the climate in many regions of the world, including the American Southwest: Warmer

sea surface waters lead to relatively wetter winters there, while the cooler La Niña leads to drier ones.

Until now, scientists have not had a detailed enough record to see the longer term fluctuations in the El Niño Southern Oscillation, or ENSO, spanning the past millennium. But tree ring samples taken from the U.S. Southwest provided a year-to-year account dating back 1,100 years. In those narrow cores, wider rings reflect wetter seasons and thinner rings the drier years.

The tree ring analysis corresponded several other records, including instrument readings for Pacific sea surface temperatures, isotope analysis of modern and relic corals from around the Pacific, and other climate reconstructions.

The record reveals an intriguing pattern: The variance between El Niño and La Niña becomes more pronounced in periods when the background temperature is warmer, and less so in cooler periods. The researchers found this cycle runs 50-90 years.

This connection between the overall temperature trend and the amplitude of the ENSO cycle could be interactive, with one enhancing the other. And that supports the idea that the continued warming of the climate may lead to enhanced ENSO variability and more extreme climate conditions around the globe.

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