

International Pacific Research Center

NEWS RELEASE

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UH MĀNOA RESEARCHERS PREDICT STRONG EL NIÑO BASED ON CONDITIONS IN THE INDIAN OCEAN

HONOLULU – An El Niño has been developing in the equatorial Pacific since early summer and will likely grow in strength over the next two months, according to the latest calculations of two researchers at the University of Hawai‘i at Mānoa’s climate center, the International Pacific Research Center (IPRC). Shang-Ping Xie, professor of meteorology, and H. Annamalai, an atmospheric scientist, base their prediction on something far away in the tropical Indian Ocean.

El Niño, the recurring climate phenomenon with unusual warm ocean temperatures in the equatorial Pacific Ocean, causes abnormal weather conditions around the globe. While it has been the “poster boy” of climate variability over the past 20-30 years, scientists mostly ignored the Indian Ocean thinking it showed too little variation to excite any interest.

This all changed in fall 1997 when scientists were stunned by rapid cooling of the normally warm Indian Ocean off Sumatra Island. This cooling of the eastern tropical Indian Ocean caught the curiosity of the climate community and drew many to study the Indian Ocean. They traced the unusual Indian Ocean cooling, dubbed Indian Ocean Dipole, to the big El Niño that was happening at the same time in the Pacific in 1997.

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The IPRC team, headed by Annamalai, went further in their research. In a study published last year in *Journal of Climate*, they looked into how such cooling in the eastern tropical Indian Ocean might impact El Niño and found that this unusual cooling weakens atmospheric convection over the region. This, in turn, sends atmospheric waves, called Kelvin waves, along the equator to the Pacific, and these waves cause anomalous westerly winds. It has been known for some time that such westerly wind anomalies are associated with a growing El Niño.

“Last month, we were alerted by colleagues in Japan of an imminent cooling in the eastern Indian Ocean,” Xie says. “We decided to gather more data on the past 35 years and found that when an El Niño was accompanied by an Indian Ocean cooling, there was a good chance that it would grow greatly in strength in the fall. For instance, the two super El Niños in 1982-83 and 1997-98 were both accompanied by unusual cooling in the eastern Indian Ocean. We suggest that it was these Indian Ocean conditions that powered the disturbances into the ‘El Niños of the century.’ Since 1997, there have been El Niño events in 2002 and 2004. Both were mediocre in strength, we believe, because they didn’t have the push for growth from the Indian Ocean.”

El Niño prediction is being routinely carried out at weather agencies around the globe, but intensity forecasts are generally poor. In fact, both the 1982 and 1997 super El Niños caught scientists by surprise as they were unfolding.

“This could be because many prediction models did not include the Indian Ocean or treated it inadequately,” Annamalai suggests. “We hope our results will help improve the accuracy of El Niño prediction. The ongoing El Niño is putting our hypothesis to the test.”

El Niño brings about abnormal weather conditions around the globe, including flooding in Ecuador and Peru, and drought in Indonesia and Australia. For example, the widely televised draughts in Indonesia in Fall 1997 were particularly severe as the region was hit by both a mega El Niño and cooling in the eastern tropical Indian Ocean.

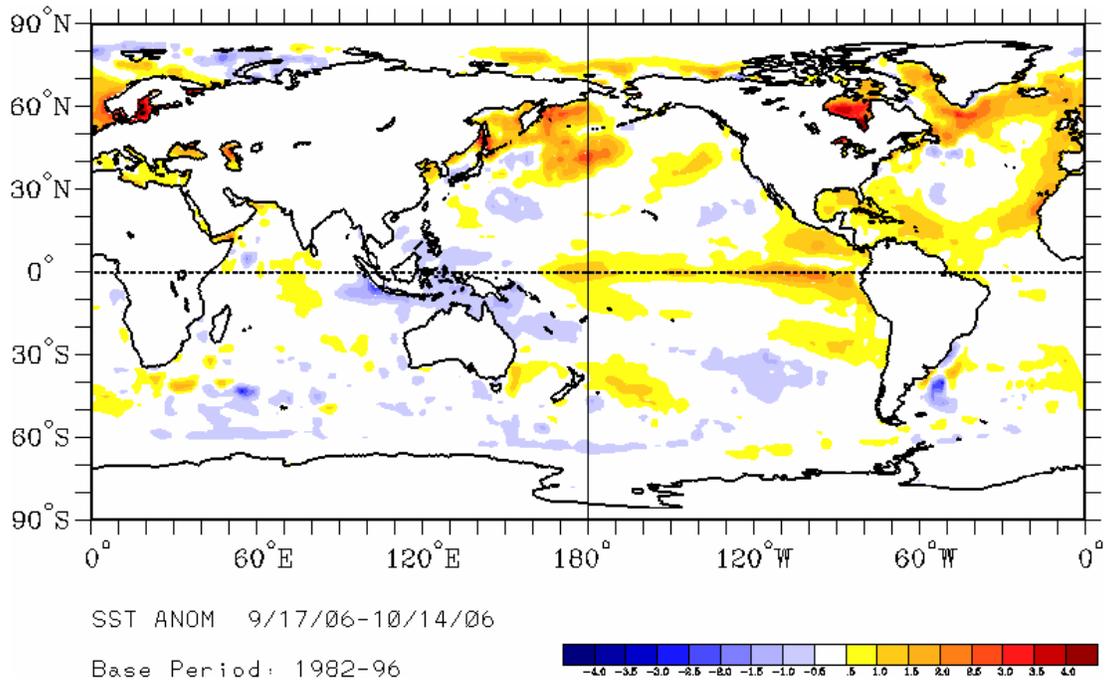
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El Niño conditions also tend to trigger more tropical cyclones in the central Pacific, while hurricane activity in the Atlantic tends to be quieter, as in this year. Winter precipitation increases over parts of California and the southern United States. In China, there tends to be more flooding in the summer following an El Niño. For example, one of the worst floods in the Yangtze River basin was recorded in 1998.

In Hawai‘i, El Niño tends to be associated with dry and less stormy winter and spring seasons, which is a nice break from the extremely wet and thunderstorm-ridden spring experienced this past year. However, it could also result in an unwelcome drought.

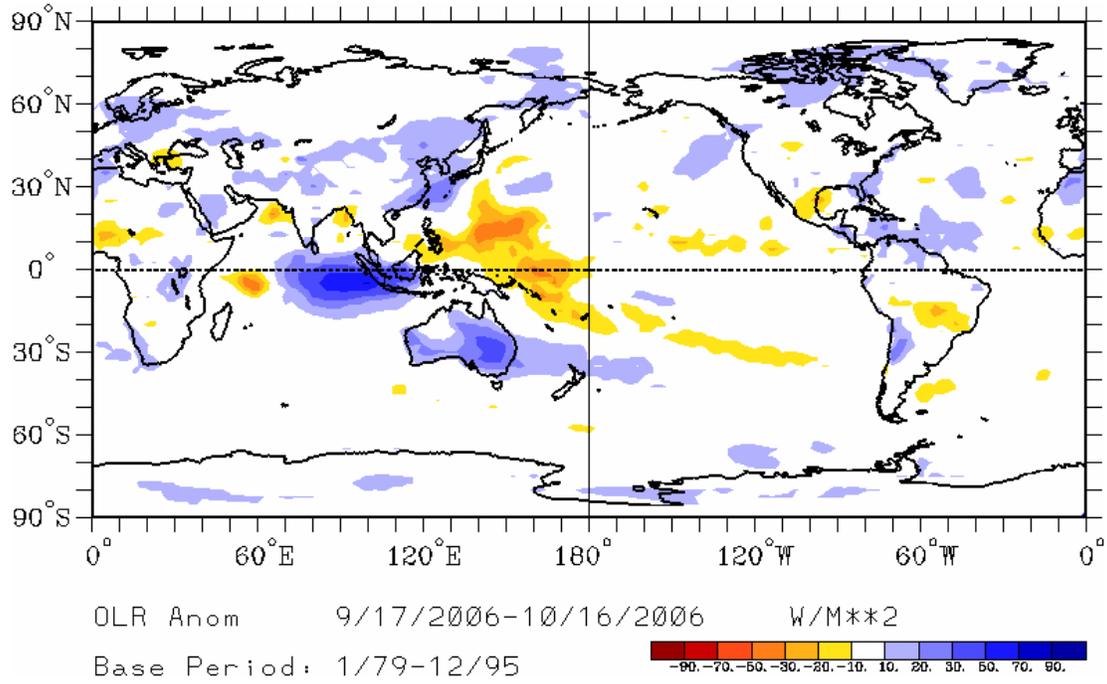
“All the abnormal weather conditions during an El Niño are usually more severe if the El Niño is strong. Predicting the intensity of El Niño several months ahead is, therefore, crucial,” says Xie.

SST Conditions over the last month. Courtesy NOAA Climate Diagnostics Center



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Outgoing Longwave Radiation Conditions over the last month. Courtesy NOAA Climate Diagnostics Center.



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