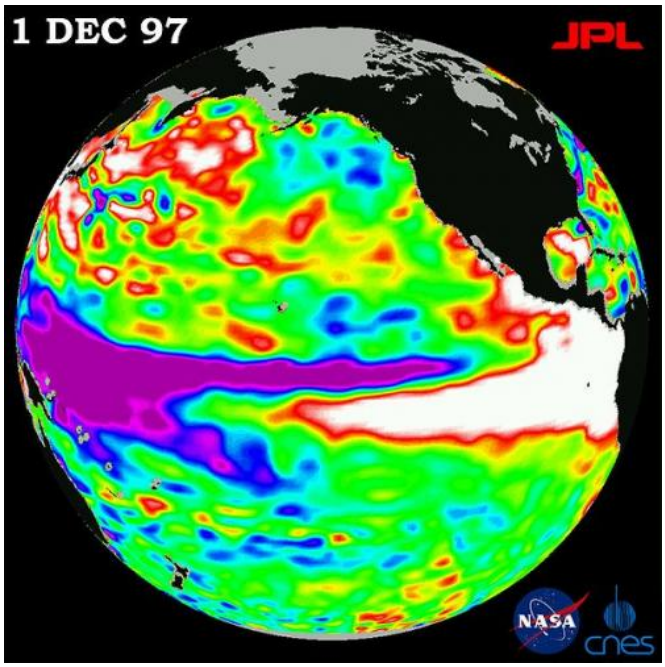
Extending El Niño event predictions to a year

31 December 2019, by Bob Yirka



The 1997 El Nino seen by TOPEX/Poseidon. Credit: NASA

A group of researchers from the Potsdam Institute for Climate Impact Research, Beijing Normal University and Justus-Liebig-Universität Giessen has found a way to predict El Niño events up to a year before they occur. In their paper published in the *Proceedings of the National Academy of Sciences*, the group describes their complexity-based approach to better predicting the seemingly random weather events.

El Niño is a weather event in which the water surface temperatures in some western parts of the Pacific grow warmer than normal and then seep eastward. Scientists are eager to learn more about such events because they can contribute to excess rainfall in some parts of the world and drought conditions in others. Knowing when they are going to occur would give people living in both areas time to plan for them. Until now, the best weather experts could do was offer predictions six months in advance. In this new effort, the researchers have found what they believe to be reasonably accurate predictions a year in advance.

The new method involves a novel analysis of sea surface temperature data based on complexity theory. It involves dividing the eastern part of the Pacific Ocean into square cells and comparing the temperature of each cell with others near it and others that are more distant. Such comparisons allow for measuring the degree of disorder in the temperature data. Then, by comparing the degree of disorder year over year, they were able to spot a pattern—years of high disorder tended to be followed by El Niño events the next year.

Once they found that pattern, the researchers went analyzed yearly surface temperature data from 1984 to 2018 to make predictions about El Niño events in the past. They report that their method correctly predicted nine out of 10 El Niño events (and had three false positives.) Additionally, they found that the higher the disorder the previous year, the stronger the following El Niño event. The researchers conclude that it is now possible to predict El Niño events up to a year in advance with reasonable accuracy.

More information: Jun Meng et al. Complexity-based approach for El Niño magnitude forecasting before the spring predictability barrier, *Proceedings of the National Academy of Sciences* (2019). DOI: 10.1073/pnas.1917007117