Researchers construct a model of impact for El Nino / La Nina events

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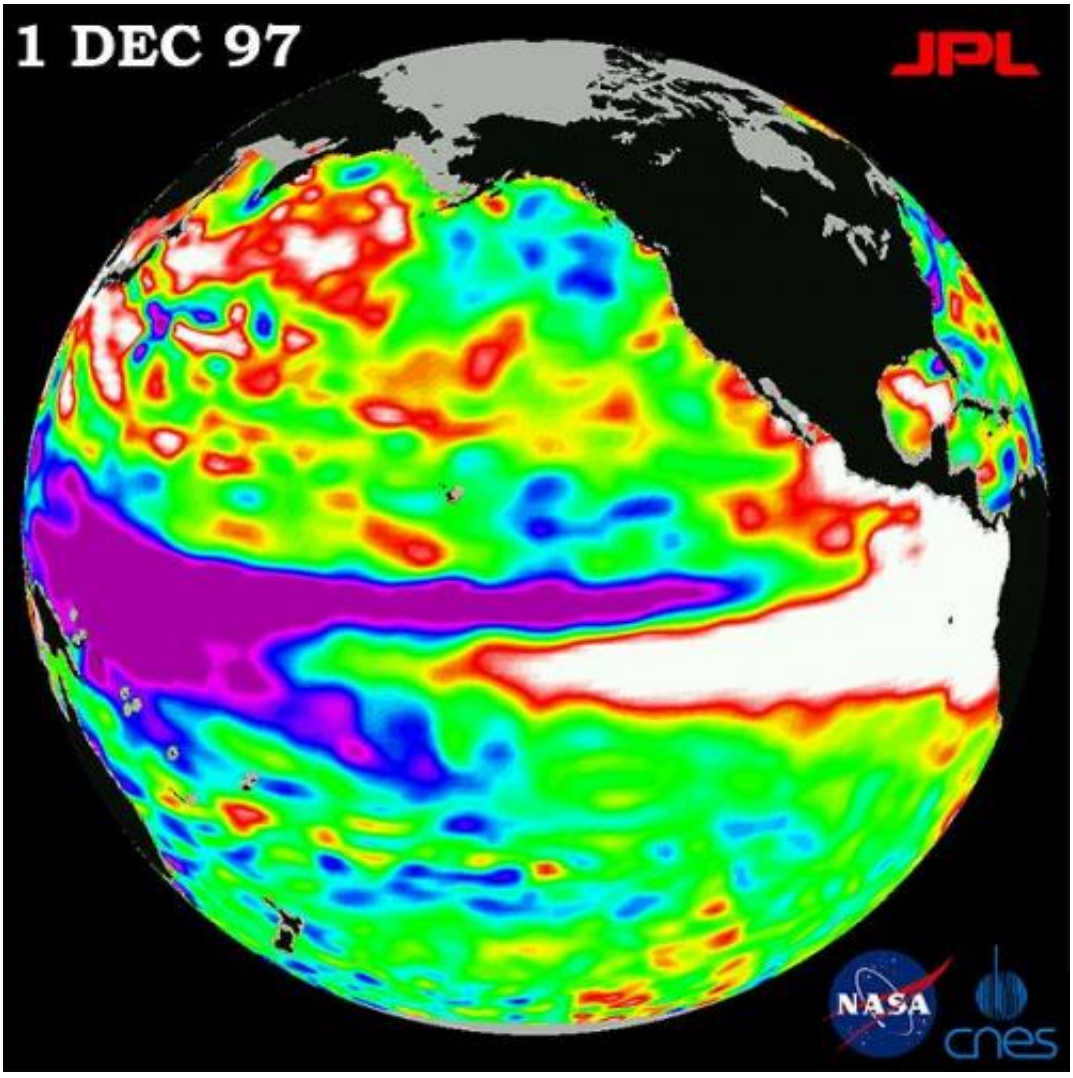

The 1997 El Nino seen by TOPEX/Poseidon. Credit: NASA

(Phys.org) —A small team made up of researchers from the U.S. and Europe has constructed a model that helps map parts of the world that are most at risk of flooding due to El Niño/La Niña events. In their paper published in *Proceedings of the National Academy of Sciences,* the team describes how they compared weather data over the past half century with economic impacts of actual floods to create a model that may soon be used to help predict flooding events in the future.

By now, most everyone has heard about El Niño/La Niña weather events — El Niño is where warm water west of South America causes more rain to fall in some places. La Niña is where the same waters are cooler than normal resulting in different changes to rain patterns. Perhaps less well known is that such events have a worldwide impact, causing more flooding than normal in some parts of the world and less in others. Oftentimes the flooding that occurs results in damage to property and loss of life, thus it would be a good thing if forecasts could be made, warning people in areas most at risk. Unfortunately, up till now, such forecasts have not been available because such events don't always cause the same types of flooding in the same places. In this new effort, the researchers sought to provide a model for building such a forecasting ability by using data over a long period of time.

The research team obtained weather data for the years 1959 to 2000, pulling out periods of El Niño/La Niña weather events which they then compared with reports of damage due to flooding. Next they compared those results with flood reports during normal times and used what they found to create a model. The model showed that during El Niño events, 34 percent of the Earth's surface had higher or lower than normal amounts of flooding—that number jumped to 38 percent for La Niña weather events.

The model also showed which parts of the planet are more susceptible on average, to flooding due to such events. The Southwest in the U.S. for

example and parts of South America, both experience more flooding during El Niño events, while places like the Sahel in Africa, and most of Australia experience less.

The research team acknowledges that their model is still in its infancy but believe that over time, as more research is conducted, it will improve to the point that it will be useful in helping areas prepare for flooding during El Niño/La Niña weather events.

More information: Strong influence of El Niño Southern Oscillation on flood risk around the world, *PNAS*, Philip J. Ward, DOI: 10.1073/pnas.1409822111

Abstract

El Niño Southern Oscillation (ENSO) is the most dominant interannual signal of climate variability and has a strong influence on climate over large parts of the world. In turn, it strongly influences many natural hazards (such as hurricanes and droughts) and their resulting socioeconomic impacts, including economic damage and loss of life. However, although ENSO is known to influence hydrology in many regions of the world, little is known about its influence on the socioeconomic impacts of floods (i.e., flood risk). To address this, we developed a modeling framework to assess ENSO's influence on flood risk at the global scale, expressed in terms of affected population and gross domestic product and economic damages. We show that ENSO exerts strong and widespread influences on both flood hazard and risk. Reliable anomalies of flood risk exist during El Niño or La Niña years, or both, in basins spanning almost half (44%) of Earth's land surface. Our results show that climate variability, especially from ENSO, should be incorporated into disaster-risk analyses and policies. Because ENSO has some predictive skill with lead times of several seasons, the findings suggest the possibility to develop probabilistic flood-risk projections, which could be used for improved disaster planning. The findings are

also relevant in the context of climate change. If the frequency and/or magnitude of ENSO events were to change in the future, this finding could imply changes in flood-risk variations across almost half of the world's terrestrial regions.