A climate model provides long-term predictions of 'El Niño' events

October 21 2019

Credit: CC0 Public Domain

Although a number of operational climate models are capable of predicting El Niño events, they cannot perform long-term forecasts more than half a year in advance. Now, a team from the Barcelona Institute

for Global Health (ISGlobal), an institution supported by "la Caixa," has developed a new statistical climate model able for the first time to predict El Niño episodes up to two-and-a-half years in advance.

The El Niño Southern Oscilation (ENSO) is a climate phenomenon that represents a variation of atmospheric and oceanic features over the equatorial Pacific. It occurs every 2-7 years, but has an irregular periodicity. It consists of two opposite phases: a warming of the sea-surface temperature in the eastern and central equatorial Pacific Ocean known as El Niño, and an opposite cooling phase known as La Niña. ENSO can cause extreme weather events in many regions of the world through atmospheric teleconnections, and therefore, it has very important implications for the global seasonal climate predictions.

The study, published in the *Journal of Climate*, uses a series of predictor variables including sea temperatures at different depths, as well as winds in the tropical Pacific, in a flexible statistical dynamic components model to make retrospective predictions of ENSO events between 1970 and 2016. The model is capable of predicting all the major El Niño episodes that occurred within that period, including the extreme event of 2015-2016, up to two-and-a-half years in advance.

The computational tool developed in this study is an improved version of a statistical dynamic components model already proposed two years ago by the same ISGlobal researchers. Desislava Petrova, first author of the two studies, says that this is an important advance in the area of climate sciences and ENSO research.

"The analysis shows that the events can be predicted with much more precision since the launching of the Tropical Pacific Observing System (TPOS), which provides better data quality and coverage, also of the subsurface ocean" explains Petrova. "This allows us to make long-term forecasts of this climate phenomenon at a relatively low computational

cost," she adds.

ICREA Professor Xavier Rodó, study coordinator and director of the Climate and Health Programme at ISGlobal points out that other statistical models should be improved by "using available data from under the sea surface, which are key to predicting El Niño-Southern Oscillation events." "This could provide early and useful information about El Niño and La Niña to decision makers around the world, which could prevent threats to human lives and reduce thousands of millions of dollars in economic costs," he comments.

Provided by Barcelona Institute for Global Health