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NEWS RELEASE**

Headquarters
45 Beacon Street
Boston, MA 02108-3693

1120 G Street, N.W., Suite 800
Washington, DC 20005-6115

Contact(s): Stephanie Kenitzer, AMS
(425) 432-2192
Kenitzer@dc.ametsoc.org

Steven Schultz
(609) 258-5729
sschultz@princeton.edu



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HOW PREDICTABLE IS EL NIÑO ? SCIENCE DOES HAVE LIMITATIONS

Why are different El Niño episodes so different and so difficult to predict? The answer may involve atmospheric noise -- bursts of wind and other transient atmospheric events that are nearly impossible to predict but have an important effect on the overall intensity and perhaps the length of El Niño events.

A group of scientists at Princeton University analyzed computer models of past El Niño events and concluded that the effects of noise may fundamentally limit how precisely El Niño events can be predicted. El Niño and its complementary event La Nina are alternating warm and cold phases of the tropical ocean waters. Together they are known as the Southern Oscillation and have a profound effect on weather throughout the Pacific rim.

"We have a relatively solid understanding of the Southern Oscillation, including El Niño and La Niña," said Alexey Fedorov, a researcher at Princeton University and author of the study appearing in a recent of [the *Bulletin of the American Meteorological Society*](#). "But it's the smaller atmospheric disturbances, such as wind bursts, that sometimes challenge the computer models and make the predictability of El Niño events inevitably limited, especially when it comes to intensity of an event."

Wind bursts and other atmospheric noise occur over timescales of days or weeks, while the average period of the Southern Oscillation is 3-5 years.

For example, the occurrence of an El Niño event in 1997 was predictable based on the information about the phase of the Southern Oscillation, but the amplitude of the event could not have been anticipated. As many scientists have argued, rapid succession of several westerly wind bursts, which are a relatively rare phenomenon, helped change the dynamics of the 1997 El Niño, which was the strongest in the 20th century.

In the case of daily weather forecasting, the initial conditions used in the complex numerical model calculations have a tremendous impact on the model outcome or

forecast. Just a minor error in the initial conditions, say temperature or precipitation, can result in a wrong forecast.

For the models that run El Niño predictions, errors in initial conditions are important in the predicting the event. However, how the atmospheric disturbances interact with the Southern Oscillation is another crucial factor, added Fedorov.

"In the absence of noise, El Niño would be perfectly predictable because the Southern Oscillation would be perfectly periodic while its amplitude slowly weakens," said the Princeton scientist. "Noise maintains the oscillation and makes it irregular."

If this is indeed the case, then predictions ought to be probabilistic, according to the researchers. The group believes running an ensemble or combination of numerical models all using the same starting conditions but each superimposed with different atmospheric noise will show a range of outcomes.

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Note to Editors and Assignment Desks: PDF or faxed copies of the paper, "How Predictable is El Niño ," are available to journalists from **Stephanie Kenitzer**, AMS press office at (425) 432-2192, or kenitzer@dc.ametsoc.org.

You may contact the researchers directly: Dr. Alexey Fedorov, Princeton University, email: @splash.princeton.edu