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NEWS

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El Niño more central since 1990

The last decade of the 20th century saw a major change in the relationship between the tropical and extra-tropical climate, according to scientists in the US and Taiwan. The discovery suggests that the increasing influence of the extra-tropical atmosphere on the tropical Pacific Ocean has driven the emergence of El Niño events in the central Pacific.

In recent years one of the most dramatic phenomena associated with climate change has been the shift of El Niño - a climate oscillation that occurs roughly every five years - from the east to the central Pacific. Scientists have begun to notice impacts resulting from the shift on weather patterns, marine biology and other parts of the ecosystem, yet the cause of the shift itself has been unknown.

Now, atmospheric scientist Jin-Yi Yu at the University of California, Irvine, and colleagues, who were the first to identify the central-Pacific El Niño, believe they have the answer. They have discovered what they reckon are two related teleconnection changes around the tropics, both emerging around 1990.

The first is the variability in sea-surface temperature in the tropical central Pacific becoming more closely related to the North Pacific Oscillation (NPO) - a seesaw in sea-level pressure over the north Pacific - than to the sea-surface temperature in the tropical eastern Pacific. The second is the sea-surface temperature anomalies in El Niño switching from the east to the central Pacific.

The increased influence of the NPO must have prompted the shift in El Niño, Yu and colleagues said. The influence of the NPO, in turn, must have resulted from changes in atmospheric circulation cells - a dramatically strengthening Hadley cell, and a weakening Walker cell.

"In plain language, Earth's atmosphere changed gears around 1990, which caused our climate machine to operate in a different mode," said Yu. "In this new mode, El Niño events tend to pop out more frequently around the International

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Dateline, rather than at their traditional location of the South American coast."

Yu and colleagues came to their conclusions by statistically analysing new data, generated from climate models and supplied by the National Centers for Environmental Prediction in the US. The researchers examined the period from the 1970s to the 2010s, and uncovered a noticeable shift in relationships around 1990. They then broke the data into pre and post 1990 periods, and discovered the changes in the Hadley and Walker circulations.

Yu thinks the team's work is important because it shows that the new, central-Pacific El Niño is not just a tropical phenomenon, but is tied to the extra-tropical climate. Moreover, the shift might mean that El Niño no longer has the same effects on the environment as it did in the past. "The existing El Niño prediction systems, which rely mostly on tropical Pacific ocean information, may not work as effectively as in the past for predicting the new type of El Niño," Yu added.

The researchers are now planning to find out why the change occurred around 1990. "It could be part of natural decadal variability, or it could be a result of global warming," said Yu.

The study is published in [Environmental Research Letters](#).

About the author

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