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NEWS | JUNE 21 2019

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Scilight 2019, 250012 (2019)
https://doi.org/10.1063/1.5115011

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20 June 2019

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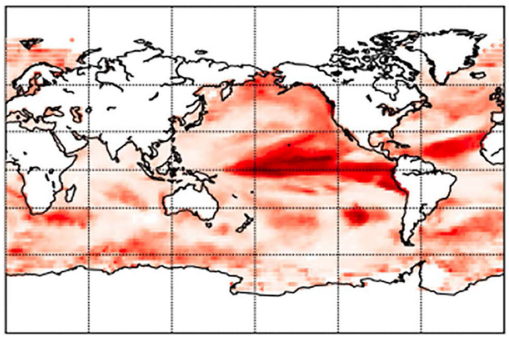
Researchers gain insights on global climate phenomena by studying the effects of sea-surface temperature on precipitation patterns at varying timescales.



Understanding the mutual interdependence between oceanic conditions and precipitation can help scientists better model climate dynamics. However, most studies exploring this relationship only focus on seasonal scales. In their paper, Ekhtiari et al. investigated the effects of sea-surface temperature on precipitation at timescales ranging from sub-seasonal to decadal.

Because various atmospheric and oceanic phenomena happen at different timescales, these must be properly accounted for in order to attribute correlation patterns between sea-surface temperature and precipitation to specific climate processes. The authors found a decomposition of the relationship between the two shows parallels with various climate phenomena depending on the timescale. Studying the temporal variations of these patterns may provide insights on long-term precipitation and drought forecasts.

“This method can help to have initial proof of some climatic events,” said co-author Nikoo Ekhtiari.

The collaboration first broke down the data into different scales from monthly to decadal. To disentangle sea-surface temperature from precipitation, they studied two characteristics—cross-degree and cross-average link distance. Cross-degree calculations were used to identify regions in which the sea-surface temperature has a particularly strong influence on precipitation variations and anomalies, and cross-average link distances were used to determine whether the sea-surface temperature in a particular area has a larger influence on precipitation locally or globally.

This research has great socioeconomic relevance in risk assessments and is important in agricultural fields. However, it is limited by the fact that while the precipitation data sets used have global coverage, sea-surface temperature data is necessarily limited to oceans. The authors note that any future work should extend the analysis to consider land surface temperature as well.

Ekhtiari hopes their methods will complement more traditional approaches in climate science.

Source: “Disentangling the multi-scale effects of sea-surface temperatures on global precipitation: A coupled networks approach,” by Nikoo Ekhtiari, Ankit Agarwal, Norbert Marwan, and Reik V. Donner, *Chaos: An Interdisciplinary Journal of Nonlinear Science* (2019). The article can be accessed at https://doi.org/10.1063/1.5095565.