

Dynamical Response of the Tropical Pacific Ocean to Solar Forcing During the Early Holocene

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Changes in solar output cause changes in the amount of radiation that Earth receives from the Sun, which in turn can cause climate variations. The effects of solar variations are not uniform over the globe—owing to the complexity of the climate system, larger solar fluxes may produce warming in one area but cooling in another. **Marchitto *et al.*** (p. [1378](#)) present a record of Holocene sea surface temperature in the eastern equatorial Pacific Ocean that shows cooling as solar output increased and warming as the Sun dimmed. These temperature changes resulted from dynamical control of El Niño and La Niña episodes by solar radiative forcing of Earth's climate.

Abstract

We present a high-resolution magnesium/calcium proxy record of Holocene sea surface temperature (SST) from off the west coast of Baja California Sur, Mexico, a region where interannual SST variability is dominated today by the influence of the El Niño–Southern Oscillation (ENSO). Temperatures were lowest during the early to middle Holocene, consistent with documented eastern equatorial Pacific cooling and numerical model simulations of orbital forcing into a La Niña–like state at that time. The early Holocene SSTs were also characterized by millennial-scale fluctuations that correlate with cosmogenic nuclide proxies of solar variability, with inferred solar minima corresponding to El Niño–like (warm) conditions, in apparent agreement with the theoretical “ocean dynamical thermostat” response of ENSO to exogenous radiative forcing.

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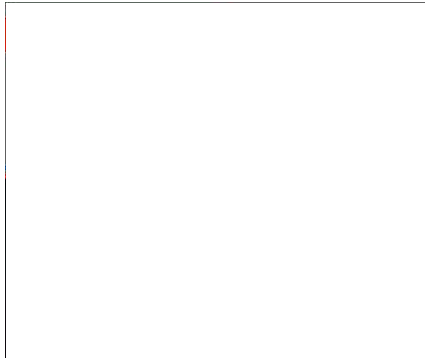
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