



Simulating the evolution of ENSO over the late Holocene

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The CSIRO Mk3L climate system model, a low-resolution coupled general circulation model, has been used to simulate the evolution of the El Niño-Southern Oscillation over the late Holocene. Both transient and snapshot simulations have been conducted of the period from 8 ka BP to the present day.

The simulations show a strengthening of ENSO over this period, with an increase in both the frequency and magnitude of El Niño events; however, the changes are smaller than those implied by the palaeoclimate record. There is also a change in the nature of the simulated ENSO, with an eastward shift in the location of greatest SST variability.

Examination of the simulated changes reveals that they are consistent with the mechanism proposed by *Clement et al.* (2000). Tropical insolation during the northern summer exhibits a decreasing trend over the late Holocene, driving a downward trend in the strength of the easterly trade winds over the equatorial Pacific Ocean. As a result, the upwelling in the eastern equatorial Pacific becomes weaker, and the zonal temperature gradient is reduced. This trend makes it progressively easier for El Niño events to develop.

Clement, A. C., R. Seager, and M. A. Cane (2000), Suppression of El Niño during the mid-Holocene by changes in the Earth's orbit, *Paleoceanography*, 15(6), 731–737.