

ENSO monitoring: Implications under a changing climate

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Sea surface temperature (SST) anomalies in the tropical Pacific are commonly used as indicators for diagnosing the El Niño–Southern Oscillation (ENSO) state. However, climate change has the potential to affect these SST indicators so that the indicators provide a less representative picture of El Niño/La Niña developments. The SST trend over the past 50 years has not been uniform across the Tropics and, in particular, the eastern equatorial Pacific has warmed slower than over regions of the Pacific. This variation in warming has implications for single-box SST indicators for monitoring ENSO.

Here we show a new method to remove the tropical SST trend from one of the most popular ENSO SST indicators, the Niño3.4 index, using three observational SST datasets. The trend and climatology analysis periods are selected based on the Interdecadal Pacific Oscillation (IPO) to account for variations in ENSO state. The climatology period contains an equal number of years with positive and negative IPO phases (1976–2014), while the trend is estimated over a longer period with no significant trend in the IPO (1962–2011). ENSO events since 1976 are then re-classified based on the observational SST datasets with the tropical trend removed and finally compared with other non-SST ENSO related indices. While there are no major changes in the new classification, marginal cases, as well as the relative magnitudes of the events are affected, highlighting the importance in accounting for climate change in ENSO monitoring indices.