

Interactive comment on “On the role of the south Pacific subtropical high at the onset of El Niño events” by Youjia Zou and Xiangying Xi

Anonymous Referee #1

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This paper hypothesizes that meridional (southward) migration of the south Pacific subtropical high (SPSH) is important for the onset of El Niño events by causing a weakening of the trade winds and anomalous eastward flow along the equator. The hypothesis is tested using a series of coupled model experiments in which a meridional migration of the SPSH is imposed on a climatological mean state. El Niño ensues with the SPSH is displaced southward and La Niña ensues when the SPSH is displaced northwards.

The paper appears to discover something that is already known, namely that variations in the SPSH affect the evolution of ENSO. The clearest indicator of this is the very high correlation between the Southern Oscillation Index (SOI) and oceanic indices for ENSO, e.g. the NINO3.4 SST index. The SOI is the difference between surface pressure at Darwin and surface pressure at Tahiti, the latter of which is located

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in the SPSH. Low SOI is indicative of weakened southeasterly trade winds and high SOI of strengthened trade winds.

The authors argue that the North Equatorial Countercurrent (labeled ECC in the paper) migrates to the equator during El Niño. The eastward flow along the equator during El Niño is not the ECC but a reversal of the South Equatorial Current (SEC) that results from a weakening the trade winds. The anomalous eastward currents in the SEC result from the fact that when the winds weaken, the unbalanced zonal pressure gradient causes an eastward acceleration of the flow along the equator.

The authors also seem to discount the role that westerly wind burst (WWB) forcing plays in the evolution of El Niño because WWBs occur in non-El Niño years as well as El Niño years. The effectiveness of WWBs however is conditioned on whether there is a prior build up of heat content along the equator which the authors seem not to understand. Almost all studies that have examined the role of these episodic wind forcing events conclude they play a very important role in the ENSO cycle helping to initiate and amplify El Niño warming.

I found this paper more confusing than helpful and recommend rejection.

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