

Interactive comment on “Do periodic consolidations of Pacific countercurrents trigger global cooling by equatorially symmetric La Niña?” by J. H. Duke

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I greatly appreciate the consideration and constructive criticism given by reviewer #2.

In the requested deeply revised paper, I will attempt to (a) quantify the extent to which observed semidiurnal thermocline heave in the western equatorial Pacific dissipates vorticity, (b) quantify the extent to which that change in vorticity alters the northward extent of the North Equatorial Countercurrent (NECC), per the Sverdrup relationship, (c) quantify the change in countercurrent specific surface area (drag inducing) that occurs when the NECC merges with the Equatorial Undercurrent (EUC) at the equator, and (d) relate that change in specific surface area to the zonal dynamic height balance

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that maintains the western warm pool. It is hoped that these physics will provide the explanation of observations that Reviewer #2 requests.

With respect to the proposed causal link between observed local phenomena in the western equatorial Pacific and the Earth climate system, I will attempt to better explain that the very weak tidal variation signal is firstly amplified by considerable shear energy above the EUC, and secondly by the known global teleconnections of ENSO, most notably its effect upon the latitude of circumpolar westerlies.

As reviewer #2 suggests, the revised paper will focus on physics that demonstrate causation in the present-day instrument record. However, I would also retain the later sections that address longer timescales, but frame them as showing correlation only, which is at least necessary to prove my hypothesis. The identification of the 586 year tidal cycle is a novel contribution, and correlation with 17 of 17 past interglacials is significant.

I maintain that it is useful to consider how changes in different timescales relate to each other. As they play out in the same Earth climate system, a solution to what drives change in each timescale may be found in asking what can drive change in all timescales (as a set of simultaneous equations). The field of paleoclimatology is now largely segregated by timescales, so this effort is proposed in the sense that interdisciplinary studies sometimes lead to new discovery in the space between otherwise mature fields. In a better crafted paper I hope to persuade the editors that this is a worthwhile tradeoff between depth and breadth, if opens new lines of inquiry for others.

Interactive comment on Clim. Past Discuss., 6, 905, 2010.

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