

ENSO from the perspective of linear, shallow water models

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In the 1970's and 80's, Jim O'Brien's group at Florida State University showed that linear, reduced-gravity shallow water models have skill at capturing and interpreting ENSO events. At that time, the models were driven by estimates of the surface wind stress derived from ship measurements and were verified using sea level measured at sparsely distributed tide gauge stations. We revisit and extend this approach in the context of modern datasets such as the AVISO satellite altimeter data and wind stress derived from reanalysis products. Aside from demonstrating considerable skill, this approach also motivates using residual sea level as a diagnostic in which the influence of local vertical movements of the thermocline are removed from sea level data using linear regression. We show that residual sea level is a useful diagnostic for capturing and understanding Central Pacific ENSO and suggests a role for Rossby waves in the dynamics of CP ENSO.

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