

Interannual to decadal variability of sea level in the tropical Pacific

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Interannual to decadal variations of the sea level in the tropical Pacific are investigated using observation-based data and numerical models. An empirical orthogonal function (EOF) analysis using satellite altimetry data since 1993 indicates that the sea level variability is dominated by three distinct modes. The first mode shows high (low) sea level in the central and eastern (western) tropical Pacific, and is largely controlled by the wind forcing during the mature phase of ENSO. The second mode is characterized by an asymmetric pattern about the equator with significance along the equator and in the South Pacific Convergence Zone. This mode is likely to be associated with a southward movement of trade winds during the decaying phase of ENSO. The third mode has a relatively large amplitude in the central and eastern tropical Pacific. These modes are found in an ocean assimilation product (MOVE-G2) as well as in a historical simulation by an ocean general circulation model in the longer-term period. We also found that the first two modes are reproduced in the long-term integration of a coupled ocean-atmosphere model with a high-resolution tropical ocean model nested into a low-resolution global model.

Keywords: tropical Pacific, sea level, interannual to decadal variability, ocean general circulation model