

ON SEA LEVEL CHANGES IN THE TROPICAL PACIFIC DURING EL NIÑO SOUTHERN OSCILLATION EVENTS

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The tropical Pacific ocean encompasses about half the circumference of the earth at the equator, and it is subject to dramatic climate variability on an inter annual time scale : the El Niño Southern Oscillation (ENSO) phenomenon. ENSO is concerned, in particular, with notable large-scale sea level changes that will be documented for the whole tropical Pacific during the 1979-1996 period covering numerous El Niño and La Niña events. The sea level changes are derived from 0/450 dbar dynamic height anomaly issued from an objective analysis of XBT temperature data.

The ENSO-related sea level changes are schematically concerned with two types of movements appearing somewhat like zonal and meridional "seesaws". The zonal "seesaw", in near-equilibrium with the zonal wind stress, concerns chiefly the equatorial band : it is characterized by anomalously low (high) sea level in the west lagging by about half a year behind anomalously high (low) sea level in the east during El Niño (La Niña). Interestingly, the sea level changes extend off the equator in the west reflecting the role of ENSO-related changes in the curl of the wind stress. The meridional "seesaw", which lags by about one year behind the Southern Oscillation Index, consists of out-of-phase variations between the regions situated north and south of about 5°N, with the main changes happening in the western-central equatorial basin. The double "seesaws" result in a longitudinal mean sea level rise (drop) within about 5°N-20°S up to the mature phase, and not just till the beginning, of El Niño (La Niña), partly compensated by a longitudinal mean sea level drop (rise) within about 5°N-20°N. Our sea level analysis offers an observational basis for testing theoretical ideas dealing with the possibility of ENSO precondition and predictability.

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ABSTRACTS

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