

Pre- and Post-1997/1998 Westerly Wind Events and Equatorial Pacific Cold Tongue Warming

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The large El Niño-Southern Oscillation (ENSO) event of 1997/98 marked a change in the character of sea surface temperature anomaly (SSTA) behavior in the equatorial Pacific cold tongue region and its relationship to Westerly Wind Events (WWEs.) Prior to and including 1997/98 event, SSTAs near or above 1°C were observed to persist for several months to a year in the cold tongue region and the central Pacific during most of the commonly agreed upon warm-ENSO events. Observational statistics compiled during and prior to the large El Niño event of 1997/98 link WWEs to substantial (up to 3°C) warming in the eastern Pacific cold tongue region. In the 10 years following 1998, however, relatively little WWE-related cold tongue warming has been observed and warm equatorial Pacific SST anomalies (SSTAs) have tended to be trapped near the dateline, rather than extending to the American coast as in a classical warm-ENSO composite. Here, the relationship between WWEs and cold-tongue warming is revisited using in situ and operational forecast winds and in situ and satellite-based SST. Significant differences are found in the basin scale zonal wind anomalies associated with WWEs that occurred before and after 1997/98. Although the post-1997/98 composite WWE westerly anomalies are very similar to their predecessors within the defining WWE regions, conditions east of the WWE regions are different; there are enhanced equatorial easterlies in the post-1997/98 cases. General ocean circulation model experiments are conducted to explore the extent to which the observed changes in the character of post-1997/98 WWEs can explain the recent behavior of cold tongue SSTAs. It is found that the wind differences can account for the changes in the average cold tongue warming associated with pre- and post- 1997/98 WWEs.