

Name: caihong wen  
caihong.wen@noaa.gov  
INNOVIM & CPC/NCEP  
National Center for Weather and Climate Prediction  
5830 University Research Court, Rm 3101  
College Park, MD 20740  
Country: USA

Title: Changes in Tropical Pacific Thermocline Depth and Their Relationship to ENSO after 1999

Additional authors: Arun Kumar, Yan Xue, M.J. McPhaden

Additional Affiliations: 301-683-3398

Abstract:

Variations in thermocline layer depth, often measured by depth of 20°C isotherm (Z20), play an important role in modulating ENSO. The historical variations of equatorial warm water volume (WWV) usually preceded ENSO SST variability by 2-3 seasons. However, it has been noted that the relationship between WWV and ENSO SST anomalies became weak with WWV no longer a good predictor for the subsequent SST conditions since the 21st century. This provokes the debates on the role of thermocline variations on the ENSO predictions since the 21th century. In this study, the observed spatial connection between the thermocline variations and El Niño and La Niña events was examined separately for the 1980-1998 and 1999-2012 periods. It is shown that the state of thermocline variations in the central tropical Pacific is a good precursor for ENSO evolutions before and after 1999, while the zonal-mean equatorial thermocline variation is a good precursor only before 1999. The analysis highlights the important role of thermocline variations in modulating ENSO evolutions in both periods. Further, it is found that the strength of the Subtropical Cells (STCs) interior mass transport in both hemispheres enhanced rapidly around the late 1990s. We proposed that the strengthened STC interior transport provides a pathway for enhanced influence of off-equatorial thermocline variations on the development of ENSO events after 1999.

End