

Dynamics of ENSO flavors in the NCAR-CCSM4

Antonietta Capotondi

NOAA/ESRL/PSD and University of Colorado/CIRES

We examine 500-years of a pre-industrial control simulation with the NCAR-CCSM4, and identify different El Niño flavors, characterized by SST anomalies peaking at different longitudes. The Niño3 and Niño4 indices, as well as modified indices, Niño3-m and Niño4-m, (computed as areal averages of SST over regions displaced 20° west relative to the Niño3 and Niño4 boxes) are used to define the different flavors. Spatial patterns of SST, wind stress and thermocline depth, as well as their evolution, are compared with results from previous observational and modeling studies. A heat budget analysis is used to identify the dominant terms contributing to growth and decay of the different flavors. The surface heat flux always damps the anomalies, and its magnitude becomes increasingly comparable with the ocean heat flux convergence for events peaking further west. Thermocline and zonal advective feedbacks are the leading dynamical terms involved in the growth and decay of events peaking in the Niño3, Niño3-m, and Niño4 regions. However, in the Niño4-m region, anomalous zonal advection of temperature anomalies is the main term responsible for the event growth, indicating that nonlinearities may play a key role in the development of warm events in the west Pacific.