Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

AAS23-P08 Room:Convention Hall Time:May 22 17:15-18:30

Pausing of the ENSO cycle: A case study for 1998 to 2002

NAGURA, Motoki[1*], Kentaro Ando[1], Keisuke Mizuno[1]

[1]Japan Agency for Marine-Earth Science and Technology

The heat balance of the surface mixed layer at the eastern equatorial Pacific Ocean (0, 140W) is examined to find mechanisms of the transition from 1998 La Nina to 2002 El Nino. The observations from the Tropical Atmosphere Ocean/Triangle Trans-Ocean Buoy Network (TAO/TRITON) are used. In the analysis period, La Nina lingers and El Nino does not immediately appear despite a deepened thermocline, which is described as ”pausing of ENSO cycle” by previous studies (e.g., Kessler 2002). The results from heat balance analysis show that the vertical heat advection anomaly and surface heat flux anomaly warm the mixed layer from 1999 to 2002, causing rise of the mixed layer temperature. A cooling anomaly due to horizontal heat advection counteracts the warming and slows down the transition from La Nina to El Nino. It is found that the eddy heat flux anomaly associated with weakened tropical instability waves significantly contributes to the cooling anomaly. During the normal period, meridional shear of the zonal currents between South Equatorial Current and North Equatorial Counter Current supplies energy via barotropic instability to tropical instability waves, giving rise to warming of equatorial cold tongue due to eddy heat flux. The Trade Winds are relaxed and South Equatorial Current is weakened during the transition from La Nina to El Nino, which results in weakening of the meridional shear of the zonal currents, decrease of tropical instability wave energy and thus reduction of warming due to eddy heat flux. The results presented here illustrate that the eddy activity has sizable influence on ENSO cycle in addition to the basin scale dynamics.

Keywords: El Nino, Tropical Instability Waves, Equatorial Pacific Ocean, Interannual Variability, Mixed Layer Heat Budget