Contrasting ENSO Events in the Tropical Pacific Using Sea Surface Salinity Observations

Awnesh Singh, Thierry Delcroix, and Sophie Cravatte

IRD, LEGOS, Toulouse, France (awneshsingh@gmail.com, +33561253205)

Sea surface salinity (SSS) observations in the tropical Pacific are used to contrast the flavors of the ten El Niño and eight La Niña events occurring from 1977 to 2008. We show there are three Eastern Pacific (EP; 1982-83, 1991-92, and 1997-98) and seven Central Pacific (CP; 1977-78, 1986-88, 1990-91, 1992-95, 2002-03, 2004-05, and 2006-07) types of El Niño events in terms of SSS. The EP El Niño events result in large ($\sim$30° longitude) eastward displacements of the eastern edge of the low-salinity warm pool waters in the equatorial band, a resulting well-marked SSS freshening ($\sim$ -1) near the dateline, and a notable SSS increase ($\sim$ +1) below the mean position of the South Pacific Convergence Zone (SPCZ). The CP El Niño events are characterized by smaller (50%) eastward displacements of the eastern edge, a $\sim$10° longitude westward shift of the equatorial SSS freshening, and a comparatively-reduced (30%) SSS increase in the SPCZ. A qualitative analysis indicates that changes in zonal current (U) and precipitation (P) during EP and CP El Niño events can account for the observed contrasted signature in SSS. Eastward current anomalies actually appear over most of the equatorial band during EP El Niño events, while there is a tendency for anomalous zonal current convergence slightly west of the dateline during CP El Niño events. Such a current convergence during CP El Niño events is consistent with the reduced eastward displacements of the eastern edge of low-salinity waters along the equator, the confinement of the warm/fresh pool in the western-central equatorial basin, and the related quasi-inexistent northeastward migration of the SPCZ and associated heavy P regime. The extents to which the relative occurrence of EP and CP El Niño contributed to the already-documented 'long-term' freshening trend are discussed.