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Identifying the Western Pacific Salinity Front Using Aquarius Measurement

H. Kao and G. Lagerloef
(hkao@esr.org)

Aquarius satellite mission is designed to measure high-resolution sea surface salinity both spatially and temporally. In this study, we smoothed the Aquarius salinity data on a 1/3*1/3 degree weekly gridded map over the western Pacific warm pool region. A sharp northeast-southwest oriented salinity front is seen in detail, but is not observed in the 1*1 degree monthly Argo map due to the low resolution. The salinity front (defined by the largest salinity gradient) is located close to 34.6 PSU isohaline (criteria generally used to define the location of salinity front), but is better defined with physical meanings. During the first four months of Aquarius measurement from Sep/2011-Dec/2011, the salinity front has penetrated much farther west than usual, associated with the westward shift of eastern edge of warm pool. Also, from the surface currents calculated from Ocean Surface Current Analyses - Real time (OSCAR), we notice that the strong westward currents enhance the zonal advection of sea surface temperature/salinity and bring the cold/salty water from central to western Pacific. This is related to the evolution of the central Pacific type of La Nina (i.e. cooling event centered in the central Pacific) in the end of 2011. The results also show that the salinity front shows up at the boundary between the south equatorial currents and north equatorial counter currents, suggesting the strong relationship between the formation of salinity front and the movement of salty and fresh water. Although further calibration/validation work is still ongoing, the preliminary results give us the confidence that the Aquarius measurement is going to help us better understand the fresh water flux and zonal advections in the western Pacific warm pool.