

Interannual variations of barrier layer thickness at the eastern part of the western Pacific warm pool

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This study investigated interannual variations of barrier layer thickness at the eastern part of the western Pacific warm pool (165E-180, 5S-2N) from 2005 to 2013 using Grid Point Value of the Monthly Objective Analysis using the Argo data (MOAA GPV: Hosoda et al. 2008) and Argo float profile data. Several previous observational studies showed that thick barrier layers in the western Pacific warm pool are correlated with eastward displacement of warm pool associated with El Nino (e.g. Maes et al. 2006; Bosc et al. 2009). However, interestingly, although 2012/13 was non-El Nino year, we found anomalous thick barrier layers occurring at the eastern part of warm pool in these years.

To document this anomalous thick barrier layers in detail, we also used Argo float profiles. The analysis indicated that, in agreement with previous studies, thick barrier layers in El Nino year (2006/7, 2009/10) are generated with strong surface freshening. On the other hand, the 2012/13s thick barrier layers are accompanied not by surface freshening but by relatively high salinity near their bottom (90-110dbar). The high salinity is due to the northward expansion of high salinity water originated in the South Pacific. It is hypothesized that strengthening of salinity stratification beneath the mixed layer associated with the stronger advection of the South Pacific water contributes to formation/maintenance of thick barrier layers.

From the above results, it is suggested that not only surface freshening associated with El Nino but also subsurface stratification under the influence of the South Pacific water is important for interannual variations of barrier layer thickness at the eastern part of the western Pacific warm pool.

Keywords: Barrier layer, Western Pacific warm pool, Interannual variations, Argo