Subsurface salinity anomalies in the eastern equatorial Indian Ocean during positive IOD events

*Shoichiro Kido[1], Tomoki Tozuka[1]

1.Graduate School of Science, The University of Tokyo

The Indian Ocean Dipole (IOD) is known as an important climate mode in the tropical Indian Ocean. Previous studies have reported that not only sea surface temperature (SST), but also subsurface oceanic temperature and sea surface salinity (SSS) undergo significant variations owing to the anomalous oceanic circulation during IOD years. However, influences of the IOD on subsurface salinity are not fully understood due to the scarcity of observations. In this study, using an ocean reanalysis product, subsurface salinity variability in the eastern equatorial Indian Ocean (95°-100°E, 3°S-3°N) associated with the IOD and its influence on the upper-ocean stratification have been investigated. It is found that salinity near the pycnocline becomes anomalously high off Sumatra in boreal fall-winter of positive IOD (pIOD) years. Anomalies with an opposite sign but smaller amplitude were observed in negative IOD years. Enhanced upwelling and eastward transport of high salinity water seem to be the main causes of those positive salinity anomalies. By decomposing density anomalies into contributions from temperature and salinity anomalies, it is demonstrated that positive density anomalies associated with high salinity anomalies lead to stronger density stratification in the upper-ocean and shoaling of the mixed layer during the mature phase of pIOD events. Our results suggest that subsurface salinity anomalies have a potential to influence the air-sea interaction by modifying the upper-ocean stratification and mixed layer processes.

Keywords: The Indian Ocean Dipole, salinity variation, upper-ocean stratification, mixed layer depth

