

Coastal upwelling events and barrier layer observed along the southwestern coast of Sumatra

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Coastal upwelling along the southwestern coast of Sumatra during the boreal summer monsoon is closely linked to the El Nino/Southern Oscillation and the Indian Ocean Dipole. To understand the coastal upwelling system, we investigated ocean temperature and salinity variations obtained from Argo floats. During 2013-2017, two Argo floats observed vertical structure of temperature and salinity every 10 days within 100 km from the coast of Sumatra. The floats observed intraseasonal-scale subsurface temperature cooling events with significant upward movements of thermocline. Anomalous local southwesterly winds and equatorial easterly winds explained the temperature cooling and thermocline variations, suggesting that the Argo observation captured coastal upwelling signal. Although these subsurface temperature cooling signals were significant, local sea surface temperature (SST) variations were relatively small. We found that during coastal upwelling events, local SST tended to be disconnected with subsurface cooling by the presence of upper-layer salinity stratification and thick barrier layer which suppressed entrainment cooling.

Keywords: Coastal upwelling, Sumatra, Barrier layer, Indian Ocean Dipole