

Intraseasonal coastal upwelling signal along the southern coast of Java observed by Indonesian tidal station data

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Understanding coastal upwelling along the southwestern coasts of Sumatra and Java and their impacts on ocean surface heat and biogeochemical balance in the eastern Indian Ocean are the main target of international research collaboration, the Eastern Indian Ocean Upwelling Research Initiative (EIOURI). In this study, analyzing sea level data along the coasts of Sumatra and Java, we investigated the coastal upwelling signal that is linked to local sea surface temperature (SST) variability. We used Indonesian tidal station data together with satellite SST data and atmospheric reanalysis data. The sea level variations along the southern coast of Java have a significant coherence with remote wind, local wind, and local SST variations, with an intraseasonal time scale of 20–50 days. Assuming that a coastal upwelling signal would appear as a sea level drop (SLD), we focused on intraseasonal-scale SLD events in the data. Significant upwelling signals are frequently observed during both the boreal summer and winter. To evaluate the impact of the coastal upwelling on local SST, we examined statistical relationships between sea level and SST variations. The results demonstrated that events that occurred during April-August were associated with local SST cooling. The horizontal distribution of the SST cooling was analogous with annual-mean SST, suggesting the importance of intraseasonal-scale coastal upwelling in forming the climatic conditions of the southeastern tropical Indian Ocean.

Keywords: Eastern Indian Ocean, Coastal Upwelling, Sumatra and Java, Tidal Station Data, EIOURI