

Decadal change of coastal upwelling along the southern coast of Java observed by chlorophyll-a variations

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Coastal upwelling along the southern coast of Java brings cold and nutrient-rich subsurface water upward and plays an important role in controlling ocean surface heat balance, biogeochemical balance, coastal ecosystem, and regional fisheries. Using satellite-based daily chlorophyll-a data for the last two decade as a proxy, we investigated decadal variation of the coastal upwelling along the southern coast of Java. We focused on the first chlorophyll-a blooming signal from April to July of each year, which is related to the onset of positive Indian Ocean Dipole event. During 2011-2020, the first significant chlorophyll-a signal appeared on average about two weeks earlier than that during 2002-2010. The shift of first appearance of chlorophyll-a signal is consistent with the decadal shoaling trend of the thermocline in the eastern tropical Indian Ocean. The shallow thermocline and the early signal of the coastal upwelling could effectively supply cold water to the eastern Indian Ocean, and thus this not only represents a long-term change in the background tropical eastern Indian Ocean, but may also play an active role in the more frequent appearance of positive IOD events in the recent decade.

Keywords: Coastal upwelling, Java, Indian Ocean Dipole, Decadal variation