

Seasonal variability of sea surface chlorophyll-a at west Borneo island

ABSTRACT

The optimization of marine fisheries activities can be achieved through an understanding of the timing of fishing, access to good information, and knowledge of oceanographic conditions. These conditions often lead to significant nutrient enrichment in the surface layer of the ocean, which in turn increases the sea surface chlorophyll-a (SSC). In the context of the west Borneo Island region, seasonal variability in SSC plays a crucial role in determining potential fishing grounds. The objectives of this study are examining the seasonal variability of SSC, identifying upwelling and downwelling processes through analysis of sea surface wind (SSW), and determining the climatological distribution of Sea Surface Temperature (SST) and sea surface height (SSH) within the water off Labuan Island, Malaysian Borneo, and the Karimata Strait, West Kalimantan, Indonesia. Remote sensing data spanning from 2007 to 2021 were analyzed, encompassing SSC, SST, SSH anomalies, SSW, wind stress curl, and Ekman pumping. Additionally, rainfall and river discharge were examined as supplementary indicators of these oceanographic processes. The findings indicate that SSW plays a pivotal role in driving upwelling and downwelling processes, which in turn influence SSC variability. In Labuan waters, upwelling occurs primarily from November to February, while downwelling predominates from June to September. In contrast, in the Karimata Strait, upwelling is identified from July to September, with downwelling prevalent between March and May. Upwelling events in both regions are characterized by increasing SSC, accompanied by decreasing SST and SSH, while the opposite trends are observed during downwelling events. The peak of rainfall and river discharge in December is noted to potentially enhance SSC variability in the Karimata Strait compared to Labuan Island waters