

Seasonal and interannual variations of surface chlorophyll-a in the upper Gulf of Thailand (2003-2017)

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The upper Gulf of Thailand is referred to as a eutrophic area due to anthropogenic nutrients containing river discharges via five main rivers located along the northern coast. The eutrophication induces phytoplankton blooms several times a year in the different locations, which sometimes causes mortality of marine organisms and impacts on coastal aquaculture and marine tourism. Heretofore, our knowledge of phytoplankton variability in this area is not well understood due to no continuity of phytoplankton data. This study, therefore, focused on using time series of satellite improved chlorophyll-a (chl-a) between 2003 and 2017 to understand the seasonal and interannual variation of the phytoplankton biomass.

Our results revealed that seasonal chl-a variations were strongly influenced by river discharges and sea surface winds controlled by Asian monsoons (i.e., southwest and northeast monsoons). The river discharges from the central coast (i.e., Chao Praya and Tha Chin rivers) were essential to supply nutrients for phytoplankton growth in the whole area. Meanwhile, the monsoon winds generate monsoon-driven circulations controlled seasonal distribution of the surface chl-a as well as transported the central river discharges to support chl-a in other areas.

Influences of El Niño-Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) were considered the impacts on surface chlorophyll variation in both concentration and distribution due to causing the variability of monsoon rainfall and possibly concerning the variabilities of river discharges and sea surface winds during the fifteen years. The percentage anomalies suggested that the chl-a tended to decrease (increase) corresponded with decreasing (increasing) the river discharges during El Niño (La Niña). Also, the interannual chl-a variation was influenced by other extraordinary events of river discharges and wind speed variabilities, such as two great floods in 2006 and 2011. The dynamics of seasonal and interannual chl-a variations will be discussed in this presentation.

Keywords: Chlorophyll variation, River discharge, Monsoon, Impacts of ENSO