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Satellite monitoring of climatic factors regulating phytoplankton variability in the Arabian (Persian) Gulf

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ABSTRACT

Possible factors regulating phytoplankton variability in the Arabian (Persian) Gulf were analyzed on the basis of satellite observations and meteorological data (1997–2009), including remotely-sensed chlorophyll a concentration (CHL), sea surface temperature, wind, solar radiation, precipitation, and aerosols. Shallow waters of northwestern Gulf influenced by Shatt Al-Arab River discharge were more productive than open Gulf waters, although seasonal CHL patterns in this and other shallow regions looked unrealistic likely because the CHL signal was obscured by bottom reflection. Therefore our further analyses focused on the open Gulf waters, which show a subtropical seasonal CHL cycle with maximum in winter and minimum in spring–summer. This cycle, however, was decoupled from the seasonal extremes of wind mixing. Interannual variations of CHL in the open Gulf regions were correlated with precipitation and aerosol data rather than with wind and sea surface temperature, consistent with the hypothesis of atmospheric deposition as a factor regulating phytoplankton growth. The effect of dust fertilization was likely observed in 2000 and 2008, when low precipitation and aerosol properties indicating elevated level of aeolian dust transport were followed by phytoplankton blooms.

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