Variability of chlorophyll-a in Taiwan Banks using MODIS data

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Chlorophyll-a concentration is one of the indicators of climate change. Changes in chlorophyll-a concentrations can affect total productivity and carbon storage. Knowing variations in high chlorophyll-a concentrations can help understand its impact on marine ecosystems. In this study, an area of high chlorophyll-a concentration in the Taiwan Strait was identified by satellite MODIS (Moderate Resolution Imaging Spectroradiometer) imagery, which is located around Taiwan Banks in the Taiwan Strait. The empirical mode decomposition (EMD) method and the empirical orthogonal function (EOF) method are applied to the monthly MODIS data from August 2002 to April 2023. The EMD result shows that the chlorophyll-a concentration has an increasing trend of 0.0048 ug/l per year. The first EOF mode accounting for 78.6% of the total variance shows a very high chlorophyll-a concentration area located around 23 degree N, 119 degree E, and low concentration at the Penghu Channel. Its principal component shows an increasing trend of 0.0072 ug/l per year. The second EOF mode, which accounts for 5.0% of the total variance, shows a seasonal variation with a high chlorophyll-a concentration around Taiwan Banks in summer and a low chlorophyll-a concentration in winter. This phenomenon is probably affected by the Kuroshio branch that comes along the Penghu Channel in winter.

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