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Statistical analysis of mesoscale eddies and their effects on chlorophyll-a concentration in the Indo Pacific warm pool

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As one of the most significant physical processes in the ocean, mesoscale eddies play an important role in the local distributions of temperature, salinity, ocean current field and ecosystem through vertical mixing and horizontal advection. In addition, mass transport is importantly affected by the propagation of mesoscale eddies. Researches on the characteristics of mesoscale eddies and their effects on chlorophyll-a concentration in the Indo Pacific Warm Pool (20°S~20°N, 60°E~170°W), the key area influencing the global climate change, help to further understand the bio-physical coupling processes in this domain. Using the remote sensing data from 1998 to 2018, combined with singular value decomposition, correlation analysis and other statistical methods, we have studied the distribution characteristics of mesoscale eddies with lifetime exceeding 4 weeks and the correlation with chlorophyll-a concentration in the Indo Pacific Warm Pool. The short-lived mesoscale eddies account for more than 70.0% and most of mesoscale eddies are nonlinear and propagate west. The seasonal numbers of mesoscale eddies vary insignificantly in the whole domain and plenty of the eddies generate in sea domains of 5°S~20°S and 5°N~20°N. The number of mesoscale eddies has little effect on chlorophyll-a concentration and the correlation between the kinetic energy of mesoscale eddies and chlorophyll-a concentration show both positive and negative.