

The Influence of Aerosol Optical Thickness and Mesoscale Eddies on Chlorophyll-a

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Chlorophyll-a concentration (Chl-a) has a close relationship with the nutrients and the atmospheric sedimentation is a good source for the nutrients of the sea. Moreover, the value of aerosol optical thickness (AOT) can stand for atmospheric sediment concentration. So, there should be a coupling relationship between AOT and Chl-a. The correlation analysis between AOT and Chl-a had been early assessed by previous works. For example, in South China Sea and Greenland Sea, the data analysis revealed that AOT had a big impact on the biogeochemistry of the South China Sea and there was a time-lag correlation between AOT and Chl-a in Greenland Sea.

Using 12 years' of AOT and Chl-a data from the NASA/MODIS and SeaWiFS sensors, we' ve studied the distributions and the coupling relationship between AOT and Chl-a all over the world. The correlation map shows some interesting areas on the earth. It is found that the highest positive correlation areas of the AOT and Chl-a time series are in the east coastal area of Africa, Baltic Sea, Caspian Sea and the band area in the Pacific between south Japan and San Francisco of USA; the highest negative correlation areas of the Chl-a and AOT time series are in The Mediterranean, west-south and east-south coastal areas of Australia.

Moreover, we analyze 10 years of measurements of SSH fields and concurrent satellite measurements of upper-ocean CHL to show that mesoscale eddies exert a strong influence on the CHL field.

Keywords: Chlorophyll-a concentration, Aerosol optical thickness, Sea surface height, Mesoscale eddy, Coupling relationship

