

The global oceanic iron distribution estimated by data assimilation approach

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Since distribution of oceanic iron is considered as one of the restriction factors of phytoplankton activity, it is necessary for a pelagic lower trophic level ecosystem model to take into account the effect of iron. In this study, we constructed a three dimensional gridded data of oceanic iron concentration by using both available in situ observation and simple iron cycle model. For the physical process of iron transport, the advection/diffusion model was used along with the flow field of ESTOC (Estimated State of Global Ocean for Climate Research). The falling atmospheric dust in the sea-surface and flux from the sediment at sea floor of the coast were set as the input of the iron. The scavenging or desorption by particulate matter in the water column were employed as the control variables and we constructed the simple iron cycle model. The optimized set of control parameters was obtained based on a Green's function approach by using available in situ iron concentration observations. The results showed that the iron concentration in the southern hemisphere is lower than northern hemisphere, and the low iron regions were well reproduced around the regions of high nutrient / low chlorophyll. Moreover, it is suggested that the Atlantic Ocean is more affected by the atmospheric dust compared with the Pacific Ocean.

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