

Numerical simulation of iron cycle in the North Pacific

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Iron is an essential micronutrient for the marine phytoplankton growth. The deficiency of iron limits the primary productivity in the subarctic North Pacific, and also controls the production of nitrogen fixers in the subtropical region. Therefore, the understanding of iron cycle is key to understand biogeochemical cycling in the whole North Pacific. In this study, we used a regional ocean model (ROMS) coupled with a marine biogeochemical cycle model (BEC) configured to a quarter degree horizontal resolution to investigate iron cycle in the North Pacific. The model showed that iron supplied from shelf sediments are extensively distributed through the intermediate layer, and the transport is supported by adsorption/aggregation to and desorption/disaggregation from slowly sinking particles that prolongs residence time of iron in seawater. It is suggested that the iron supplied from shelf sediments of the Okhotsk and Bering Seas are exported to the Pacific Ocean, implying the biogeochemical linkage between the marginal seas and the ocean basin. Iron distributed in the intermediate layer is supplied to the surface water through diapycnal mixing around the Straits connecting the marginal seas. We will present the importance of the diapycnal mixing on primary productivity in the western subarctic region from the results of iron budget analysis.

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