An insight into chemical speciation of dissolved iron in the intermediate water of the North Pacific

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Iron has known to be one of the important factors controlling phytoplankton growth and nitrogen fixation by diazotrophs in large areas of the open ocean. Iron is less soluble in oxic seawater, therefore, external inputs of iron, which are spatially and/or temporally sporadic, regulate ocean primary productivity. The stability of iron in seawater, which is mainly controlled by organic ligands, is a contributing factor to its long-distance transport from external point sources to remote areas. Siderophores, saccharides, and humic substances have been considered to be probable iron-binding organic ligands in marine environments. Among these, bio-refractory humic substances can be the more important iron carriers in the intermediate waters, because siderophores and saccharides have known to be easily degradable by microbes.

Although sedimentary iron from continental margins has been considered to have a strong impact on iron distribution in the open ocean. In the North Pacific, it has been pointed out that sedimentary iron from the shelf region of the Sea of Okhotsk is widely distributed via circulation of the dense shelf water, the Okhotsk Sea Intermediate Water, the North Pacific Intermediate Water. However, the chemical species of iron contributing long-distance transport by the circulation of intermediate waters have not been clarified.

We determined a transect of concentration of dissolved iron together with levels of humic-like fluorescent dissolved organic matter, as a tracer of iron species, from the Sea of Okhotsk to the subtropical gyre of the western North Pacific. In this presentation, we will discuss possible chemical species of dissolved iron contributing to long-distance transport through the circulation of intermediate waters in the North Pacific.

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