

Iron supply system in the western North Pacific - Toward the integration and quantitative understanding of atmospheric-derived iron and ocean circulation derived iron -

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From the late 1990s to the early 2000s, iron(Fe) fertilization experiments and shipboard culture experiment conducted in the eastern and western subarctic North Pacific clearly revealed that Fe is limiting nutrient for phytoplankton production in the High Nutrient Low Chlorophyll (HNLC) waters. Additionally, it has been reported that the Fe supply process is related to the growth of nitrogen fixed organisms (diazotroph) in the subtropical and tropical waters. Therefore, in order to understand the primary production process in the western North Pacific, we need to clarify the natural Fe supply processes in the western North Pacific. Several Fe supply processes have been reported in this region, such as atmospheric dust Fe supply, sedimentary Fe supply from oceanic dynamics, etc.. From the late 1980s, research on atmospheric dust has progressed and it has been confirmed that Fe is supplied to the ocean via atmospheric dust such as lithogenic particles (Kosa), anthropogenic particles and volcanic ash particles. After the 2000s, the advances in the sampling and analytical techniques provide unprecedented capability for measurement of Fe concentration in seawater. The detailed Fe distribution and the oceanic sedimentary Fe supply process in the western north Pacific have been revealed. The seasonal amplitude of primary production and nutrient concentrations in the HNLC area requires a quantitative and consistent explanation in relation to these Fe supply processes.

In this presentation, I will review the Fe supply processes via atmospheric and ocean circulation, and discuss possible quantitative explanation for the primary production process, nutrient seasonal variation and biogeochemical dynamics in the western North Pacific.

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