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Factors affecting the supply and scavenging of trace metals in the subarctic North Pacific Ocean

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The high-nutrient, low-chlorophyll (HNLC) region in the subarctic North Pacific Ocean is a place where phytoplankton growth is influenced by the concentrations and biogeochemical cycles of trace metals [1, 2]. Knowing the supply and scavenging of trace metals is important to deepen the understanding of marine geochemistry. Thus, the attention to Pacific Ocean GEOTRACES studies related to trace metals is increasing.

In this research, five trace metals (Al, Mn, Fe, Co and Pb) are chosen for the analysis. They are important geochemical tracers and/or essential elements for marine organisms, and especially Fe is the limiting factor for phytoplankton growth. Seawater samples were collected during the R/V *Hakuho Maru* KH-17-3 cruise in 2017. Dissolved trace metals (dM) in filtered seawater samples were preconcentrated with a chelate resin column (NOBIAS Chelate-PA1) [3], then their concentrations were determined by ICP-MS. Unfiltered seawater samples were used for the quantification of total dissolvable trace metal (tdM) concentrations. Labile particulate trace metal (lpM) concentrations were calculated as the difference between tdM and dM.

The supply from continental sources and boundary scavenging of trace metals are observed in their full-depth sectional distributions, especially near the continental slope in the Gulf of Alaska. Al, Mn, Fe and Co concentrations decrease with increasing distance from the continent. Along 145°W, the logarithms of integral concentrations of lpM decrease linearly with distance from the continental shelf edge to 250 km off-shore, and the concentrations level off afterwards.

Compared with previous studies, we observe the temporal decreasing trend of subsurface dPb from 2005 to 2017 at 160°W, which reflects the decrease in anthropogenic Pb emission. At 47°N 160°E, the full-depth integral concentrations of lpAl, lpMn, lpFe and lpCo drastically decreased from 2011 to 2017. This is probably due to the aftermath of the Great East Japan Earthquake in 2011 and the scavenging, while dMn, dFe and dCo did not show obvious decreasing trend.

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