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Quantitative Analysis of Fe, Mn and Cd from Sea Ice and Seawater in the Chukchi Sea, Arctic Ocean

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Abstract

Sea ice is important for the health of the polar oceans yet its role in the biogeochemical cycling of trace metals is not so clear. To understand the geochemical behaviour of trace metals and their accumulation into sea ice, dissolved (D, < 0.2 μm), and labile particulate (LP, Total Dissolvable - Dissolved) Fe, Mn, and Cd were examined in sea ice and seawater collected from the Chukchi Sea in the Arctic Ocean. Samples were pre-concentrated utilizing the solid-phase extraction NOBIAS Chelate PA-1 resin (Hitachi High-Technologies Corporation) and analyzed on a Graphite Furnace Atomic Absorption Spectrometer. Chukchi seawater showed high percentage for DMn (71.5 %) and DCd (66.3 %) with a high percentage of LPFe (94.1 %). In seawater, DCd was the only metal to correlate with phosphate (R^2 = 0.78) indicating a biogeochemical cycling source. Chukchi seawater concentrations of Fe and Mn may have been controlled through external sources such as sediments (shelf or river) and/or sediment reductive processes. Trace metal concentrations in Chukchi sea ice were heterogeneous. Sea ice showed high percentages for the LP fraction (99.2% Fe, 63.6 % Mn and 71.2 % Cd). This data