Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.30688

Spatial distributions of dissolved trace metals in the Chukchi Sea and Eastern Siberian Sea (western Arctic Ocean)

JIWOO KIM[1], TAEJIN KIM[1], HUNSUB SIM[1], JIN YOUNG JUNG[2], KYOUNG-HO CHO[2], YOUNGJU LEE[2], TAE-WAN KIM[2], JISOO PARK[2], EUN JIN YANG[2] AND HOJONG SEO[3]

[1]Pukyong National University
[2]Korea Polar Research Institute
[3]University of California, Irvine

The Arctic Ocean is unique among global oceans as its continental shelves comprise more than half of its area. It receives over 10% of the total global river water flux while accounting for only 1% of the world's ocean volume. Due to global warming, the Arctic Ocean has undergone significant changes, including the retreat of multi-year sea ice and an increase in riverine flux, both of which could influence the distribution of nutrients and trace metals in seawater.

Trace metals generally exist at very low concentrations (pM–nM) in seawater but act as essential micronutrients or limiting factors for the growth of marine organisms. This study investigated the spatial distribution of trace metals (Fe, Cu, Zn, and Cd) in the western Arctic Ocean, covering the region from the Chukchi Sea to the East Siberian Sea. Trace metal concentrations were analyzed and compared with various parameters including sea ice melt and riverine fractions to determine their sources and behaviors. Seawater samples were collected using a clean seawater sampling system during the 2021 Arctic expedition (IBR/V *Araon*; July 20–August 10, 2021). Dissolved trace metals in seawater samples were determined using a high-resolution inductively coupled plasma mass spectrometry (HR-ICP-MS) (Element-2, Thermo Fisher Scientific), which was directly connected with seaFAST automation system (Elemental Scientific Inc.; ESI).

Sampling sites were divided into three regions based on their respective regional characteristics. The distribution trends of trace metals in each region varied depending on source inputs, mixing, and removal mechanisms. The major source of trace metals (Fe, Zn, and Cd) in this region is likely derived from sediments, while riverine input may act as the dominant source for Cu. As a result, elevated concentrations of trace metals were observed in the Halocline Layer, which could be influenced by sediments and transported horizontally. Our results could improve our knowledge of trace metal cycling in the Arctic Ocean.