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The Transpolar Drift and East Greenland Current system governs the long-range transport of riverine dissolved Nickel from the Arctic Ocean to the North Atlantic

DYLAN J. HALBEISEN[1], DR. WEN-HSUAN LIAO, PHD[2], ROB MIDDAG[3], SHUN-CHUNG YANG[4], DR. XIAOPENG BIAN, PH.D.[4], ADAM ROSS[4], SETH G. JOHN[4], STEPHAN KRISCH[5], ERIC P. ACHTERBERG[6] AND DR. TIM M. CONWAY[1]

[1]University of South Florida
[2]National Cheng Kung University
[3]NIOZ
[4]University of Southern California
[5]Federal Institute of Hydrology
[6]GEOMAR Helmholtz Centre for Ocean Research Kiel

The Arctic Ocean is characterized by submarine ridges, opposing surface gyre systems, and the in- and outflow of Pacific, Atlantic, and terrestrial waters. In the last four decades, the Arctic has undergone unprecedented warming, which has increased the supply of terrestrial fresh waters, cryospheric melt waters, and, potentially, micronutrients. Marine microorganisms require nickel (Ni) as an essential micronutrient responsible for catalysis of (non-)redox reactions, including nitrogen acquisition and methane production. Therefore, constraining the distribution of dissolved Ni concentrations ([dNi]) in the ocean can elucidate the processes that control marine nutrient cycling and thus influence global climate. Stable Ni isotope ratios (^{60}Ni) measured in seawater can provide further insight into the processes that supply, remove, stabilize, and transport dNi in the ocean. In the Arctic, the Transpolar Drift (TPD) transports riverine waters from the East Siberian and Laptev Seas to the central Arctic Basin, producing anomalously high [dNi] (up to 8.6 nM) in the surface layers. Here, we present new distributions of δ^{60}Ni from the central Arctic and the Denmark Strait to investigate whether the TPD-East Greenland Current (EGC) system transports riverine-derived dNi southward from the Arctic into the Atlantic Ocean. Our preliminary results show that the EGC transports fresh (< 34 psu) Polar Surface Waters (PSW; ≤ 200m) with elevated [dNi] (4.5 nM) and low δ^{60}Ni (down to +1.12±0.07‰) southward along the Greenland shelfbreak into the Blosseville and Irminger Basins. Conversely, away from EGC influence, surface waters in the central and eastern Denmark Strait possess [dNi] and δ^{60}Ni within global ocean averages (~4 nM; +1.33±0.13‰), mirroring observations previously made in the Iceland and Irminger Basins. Overall, we show how dNi from Arctic rivers persist in the PSW layer of the TPD-EGC system, supplying dNi to the surface (≤ 200m) waters throughout the Arctic Ocean, Greenland Sea, and North Atlantic.