Zinc and nickel isotopes in the North Atlantic Ocean (GA01 transect).

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Zinc (Zn) and nickel (Ni) are important biologically active trace metals in the ocean, directly influencing the biological pump for carbon to the deep ocean. Yet, their biogeochemical cycles are not completely understood.

The strong spring bloom, the variety of trace metal sources and the different water masses make the North Atlantic Ocean a promising area to study the processes affecting the oceanic Zn and Ni inventories. Here, we investigate six full depth profiles of dissolved Zn and Ni concentrations and isotopic compositions across the North Atlantic, as part of the GEOTRACES GA01 cruise (GEOVIDE; May-June 2014).

In the surface ocean, as expected, Zn concentrations are depleted to extremely low values (as low as < 0.1 nmol L^{-1}) consistent with biological uptake. However, the isotopic picture is less clear with the low concentrations associated with light Zn isotopic values (down to -0.1‰) that could either highlight shallow remineralisation or scavenging of heavier Zn onto particles. Below 1000m, significant variations of dissolved Zn isotopic values (between 0.01 and 0.55‰) were observed. Specific processes related to sediments, the presence of Fe/Mn oxides, hydrothermal inputs, or different water masses such as the Labrador Seawater and the Mediterranean Outflow will be discussed.

The Ni concentration and isotopic composition data exhibit a more systematic pattern with depth compared to Zn. As observed elsewhere, some stations display a slight increase of the Ni isotopic signature towards the surface, as concentrations are being drawn down, indicating a fractionation by phytoplankton uptake.

Overall, this study provides new insights into sources, sinks and internal processes affecting Zn and Ni distributions.