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# Supply, cycling and export of trace metal micronutrients from Greenland fjords traced by Cu and Zn isotope ratios

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Trace metal micronutrients, including copper (Cu) and zinc (Zn), are critical in regulating marine ecology and primary productivity. Glacial inputs via fjord systems are important yet poorly constrained sources of these critical micronutrients to the ocean [1]. Their stable isotope compositions ($\delta^{65}$Cu and $\delta^{66}$Zn) are useful tools to provide constraints on nutrient sources and cycling and to disentangle different biogeochemical processes [2].

Here, we present new Cu and Zn isotopic data of water and suspended particulate samples collected from two Greenland fjords. Ameriliksfjord is influenced by a land-terminating glacier, while Nuup Kangerlua is fed by several inputs including major marine-terminating glaciers, and the two fjords exhibit distinct hydrographic and ecosystem characteristics [3]. Additional seawater samples collected from the adjacent coastal ocean were analysed to further evaluate the downstream effect.

Covariations of $\delta^{65}$Cu values of particulate and dissolved phases indicate the importance of adsorption/desorption in modulating metal concentrations within both fjords. Biological uptake is another key controlling process, as revealed by the correlation between $\delta^{66}$Zn and chlorophyll-a contents in the dissolved phase. The two fjords differ in the distributions of metal concentrations and isotope compositions for both dissolved and particulate phases, suggesting different supply and cycling mechanisms. Our results also suggest export of dissolved glacially derived trace metal micronutrients reaching the coastal ocean, with some (e.g. Zn) being largely consumed near shore to support local productivity. The role of glacial meltwater input in the global oceanic budgets of Zn and Cu, and their isotopes, as well as the implications of glacial supply of trace metal micronutrients to the polar oceans under ongoing climate warming, will be discussed.

References:

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