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Investigating the behaviour of iron during sediment resuspension along the Denmark Strait and the Greenland Shelf

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Broadly, the North Atlantic Ocean is iron-limited, with pronounced phytoplankton blooms during spring linked to fluxes of bioavailable iron downstream from Arctic shelf sediments, rivers, and glacial inputs. The flux magnitude and longevity of resuspended iron from sediments in seawater is poorly understood, yet is a vital source of bioavailable iron to surface waters globally. This incubation study investigates the short-term exchange of iron (and other trace metals) between sediments and bottom waters from varying depths along the Denmark Strait and the East Greenland shelf. During boreal summer 2021, we collected seafloor bottom waters over 5 stations along the Denmark Strait, and spiked samples with coretop sediment from the same locality. Over 48 h with regular mixing, we sampled to determine the presence and behaviour of concentration change of iron phases within the bottom water.

Preliminary data from the East Greenland shelf site indicates an increase in dissolved iron concentrations ([dFe]) relative to the background concentration, following sediment addition. However, we expect the behaviour of [dFe] over time to differ significantly between sites, due to differing reactivity of iron-bearing minerals along the transect. We will quantify dFe and dissolved macronutrient concentrations, as well as the total dissolvable and soluble iron components, and determine the mineralogical composition of coretop sediments to further infer the reactivity and lability of the sediment-derived iron. Results will be compared with sediment-porewater [dFe] and the diffusive efflux of dFe calculated using radiogenic radium measurements collected from the same locations.