Iron transport by subglacial meltwater indicated by δ^{56}Fe in coastal sediments of King George Island, Antarctica

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Iron (Fe) fluxes from reducing sediments and subglacial environments potentially contribute to bioavailable Fe in the Southern Ocean. Stable Fe isotopes (δ^{56}Fe) may be used to trace Fe sources and reactions, but data are scarce and Fe cycling in natural environments is not understood sufficiently to constrain δ^{56}Fe endmembers for different types of sediments, environments, and biogeochemical processes.

δ^{56}Fe data from pore waters and sequentially extracted solid Fe phases at two sites in Potter Cove (King George Island, Antarctica), a bay affected by fast glacier retreat, are presented. Close to the glacier front, sediments contain high amounts of easily reducible Fe oxides and show a dominance of ferruginous conditions compared to sediments close to the ice-free coast, where surficial oxic meltwater discharges and sulfate reduction dominates. We suggest that high amounts of reducible Fe oxides close to the glacier mainly derive from subglacial sources, where Fe liberation from comminuted material beneath the glacier is coupled to biogeochemical weathering. A strong argument for a subglacial source is the predominantly negative δ^{56}Fe signature of reducible Fe oxides that remains constant throughout the ferruginous zone. *In situ* dissimilatory iron reduction (DIR) does not significantly alter the isotopic composition of the oxides. The composition of the easily reducible Fe fraction therefore suggests pre-depositional microbial cycling as it occurs in subglacial environments. Sediments influenced by oxic meltwater discharge show downcore trends towards positive δ^{56}Fe signals in pore water and reactive Fe oxides, typical for *in situ* DIR as ^{54}Fe becomes less available with increasing depth.

Henkel et al. (2018) Diagenetic iron cycling and stable Fe isotope fractionation in Antarctic shelf sediments, King George Island. GCA 237, 320-338.