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Preliminary results of sedimentary stable iron isotope data from South Georgia, Southern Ocean

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Iron (Fe) is an essential micronutrient for phytoplankton growth. Large parts of the Southern Ocean (SO) are high nutrient low chlorophyll (HNLC) regions where primary productivity is limited by the availability of Fe. In the vicinity of islands, such as South Georgia, phytoplankton blooms fueled by iron originating from the islands have been observed. The effects on the biological carbon pump can, however, not be well assessed since data are scarce and our understanding of Fe transport pathways in remote coastal- and shelf areas is very confined. Moreover, iron fluxes into the SO may change under global warming and not all of the potential Fe sources (e.g., meltwater, benthic fluxes, ice) are expected to contribute continuously or to be equally sensitive with respect to climate change. The increase of our knowledge with respect to the dominant Fe transport and reaction pathways in (sub)polar coastal areas is essential for the evaluation of positive and negative feedback mechanisms on climate change and reliable forecasts.

Fe isotopes are a useful tool to identify and trace Fe sources and reaction pathways. Here we aim to assess which iron sources are dominant in fjords of the island of South Georgia, Sub-Antarctic. Measurements of Fe concentrations and δ^{56}Fe data from meltwater, groundwater, pore water and sedimentary reactive Fe phases are used to assess the variability of the "isotopic fingerprint" of meltwater, groundwater and benthic Fe fluxes in two fjords of South Georgia and to evaluate the role of these releases in the study area. We present preliminary data of 4 stations in the Cumberland Bay Fjord and King Haakon Bay. Highest dissolved Fe concentrations in shallow sediments were measured in the vicinity of the glacier and decrease towards the outer part of the fjords suggesting the inner parts to be Fe-dominated sites.