# Transfer of iron from continental shelves to anoxic basins: a comparison of the Black Sea and Baltic Sea

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Iron (Fe) is a key micronutrient for phytoplankton. Continental shelf sediments act as a source of Fe to offshore marine waters. Here, we compare the release of Fe from shelf sediments and its transfer to adjacent anoxic basins ("Fe shuttling") in the Black Sea and Baltic Sea using water column, porewater and sediment analyses of Fe combined with in-situ benthic flux measurements. We demonstrate that strong release of Fe from shelf sediments occurs in both basins. In the Black Sea, we only observe sediment Fe release from coastal sediments overlain by oxic waters that receive a relatively high input of organic matter and that are characterized by high macrofaunal activity. In the Baltic Sea, in contrast, the highest sediment Fe release is observed at sites where bottom waters are low in oxygen but do not contain sulfide.

Results of sequential extractions and synchrotron-based X-ray spectroscopy of the suspended matter on the Black Sea shelf highlight that poorly crystalline Fe-oxides and clays account for most of the Fe that is transported laterally over the shelf within the nepheloid layer. The forms of Fe in the suspended matter and surface sediment on the Black Sea shelf are very similar, consistent with transport of particulate Fe through deposition and resuspension of particles in an oxygenated environment. In the Baltic Sea, lateral transport of Fe takes place in both dissolved and particulate form, with the former only being important at sites with low bottom water concentrations of both oxygen and sulfide. Our results highlight that benthic Fe release from continental shelves is a complex process controlled by bottom water oxygen concentrations, macrofaunal activity and the supply of organic matter and Fe-oxides. We will discuss the consequences of our findings for the lateral transport of Fe to the anoxic basins in the Black Sea and Baltic Sea.