

Towards a link between benthic iron cycling and benthic fauna community: A case study in Swedish fjord sediments

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Iron availability limits marine primary productivity in large parts of the ocean. Because of its short residence time in the surface ocean, iron concentrations are directly controlled by their sources. Important iron sources for marine waters in high latitudes can be weathering processes either on land or glaciers, yet the actual delivery to the ocean is strongly dependent on the characteristics of the iron cycling in the transitional fjords. As iron in oxic waters is highly insoluble, rapidly oxidized and removed from the water column by settling to the seafloor, benthic iron recycling is a critical, yet poorly understood part of land-to-ocean iron transport. More specifically, the activity of benthic fauna (“bioturbation”) is known to promote benthic iron recycling in marine sediments, but the link between faunal community composition and activity and benthic iron recycling in fjord sediments remains largely unquantified. As high-latitude benthic fjord ecosystems are especially vulnerable to climate-induced changes, this represents an important knowledge gap preventing a reliable assessment of the iron transport to the oceans and thus marine productivity, the global carbon cycle and ultimately projected climate change.

Here we present the benthic iron cycle in three fjord systems from southwest Sweden that have different water-column oxygenation states (permanently oxic, seasonally hypoxic, permanently anoxic). We will show porewater distributions of dissolved iron and iron mineralogy, complemented by benthic fauna community composition. Our results illustrate the importance of benthic faunal behaviour in driving benthic iron recycling.

Keywords

Benthic Iron Cycling; Benthic Fauna Community; Bioturbation; Swedish Fjord