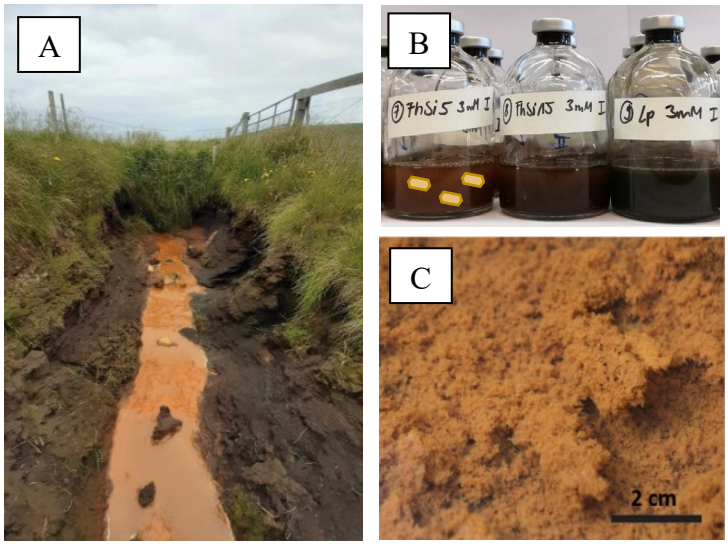

Figure 1. (A) Natural iron-rich precipitates forming in a wetland drainage canal. (B) Reaction vials used for mineral transformation experiments. (C) Loosely-consolidated structure of iron-rich precipitates.

Mineral transformation of iron-organic matter precipitates

Context and objectives:

Accumulations of iron-rich precipitates are abundant in surface streams of wetlands, where redox interfaces facilitate rapid oxidation and precipitation of iron minerals. Due to the high surface area and sorption capacity of iron minerals, such precipitates are often found in association with high amounts of sorbed organic carbon and trace elements. In wetland streams, these loosely-consolidated precipitates are easily mobilized through precipitation events. For coastal wetlands, like those found in Iceland, the proximity to the coast suggests that these iron- and organic-rich precipitates are likely to contribute to the suspended sediment load exported to coastal waters. Exposure to vastly different geochemical conditions may induce mineral transformation and the release of associated organic carbon to coastal waters. This project will follow the fate of iron (minerals) and organic carbon in natural iron-rich precipitates during exposure to geochemical conditions mimicking seawater to assess the extent to which iron-precipitates contribute to the bioavailable iron and carbon in coastal waters.

Techniques / What to expect:

In this project, you will synthesize iron minerals in the laboratory in the presence and absence of organic carbon. You will then conduct mineral transformation experiments by spiking mineral suspensions with (1) dissolved Fe(II) or (2) sulfide. Solid- and aqueous phase samples will be collected and analyzed for mineral transformations (XRD), changes in mineral morphology (electron microscopy) total element content (acid dissolution and ICP-OES) and carbon content (CHN analyses).

Working place:

Environmental Chemistry Group, UniNE, Av. de Bellevaux 51, 2000 Neuchâtel.

Collaboration:

The project will be supervised by Prof. Laurel ThomasArrigo (laurel.thomas@unine.ch) and a Postdoc/PhD student in the Environmental Chemistry group (to be determined)

Literature:

ThomasArrigo et al., 2016, *Environ. Sci. Technol.*, 50, 3607-3616. ThomasArrigo et al., 2020, *Environ. Sci. Nano.*, 7, 3405-3418.

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