



Figure 1. Examples of iron-rich organic soil profiles sampled from the volcanic-influenced soils of Iceland. These soils regularly undergo flooding, due to common and intense precipitation events.

Temperature sensitivity of carbon cycling and priming effects in iron-rich organic soils

Context and objectives:

Soils store vast amounts of carbon, but the stability of this carbon is highly sensitive to temperature and mineral interactions. Iron minerals play a crucial role in protecting organic matter from decomposition, yet warming may alter these protective mechanisms and stimulate microbial CO₂ production. This MSc project will explore how temperature affects carbon mineralization dynamics in an iron- and carbon-rich soil through a controlled incubation experiment. By tracking CO₂ release and quantifying the priming effect across different temperatures, the study will reveal how microbial processes respond to changing thermal conditions. The results will contribute to a better understanding of soil carbon–iron interactions under climate change.

Techniques / What to expect:

This project will involve anoxic soil incubations performed at different controlled temperatures (5°C – 30°C). Headspace gases will be regularly sampled for CO₂ and CH₄ emissions. In addition, you will analyze trends in porewater geochemistry (redox potential, pH, dissolved Fe, dissolved organic carbon), and at the end of the experiment, selective chemical extractions will assess changes in the iron mineralogy of the soil.

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. (2023) *Environ. Sci. Technol.*, 57, 9204-9213.