

Tuesday 2nd December 2025, 4.15 pm
Room 002, Hallerstrasse 12, GIUB

Trace Element Dynamics in Periodically Waterlogged Soils



Dr. Andreas Voegelin

Scientist, Group Leader Molecular Environmental Geochemistry
Head of Department Water Resources & Drinking Water

Short Bio. Andreas Voegelin's research focuses on the biogeochemistry of trace elements (TE) (Tl, As, Cu, Pb, Cd, Zn, etc.) and phosphorus (P) in natural and technical systems, with emphasis on the roles of solid-water interface processes, redox-driven reactions, and the formation and transformation of iron oxides. Synchrotron-based X-ray speciation techniques play a crucial role in unravelling molecular scale processes. Current research includes the projects "T-Dyn" on TE in periodically water-saturated soils and "T-Rox" on TE release from excavated material from underground construction into water resources. He also teaches bachelor's and master's courses in biogeochemistry at ETH Zurich.

Abstract. Riverbank flooding or intense precipitation can lead to soil waterlogging and a temporary shift toward reducing conditions, driven by ongoing microbial respiration. The involved biogeochemical processes can significantly alter the speciation and solubility of essential or toxic trace elements (TE), with consequences for TE bioavailability and their transfer into water resources. In this presentation, I will first discuss earlier research on key soil biogeochemical processes affecting the fate of TE in periodically waterlogged soils. In the second part, I will present the new SNF-project "T-Dyn" which aims to assess the release selected elements (Tl, As, Cu, Pb, Cd) from soils into water resources under current and future climatic conditions in Switzerland, with a focus on the role of seasonal factors, specific mobilization mechanisms, and microscale soil heterogeneity.