universität freiburg

Kolloquium - Boden, Wasser, Luft

21. November 2024, 16 ct - 18 Uhr
Hörsaal Fahnenbergplatz, Friedrichstr. 39

Prof. Christian von Sperber

McGill University, Canada

Tracing sources and pathways of phosphorus in soils, water and air

Phosphorus is an essential element for all living organisms. On the one hand, too little available phosphorus in soils limits primary productivity and agricultural production. On the other hand, too much phosphorus, e.g. from fertilizer, can lead to the transfer of phosphorus from agricultural fields to aquatic ecosystems causing eutrophication and toxic algal blooms. The transfer of excess phosphorus occurs, both, via overland flow during storm events, but also via subsurface flow during saturated conditions. To date, little is known about the relative contribution of these different flow paths, which is necessary to mitigate this pressing environmental problem.

Tracing the transfer of phosphorus from soils to waters is a challenging task. In contrast to other light elements, phosphorus only has one stable isotope (^{31}P). Therefore, it is not possible to directly analyze the ratio of heavy to light stable isotopes of phosphorus. However, under ambient conditions, phosphorus usually is associated with oxygen forming organic and inorganic phosphates (PO_4^{3-}). Methodological advances during the past decade allow to analyze the stable oxygen isotope ratios of phosphates from environmental samples, which can then be used as an indirect tracer of phosphorus.

Here, I will discuss the use of the oxygen isotope ratios of phosphate as tracer of phosphorus along the soil-freshwater continuum in riparian zones of wetland ecosystems in Canada. To do this, I will present my work on the biogeochemistry of phosphorus in wetland soils including case studies from temperate grassland ecosystems and boreal peatlands. Last but not least, I discuss the potential of tracing atmospheric inputs and losses of phosphorus to and from arctic soils during wild fires.

Veranstaltet von den Professuren für
Hydrologie, Umweltmeteorologie, Bodenökologie und Umwelthydrosysteme und Biochemische Systemmodellierung
Fakultät für Umwelt und natürliche Ressourcen der Universität Freiburg