

Geomicrobiological and Geochemical Colloquium seminar series

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The Changing Arctic Critical Zone: tracing the influence of permafrost thaw

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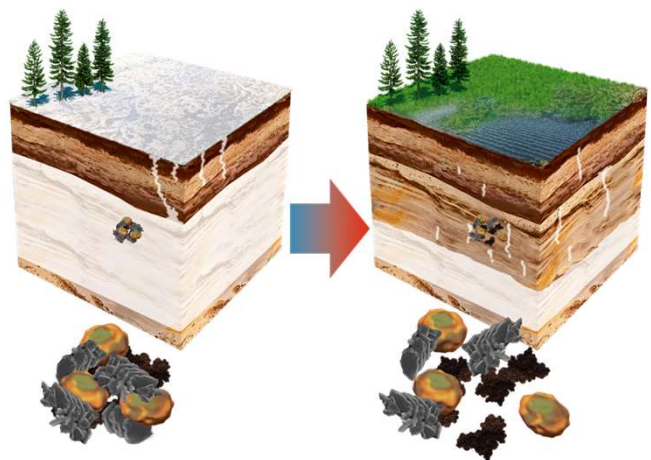
Catholic University of Louvain, Belgium

In person: A71 seminar room 513/515

Abstract

Critical Zone (CZ) is an interdisciplinary framework for the analysis of the coupled chemical, biological and physical processes operating from the canopy to the aquifers. The ongoing rapid permafrost thaw in polar regions, not previously anticipated, induces major changes in the Arctic CZ. Major efforts from the scientific community active in polar regions have been achieved to quantify the permafrost organic carbon (OC) pool and to measure the associated permafrost carbon (C) emissions considered as a tipping point of our climate system. However, an incomplete representation of the controlling processes generates large uncertainties on the magnitude and timing of permafrost C emissions and thereby on the remaining C budget estimates. The added value of the CZ approach, so far limited in the Arctic, is to consider the potential indirect factors modulating permafrost C emissions.

In parallel, significant progress has been made in the field of isotope geochemistry, but the power of the approach has not yet been fully unfolded, especially in challenging polar environments. Here I combine the CZ approach with pushing further existing isotope tracers (Si and Sr) to shed light on the key geochemical processes affected by changes in soil water saturation upon permafrost thaw and affecting mineral-OC interactions, and thereby OC release from the Arctic CZ.



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