EGU25-8343, updated on 16 May 2025
https://doi.org/10.5194/egusphere-egu25-8343
EGU General Assembly 2025

Soil solution chemistry along a land cover transect in the alpine tundra (NW Italian Alps)

Andrea Benech, Emanuele Pintaldi, Nicola Colombo, and Michele Freppaz
University of Turin, Department of Agricultural, Forest and Food Sciences, Grugliasco, Italy

Soil solution sampling is a critical approach to understand the dynamics of water and nutrient transport in terrestrial ecosystems, however little information is available for high-elevation environments. During the summer 2024, soil solution was sampled at 10 cm depth in the Long Term Ecological Research-LTER site Istituto Mosso (2650 – 2900 m a.s.l., NW Italian Alps), using 30 soil disc lysimeters among 3 distinct vegetation communities belonging to alpine tundra ecosystem: snowbed communities, *Carex curvula* grasslands, and mixed conditions. This work presents new insights in the application of soil suction lysimeters at high-elevated, logistically-complex environments. By collecting and analyzing the soil solution, we aimed to contribute to the comprehension of the functioning of alpine tundra ecosystems, particularly under the pressure of climate change, focusing on the possible shift in vegetation cover from snowbed communities toward *Carex curvula* grasslands due to higher air/soil temperature and earlier spring snowmelt. These measurements were complemented by continuous monitoring of soil temperature and moisture, providing a comprehensive understanding of soil dynamics in these ecosystems. Special attention was paid to the transport processes of water and nutrients (namely carbon and nitrogen), which are fundamental to understand biogeochemical cycling in alpine areas. Notably, the content of Dissolved Organic Carbon (DOC) was the highest in *Carex curvula* grasslands, while nitrate concentrations exceeded those of ammonium across all sites. The outcomes of this study are expected to contribute to advancing methodologies in soil solution sampling and provide critical information for evaluating alpine ecosystem responses to changing climatic conditions. These findings will also help refining our understanding of water and nutrient dynamics, offering implications for both ecological research and management strategies in vulnerable high-elevation environments.

Research supported by NBFC - University of Turin/DISAFA, funded by the Italian Ministry of University and Research, PNRR, Mission 4 Component 2, “Dalla ricerca all’impresa”, Investment 1.4, Project CN00000033