EGU21-9969
https://doi.org/10.5194/egusphere-egu21-9969
EGU General Assembly 2021

Effects of dominant moss species on shrub growth and xylem anatomy along a precipitation gradient in the subarctic tundra

Alba Anadon-Rosell[1], Anders Michelsen[2], Signe Lett[2], Ellen Dorrepaal[3], Georg von Arx[4], Jan Tumajer[1], and Martin Wilmking[1]

[1]Institute of Botany and Landscape Ecology, University of Greifswald, Greifswald, Germany
[2]Terrestrial Ecology Section, Department of Biology, University of Copenhagen, Copenhagen, Denmark
[3]Department of Ecology and Environmental Science, Climate Impacts Research Centre, Umeå University, Abisko, Sweden
[4]Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland

In the tundra, bryophytes may be the dominant growth form covering the soil surface of shrub communities. They can modulate soil conditions through their capacity to retain moisture and nutrients and their chemical characteristics. The study of the interaction between shrubs and bryophytes is essential to understand the functioning of these shrub communities, which are expanding due to global change. In this study, we collected *Betula nana* and *Empetrum hermaphroditum* ramets growing in moss carpets dominated by *Hylocomium splendens*, *Pleurozium schreberi* or *Sphagnum* spp., which differ in growth habit, density of their carpets and water holding capacity, amongst others. We sampled three ramets per site and moss species in eight locations distributed along a precipitation gradient (571-1155 mm/year) in the subarctic alpine tundra near Abisko, Sweden. To investigate structural and functional responses to the dominant moss species and precipitation regime, we prepared microscopic sections of the shrubs stem base and measured growth rings and xylem anatomical parameters (vessel lumen area, vessel density and grouping, and theoretical hydraulic conductivity). We also measured shrub leaf C and N concentration and isotope composition ($\delta^{13}C$, $\delta^{15}N$). To understand moss effects on soil characteristics along the precipitation gradient, we measured soil pH and water and nutrient content (nitrate, ammonium, phosphate, dissolved organic C and dissolved organic N). Preliminary results on shrub leaf physiology and soil characteristics show a significant interaction between moss species and the precipitation gradient, indicating that mosses modulate the effects of climate conditions on shrubs. We discuss the importance of moss species combined with the precipitation regime for the performance of tundra shrubs in the context of a changing climate.