Geophysical Research Abstracts
Vol. 20, EGU2018-10646, 2018
EGU General Assembly 2018

Patterns of bryophyte diversity and soil nutrient availability in vernal pools located in Central Pennsylvania, USA

Shauna-kay Rainford (1) and Patrick Drohan (2)

(1) The Pennsylvania State University, Ecology Program, The Huck Institutes of the Life Sciences, United States (sur210@psu.edu), (2) The Pennsylvania State University, Department of Ecosystem Science and Management, United States (pjd7@psu.edu)

Bryophytes are important contributors to carbon (C) sequestration in wetland environments and play a critical role in regulating the impacts of global climate change on C and nitrogen (N) cycles. As such, it is important to understand patterns in nutrient availability and bryophyte diversity in wetlands. Here, bryophyte biomass, species richness count, and a number of soil nutrient indices (i.e. N, phosphorus (P), and C, chemically fractionated recalcitrant index for C (RIC) and N (RIN), pH, cation exchange capacity (CEC), and base cation percent saturation) are compared in six vernal pools spread across the Appalachian Plateau and the Ridge and Valley, two physiographic provinces of central Pennsylvania, USA, that differ in topography and parent material. A three-level nested ANOVA was used to compare bryophyte and soil nutrient attributes at four depths (0-5 cm, 5-10 cm, 10-15 cm and 15-20 cm) between the two regions. Results show there was a significant difference in the amount of bryophyte species (i.e. differences in species richness), but not biomass, between the two regions. Total C, N, and RIN were significantly different across regions at depths of 0-5 cm, 5-10 cm, and 10-15 cm, but demonstrated no significant differences from 15-20 cm, while soil C:N and RIC were not significantly different at all depths between the regions. We observed a constant retention of recalcitrant C, as revealed by RIC with depth in all vernal pools except for one, for which RIC increased in the soil at 0-5 cm depth. While P content was significantly different between the two regions at all depths, which was expected due to differences in parent material between the two provinces, no significant differences were found for pH, CEC, or base cation percent saturation with depth between the regions. Our results suggest that wetland soils of different physiographic origin may experience differences in bryophyte species richness, and C and N availability, yet differences in these properties do not appear to impact the ability of such wetland soils to sequester carbon in terms of bryophyte biomass or recalcitrant C retention capacity. This may be driven more by the similarities in CEC, pH, and base cations that were found across soil depths between the two regions. As such, similarities in C input via bryophyte biomass and carbon retention (as expressed by RIC) may lead to vernal pools having the same C sequestering ability throughout this North American region.