Geophysical Research Abstracts
Vol. 19, EGU2017-16898, 2017
EGU General Assembly 2017

Application experiments to trace N-P interactions in forest ecosystems

Jaane Krüger (1), Jörg Niederberger (2), Stefanie Schulz (3), and Friederike Lang (1)

(1) Chair of Soil Ecology, University of Freiburg, Freiburg, Germany (jaane.krueger@bodenkunde.uni-freiburg.de), (2) Chair of Silviculture, University of Freiburg, Freiburg, Germany, (3) Research Unit for Comparative Microbiome Analyses, Helmholtz Zentrum München, München, Germany

Phosphorus is a limited resource and there is increasing debate regarding the principles of tight P recycling. Forest ecosystems show commonly high P use efficiencies but the processes behind this phenomenon are still unresolved. In frame of the priority program "SPP 1685 Ecosystem nutrition - Forest strategies for limited phosphorus resources" around 70 researchers from different disciplines collaborate to unravel these processes. The overall hypothesis to be tested is that the P nutrition strategy of forest ecosystems at sites rich in mineral P is characterized by high P uptake efficiency (acquiring systems). In contrast, the P strategy of forest ecosystems facing low soil P stocks is characterized by highly efficient mechanisms of P recycling. To test this hypothesis, we analyzed five beech forest ecosystems on silicate rock with different parent materials representing a gradient of total P stocks (160 – 900 g P m^{-2}, down to 1m soil depth). In fact, we found evidence confirming our hypothesis, but controls and drivers of P strategies are still unknown as other environmental variables differ. One of those might be the N content, as organisms strive to reach a specific internal N:P ratio. Thus, an additional application of N might also alter P nutrition. To test this, we established a factorial P x N application experiment at three of the study sites. With our presentation we will introduce this experiment and give a review on published P x N experiments discussing different advantages and disadvantages of different basic conditions (e.g. amount and application form, doses, sampling and statistical design, monitoring periods, budget calculation, isotopic tracing). Finally, we want to initiate a common discussion on the standardization of P x N field experiments to enable interdisciplinary and across-compartment comparisons (e.g. different land use, different climate zones, terrestrial and aquatic ecosystems).