Geophysical Research Abstracts
Vol. 16, EGU2014-1872, 2014
EGU General Assembly 2014

Spatial variability of soil parameters - subsoils as heterogenic environments

Stefanie Heinze (1), Stephan John (2), Kristina Kirfel (3), Robert Mikutta (4), Jana Niebuhr (1), Sebastian Preusser (5), and Bernd Marschner (1)

(1) Ruhr-Universitaet Bochum, Institute of Geography, Soil Science/Soil Ecology, Germany (stefanie.heinze@rub.de), (2) University of Cologne, Faculty of Mathematics and Natural Sciences, Department of Geosciences, Germany, (3) Georg-August University Goettingen, Plant Ecology and Ecosystem Research, Germany, (4) Leibninz University Hannover, Department of Soil Sciences, Germany, (5) University of Hohenheim, Institute of Soil Science and Land Evaluation - Soil Biology, Germany

Subsoils are known to store a high amount of organic carbon (40-60% of the total C-pool). 14C-dating detected that in subsoils organic matter (OM) age increased with increasing depth and reaches several 1000 years. The high age of subsoil OM might be caused by a complex structure, by limited access of OM for microbial decomposition or a limited input of fresh organic material. The latter, mostly reaches the subsoil through special pathways, like root channels, bioturbation processes or preferential flow pathways where dissolved organic carbon will be transported. The spatially concentrated input of OM supposed that the heterogeneity of physical, chemical, and biological soil parameters is higher in subsoils than in top soils. Within the DFG-FOR 1806 we investigated the heterogeneity of soil parameters in soil profiles (top and subsoil) of a podzolic Cambisol in a 95 years old beech forest in Lower Saxony, Germany. Three transects were established with a vertical and horizontal dimension of 2.00m and 3.15m, respectively. 64 soil samples were taken out of a grid in 10, 35, 60, 85, 110, 135, 160 and 185m depth with increasing horizontal distance to a main tree. To analyze the variability and relationship of soil properties in the soil profiles, analysis of soil physical (e.g. texture), chemical (e.g. organic C, dissolved organic C, total N, pH), and biological (e.g. enzyme activities, microbial biomass C) parameters were conducted within the research group. The results showed a very strong decline of organic C from 1.15% (10cm) to 0.12% (60cm). The differences of SOC were not pronounced with increasing distance to the main tree. Also total nitrogen decreased between 10 and 60cm strongly from 0.05 to 0.005%. The pH showed a slight increase between 10 and 35cm from 3.51 up to 4.27. For microbial biomass measures the same stratification was detected but the variance within biological parameters were higher in the subsoil than in the topsoil. Enzyme activities showed a higher variance with increasing depth with a lower diversity. The coming results of the texture will give additional information to explain depth dependent variations. In conclusion, the subsoil showed lower contents of measured parameters in comparison to the topsoil but the heterogeneity of soil properties is enhanced in the subsoil, especially for microbial indices.