Geophysical Research Abstracts
Vol. 16, EGU2014-10595-1, 2014
EGU General Assembly 2014

Enzyme activities along a latitudinal transect in Western Siberia

Jörg Schnecker (1,2), Birgit Wild (1,2), Ricardo J. Eloy Alves (2,3), Norman Gentsch (4), Antje Gittel (2,5), Anna Knoltsch (1,2), Nikolay Lashchinskiy (6), Robert Mikutta (4), Mounir Takriti (1,2), Andreas Richter (1,2)

(1) University of Vienna, Department of Microbiology and Ecosystem Science, Vienna, Austria (joerg.schnecker@univie.ac.at), (2) Austrian Polar Research Institute, Vienna, Austria, (3) University of Vienna, Department of Ecogenomics and Systems Biology, Division of Archaea Biology and Ecogenomics, Vienna, Austria, (4) Leibniz Universität Hannover, Institut für Bodenkunde, Hannover, Germany, (5) University of Bergen, Centre for Geobiology, Department of Biology, Bergen, Norway, (6) Central Siberian Botanical Garden, Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russia

Decomposition of soil organic matter (SOM) and thus carbon and nutrient cycling in soils is mediated by the activity of extracellular enzymes. The specific activities of these enzymes and their ratios to each other represent the link between the composition of soil organic matter and the nutrient demand of the microbial community. Depending on the difference between microbial nutrient demand and substrate availability, extracellular enzymes can enhance or slow down different nutrient cycles in the soil.
We investigated activities of six extracellular enzymes (cellobiohydrolase, leucine-amino-peptidase, N-acetylglucosaminidase, chitotriosidase, phosphatase and phenoloxidase) in the topsoil organic horizon, topsoil mineral horizon and subsoil horizon in seven ecosystems along a 1,500 km-long North-South transect in Western Siberia. The transect included sites in the southern tundra, northern taiga, middle taiga, southern taiga, forest-steppe (in forested patches as well as in adjacent meadows) and Steppe. We found that enzyme patterns varied stronger with soil depth than between ecosystems. Differences between horizons were mainly based on the increasing ratio of oxidative enzymes to hydrolytic enzymes. Differences between sites were more pronounced in topsoil than in subsoil mineral horizons, but did not reflect the north-south transect and the related gradients in temperature and precipitation. The observed differences between sites in topsoil horizons might therefore result from differences in vegetation rather than climatic factors. The decreasing variability in the enzyme pattern with depth might also indicate that the composition of soil organic matter becomes more similar with soil depth, most likely by an increasing proportion of microbial remains compared to plant derived constituents of SOM. This also indicates, that SOM becomes less divers the more it is processed by soil microorganisms. Our findings highlight the importance of soil depth on enzyme activities. Since microorganisms produce enzyme according to their nutrient demand, enzyme activities can enhance nutrient cycling differently in distinct soil horizons.