Geophysical Research Abstracts
Vol. 16, EGU2014-4990-1, 2014
EGU General Assembly 2014

Water and dissolved carbon transport in an eroding soil landscape using column experiments

Helene Rieckh (1), Horst Gerke (1), Nadia Glæsner (1,2), Charlotte Kjaergaard (2), and Michael Sommer (1)

(1) Institute of Soil Landscape Research, Leibniz-Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany (helene.rieckh@zalf.de), (2) Department of Agroecology, Aarhus University, Blichers Alle 20, Postboks 50, DK-8830 Tjele, Denmark

In the hummocky ground moraine soil landscape, a spatial continuum of more or less eroded soils developed from till under intensive agricultural cultivation. Water flow and solute transport are affected by the variable soil structural and pedological developments, which are posing a challenge for flux estimation. The objective of this study was to investigate transport of water, dissolved organic (DOC), and particulate carbon (PC) through soil profiles of an eroded Haplic Luvisol and a heavily eroded Haplic Regosol. We studied 5 soil horizons in three replicates each: Ap (0-20 cm) and E (20-40 cm and 40-60 cm) horizons of the eroded Haplic Luvisol and Ap (0-20 cm) and CBkg (20-40 cm) horizon of the Haplic Regosol. Leaching experiments were performed on intact soil columns (20 cm diameter, 20 cm height) and carried out during unsaturated conditions with a suction applied at the lower boundary. Breakthrough curves for a pre-applied tracer (Br-) on the soil surface and a tracer applied with irrigation water ($3H_2O$) were modeled analytically using CXTFIT. The heterogeneity of the Luvisol horizons was generally higher than that of the Regosol horizons, which relates to the higher heterogeneity of the Luvisol bulk density. The active flow volume was smaller for the Regosol horizons both in 0-20 cm and 20-40 cm depths. The highest DOC leaching was from the E horizon (20-40 cm depth) located just underneath the Ap horizon of the Luvisol corresponding with its lower clay content. From the finding of a substantially lower leaching of particles from all Regosol horizons, we assume a lower transport of particulate C from the Haplic Regosol than from the eroded Haplic Luvisol. Results suggest that soil erosion not only affected the pedological structure and physical soil properties but also strongly the water and solute movement.