Geophysical Research Abstracts
Vol. 15, EGU2013-7521-1, 2013
EGU General Assembly 2013

Soil redistribution and dynamics of organic carbon

Xiang Wang, Erik Cammeraat, Paul Romeijn, and Karsten Kalbitz

Earth Surface Science, Institute for Biodiversity and Ecosystems Dynamics, University of Amsterdam, The Netherlands (x.wang@uva.nl)

A better understanding of how water erosion influences the redistribution of soil organic carbon (SOC) is sorely needed. Here, the main objective was to determine the complete carbon (C) budget of a loess soil affected by water erosion. We measured fluxes of SOC, dissolved organic carbon (DOC) and CO_2 in a unique replicated rainfall-simulation experiment. We characterized different carbon pools in the soil and redistributed sediments using density fractionation and determined C enrichment (ERc) in the sediments. CO_2 emissions were quantified during the 120 days of the experiment with four rainfall events. Erosion, transport and deposition resulted in a significantly higher ERc of the sediments exported ranging between 1.3 and 4.0. In the exported sediments, C contents of the free light fraction and mineral-associated OC were both significantly higher than those of non-eroded soils indicating that water erosion resulted in losses of C-enriched material both in the form of particulate organic C (POC, C not bound to soil minerals) and mineral-associated OC. However, in the first of the four rainfall events, our data clearly indicated a larger C enrichment of exported sediments for POC than for mineral-associated OC. The lateral C losses with overland flow per event remained constant or slightly increased relative to the first rainfall event. The averaged OC fluxes as particles were 10 times larger than DOC fluxes. Emission of CO_2 from the soil slightly decreased at the erosion zone while increased by 27% at the deposition zone in comparison to non-eroded soils. Overall, CO_2 emission was the predominant form of C loss contributing to about 98% of total C losses during the long-term experiment. However, our study also underlines the importance of C losses by particles and as DOC to understand effects of water erosion on the C balance at the interface of terrestrial and aquatic systems.