Geophysical Research Abstracts
Vol. 18, EGU2016-15514, 2016
EGU General Assembly 2016

Monitoring solute fluxes: Integrating electrical resistivity with multi-compartment sampler techniques

Esther Bloem (1), Perrine Fernandez (1,2), Helen K. French (1,2)

(1) NIBIO, Norwegian Institute of Bioeconomy Research, Ås, Norway (Esther.Bloem@nibio.no), (2) Norwegian University of Life Sciences, Ås, Norway

The impact of agriculture, industry, airport activities on soil and water quality is strongly influenced by soil heterogeneity. To improve risk assessment, monitoring, and treatment strategies, we require a better understanding of the effect of soil heterogeneity on contaminant movement and better methods for monitoring heterogeneous contaminated transport. Sufficient characterization of spatial and temporal distribution of contaminant transport requires measurements of water and solute fluxes at multiple locations with a high temporal resolution. During this presentation, we will show a newly developed instrument, which combines multi-compartment sampling with electrical resistivity measurements, to observe spatial and temporal fluxes of contaminants.

Solute monitoring is often limited to observations of resident concentrations, while flux concentrations govern the movement of solutes in soils. Bloem et al. (2010) developed a multi-compartment sampler (MCS) which is capable of measuring fluxes at a high spatial resolution under natural conditions. The sampler is divided into 100 separate compartments of 31 by 31 mm. Flux data can be recorded at a high time resolution (every 5 minutes). Tracer leaching can be monitored by frequently sampling the collected leachate while leaving the sampler buried in situ. To optimize the monitoring of tracer leaching and measure real solute fluxes the multi-compartment sampler has been extended with 121 electrodes. The electrodes are mounted at each corner of each compartment to measure the electrical conductivity above each compartment while water percolates through the compartments. By using different electrode couples, the setup can also be used to image above the multi-compartment sampler.

The instrument can be used for detailed studies both in the laboratory and in the field. For laboratory experiments a transparent column is used which fits perfect on top of the MCS. We present a selection of the integrated electrical resistivity and MCS results from our laboratory setup. The performance and capabilities of this instrument will be explained.