Poster Presentations

P01

Integrating electrical resistivity with multi-compartment sampler techniques to study heterogeneous solute transport in the unsaturated zone

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Soil and groundwater contamination is a major concern. Agriculture, industry, airport activities all have impact on the water quality. Soil heterogeneity, fingered flow and macropore flow cause solutes to spread out in time and space as they move downwards from the soil surface with infiltrating water. To improve risk assessment, monitoring, and treatment strategies, we require a better understanding of the effect of soil heterogeneity on contaminant movement and methods for monitoring the effects of this heterogeneity at contaminated sites. During this presentation, we will show a newly developed instrument, which combines multi-compartment sampling with electrical resistivity measurements.

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. Recently this instrument has been extended with 121 electrodes. The electrodes are mounted at each corner of each compartment to measure the electrical conductivity above each individual 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 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.

References:

Bloem, E., Hogervorst, F.A.N., de Rooij, G.H. & Stagnitti, F. (2010): Variable-suction multicompartment samplers to measure spatiotemporal unsaturated water and solute fluxes. – Vadose Zone Journal, **9**/1, 148–159.