



Lysimeter Soil Retriever (LSR) – A tool for investigation on heterogeneity of the migration and structural changes

S. Reth (1a,3), M. Gierig (2), J.B. Winkler (3), C.W. Mueller (4), C. Nitsche (5), and M. Seyfarth (1b)

(1a) Umwelt-Geräte-Technik GmbH, Branch South, Freising, Germany (sascha.reth@ugt-online.de, phone: +49 (0) 8161-2346441, fax: +49 (0) 8161-2346443), (1b) Umwelt-Geräte-Technik GmbH, Müncheberg, Germany (manfred.seyfarth@ugt-online.de, phone: +49 (0) 33432-89575, fax +49 (0) 33432-89573), (2) Bavarian Environmental Agency, Wielenbach, Germany (Michael.Gierig@lfu.bayern.de), (3) Helmholtz Zentrum München, German Research Center for Environmental Health, Institute of Soil Ecology, Department of Environmental Engineering, Neuherberg, Germany (bwinkler@helmholtz-muenchen.de), (4) Lehrstuhl für Bodenkunde, TU München, Freising-Weihenstephan, Germany (carsten.mueller@wzw.tum.de), (5) BGD Boden- und Grundwasserlabor GmbH, Dresden, Germany (cnitsche@bgd-gmbh.de)

Generally research fields of lysimeter studies scheduled as long term experiments. In the course of the studies, the lysimeters act more or less as a “black box”. Usually the soil material is identified and analysed at the beginning of the experiments. But there is also a strong need to analyze the soil without disturbance of the soil structure after the experiments in order to obtain information about spatial and structural changes within the soil profile. The new technique of the Lysimeter Soil Retriever for the first time enables studies on the heterogeneous migration of percolating water, and changes of soil structure as well as soil organic matter (SOM) and biomass distribution, as well as the distribution of mycorrhiza and microbes in different depths on intact soil profiles.

The main target by using the LSR is the preparation of an intact soil monolith from the field lysimeter and the immediate dissection into slices to enable a direct sampling of its soil environment at several depths. Distribution and composition of SOM, pH-values, soil porosity, as well as degradation of PAH were only a few parameters, which are determined at the different soil depths. In this presentation we give some examples for the different application of the LSR and the advantage for the experiments:

- The soil of 8 lysimeters, planted with young beeches was retrieved after several years of fumigation with doubled atmospheric ozone concentrations and application of fungi. Due to the accurate sectioning of the soil monoliths a very dense and intensive soil sampling was possible. As the whole soil space of 8 lysimeters could be sampled, precise spatial information were obtained about the rapid formation of SOM depth gradients within the experiment duration.
- After the investigation on the mobilization of polycyclic aromatic hydrocarbons (PAH) by the seepage water, the lysimeter soil was retrieved. Investigations on the microbiological degradation of the PAH were possible in the whole soil monolith.
- After the investigation on the migration behaviour of BTEX, MKW, PAK and Phenol, the soil of a lysimeter was retrieved to get information of the soil properties.