

Special lysimeter probing techniques

S. RETH and M. SEYFARTH

A key requirement to validate findings is the implementation of in-situ probing techniques.

During the growth periods the plants' photosynthesis was monitored continuously (in-situ gas exchange measurements) and the root development was studied with a minirhizotron camera (endoscopic technique)

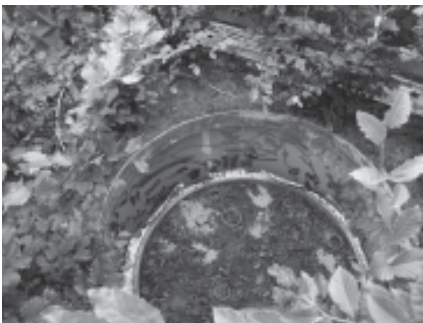


Figure 1: Lowering of a lysimeter after cutting the trees



Figure 2: Transport of a lysimeter to the LSR

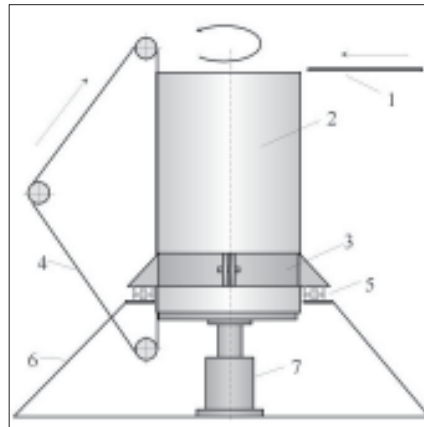


Figure 3: Schematically view on LSR with a lysimeter vessel (1 cut off plate; 2 lysimeter vessel; 3 sleeve; 4 wire saw; 5 roll-riding system; 6 frame; 7 telescopic cylinder)

The main goal was the retrieval of intact soil monoliths from the lysimeters, and the immediate dissection into slices, such that the rhizosphere and its soil environment can be directly probed at several depths.

The Lysimeter Soil Retriever (LSR) (RETH et al., 2006a) was developed (patent pending, RETH et al., 2006b) and successfully installed as shown in the following pictures.

The Lysimeter Soil Retriever a novel tool for plant-soil research

- allows for the first time to analyze the soil without disturbance after a long-term experiment
- the retrieving of intact soil slices allows a much broader range of applications of lysimeters
- changes in the soil system can be analyzed virtually in-situ

Further applications in combination with the GSF exposure chambers, the greenhouse and the Scheyern field site



Figure 4: Preparation for the first cut of a soil slice



Figure 5: Sampling of a freshly cut soil slice

- investigations on the plant-soil system in the context of global warming
- long-term influence of crop rotation on the soil system, including microbiota
- development of land management for energy-plants

Literature

- RETH, S., M. SEYFARTH, O. Gefke and H. FRIEDRICH, H., 2006a: Lysimeter Soil Retriever (LSR) - a new technique for retrieving soil from lysimeters for analysis. Journal of Plant Nutrition and Soil Science, in press.
- RETH, S., M. SEYFARTH, O. GEFKE and H. FRIEDRICH, 2006b: Deutsche Patentanmeldung "Vorrichtung zur Entnahme eines Bodenmonolithen aus einem Lysimetergefäß". Anmelde datum 27.02.2006, Patentnr. 10 2006 010 158

Autoren: Dr. Sascha RETH, Institute of Soil Ecology, GSF - National Research Center for Environment and Health, Department of Environmental Engineering, Ingolstädter Landstraße 1, D-85764 NEUHERBERG, sascha.reth@gsf.de, Dr. Manfred SEYFARTH, UGT Environmental Measurement Devices Ltd., Eberswalder Str. 58, D-15374 MÜNCHEBERG

