Geophysical Research Abstracts
Vol. 16, EGU2014-3311, 2014
EGU General Assembly 2014

Influence of the lower boundary in lysimeter observations

Ulrich Weller (1), Katja Richter (1), Jozef Gubis (2), and Hans-Jörg Vogel (3)

(1) UGT GmbH, Germany (ulrich.weller@ugt-online.de), (2) Plant Production Research Center PIEŠŤANY, Slovakia, (3) Helmholtz Center for Environmental Research - UFZ, Germany

Lysimeters are a valuable tool to study the water household in soils under close to natural conditions. One major drawback is that they are cut off at the lower boundary. This influences strongly the percolation of water. As long as water is leaching down in the soil, it is stagnating at the lower boundary until saturated conditions are reached and the water can percolate through the gravel filter, and under unsaturated conditions there is no flow at all at the lower boundary.
In natural soils the water potential at the same depth differs considerably from the regime in a lysimeter. If the depth of the soil or the soil forming substrate is deep enough, the lower boundary is at the potential that allows the percolation of the long term mean of percolation. In other situations, a water table may influence the matric potential in the natural soil, or a less permeable layer may impede free drainage. In all these situations the matric potential at the depth of the lower boundary of the lysimeter will differ substantially in the natural soil.
The latest generation of lysimeter therefore has a controlled lower boundary. The matric potential can be actively adjusted to a desired value over a broad range. Most applications connect the suction in the lysimeter to a reference value obtained in the field at the same depth in order to mimic the correct distribution of the soil water. In this presentation we demonstrate the long term influence of the different lower boundary regimes on percolation and evaporation of water based on soil physical models, and we show first field data on the practical implementations with several months of observations.