Geophysical Research Abstracts,
Vol. 11, EGU2009-10895, 2009
EGU General Assembly 2009

The estimation of soil water fluxes using lysimeter data

M. Wegehenkel

Leibniz-Centre for Agricultural Landscape Research, Institute of Landscape Systems Analysis, Müncheberg, Germany (mwegehenkel@zalf.de)

The validation of soil water balance models regarding soil water fluxes in the field is still a problem. This requires time series of measured model outputs. In our study, a soil water balance model was validated using lysimeter time series of measured model outputs. The soil water balance model used in our study was the Hydrus-1D-model. This model was tested by a comparison of simulated with measured daily rates of actual evapotranspiration, soil water storage, groundwater recharge and capillary rise. These rates were obtained from twelve weighable lysimeters with three different soils and two different lower boundary conditions for the time period from January 1, 1996 to December 31, 1998. In that period, grass vegetation was grown on all lysimeters. These lysimeters are located in Berlin, Germany. One potential source of error in lysimeter experiments is preferential flow caused by an artificial channeling of water due to the occurrence of air space between the soil monolith and the inside wall of the lysimeters. To analyse such sources of errors, Hydrus-1D was applied with different modelling procedures. The first procedure consists of a general uncalibrated appli-cation of Hydrus-1D. The second one includes a calibration of soil hydraulic parameters via inverse modelling of different percolation events with Hydrus-1D. In the third procedure, the model DUALP_1D was applied with the optimized hydraulic parameter set to test the hy-pothesis of the existence of preferential flow paths in the lysimeters. The results of the different modelling procedures indicated that, in addition to a precise determination of the soil water retention functions, vegetation parameters such as rooting depth should also be taken into account. Without such information, the rooting depth is a calibration parameter. However, in some cases, the uncalibrated application of both models also led to an acceptable fit between measured and simulated model outputs.