Geophysical Research Abstracts,
Vol. 11, EGU2009-1876-1, 2009
EGU General Assembly 2009

Uncertainties in pesticide monitoring using suction cups: Evidences from numerical simulations

L. Weihermüller (1), R. Kasteel (1), J. Vanderborght (1), J. Šimůnek (2), and H. Vereecken (1)

(1) Forschungszentrum Jülich, Agrosphere Institute, Jülich, Germany (l.weihermueller@fz-juelich.de, 0049 02461 618669),
(2) University of California Riverside (UCR), Department of Environmental Sciences

Risk assessment of pesticide leaching towards the groundwater becomes more and more prescribed by the authorities. Various methods are available to monitor transport and leaching of pesticides in the vadose zone. For experiments at the field scale, soil coring or in-situ sampling using capillary wicks, porous plates, and suction cups are used. The advantage of the in-situ sampling systems resides in the high temporal resolution of solute extraction at different depths or horizons. Especially suction cups seem to play an important role in pesticide monitoring due to their easy installation and low costs. In literature, most studies analyzing suction cup behavior focused on conservative substances, steady state infiltration, and homogeneous soils. In our numerical study, we analyzed breakthrough curves from suction cups in heterogeneous soils under atmospheric conditions. To account for reactive transport, two pesticides were also simulated, whereby each one represents a different physico-chemical behavior. Finally, we simulated two different operation modes of the suction cups: i) permanent suction according to a measured reference tensiometer plus additional offset, and ii) weekly operation with constant suction of -600 cm. The results show that the breakthrough as well as the mass recovery and the mean concentration depends on the physico-chemical properties of the substance and location of the suction cup within the heterogeneous flow field. Second, the total mass as well as the mean concentration depends on the operation mode of the suction cup system.