



## **Experimental investigations of the dynamics of the capillary fringe**

**U. Mohrlök** (1), D. Radny (2), T. Scheytt (2)

(1) Institute for Hydromechanics, University of Karlsruhe, Germany (mohrlök@ifh.uka.de),

(2) Hydrogeology Group, Institute of Applied Geosciences, Technical University of Berlin, Germany (radny@hydrogeo.tu-berlin.de)

The capillary fringe defines the interface between the vadose zone and the groundwater. Water and mass fluxes to the groundwater due to infiltration are strongly depending on the dynamics of the capillary fringe with respect to the physical and chemical conditions. Experimental investigations were conducted in order to observe the development of the capillary fringe under the condition of varying groundwater table and to study the flow and tracer behaviour within the capillary fringe.

A small scale two-dimensional experimental set up, 80cm x 50cm x 10cm, was selected for those investigations. The set up was constructed of acrylic glass and was filled up homogeneously with sandy sediment. The construction enabled controlled fluctuations of the groundwater table as well as lateral groundwater flow. Beside the visualization of the water movement using dye tracers the monitoring of the water tension throughout the system was possible by the implementation of 10 microtensiometers. Three experiments with two different sediments were conducted separated into two phases. A saturation phase at the beginning was to establish a capillary fringe under equilibrium conditions. The subsequent flow phase was to compare the flow in the capillary fringe with the groundwater flow partly under fluctuating groundwater table conditions.

The observations, particularly the water tension data, showed a slowly equilibration of the capillary rise within the saturation phase. During the flow phase a faster dye transport was observed in the groundwater than in the capillary fringe. Groundwa-

ter fluctuations were recorded immediately in the saturated capillary fringe whereas were delayed and smoothed in the unsaturated part. Additionally, an influence of the temperature on the water tension was observed due to the temperature dependent interfacial tension.