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The effect of initial water saturation on the solute transport

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Water flow and solute transport may be influenced by presence of encapsulated air in heterogeneous soils. Since the variation in encapsulated air volume causes the water content changes, solute transport is also influenced. Recent papers show that the dispersivity can be significantly affected by soil water content. The aim of this research was to investigate the effect of encapsulated air on dispersion by means of experiment in laboratory. Two undisturbed soil samples were collected at the small experimental catchment in the Jizera Mountains and the experimental site in the Šumava Mountains. The fully automated set-up was designed to perform infiltration-outflow experiments with the same constant pressure head top boundary condition and various initial soil water contents. Suction pressure heads and outflow fluxes were recorded continuously during the experiments. Subsequently the newly designed set-up included electrochemical in-line analysis of bromide in the effluent. Bromide concentrations were determined by ion selective electrode installed in the flow cell. Infiltration-outflow experiments were conducted on soil cores. Initial soil water pressure head ranged from 0 to -300 cm. The tension infiltrometer was used to secure the constant suction pressure head -1 cm at the upper surface of soil cores. Breakthrough curves of bromide ion were determined during steady state flow. Bromide solutionwas applied as a step function at the top of the soil core and breakthrough curve was acquired. Sorption properties of bromide were measured by standard batch method to confirm that assumption of conservative transport is valid. The results show clearly variations of dispersion with varying water saturation. The dispersion coefficients will be determined by fitting a one-dimensional advection-dispersion equation to experimental data. Detailed experimental results will be given on the poster. This research has been supported by MSMT 1K05024.