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Unsaturated Flow Effects on Solute Transport in Soils

Friday, 4 June 2021 11:25 (15 minutes)

A major contaminant transport process in soils is hydrodynamic dispersion by affecting the spreading and arrival of surface-applied pollutants at underlying groundwater reservoirs. When a soil is unsaturated, hydrodynamic dispersion is very much affected by soil water saturation. Centimeter- and decimeter-scale column experiments were carried out to explore the effects of fluid saturation and soil type on the unsaturated solute dispersivity. Measured in-situ breakthrough curves were analyzed in terms of both classical advection-dispersion and dual-porosity (mobile-immobile) type transport equations. A clear non-monotonic relationship was found between the dispersivity and soil water saturation. The extent of non-monotonicity was more pronounced for relatively coarse-textured soils compared to the finer soils. This finding has been reported rarely before; it explains the inconsistency of saturation-dispersivity relationships in the literature. The relationship between solute dispersivity and water saturation proposed herein may improve the performance of field-scale transport models for the unsaturated zone.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

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