



High-resolution lab experiment on solute transport through vadose zone into groundwater

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Transport of solutes through natural and artificial porous media plays an important role in contaminant hydrology and addresses challenging issues of complex systems. Translucent porous media in Hele-Shaw cells allow determination of water saturation and concentration distributions by absorption of light.

In this study, the transport of conservative solutes through a quasi two-dimensional porous medium is investigated with spectroscopic light transmission. Images of the Hele-Shaw cell are taken at different wavelengths to obtain simultaneous distributions of water saturation and concentration of an injected dye tracer at high temporal and spatial resolutions.

We observe the transport of initially narrow pulses under saturated and unsaturated conditions with constant vertical flux. Additionally we examine the transition of such pulses from the unsaturated zone through the capillary fringe into the saturated zone.