



Tracer experiments to study preferential flow in a soil column by means of MRI.

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The magnetic resonance imaging (MRI) technique has been used for visualization and interpretation of flow pathways. A set of tracer-infiltration experiments was performed on soil columns filled with packed homogeneous sand samples and with composite sand-soil samples, respectively. Heterogeneous soils exhibiting preferential flow were selected for this purpose. The flow paths were visualized using the tracer $\text{Ni}(\text{NO}_3)_2$ which has a different relaxation time than the infiltrating water. The tracer pulse was added under hydraulic “steady state” conditions. Small disturbances in the tracer front were observed during the break-through in both cases – for homogeneous sample as well as for the composite sample. These disturbances can be related to the preferential flow phenomena in combination with the air bubble entrapment. However, any more detailed explanation would be merely speculative due to the character of the imaging method employed in this experiment.

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