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# Direct observations of surface water–groundwater interaction using electrical resistivity tomography

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**Abstract** Electrical resistivity tomography is a helpful tool to observe the infiltration process in and through the soil. Array 3-D measurements and 3-D inversion schemes are required for reliable interpretation of heterogeneous subsurface structures. Smoothing of the inversion can be minimized by using adequate regularisation parameters and time corrections are needed to counteract the finite measurement time of the full array. One experiment in sandy soil revealed fast water infiltration and within three days the infiltrated water had percolated to the groundwater at 1.5 m. The quantitative reconstruction was possible because no saline tracer was applied. Therefore, the change in resistivity could uniquely be attributed to water content changes using an Archie function confirmed by the field measurements. For the experiment at a slope, a saline tracer was applied. The experiment aimed at the mapping of possible preferential flow pathways. The first results show slow lateral movement along the steepest gradient.

**Key words** ERT; vadose zone; flow process monitoring; subsurface storm flow