

ESTIMATION OF WETTING FRONT MOVEMENT FROM TIME-LAPSE ERT AT FIELD SCALE

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Tracking the behavior of the wetting front during infiltration experiments can provide often-valuable information that is used to describe and quantify soil physical parameters and predict the fate of pollution. Time-lapse surface electrical resistivity tomography (ERT) is a popular method to study near-surface hydro-geophysical processes and quantify changes in the subsurface hydrological status. A common analysis method is to link a reduction of resistivity values at a specific location with the passing of a wetting front at that location. A number of studies have observed that during the monitoring of wetting fronts with time lapse ERT, the inverted data in front of the wetting front tend to show an increase in resistivity, which does not make sense from a hydrologic perspective. This behavior is sometimes attributed to be an artefact of the inversion and disregarded in further analysis. Our hypothesis in this study is that the complete inverted data set holds important information that can improve the accuracy of the location of wetting fronts at field scale. We explore via synthetic models and field data the potential of using the complete inverted dataset to locate the wetting front more accurately. Our synthetic models and scenarios are based upon data collected during field experiments. Flooding experiments were conducted on a sandy field, interlaced with more loamy layers, during different times over the irrigation season. Incorporation of these different field conditions, allows us to assess the impact of different starting conditions and soil heterogeneity on the location and movement of wetting fronts. Comparing classical metrics based on reduction in resistivity with the complete inverted dataset shows that incorporation of the complete inverted data set improves identification of the location of the wetting front from time-lapse ERT experiments under high intensity water application.