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# Parameter estimation analysis of the novel evaporation experiment for determining soil hydraulic properties

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Hydraulic properties are essential for modelling soils. To obtain valid hydraulic properties also for the dry range, a new evaporation method and a numerical model to determine soil hydraulic properties by inversion was developed by Schneider et al. (2006). The objective of this study was an analysis of the inversion model. The physics of the evaporation process was investigated and the model was tested for well-posedness and uniqueness using response surfaces, a sensitivity study and by inverting synthetical data with known parameters. The performance on different boundary conditions and different measured properties was examined in a similar way.

The model was shown to be well-posed and unique. The physical analysis exposed two different evaporation regimes, a soil-atmosphere boundary layer dominated regime (regime I) in the saturated region and a hydraulically dominated regime (regime II). By using boundary condition changes it is possible to force the system to switch between the two regimes, e.g. from II back to I. A dry front forms which penetrates deeper into the soil as time passes. The model results improved drastically when a potential measurement was included. The tensiometer must then be removed later on to avoid the release of water from the tensiometer into the soil due to the extremely low potentials in the dry soil.