



## **Sensitivity analysis of a model for water infiltration into single permeability soils and application to heterogeneous soils**

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### Abstract.

Modeling water infiltration into soils is crucial regarding the understanding and prediction of the water cycle across scales. Haverkamp et al. (1994) have developed a model for water infiltration into uniform single permeability soils under constant water pressure head at the surface. This model has been used for many applications and in many particular methods for hydraulic characterization of soils (e.g., BEST methods and Beerkan run that involves simple water infiltration through a ring positioned at the soil surface). The model has also been investigated regarding its mathematical properties and input parameters (e.g., shape parameter beta). However, no exhaustive sensitivity analysis has been conducted to define the influence of all its input parameters properly. In this study, we use the scaled version of the model proposed by Lassabatere et al. (2009) to characterize the sensitivity of the model with regards to its input parameters, i.e. the scaling factors for time, cumulative infiltration and the shape parameter beta. This step characterizes the dependency of the model with regards the scaling factors and helps in designing the best strategies for the estimations of these scaling factors and in turns the hydraulic parameters of single permeability soils. Lastly, we question the use of such a model for inverting Beerkan runs from heterogeneous soils (e.g., dual-permeability systems). We demonstrate that, despite the quality of fits, estimates may be very far from the target hydraulic parameters, leading to the inappropriate hydraulic characterization of those dual-permeability systems.

### References.

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