

Interactive comment on “Use of field and laboratory methods for estimating unsaturated hydraulic properties under different land-use” by S. Siltecho et al.

S. Siltecho et al.

claude.hammecker@ird.fr

Received and published: 29 August 2014

The authors would like to thank Mrs Meskini-Vishkaee for her valuable comments and the time she dedicated to this review.

The discussion indeed did not mention interpretations about the differences obtained with the different methods as it was not the actual aim of the paper. However we agree that this part should be enhanced and some elements can be proposed especially by the fact that most of the the methods assume different kind of models. For example, the Beerkan method assumes that infiltration is governed by Haverkamp's in-

C3480

filtration equation and that the retention curve follows van Genuchten's functional with Burdine conditions whereas hydraulic conductivity is supposed to follow Brooks and Corey equation. For the disc infiltrometer method, infiltration is described by Wooding equation, with the assumption that hydraulic conductivity is an exponential function of soil matric potential. The pedo transfer functions of Arya et al, or Mohammadi and Vanclooster (2011) as suggested by the reviewer, despite being physically based, suppose a direct relation between the particle size and retention curve by assuming a sphere packing model, regardless the soil structure. The evaporation method and the inverse modeling start both with real experimental values obtained during a drying procedure, but finally parameters for van Genuchten functional with Mualem conditions are fitted to the experimental curves. Each method is based on strong and different hypothesis about the shape of the unsaturated hydraulic functions and or infiltration curve. It is therefore not really surprising the results obtained being different. We think it is important to present clearly the context of this study to be able to evaluate it's practical implication. Therefore we will keep the structure of the abstract and the text.

The aim of the paper is not to test all the latest developments in the evaluation of retention curve with PSD, but to assess the validity of some well established techniques in order to find out about the difference in soil properties depending on land use and topographic position. Thought the model presented in Mohammadi and Vanclooster (2011) adds some improvements to the model of Arya, it is not fundamentally different.

Though it would be convenient to have some references, the results measured here for hydraulic soil properties could not been compared to previous measurements because they are the first ones performed in this area.

In order to limit the number of figures and as the scaled hydraulic conductivity curves did not show major differences we chose to concentrate on the scaled retention curves.

Indeed the results obtained with Beerkan method show different retention curve shapes mainly because parameter n is significantly lower than for other methods.

C3481

C3482

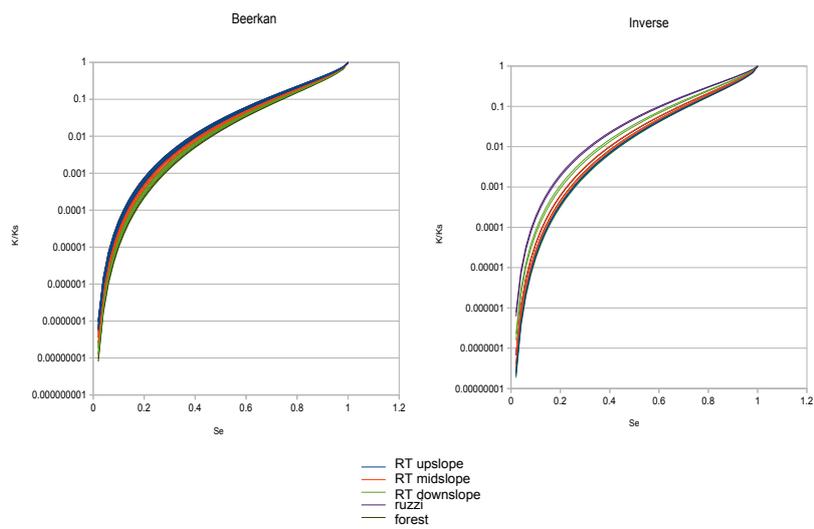


Fig. 1. reduced hydraulic conductivity versus effective saturation

C3483

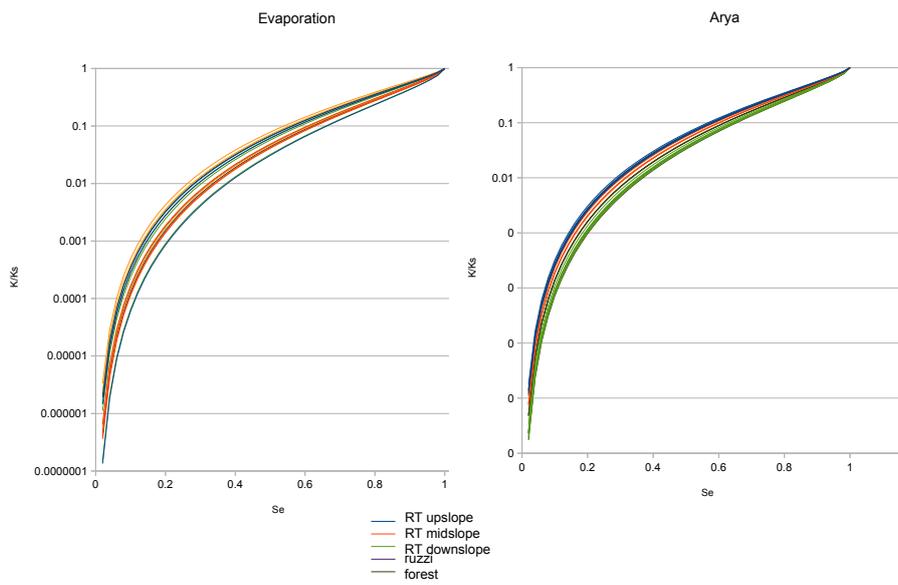


Fig. 2. reduced hydraulic conductivity versus effective saturation

C3484

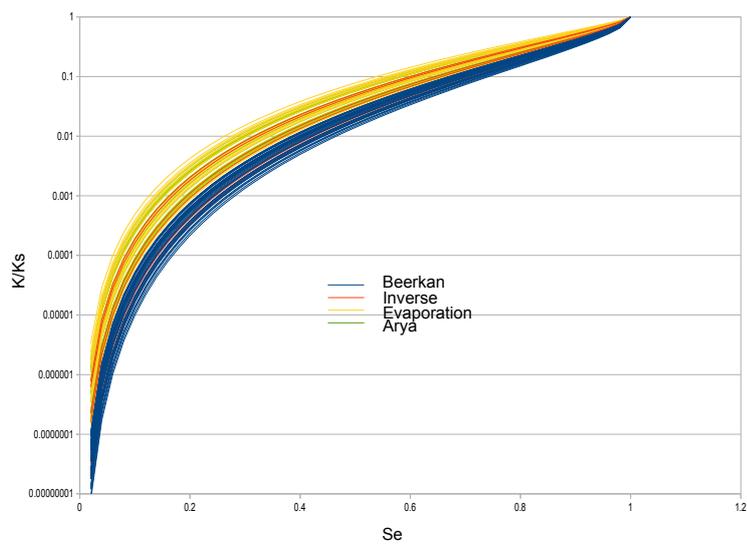


Fig. 3. reduced hydraulic conductivity versus effective saturation

C3485