Geophysical Research Abstracts
Vol. 14, EGU2012-6078, 2012
EGU General Assembly 2012

Is the hydraulic behaviour of linearly similar soils different than non-similar soils?

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Construction of virtual soil domains for hydrological modeling often assumes that the hydraulic properties can be scaled according to linear scaling theory (e.g., Miller-Miller scaling or Warrick-Nielsen scaling). While linear similarity is an appropriate model of the hydraulic properties for some soils, it is likely not appropriate for all soils. The primary objectives of this work are: 1) to discuss the pore domain characteristics of linearly similar and nonlinearly similar soils; 2) explore the hydraulic behaviour (i.e. the spatial patter of soil water fluxes) of linearly similar and nonlinearly similar soils with the aid of a numerical simulation model (Hydrus 2D); and 3) discuss how the results and conclusions of the numerical simulations might be used to aid in the interpretation of data from field experiments and monitoring. It is also hoped that the results of this work will contribution to the understanding of how the spatial variability of hydraulic properties influence the spatial variability of soil hydraulic processes and the appropriateness of scaling the Richards equation.