



Estimation of soil hydraulic properties of soils with heterogeneous pore-size distribution - on appropriate methods and models

W. Durner, A. Peters, S.C. Iden

Institut für Geoökologie, Technische Universität Carolo-Wilhelmina zu Braunschweig, Langer Kamp 19c, 38106 Braunschweig, Germany (w.durner@tu-bs.de)

The transferability of soil hydraulic properties measured in the laboratory to the field or catchment scale is a key problem in soil hydrology. Field soils are almost always structured, and the consequences for effective water and solute transport are qualitatively known, but hard to predict quantitatively. Our hypothesis is that accurate measurements of effective soil hydraulic properties can play a key role in characterizing structured pore systems, because they are extremely indicative of preferential flow domains of the soil porous system. However, traditional measurement methods are much too insensitive to yield the requested information. This contribution reviews the problem, and shows the historical development of evaluation methods for soil hydraulic measurements. It turns out that advances in the determination of hydraulic properties depend on suitable and accurate measurement data, and avoidance of any systematic errors in the process model and the model for the constitutive relationships. For appropriate models, effective properties of uni-, bi- or multimodal pore systems can be determined with amazing accuracy, even in the critical region near saturation and toward dryness.