Geophysical Research Abstracts
Vol. 21, EGU2019-10981, 2019
EGU General Assembly 2019

Accounting for subsurface structures in flow and transport modelling of heterogeneous soils and the vadose zone

Horst H. Gerke (1) and Vilim Filipović (2)

(1) Leibniz-Zentrum für Agrarlandschaftsforschung, Landschaftsprozesse, Müncheberg, Germany (hgerke@zalf.de), (2) Department of Soil Amelioration, Faculty of Agriculture, University of Zagreb, Svetošimunska 25, 10000 Zagreb, Croatia

Quantification of water and solute movement in the unsaturated soil and the vadose zone is important for predicting amount and quality of ground and surface waters. Such predictions are limited by effects of spatial heterogeneity in the unsaturated zone, e.g., by initiation of preferential and lateral flow processes in the subsurface. In this presentation, simulation studies of flow and transport in contrasting heterogeneous substrates and complex settings are reported. Simulations are all based either on either detailed knowledge or the generation of the subsurface structures. Models of the subsurface structure have been developed for large unsaturated overburden spoil piles that are typical in post-coal mining landscapes. 3D spatial structures were generated for constructed hydrological catchment and for small agricultural watershed and hillslope soils. Simulations reveal that identifying and parameterizing the most critical structures is the key for capturing the overall effects. Subscale structures that may account for local non-equilibrium conditions and preferential flow could be included by appropriate upscaling of the smaller-scale heterogeneities in the macroscopic scale model approaches.