Geophysical Research Abstracts
Vol. 20, EGU2018-16366, 2018
EGU General Assembly 2018


# Simulations of subsurface runoff with HYDRUS-2D/3D to quantify hydraulic anisotropy of layered sediments

Katja Maerker (1), Luisa Hopp (2), and Arno Kleber (1)

(1) Institute of Geography, TU Dresden, Germany (katja.maerker@tu-dresden.de), (2) Department of Hydrology, University of Bayreuth, germany (luisa.hopp@uni-bayreuth.de)

Central European low mountain ranges have been flood formation areas in recent decades. Due to its layered structure, the subsurface of low mountain range hillslopes significantly influences the runoff processes in catchment areas. Investigations in gneiss and shale regions show that the deepest layer (basal layer), which is rich in platy coarse clasts, has hydraulic anisotropic properties. This affects the generation of subsurface runoff. Due to the lack of field and laboratory methods for stony substrates, this flow process could not be quantified sufficiently until now. The aim of this study is the quantification of hydraulic anisotropy of the basal layer in a highly instrumented small headwater in the Eastern Ore Mountains using hydrological simulations with the model HYDRUS-2D/3D. These findings could be fundamental preconditions for flood formation forecasting in gneiss catchments.

The physically based hydrological model HYDRUS-2D/3D simulates two- and three dimensional water movements in variably saturated porous materials at the hillslope and small catchment scale. Important input parameters of the model are the substrate-specific van-Genuchten soil hydraulic parameters as well as the saturated hydraulic conductivity. Precipitation data from 2008/2009 were used to simulate subsurface runoff. The simulated hydrological response was compared to observed soil tensiometer data and spring discharge.

The simulated discharge time series, using isotropic properties of the layered subsurface, showed a pronounced deviation from observed discharge. Best results were realised with anisotropy ratios of 50 in the basal layer.