Geophysical Research Abstracts
Vol. 15, EGU2013-5293, 2013
EGU General Assembly 2013

Initial phases of surface development in a constructed hydrological catchment using the CAESAR landscape evolution model

Anna Schneider (1) and Horst H. Gerke (2)

(1) Chair of Geopedology and Landscape Development, BTU Cottbus, Germany (schneida@tu-cottbus.de), (2) Institute of Soil Landscape Research, Leibniz-Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany

High rates of sediment redistribution and a differentiation of geomorphic structures are characteristic for initial phases of surface development. To simulate sediment redistribution in this phase requires a spatially distributed and temporally dynamic soil erosion or landscape evolution model.
In this study, we tested the application of the landscape evolution model CAESAR for simulating sediment redistribution during the initial five years of development in a 6 ha artificially created catchment. The objectives were to evaluate effects of input data resolution, initial topographic conditions and climatic influences on surface development by CAESAR simulations.
We used a Digital Elevation Model (DEM) of the catchment surface at the initial state of development and hourly precipitation data recorded in the catchment to run the model. Maps of the developing erosion rill network, DEMs for several states of surface development, and discharge data were used for parameter calibration and validation. The influence of DEM resolution, roughness of the input DEM, and precipitation characteristics on model outputs was evaluated.
First results show that characteristic patterns of sediment redistribution can be simulated with the landscape evolution model. Resolution of the input DEM was found to affect drainage density of the simulated erosion features. Deviations between the simulated and observed rill network geometry are most probably due to influences of spatially varying sediment hydraulic and mechanical properties on erosion intensity. Results further suggest effects of the initial surface roughness and of precipitation characteristics on the temporal dynamics of rill network development.