Geophysical Research Abstracts
Vol. 16, EGU2014-2789-1, 2014
EGU General Assembly 2014

Initial phases of landform evolution in a small catchment

Anna Schneider (1,2), Horst H. Gerke (3), Thomas Maurer (2,4), and Thomas Raab (1)

(1) Geopedology and Landscape Development, BTU Cottbus-Senftenberg, Germany, (2) Research Center Landscape Development and Mining Landscapes (FZLB), BTU Cottbus-Senftenberg, Germany, (3) Institute of Soil Landscape Research, Leibniz-Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany, (4) Chair of Hydrology and Water Resources Management, BTU Cottbus-Senftenberg, Germany

During initial phases of landform evolution, the surface of sediment bodies is commonly not yet equilibrated with the environmental conditions and is thus liable to rapid changes by accelerated geomorphic activity. Geomorphic processes acting during these early development phases depend on the initial sediment composition and the subsurface and surface structures of the geosystem; at the same time, these processes lead to landscape structures that constitute boundary conditions for further ecosystem development.
Studies on initial landform evolution are often limited to relatively small-scale experiments or rely on modeling exercises. Larger-scale experiments could be carried out in constructed hydrological catchments with well-known and documented initial conditions.
The central aim of this work was a 3D-spatially and temporally resolved description of the evolution of hydro-geomorphic surface structures during the initial years of ecosystem development and of its dependence on initial and boundary conditions. The data are from the 6-ha, constructed hydrological catchment 'Hühnerwasser'. Surface geometry changes were quantified using remotely-sensed data. Mass balances were obtained using quantitative soil-landscape modeling and geomorphic change detection. Empirical results were compared with those obtained with a numerical landscape evolution model.
Results allow for a characterization of phases of rill network growth, contraction and stabilization and suggest influences of initial morphology, precipitation characteristics, and developing structure-process-interactions on rill network geometry in the catchment. The results suggest that phases of hydro-geomorphic surface structure evolution can be related to the spatial organization of surface flow patterns during initial phases of landform development.