Geophysical Research Abstracts
Vol. 14, EGU2012-11001, 2012
EGU General Assembly 2012

Model-based assessment of erosion risks on man-made slopes in recultivation areas

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The present study deals with non-vegetated slopes of post mining areas which are heavily endangered by soil erosion by water. The prevention of massive on-site damages as well as off-site effects by the emission of acid dump materials is one of the major challenges in the context of recultivation of closed-down open cast mining areas.
Hence, the aim of this study is the development of a reproducible methodology to determine erosion risks on slopes in recultivation areas. Moreover, a standardised technique is developed to plan, dimension and test erosion protection measures in recultivation landscapes.
The analyses of the study are based on the event-based physical erosion model EROSION 3D. The widely used model is able to predict runoff as well as detachment, transport and deposition of sediments. Its use and validation ranges from erosion prediction from agricultural land to sediment input into water bodies. The required input parameters of EROSION 2D/3D (hydraulic roughness, infiltration rates etc.) were determined under field conditions by simulated rainfall experiments. These field experiments took place on selected non-vegetated plots of the Lusatian mining district in eastern Germany.
Due to their huge influence on infiltration and erosion processes special characteristics of coal-containing dump soils (hydrophobicity, air trapping effect) have to be considered and implemented into the model within this survey.