



The determination of risk areas for muddy floods based on a worst-case erosion modelling

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Soil erosion and muddy floods are a frequently occurring hazard in the German state of Saxony, because of the topography and the high relief energy together with the high proportion of arable land. Still, the events are rather heterogeneously distributed and we do not know where damage is likely to occur. The goal of this study is to locate hot spots for the risk of muddy floods, with the objective to prevent high economic damage in future.

We applied a soil erosion and deposition map of Saxony, calculated with the process based soil erosion model EROSION 3D. This map shows the potential soil erosion and transported sediment for worst case soil conditions and a 10 year rain storm event. Furthermore, a map of the current landuse in the state is used.

From the landuse map, we extracted those areas that are especially vulnerable to muddy floods, like residential and industrial areas, infrastructural facilities (e.g. power plants, hospitals) and highways. In combination with the output of the soil erosion model, the amount of sediment, that enters each single landuse entity, is calculated. Based on this data, a state-wide map with classified risks is created. The results are furthermore used to identify the risk of muddy floods for each single municipality in Saxony.

The results are evaluated with data of real occurred muddy flood events with documented locations during the period between 2000 and 2010. Additionally, plausibility tests are performed for selected areas (examination of landuse, topography and soil). The results prove to be plausible and most of the documented events can be explained by the modelled risk map.

The created map can be used by different institutions like city and traffic planners, to estimate the risk of muddy flood occurrence at specific locations. Furthermore, the risk map can serve insurance companies to evaluate the insurance risk of a building. To make them easily accessible, the risk map will be published online via a web GIS application.