



Flash flood susceptibility maps derived with a coupled hydrologic-hydraulic model – an application in Braunsbach, Germany

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Torrential rainfall is a currently unpredictable meteorological phenomenon that may cause complex geomorphological processes such as a flash flood. These flash floods occur very fast and are not necessarily limited to river courses, but can also occur on slopes. Respective discharge change is very quick and the potential to mobilize any type of moveable material is very high. Therefore, potential unforeseen negative consequences to the society are very likely. Hydraulic simulations in a GIS environment can be used to analyse situations and provide support to communities and authorities to secure human lives and property.

The aim of the study is to investigate flash floods triggered by a torrential rainfall event. For the example of Braunsbach in 2016, the trigger was analysed and the process chain was modelled using an adopted version of the 2-dimensional hydraulic flood-area model to delineate the spatial extend of the flash flood impact. For the generation of a flash flood susceptibility map, a coupled hydrologic-hydraulic model has been applied and the water runoff from the location of impact of precipitation to the next larger body of water (e.g. as indicated in the high-waters-hazard-map) is depicted. Important structures such as passages and obstacles are integrated into the model. These structures derive from field work and records from planning.

The resulting flash flood susceptibility map can be used to identify the critical impact locations and is therefore a tool for identifying the potential locality of counter measures in order to reduce or even prevent the effects of torrential rainfall. Such a susceptibility map can be made available for communal torrential rainfall risk management strategies and contributes to the best possible preparation against impacts from heavy rains.

Based on the findings of this study we conclude, that it should be beneficial for communities in vulnerable regions to have flash flood susceptibility maps, to identify in advance potential impact areas and to allow respective measures to preserve human life and property and to reduce associated economic losses. It is regarded as a useful preventive scheme for many potentially endangered communities.