



Deficits and Solution Approaches of Measuring and Model Validation of Flash Floods in Bavaria (Germany)

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In 2016 and 2017 numerous flash flood events happened in Germany followed by an increasing number of research projects focusing on this type of hazard. In a project called HiOS we approach this phenomenon applying the hydrological models LARSIM and WaSiM on a large number of Bavarian catchments and events. The general question of the hydrological research is, if and how a flash flood can be reproduced realistically using spatially distributed, hydrological water balance models, which are used wide spread in the Bavarian and German water management. Thereby, we want to answer questions about the scales of processes, calibration procedures, regionalization of parameters, as well as provision of necessary input data through existing measurement systems. Generally, input and validation data for hydrological flash flood modelling are rare and often insufficient, despite there is existing a large amount of meteorological and hydrological data in Bavaria. This includes the spatial distribution of soil moisture and precipitation, as well as discharge data. In Central Europe, flash floods arise in small catchments with an area below 100 km², whose water balance seldom can be evaluated with existing precipitation and gauge stations. The number of reliable quantitative discharge measurements of flash floods is even smaller, as many devices are not built for such high discharges and therefore either have large uncertainties, fail or even get destroyed.

With this contribution we show the spatially heterogeneous data availability of precipitation and discharge in small catchments (< 100 km²) in Bavaria, as well as an estimation of the resulting uncertainties in the hydrological modelling. Additionally, we analyze the available precipitation and discharge data with high temporal resolution (time step = one minute) for the period 2002 until 2017, to determine the available event data base for process-based hydrological research. We present documented events in comparison to extreme value statistics (KOSTRA) and warning levels of the German weather service (DWD). Furthermore, we evaluate the potential of the existing measurement network to assess flash flood events at catchment scale and where additional measurement instruments as camera-based gauge measurements can lead to a significant improvement of flash flood documentation.