



Medium-scale flood risk assessment – a probabilistic-hydrological approach

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Flood risk assessments on a medium scale, e.g. for a complete reach of a river, are of major interests for insurance and especially reinsurance companies. However, the methodologies applied are usually very simple and often neglect the hydrological characteristics of the watershed at interest. The common method applied is the construction of flood risk maps delineating flooded areas associated to specified return intervals, e.g. the 10, 50 and 100 year flood and an associated damage estimation. These flood risk maps are constructed by performing extreme value statistics at appropriate gauges, transformation of discharge values to water levels, estimation of the local inundated area by intersection with an elevation model and finally a spatial interpolation of the flood line between the gauging stations. Clearly, this static method has many drawbacks. For example, it does not account for the reducing effect of upstream retention effects due to levee breaches on the downstream flood magnitude..

Therefore we propose a probabilistic-hydrological approach consisting of simplified physical and statistical models representing important links in the flood process chain, including tests for levee failures along the complete river reach. Due to their comparatively low computational demand these models are amenable to probabilistic modelling in terms of Monte-Carlo simulations. By this approach the drawbacks of the method described above are mitigated and an assessment of magnitude and probability of flood event characteristics is possible. Additionally a spatially differentiated damage assessment is achieved by 2D-floodplain inundation modelling in combination with georeferenced building inventory and damage functions relating damage to inundation depth. Following this approach a probabilistic risk assessment for a complete river reach considering the hydrological characteristics of the watershed is possible. The modelling system and its application to the Lower Rhine in Germany are

presented.