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Integrated urban flood risk management using hydrological and damage potential modelling

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Due to the exposed accumulation of economic and socio-cultural values urban areas are characterised by high flood risk and vulnerability, especially during extreme flood events. The evaluation and establishment of effective flood risk management and urban planning strategies requires knowledge of the spatial and temporal distribution of floods. Moreover, sound knowledge on allocation and dynamics of damage potentials are necessary prerequisites for flood risk mapping and decision support systems. Therefore, appropriate methods for compiling, quantifying and finally integrating spatio-temporal flood characteristics into model based prediction and planning tools using suitable parameters are essential.

The project “Development of a 3-zone model for the groundwater and infrastructure management after extreme flood events (3ZM-GRIMEX)” (funded by the German BMBF) focuses on the complex interactions of urban water transport during floods. The main aim is the development of an integrated tool which describes the interactions between surface water, sewage water system and groundwater flow. This will lead to an improved risk-based flood management and will be demonstrated on the example of the city of Dresden (Saxony, Germany). In the EU-funded FLOOD*site* project further urban sites along the Mulde river, which was heavily affected by the large Elbe flood 2002, are objects of flood simulation and evaluation.

Set against this background this paper will focus on the modelling of the surface water dynamics with respect to quantified damage potentials in urban areas. One major task is the evaluation of the effectiveness and robustness of the model inundation predictions for different parts of an urban system. Another part of the paper covers the analysis of the spatial and temporal effects of urban land use change utilising the effective parameters: surface roughness and the complex urban topography.