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Consideration of flood resilience measures within damage assessment

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Flood resilience strategies are becoming an increasingly important issue in flood risk management in Europe as they seek to mitigate the vulnerability of receptors exposed to flooding. Significant receptors within flood prone areas are, amongst others, built-up areas with a broad variety of buildings. Thus, the physical vulnerability of buildings has a strong effect on economic losses. Key criteria for the implementation of flood resilience measures (FRe M) are their potential to improve the resilience properties of buildings. For this purpose detailed knowledge about the effects of FRe M in terms of vulnerability mitigation is indispensable.

The paper presents a methodology that uses a synthetic approach to analyse the flood vulnerability of built-up areas and to assess the impacts of FRe M towards damage reduction. As a result of this engineering approach, specific depth-damage functions can be derived synthetically for building types which describe the degree of damage depending on different water levels. Some of the synthetic depth-damage functions are implemented in the GIS-based flood damage simulation model HOWAD–PREVENT. This expert tool spatially interlinks hydraulic modelling results with detailed information on the physical vulnerability of buildings; it then calculates the damage for each building with its site-specific water level taking account of the impacts of implemented FRe M.

High resolution modelling supports decision makers to find cost-effective technologies and appropriate technology combinations to improve the resilience of buildings. Within the EU-research project “Smart Resilience Technology, Systems and Tools“ (SMARTeST) HOWAD-PREVENT has already been applied in European case studies in the United Kingdom, Spain and in Germany to consider different national and local contexts and different flood types.