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Urban structure mapping using high-resolution remote sensing data for modelling flood losses in Dresden, Germany

Tina Maria Gerl (1), Heidi Kreibich (2), and Mathias Bochow (3)

(1) Institute of Geographical Sciences, Freie Universität Berlin, Germany (tina.gerl@fu-berlin.de), (2) Department 5.4 Hydrology, Helmholtz-Zentrum Potsdam Deutsches GeoForschungsZentrum (GFZ), Germany (heidi.kreibich@gfz-potsdam.de), (3) Department 1.4 Remote Sensing, Helmholtz-Zentrum Potsdam Deutsches GeoForschungsZentrum (GFZ), Germany (mathias.bochow@gfz-potsdam.de)

Due to high settlement densities and concentrations of valuable objects along rivers floods often cause huge economic losses, as experienced by Germany during the 2002 flood event in the Elbe and Danube catchments. To support a comprehensive risk management and evaluate the cost-effectiveness of mitigation measures, reliable damage models are required. The Flood Loss Estimation Model for the Private Sector (FLEMOps) was developed to calculate damage on residential buildings in Germany, considering parameters as water level, building type, building quality, precaution and contamination. Until now, the commercial geodata INFAS were used to characterise the residential building stock at municipal scale. The current study aims at identifying building specific parameters by the application of remotely sensed data to improve the damage calculation with the flood loss model FLEMOps. In a first step multi-spectral IKONOS data is classified using a hierarchical approach combining a conventional maximum likelihood classifier with LiDAR height information to distinguish different land cover classes (e.g. roof types, vegetation) in Dresden, Germany. The land cover classes are further analysed by an adapted urban structure type mapping approach, which computes distinctive spatial features on building block scale of ATKIS data, allowing the differentiation of urban structure types such as single-family houses, multi-family houses, high-rise buildings and others. The generated information about the urban spatial structure is then linked to building specific flood damage data obtained by telephone interviews in previous studies. Thus, we will explore if spatial structure information derived from high-resolution remote sensing data is correlated with flood vulnerability and thus, can reduce uncertainties associated with flood damage estimation.