

The uncertainty cascade in flood risk assessment under changing climatic conditions - the Biala Tarnowska case study

Joanna Doroszkiewicz (1) and Renata Romanowicz (2)

(1) Institute of Geophysics, Polish Academy of Sciences, Warsaw, Poland (joador@igf.edu.pl), (2) Renata J. Romanowicz
Institute of Geophysics, Polish Academy of Sciences, Warsaw, Poland (romanowicz@igf.edu.pl)

Uncertainty in the results of the hydraulic model is not only associated with the limitations of that model and the shortcomings of data. An important factor that has a major impact on the uncertainty of the flood risk assessment in a changing climate conditions is associated with the uncertainty of future climate scenarios (IPCC WG I, 2013). Future climate projections provided by global climate models are used to generate future runoff required as an input to hydraulic models applied in the derivation of flood risk maps.

Biala Tarnowska catchment, situated in southern Poland is used as a case study. Future discharges at the input to a hydraulic model are obtained using the HBV model and climate projections obtained from the EUROCORDEX project. The study describes a cascade of uncertainty related to different stages of the process of derivation of flood risk maps under changing climate conditions. In this context it takes into account the uncertainty of future climate projections, an uncertainty of flow routing model, the propagation of that uncertainty through the hydraulic model, and finally, the uncertainty related to the derivation of flood risk maps.

One of the aims of this study is an assessment of a relative impact of different sources of uncertainty on the uncertainty of flood risk maps. Due to the complexity of the process, an assessment of total uncertainty of maps of inundation probability might be very computer time consuming. As a way forward we present an application of a hydraulic model simulator based on a nonlinear transfer function model for the chosen locations along the river reach. The transfer function model parameters are estimated based on the simulations of the hydraulic model at each of the model cross-section. The study shows that the application of the simulator substantially reduces the computer requirements related to the derivation of flood risk maps under future climatic conditions.

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