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Flood risk in the Savinja River catchment, Slovenia (Europe)

Nejc Bezak, Mojca Šraj, Simon Rusjan, Klaudija Sapač, Andrej Vidmar, Andrej Kryžanowski, and Mitja Brilly
University of Ljubljana, Faculty of civil and geodetic engineering, Ljubljana, Slovenia (nejc.bezak@fgg.uni-lj.si)

The Savinja River catchment is one of the areas with the highest flood risk in Slovenia, Europe. The Savinja River is one of the largest tributaries of the Sava River (in Slovenia) that drains into the Danube River and Savinja River catchment covers approximately 1850 km2. A combination of the torrential characteristics of the Savinja River and its tributaries with relatively high mean annual precipitation (up to 2000 mm) is inconvenient from the flood risk perspective. Extreme floods occurred in this catchment in 1954, 1990, 1998 and 2007. Due to the changing climate patterns and other changes such as decreased maintenance of water infrastructure and river cross-sections the flood hazard could even increase in the future.

For the purpose of this study the hydrological model of the Savinja catchment was defined using the HBV-light software. The automatic calibration of the hydrological model using hourly data (e.g., discharge, precipitation,...) was performed using a set of Model-Independent Parameter Estimation and Uncertainty (PEST) tools. The outputs of the calibrated and validated hydrological model were used as inputs to the hydraulic model of the Savinja catchment where HEC-RAS 5.0.3 software was used to construct the hydraulic model. Using the combined hydrological and hydraulic modelling the impact of the proposed flood protection measures to reduce the flood risk in the Savinja River catchment was evaluated. Moreover, the backwater effect was also analysed and discussed.