



Estimation of future flood risk for flood warning systems in the Hron and Torysa river basins

Kamila Hlavcova, Jan Szolgay, Silvia Kohnova, and Roman Vyleta

Slovak University of Technology, Dept. of Land and Water Resources Management, Bratislava, Slovakia
(hlavcova@svf.stuba.sk, jan.szolgay@stuba.sk, silvia.kohnova@stuba.sk, roman.vyleta@svf.stuba.sk)

Since medium- and long-term precipitation forecasts are still not reliable enough, real time estimation of the degree of extremity of flood events that might occur in course of forthcoming dangerous meteorological situations, could be useful as additional information in flood warning systems. One of the possibilities how to approach answering such a question is to use all routinely available data in conjunction with existing practices for off line flood risk estimation. In the paper the joint effect of synthetic extreme precipitation together with different degrees of antecedent basin saturation on extreme floods was analysed with regard to future flood risk estimation.

The Hron river basin with an area of 1766 km² located in the central part of Slovakia and the Torysa river basin with an area of 1298 km² located in eastern Slovakia were chosen as the pilot basins in the study. Annual basin average maximum 1-to-5 day precipitation depths with different return periods were derived for the basins using spatial interpolation techniques and used as synthetic extreme precipitation in runoff simulations. A conceptual rainfall-runoff model based on daily time step was adopted for modelling of runoff. Several scenarios of the joint occurrence of synthetic extreme precipitation and antecedent basin saturation index were constructed. Using event based flood simulations, synthetic flood waves were generated for these scenarios. The relationship between return periods of the synthetic extreme precipitation and the return periods of the simulated floods was analysed. The effect of antecedent basin saturation on the extremity of floods was quantified, and critical values of the basin saturation index leading to floods with a higher return period than the return period of precipitation were identified. A method how to implement these critical values into on line flood risk warnings in hydrological forecasting and warning system in the basins was suggested.