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Estimation of flash floods on Svacenický and Debernícky Creeks in Slovakia

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A significant problem in estimating the occurrence and magnitude of flash floods is the lack of measured data, particularly in small ungauged catchments. Spatially distributed hydrological models with a high spatial resolution of rainfall data and physiographical basin properties can be applied to decrease uncertainties in the flash floods estimating. In the paper a methodology for analysis of flash flood events in small basins based on the post-event surveying and hydrological modelling is tested. The flash floods selected occurred on the 6th of June, 2009, in the Svacenický and Debernícky Creek basins in Western Slovakia. The estimation of the maximum flood peak and flood wave volume in the Svacenický Creek was provided on the base of water level records from SHMI gauging station at the mouth of the Svacenický Creek and the post-event analysis after the flood event. The areas of channel's cross-profiles were measured for maximal water level, longitudinal slope of water level was approximated to the bottom slope and roughness was estimated according to the river banks and channel bottoms. Flow velocities were estimated using Chézy equation and Manning roughness coefficient. The reconstructed flood wave was compared with the simulated discharges using the hydrological event-based model KLEM. The distributed hydrological model KLEM is based on the availability of raster information of the landscape's topography, soil and vegetation properties, and radar rainfall data. The SCS-Curve Number procedure is applied on a grid for the spatially-distributed representation of runoff-generating processes, a description of the drainage system response is used for representing the runoff's routing. A digital elevation model as well as soil, geology, land use and rainfall data for the Svacenický Creek basin were prepared in the grid form (resolution of 20 m). The maps of isohyets in 15-minutes time step replaced the missing radar measurements as model inputs in this case. Comparison of the results achieved by the KLEM model and the post-event analysis in the Svacenický Creek showed the consistency of simulated and estimated discharges both in time and space. Subsequently, the optimised parameters of the KLEM model for the Svacenicky Creek basin were used for modelling the flash flood in the Debernícky Creek basin where no direct observations of water levels were available.