Hydrological analysis of flash flood events in Slovakia

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The paper concentrates on an analysis of three major flash floods in Slovakia, which occurred during recent years and caused great damage to property and also loss of lives. The flash floods selected occurred on the 20th of July, 1998, in the Malá Svinka and Dubovický creek basins; the 24th of July, 2001, at Štrbský Creek; and the 19th of June, 2004, at the Turniansky Creek. A description of the basins along with the selected flash floods is set out, and the results of the post-survey reconstruction of the flash flood events are described. To understand rainfall-runoff processes during these extreme flash floods and to test uncertainty of post-survey analyses, runoff responses during selected major events were examined using the KLEM (Kinematic Local Excess Model) spatially-distributed hydrological model. The distributed hydrological model is based on the availability of raster information of the landscape's topography, the soil and vegetation properties, and radar rainfall data. In the model, 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.

The simulated values achieved by the KLEM model were compared with the maximum peaks estimated on the basis of post-event surveying and the results achieved are summarized and discussed. The consistency of the estimated and simulated values by the KLEM model was evident both in time and space, and the methodology has shown its applicability for practical purposes.