Geophysical Research Abstracts
Vol. 14, EGU2012-12972, 2012
EGU General Assembly 2012

Catchment slope properties as an input to estimations of flood characteristics

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Flood characteristics of small catchments are a subject of many research activities as these properties of catchments are very important for flash flood hazard assessments. The ways of its estimations are different but it is very rare to have long term measurement which can be used for standard statistic calculation. Therefore, the estimations are usually made using hydrological modelling or some general methods which include several main catchment characteristics.

The national research project COST LD 11031 Flood Characteristics of Small Catchments focuses on the development of a new method for estimations of flood characteristics based on four main catchment properties which are slope conditions, catchment shape properties, land use conditions and soil properties. The general shape of proposed method is similar to those equations published by Olson (2009) or Asquith and Slade (1996). The shape can be written using following equation

$$FC = f_1(A) \cdot f_2(CD_{slope}) \cdot f_3(CD_{shape}) \cdot f_4(CD_{LU}) \cdot f_5(CD_{soil}) \cdot f_6(P)$$

where *FC* is flood characteristic (peak discharge, flood wave volume), CD_i are catchment descriptors expressing chosen catchment properties, P is rainstorm total for given return period and f_i are mathematical functions.

For purposes of a relevant construction of proposed method, the influence of each catchment property must be in detail analyzed and described in a mathematical manner. There are different ways how to do that. In case of slope conditions, it has been decided to use mathematical modelling to obtain sufficient dataset for statistic evaluation. The GSSHA (Downer and Ogden, 2006) model has been chosen for this purpose and verified using measured data from an experimental catchment of Býkovický potok which is located about 50 km south-east of Prague. Five small catchments of different shape and other characteristic have been used for purpose of catchment slope influence on flood characteristics analysis. The results of this analysis are presented in this contribution. The assumption that the influence of slope conditions is more important in case of flood wave shape than in case of its volume has been confirmed. Finally, the analysis of fitting obtained data by different mathematical functions has been carried out.

Acknowledgement

The research presented in this contribution has been carried out within the national research project COST LD 11031 Flood Characteristics of Small Catchments funded by Ministry of Education, Youth and Sports. All the support is highly acknowledged.

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