Geophysical Research Abstracts,
Vol. 11, EGU2009-11240, 2009
EGU General Assembly 2009

Analysis of Rainfall Intensity-Duration-Frequency Relationships in Slovakia (Estimation of Extreme Rainfall Return Periods)

J. Pecho (1), P. Faško (1), M. Lapin (2), and L. Gaál (3)

(1) SHMI, Climatological Service Department, Bratislava, Slovakia (jozef.pecho@shmu.sk, pavol.fasko@shmu.sk), (2) Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava, Slovakia (lapin@fmph.uniba.sk), (3) Slovak University of Technology, Department of Land and Water Resources Management, Bratislava, Slovakia (ladislav.gaal@stuba.sk)

Short-term rainfall intensity maxima might gain a rising tendency in the future in consequence of the global warming. The monitoring and statistical as well as spatial analyses of above-mentioned precipitation characteristics are highly important because of observed negative impacts linked with their occurrence. Probabilistic modeling and statistical analysis of relationships between rainfall intensity and its duration as well as frequency (generally express by Intensity-Duration-Frequency curves) represents on of the most commonly used tools in the flood risk management, water resources engineering as well as for flood protection projects. A set of IDF-curves defines a relation between the mean intensity of precipitation, the duration of the aggregation time of the rainfall and return period of the event. There are some statistical techniques how to establish the IDF-curves for annual maximum precipitation totals with selected duration.

For many years the Gumbel as well as Pearson III-type distribution have been utilized as the most suitable theoretical distribution in the order to model the extreme rainfall events. Recently, some new theoretical and empirical studies support the fact that particularly Gumbel distribution may significantly underestimate the highest rainfall values. New theoretical findings suggest to replace the Gumbel distribution by other type of Extreme Value distribution (most commonly by General Extreme Value "GEV" distribution). For the establishment of the IDF-curves we have utilized some theoretical basis of Koursoyiannis et al (1998) study.

The main purpose of the presented paper is to produce IDF-curves for extreme rainfall values obtained from several meteorological stations in Slovakia within the 1961-1990 period (e.g. Hurbanovo, Štrbské Pleso, Oravská Lesná, etc.). In the contribution we tested the appropriateness of Gumbel and GEV distribution utilization for the purpose of IDF-curves assessment. Our additional goal is to analyze also the long-term changes of extreme rainfall values within the annual regime.