Extreme Precipitation Mapping for Flood Risk Assessment in Ungauged Basins of Slovakia

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The objective of this study was to test and compare methods and tools for the spatial interpretation of the maximum daily precipitation totals and their design values, for flood risk assessment in ungauged catchments. The analysis was made using data from 25 precipitation stations in the upper Hron River basin from the period 1951 to 2000. In the first step N-year values of the maximum daily precipitation depths were estimated at site using several distribution functions and parameter estimation methods. To make an interpretation of a spatial variability of design maximum daily precipitation depths in the upper Hron region contour and grid maps of the mean value, standard deviation, N-year maximum annual daily precipitation depths were derived using several interpolation methods (Thiessen polygons, kriging, cokriging and inverse weighting distance method). In the second step time series of 50 years of grid maps of daily areal precipitation were derived from daily station data using interpolation techniques (kriging and inverse distance method). Maps of maximum annual and seasonal precipitation totals were constructed from these maps by methods of map algebra. Statistical and spatial analysis of these map time series was performed and the efficiency and applicability of spatial interpolation methods was tested. For the estimation of design values the extremal distribution functions were selected, which performed as the most appropriate ones according to the statistical tests in the stations. The statistical characteristics of selected distribution function were calculated in each grid and finally design N-year values were derived for each grid of raster maps. The calculated N-year values of daily precipitation totals were compared with N-years values estimated at-site in each station and interpolated in the basin. The results showed

that this new approach can give qualitative and quantitative new information about the N-year maximum daily precipitation totals for regions without direct precipitation measurements.