Geophysical Research Abstracts,
Vol. 11, EGU2009-7913, 2009
EGU General Assembly 2009

Extreme Precipitation Mapping for Flood Risk Assessment in Ungauged Basins

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The poster present a study of mapping 2-year and 100-year annual maximum daily precipitation for rainfall-runoff studies and estimating flood hazard. The main objective was to discuss the quality and properties of maps of design precipitation with a given return period with respect to the expectations of the end user community. Four approaches to the preprocessing of annual maximum 24-hour precipitation data were used, and three interpolation methods employed. The first method is the direct mapping of at-site estimates of distribution function quantiles; the second is the direct mapping of local estimates of the three parameters of the GEV distribution. In the third method, the daily measurements of the precipitation totals were interpolated into a regular grid network, and then the time series of the maximum daily precipitation totals in each grid point of the selected region were statistically analysed. In the fourth method, the spatial distribution of the design precipitation was modeled by quantiles predicted by regional precipitation frequency analysis using the Hosking and Wallis procedure. Homogeneity of the region of interest was tested, and the index value (the mean annual maximum daily precipitation) was mapped using spatial interpolation (instead of the more usual regional regression). Quantiles were derived through the dimensionless regional frequency distribution estimated by using L-moments. The three interpolation methods used were the inverse distance weighting, nearest neighbor and the kriging method. The daily precipitation measurements at 23 climate stations from 1961-2000 were used in the upper Hron basin in central Slovakia. Visual inspection and jackknife cross-validation was used to compare the combination of approaches. Under the specific regime dominated by thermal and frontal convective events, the potential advantage of using mapping of daily precipitation series as a basis for quantile estimation was not shown and under the given conditions the use of the regional frequency analysis is recommended as a suitable method to account for the spatial variability of design precipitation for mapping purposes. By trading of space for time it overcomes the problems of data shortage and unequal lengths of data series and, through the notion of quantitatively underpinned spatial homogeneity, it also offers a solution to the problem of inadequate spatial coverage and sampling of precipitation fields by the gauging network.