EMS Annual Meeting Abstracts
Vol. 12, EMS2015-566, 2015
15th EMS / 12th ECAM

Relationship between precipitation and hydrological extremes in the Polish Carpathians in the last several decades

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The main goal of the study is the assessment of the influence of effect of precipitation on extreme hydrological phenomena in the Carpathian region in Poland. The special attention is paid to the long-term variability of both mentioned elements in the context of climate variability.

The study focused on eight catchments with undisturbed runoff regimes. Daily data were used for the warm months of the year (May to October) during the sixty-year period 1951 – 2010. The data included atmospheric precipitation totals collected at over 20 gauging stations as well as discharge values at eight water level gauging stations found in selected catchments. The precipitation-discharge relationship was analyzed using daily precipitation totals as well as multi-day precipitation totals to estimate the length of precipitation event most responsible for floods. Extreme events were noted using probability techniques (75%, 90%, 95%) and analyzed.

According to the precipitation-discharge relationship estimated in this research study, the 48-hour precipitation total (preceding discharge) was found to be the most important variable to be subjected to further analysis. Research has shown strong linkages between extreme precipitation events and extreme discharge events in the Polish Carpathians which suggests that flood risk in this part of Poland will vary with precipitation totals.