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Hydrometeorological extremes in Moravia and Silesia: past, present and future

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Based on co-operation of several universities and institutes natural disasters in Moravia and Silesia (eastern part of the Czech Republic) were investigated from point of view of fluctuations, severity, causes and impacts. Study of hydrometeorological extremes included extremely high precipitation, droughts, floods, windstorms and hailstorms. Basic analysis was done for the period 1961–2000 based on the network of meteorological stations of the Czech Hydrometeorological Institute. For several characteristics analysis was extended before 1961 using instrumental data as well as different documentary evidence. The spatial variability of extremes was investigated with corresponding maps. Based on GEV distribution characteristics of maximum daily as well as maximum and minimum 1-, 2- and 3-months totals for different return periods were calculated. Drought patterns were characterized by Standardized Precipitation Index, Lang's Rain Factor, and Palmer's indices: PDSI and Z-index. Floods were analysed for several rivers in catchments of the Morava and the Odra for peak discharges with return period $\geq$ 2 years. Maximum wind speeds with different return period were used for analysis of wind extremes besides evidence about windstorms derived from documentary sources (including tornadoes). For hailstorms one common series for the whole studied territory was developed and further analysed. For every of selected extremes their impacts on human society were studied with detail analysis of the most disastrous events. Recent trends of hydrometeorological extremes and estimations of possible future trends were discussed in the context of global warming.