

# **Climate change effects on probabilities of heavy rainfall events in central Europe**

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Heavy precipitation constitutes one of the most important natural hazards in many parts of the world, with disastrous consequences associated mainly with floods. Observations as well as most climate model simulations are generally in accord with the hypothesis that the hydrologic cycle should intensify and become more variable with the greenhouse gas induced climate change, although uncertainties of these projections are much larger than for temperature extremes. In this study, several regional climate models (RCM) are examined as to their abilities to reproduce frequency distributions of heavy precipitation events in central Europe. The peaks-over-threshold analysis with increasing threshold censoring is used to estimate multi-year return levels of daily rainfall amounts, with parametric bootstrap employed to construct their confidence intervals. Scale-reduction techniques are applied to obtain local or 'appropriate-scale' time series from the RCM simulated data. Scenarios of changes for future time horizons are based on differences between future and present climate and take into account various greenhouse gas emission scenarios. A specific attention is paid to a small flood-prone region with enhanced influence of Mediterranean cyclones on the borders between the Czech Republic, Poland and Slovakia. The results show that over most of central Europe, heavy precipitation events are very likely to increase in severity at least in some parts of the year. The study is supported by the Grant Agency of AS CR under project B300420601.