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# MUNSTAR - Methodical investigation concerning the revision of heavy rainfall statistics for Germany

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Determination of decisive design precipitation rates (Intensity Duration Frequency (IDF) or Depth Duration Frequency (DDF) curves) can serve as essential data base for precise sizing of water management structures for protection against flooding in heavily populated areas. Based on precipitation data obtained from Deutscher Wetterdienst (DWD) the calculation of design precipitation rates in form of coordinated heavy rain regionalization and evaluation (KOSTRA-DWD) is available since the early 1980s in order to analyze the occurrence probabilities of heavy precipitation. Within this study we aim to update and supplement the existing data base and thoroughly revise the statistical methodology.

Extreme value statistics is a widely accepted tool to describe the magnitude and the probability of occurrence. Homogeneous long-term time series of precipitation are one basic requirement for the application of extreme value statistics. Since the monitoring network of precipitation is under constant change, it is necessary to acquire long-term and spatio-temporal high-resolution time series based on all available precipitation data in Germany. Based on this extensive station network, a thoroughly quality-controlled data set is provided, which is further checked for stationarity and breakpoints i.e. structural changes in linear regression models detected by tests based on F statistics and tests from the generalized fluctuation test framework.

Our extreme value analyses aim on obtaining the return period of extreme events of a given duration or magnitude to be assessed. As the vast majority of available information is (still) at a daily time scale, we aim on reconstructing and digitalizing sub-daily historic precipitation data for Germany, to gain urgently needed insights in long-term and gap-filled precipitation trends. In this contribution we present the project MUNSTAR and its first results.