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Extension of hourly rainfall records using k-nn resampling for derived flood frequency analysis

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Objective derived flood frequency analysis (DFFA) for the estimation of design floods using hydrological models requires usually long continuous input rainfall time series. Often only long daily rainfall records are available, which leads to an underestimation of simulated peak flows for smaller scale catchments. Alternatively, synthetic rainfall data can be used provided by a stochastic rainfall model or by a disaggregation approach. Here, a simple resampling technique based on k-nn bootstrapping is applied to extend hourly rainfall records conditioned on longer daily ones. The method is tested based on precipitation statistics like IDF curves, event properties and other characteristics. Also, the approach is validated based on hydrological modelling. For hydrological modelling a comparison between daily and hourly DFFA is carried out, in order to find out which approach shows the better performance and smaller uncertainty. For the daily approach the simulated peaks are bias corrected using a fixed scaling factor from the literature to account for underestimation. The case study uses data from selected mesoscale catchments in northern Germany. It is hypothesized, that the hourly DFFA using extended hourly records provides better estimates than the daily one with post-processing of the simulated peaks.