Supplementary material to "Benefits of the simplified MEV for the analysis of hourly precipitation extremes in a changing climate." (Lennartz et al.)
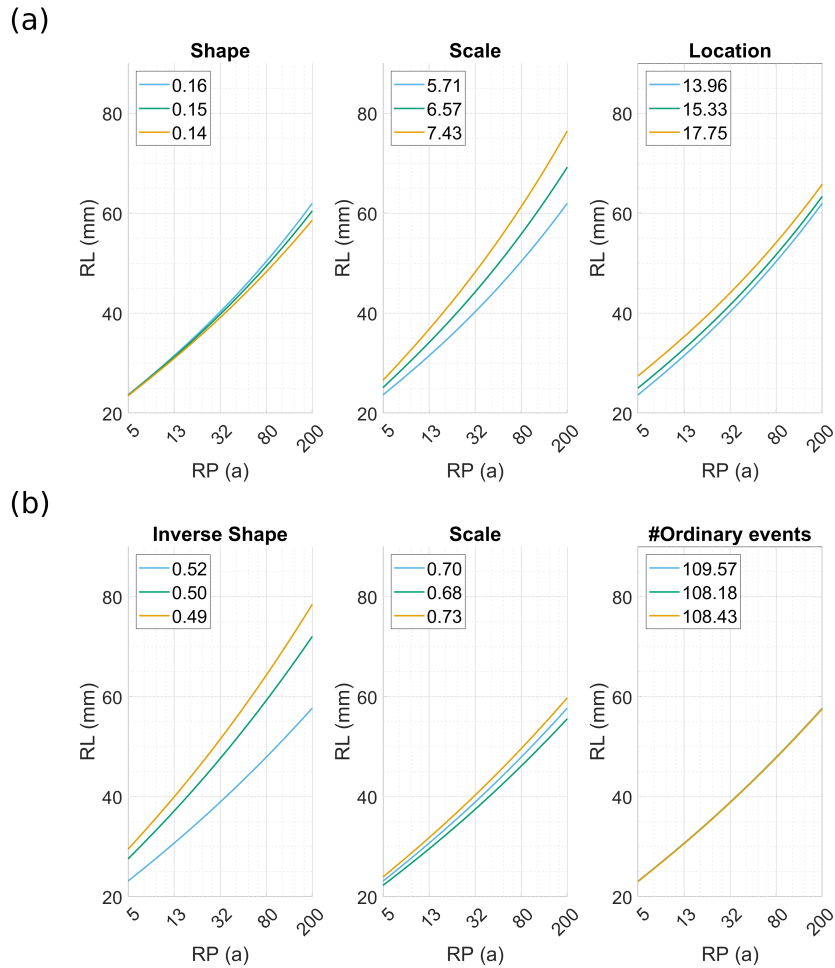

Figure S1: Return level sensitivity for each individual parameter of the GEV (a) and sMEV (b). The change in parameter values are derived by the spatial mean value of each parameter for the 3 different time periods.
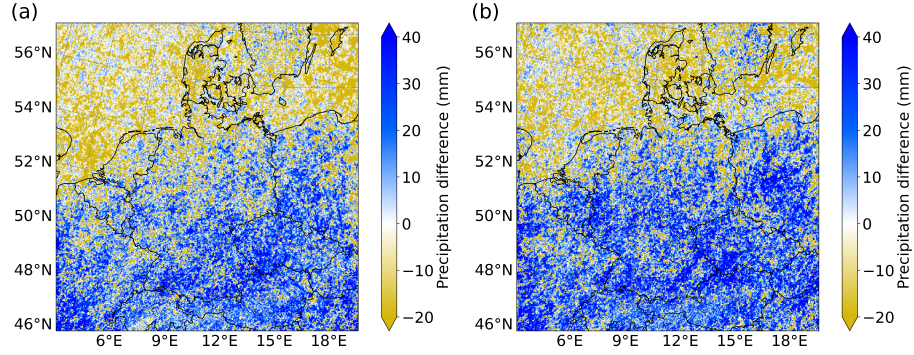
Figure S2: Return level difference of the sMEV and GEV over the study area for the time periods (a) 2031-2060 and (b) 2071-2100.
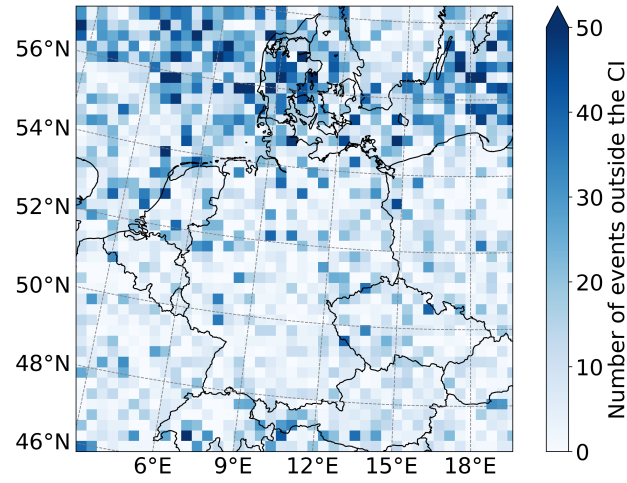

Figure S3: Initial testing of 42x42 grid points examining how many RX1h events fall outside the 90% confidence interval. The map is constructed by bootstrapping the upper 5% of events (equaling the left-censoring threshold of the 95th percentile. A value of 9 or less indicates that the test is passed.
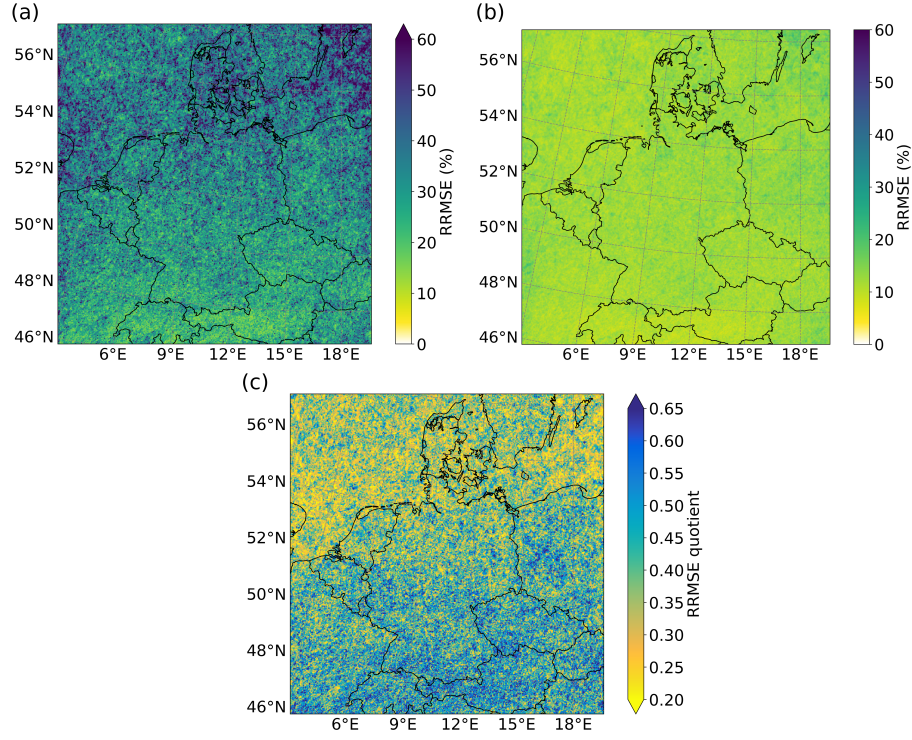
Figure S4: The spatial distribution relative root-mean-square error (RRMSE) for the 100-year return period and a 30-year sample size for (a) the GEV, (b) the sMEV and (c) the RRMSE of the sMEV divided by the RRMSE of the GEV. The calculation is based on bootstrapping the available years 100 times.
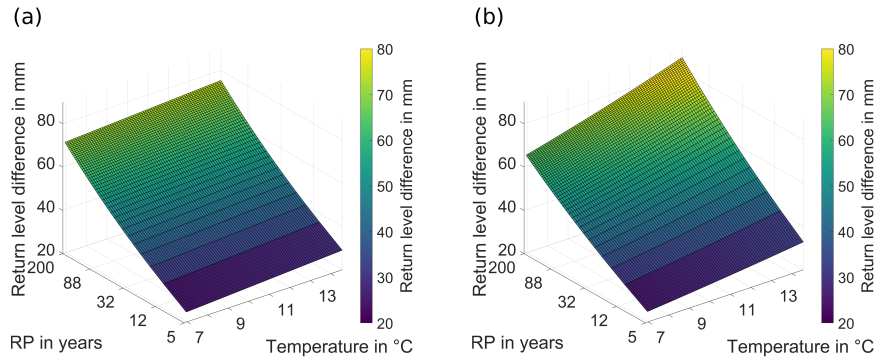

Figure S5: Average return levels of the (a) NS-GEV and (b) NS-sMEV for different temperatures and return periods. Both are fitted to the entire time series available. Note the logarithmic scale for the return periods.
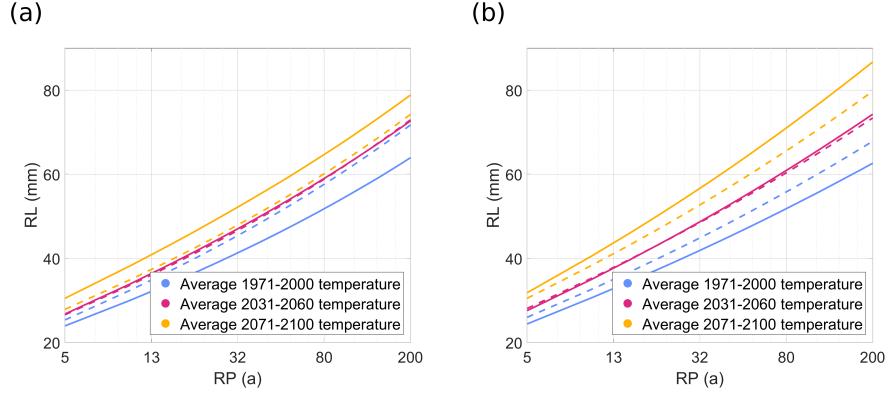
Figure S6: Return levels, averaged over the study area, of the NS-GEV (a) and NS-sMEV (b) for different return periods. The solid lines denote the RL for three separate non-stationary distribution fitted to each respective time period. The temperature used to plot the distributions are their respective spatial and temporal average temperatures for each time period. Dashed lines show the RL for the distribution which is fitted to all time periods combined. The same 3 temperature values are used to plot three return level curves.
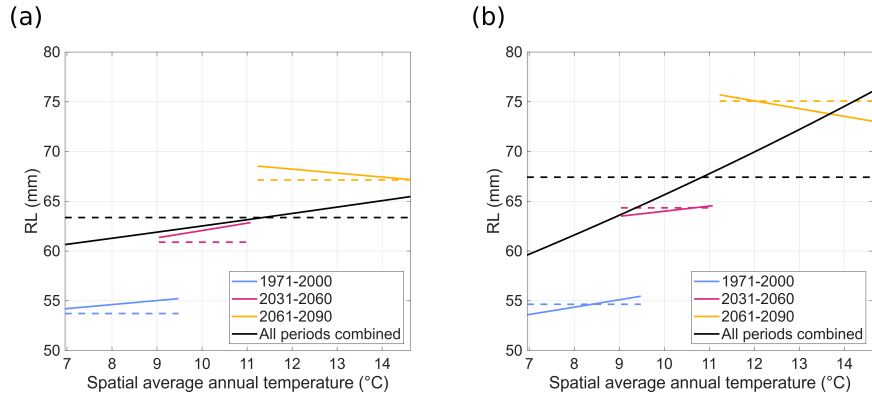

Figure S7: The 100-year median return levels over the study area, of the NS-GEV (a) and NS-sMEV (b). The solid lines denote the 100-year RL for four separate non-stationary distribution fitted to each respective time period and the combined time period. The dashed lines are the respective return levels of the stationary distributions. Each plot is constraint to the annual spatial average temperatures values present in the respective time period.