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Seasonal extreme value statistics for precipitation in Germany

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Extreme precipitation has a strong influence on environment, society and economy. It leads to large damage due to floods, mudslides, increased erosion or hail. While standard annual return levels are important for hydrological structures, seasonaly resolved return levels provide additional information for risk managment, e.g., for the agricultural sector. For 1208 stations in Germany, we calculate monthly resolved return levels. Instead of estimating parameters separately for every month in the year, we use a non-stationary approach and benefit from smoothly varying return levels throughout the year. This natural approach is more suitable to characterise seasonal variability of extreme precipitation and leads to more accurate return level estimates. Harmonic functions of different orders are used to describe the seasonal variation of GEV parameters and crossvalidation is used to determine a suitable model forall stations. Finally particularly vulnerable regions and associated month are investigated in more detail.