



Robust assessment of future changes in extreme precipitation over the Rhine basin using a GCM

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Estimates of future changes in extremes of multiday precipitation sums are critical for estimates of future discharge extremes of large river basins. Here we use a large (17-member) ensemble of global climate model SRES A1b scenario simulations to estimate changes in extremes of 1–20 day precipitation sums over the Rhine basin, projected for the period 2071–2100 with reference to 1961–1990.

We find that in winter, an increase of order 10%, for the 99th percentile precipitation sum, is approximately fixed across the selected range of multiday sums, whereas in summer, the changes become increasingly negative as the summation time lengthens. Explanations for these results are presented that have implications for simple scaling methods for creating time series of a future climate. We show that this scaling behaviour is sensitive to the ensemble size and indicate that currently available discharge estimates from previous studies are based on insufficiently long time series.

In the near future, this study will be extended to consider changes in the simultaneous occurrence of wind and precipitation extremes.