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Construction of scenarios of extreme precipitation and temperature in western Germany for the end of the 21^{st} century

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Analysis of observed precipitation and temperature in many parts of Europe has suggested that both variables have shown an increasing trend over the second half of the last century. A similar investigation performed on daily observations in the western part of Germany has also indicated that both the mean and the extremes of both variables have increased significantly at many locations. Since changes in the extremes of these variables have a far-reaching social and economic impact, it is worthwhile to assess the possible changes in the extremes under possible climate change scenarios forced by the ongoing enhanced anthropogenic activities. In order to achieve this objective, two different statistical downscaling methods were implemented and validated in terms of their ability to reconstruct the observed daily series of precipitation and temperature as well as the variability of their extremes at selected locations from large-scale climate variables derived from reanalysis data. Further validation of the models was carried out by evaluating the variability of the extremes of the surface variables downscaled by the models driven by predictor variables simulated by one of the current generation of GCMs (HadAM3P) for a control period representing the present day climate against the variability of the corresponding observed variables. The models were subsequently used to construct possible future scenarios of extremes of daily precipitation and temperature from predictor variables simulated by the same GCM forced by natural and possible future anthropogenic forcing for the end of the 21^{st} century.