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Validation of statistical downscaling methods with respect to extreme events over Europe. Results from the COST Action VALUE

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Within the EU-COST Action VALUE a comprehensive validation framework for downscaling methods has been developed. Results of the present contribution are based on Experiment 1(a) of VALUE, which is an experiment to validate the downscaling skill using observational data. The downscaling methods which participated in the validation experiment comprise model output statistics, perfect prognosis as well as weather generators.

The focus is on validation results for extremes of temperature and precipitation. Performance measures for indices which quantify marginal and temporal aspects of extremes are considered. Validation is based on station data which has been selected to represent different climates and a variety of local characteristics across Europe. Predictor data was taken from the ERA-Interim reanalysis in 0.75° and 2.0° resolution.

Raw ERA-Interim output reveals mostly a large bias with respect to the extreme index values at the stations, clearly pointing to the necessity of downscaling. However, from the diverse validation results it becomes clear that there is no optimum downscaling method for all aspects of extreme events. But in general the performance of downscaling methods to represent marginal aspects of precipitation extremes is much improved by explicitly including a seasonal component; the effect is less pronounced for temperature extremes. Furthermore, methods using parametric distributions require non-standard distributions to correctly represent marginal aspects of extremes.