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The role of observational reference data for climate downscaling: Insights from the VALUE COST Action

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VALUE is an open European network to validate and compare downscaling methods for climate change research (http://www.value-cost.eu). A key deliverable of VALUE is the development of a systematic validation framework to enable the assessment and comparison of downscaling methods. Such assessments can be expected to crucially depend on the existence of accurate and reliable observational reference data. In dynamical downscaling, observational data can influence model development itself and, later on, model evaluation, parameter calibration and added value assessment. In empirical-statistical downscaling, observations serve as predictand data and directly influence model calibration with corresponding effects on downscaled climate change projections.

We here present a comprehensive assessment of the influence of uncertainties in observational reference data and of scale-related issues on several of the above-mentioned aspects. First, temperature and precipitation characteristics as simulated by a set of reanalysis-driven EURO-CORDEX RCM experiments are validated against three different gridded reference data products, namely (1) the EOBS dataset (2) the recently developed EURO4M-MESAN regional re-analysis, and (3) several national high-resolution and quality-controlled gridded datasets that recently became available. The analysis reveals a considerable influence of the choice of the reference data on the evaluation results, especially for precipitation. It is also illustrated how differences between the reference data sets influence the ranking of RCMs according to a comprehensive set of performance measures.