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Evaluating regional climate model simulations of daily maximum and minimum temperatures in the ENSEMBLES project

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In the present study it is investigated how RCMs can simulate probability distributions of daily maximum and minimum temperatures. Data from a number of centres pursuing climate simulations with regional climate models within the European ENSEMBLES project are used. All models operate on an identical grid over Europe with a horizontal resolution of approximately 25 km. The models have been forced by lateral boundary conditions and sea surface temperatures from reanalysis data. From the models daily minimum and maximum temperatures at the 2m-level are used for the time period between 1961 and 2000. Model data on a daily basis are compared to observational data both for single stations and to data gridded to the same domain as the models. Probability distributions are derived by binning the daily data from observations and models at the corresponding grid points. By adding the minimum of the simulated and observed frequencies for each bin over the entire interval the range of overlap between the two distributions is determined. The resulting skill scores that range from 0 to 1 may be suitable for weighting of model results in order to construct probabilistic climate change scenarios based on a given experimental setup as in the ENSEMBLES project. It is shown that the probability distributions are generally well captured by most models for most stations and seasons. On average the performance is best for fall and spring while winter and summer are slightly worse even though the individual models show different behaviour. During winter some of the models show an exaggerated agglomeration of days with temperatures close to 0°C at many stations.