Geophysical Research Abstracts
Vol. 19, EGU2017-15061, 2017
EGU General Assembly 2017

Analysis of the regional MiKlip decadal prediction system over Europe: skill, added value of regionalization, and ensemble size dependeny

Mark Reyers (1), Julia Moemken (1,2), Joaquim Pinto (2), Hendrik Feldmann (2), Christoph Kottmeier (2), and MiKlip Module-C team (2)

(1) Institute for Geophysics and Meteorology, University of Cologne, Cologne, Germany, (2) Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Karlsruhe, Germany

Decadal climate predictions can provide a useful basis for decision making support systems for the public and private sectors. Several generations of decadal hindcasts and predictions have been generated throughout the German research program MiKlip. Together with the global climate predictions computed with MPI-ESM, the regional climate model (RCM) COSMO-CLM is used for regional downscaling by MiKlip Module-C. The RCMs provide climate information on spatial and temporal scales closer to the needs of potential users.
In this study, two downscaled hindcast generations are analysed (named b0 and b1). The respective global generations are both initialized by nudging them towards different reanalysis anomaly fields. An ensemble of five starting years (1961, 1971, 1981, 1991, and 2001), each comprising ten ensemble members, is used for both generations in order to quantify the regional decadal prediction skill for precipitation and near-surface temperature and wind speed over Europe. All datasets (including hindcasts, observations, reanalysis, and historical MPI-ESM runs) are pre-processed in an analogue manner by (i) removing the long-term trend and (ii) re-gridding to a common grid.
Our analysis shows that there is potential for skillful decadal predictions over Europe in the regional MiKlip ensemble, but the skill is not systematic and depends on the PRUDENCE region and the variable. Further, the differences between the two hindcast generations are mostly small. As we used detrended time series, the predictive skill found in our study can probably attributed to reasonable predictions of anomalies which are associated with the natural climate variability. In a sensitivity study, it is shown that the results may strongly change when the long-term trend is kept in the datasets, as here the skill of predicting the long-term trend (e.g. for temperature) also plays a major role.
The regionalization of the global ensemble provides an added value for decadal predictions for some complex regions like the Mediterranean and Iberian Peninsula, while for other regions no systematic improvement is found. A clear dependence of the performance of the regional MiKlip system on the ensemble size is detected. For all variables in both hindcast generations, the skill increases when the ensemble is enlarged. The results indicate that a number of ten members is an appropriate ensemble size for decadal predictions over Europe.