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Skill and Added Value of Regionalized Decadal Hindcasts for Europe

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The German research program MiKlip aims at the development of a decadal ensemble predictions system. A module within MiKlip is dedicated to develop a regional downscaling system for the global predictions. The regional focuses of the downscaling experiments are Europe where global decadal predictions show skill.

The global prediction system consists of the Max-Planck-Institute for Meteorology Earth System Model MPI-ESM. For the regional downscaling over Europe the regional climate model (RCM) COSMO-CLM is applied to establish a regional ensemble for the CORDEX-EU domain with a resolution of 0.22°. In the first instance the MPI-ESM-LR decadal ensemble experiments for CMIP5 are used to force the RCM. Ten ensemble members from five hindcasts periods between 1960 and 2010 were downscaled.

The regional baseline ensemble thereby obtained is analysed to determine the skill the regional experiments compared to observations and relative to the larger global ensemble. The methods include continuous and categorical skill metrics to explicate predictive skill of the regional ensemble as well as the value added to global predictions. Additionally different filter, both temporal and spatial, are applied and the results are analysed as well to possibly identify scales on which skilful prediction can be achieved.

A positive skill for near surface temperature was found. This skill varies on season and region. The same is valid for the value added by regionalization. In particular multi-year averages up to nine years have shown some measures of skill.

Some previous studies indicate that extremes might partly show a higher predictive skill than mean precipitation or temperatures. Skilful predictions of decadal tendencies of extremes (like droughts, heat waves or storms) also exhibit a higher value to potential users than variations of mean quantities. Therefore, the decadal variations of (moderate) extremes and their predictability are considered, too. So far there are indications for some skill with respect to the decadal variations of extreme precipitation.