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A robust assessment of the skill of regional decadal predictions for Europe

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The BMBF project MiKlip has developed a decadal climate prediction system, which is intended to go operational at DWD by the end of 2019.
The global part of the prediction system uses the Max-Planck-Institute Earth System Model (MPI-ESM) in low (T63L47) and now also in high resolution mode (T127L95). A regionalization module is part of the project, which for the first time offers a systematic dynamical downscaling on the decadal time-scale using COSMO-CLM with 0.44° and 0.22° resolution.
There exist now several generations of consistent (regional) decadal hindcast ensembles with ten members for the starting years 1960 to 2018. They cover different GCM/RCM model generations and resolutions as well as different initialization methods. The various hindcast ensemble exhibit robust spatial and temporal pattern of skill and an added value of the downscaling. The predictive skill increases over time with lower skill prior about 1980 and rising skill afterwards. The added value of initialization decreases over time. Both effects are related to the warming trend, which provides a growing contribution to the overall development in the recent years, compared to the natural variability modes. Regionally, the skill is higher in Southern Europe than in Scandinavia. With respect to the seasonality, the skill is highest in summer, especially in Southern Europe and lower in winter. From the British Isles over France and Germany spring and autumn display increased skill scores. The added value of downscaling is depicted in the shift of the distributions of the Means Square Error Skill Score (MSESS), the correlation and the Continuous Rank Probability Skill Score (CRPSS) towards higher values.
In 2019, for the second time, a regional decadal prediction for Europe is issued alongside the MiKlip global predictions (https://www.fona-miklip.de/). It can be shown that a recalibration improves the predictive skill significantly. A sufficient skill is found also for climate indicators beyond mean temperature as well as for extremes. It can be concluded that decadal prediction can provide user-relevant climate information several years ahead.