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Spatial temperature calibration of a multi-model ensemble using a NGR approach with local anomalies

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Ensemble systems aim at representing a range of possible future states of the atmospheric system. However, ensemble forecasts still tend to be underdispersive and biased. Thus, they should be post-processed with statistical models such as the nonhomogenous Gaussian regression (NGR, Gneiting et al. 2005). For temperature, NGR returns a Gaussian predictive density distribution where the location and scale parameters depend on the raw ensemble.
Following Scheuerer and König (2014), the original NGR approach is modified using local observation and forecast anomalies to remove site-specific characteristics. Therefore, a single model can be fitted for all available stations simultaneously. Observation and forecast anomalies are calculated by subtracting site-specific climatological means from the observations and forecasts, respectively. Thus, the improvement of the calibrated ensemble system strongly depends on the quality of the climatological means.
The method is implemented for a multi-model ensemble consisting of the LAEF (Limited Area Ensemble Forecasting) system and high resolution deterministic forecasts, and adapted for gridded 2 m temperature forecasts. As observational background the 1 km gridded INCA 2 m temperature analyses were used taking advantage of calibrating the ensemble data with highly resolved observations.
Results of spatially calibrated temperature forecasts of both, the LAEF ensemble and the LAEF-Multi-Model ensemble are evaluated against independent observations and raw LAEF forecasts. Hence, the added value of spatial calibration by exploiting high-resolution analysis fields will be demonstrated. Additionally, a local, non-anomaly NGR approach is evaluated against the anomaly approach.