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Skill assessment of post-processing methods for ECMWF SEAS5 seasonal forecasts over Europe

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Seasonal forecasts provide information on climate conditions several months ahead and therefore they could represent a valuable support for decision making, warning systems as well as for the optimization of industry and energy sectors. However, forecast systems can be affected by systematic biases and have horizontal resolutions which are typically coarser than the spatial scales of the practical applications. For this reason, the reliability of forecasts needs to be carefully assessed before applying and interpreting them for specific applications. In addition, the use of post-processing approaches is recommended in order to improve the representativeness of the large-scale predictions of regional and local climate conditions. The development and evaluation downscaling and bias-correction procedures aiming at improving the skills of the forecasts and the quality of derived climate services is currently an open research field. In this context, we evaluated the skills of ECMWF SEAS5 forecasts of monthly mean temperature, total precipitation and wind speed over Europe and we assessed the skill improvements of calibrated predictions.

For the calibration, we combined a bilinear interpolation and a quantile mapping approach to obtain corrected monthly forecasts on a 0.25°x0.25° grid from the original 1°x1° values. The forecasts were corrected against the reference ERA5 reanalysis over the hindcast period 1993–2016. The processed forecasts were compared over the same domain and period with another calibrated set of ECMWF SEAS5 forecasts obtained by the ADAMONT statistical method.

The skill assessment was performed by means of both deterministic and probabilistic verification metrics evaluated over seasonal forecasted aggregations for the first lead time. Greater skills of the forecast systems in Europe were generally observed in spring and summer, especially for temperature, with a spatial distribution varying with the seasons. The calibration was proved to effectively correct the model biases for all variables, however the metrics not accounting for bias did not show significant improvements in most cases, and in some areas and seasons even small degradations in skills were observed.

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