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Estimating seasonally varying thresholds for seasonal predictions of climate indices

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Many end-users would strongly profit from a prediction how the future/next season's climate might impact their sector of interest. EUPORIAS, which is embedded in the framework of EU FP7, aims exactly at improving this knowledge and explores ways to communicate such seasonal forecasts.

A simple way to convey climate information with user-relevance is to provide climate indices based on meteorological variables. Hence, depending on the index of interest, daily climate data is transformed by non-linear functions into aggregated data. In most cases, thresholds are applied to count or aggregate events above or below it.
Whereas the calculation of the indices is usually quite straight forward, the estimation of the associated thresholds can be more complex. For once, they can be seasonally variable depending on the statistical distribution that particular day of the year. On the other side, when calculating indices from model data, such as climate models or reanalyses, absolute thresholds are not independent of the model bias which can be different depending on the season and region. However, the reference period is often rather short to provide a representative sample for bias corrections and threshold estimates. It is shown for seasonal forecasts that the model bias estimation has an influence on the skill when the same index is calculated once for non-debiased data and once for debiased data. Furthermore, we use the large sample of ensemble seasonal forecasts in order to explore methods to calculate daily percentile-based thresholds that represent the climate adequately.

Further, we use the derived bias corrections and thresholds to calculate climate indices from seasonal forecasts. In particular, we explore the skill in predicting climate indices several months ahead based on the threshold calculation mentioned above and compare them to conventional seasonal mean values. As climate indices are often aggregated over time or counted events, the forecast might profit from a memory effect or from predictability in sub-seasonal variability We compare the different types of indices, such as aggregated, threshold dependent and count data and what effects these characteristics have on the quality of a forecast.