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Seasonal prediction of the NAO from stratospheric and tropospheric indicators for different data products and index definitions

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Skilful winter forecasts of the North Atlantic Oscillation (NAO) anomaly - a proxy for weather conditions in Europe - are of crucial importance to industry applications and power supply policies at the local and regional level. These forecasts are achieved by either dynamical models, based on deterministic equations, or statistical models exploring correlations and teleconnections between key stratospheric and tropospheric variables and the NAO index.

The response to anomalies in stratospheric polar cap temperatures, as e.g. the negative NAO response observed after major stratospheric sudden warming events, is quite reliably reproduced in seasonal prediction models. The strength of this response depends on the model and the strength and vertical extent of the forcing, which is modulated by teleconnections affecting the stratosphere, such as El Nino and the Quasi-Biennial Oscillation. In addition, various teleconnections with tropospheric origin tend to affect the prediction of the NAO.

Both types of models - dynamical and statistical models - show some skill in predicting the NAO index anomaly on seasonal timescales, but this skill exhibits a strong year-to-year variability, since the connection between the NAO and the different predictors including the teleconnection mechanisms are not yet well understood.

We present results comparing the statistical properties of the NAO index time series based on different reanalysis datasets and different index definitions with respect to the NAO winter variability, and their relation to statistical indicators used in weather forecasting for different winter regimes in Europe.