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Representation and predictability of North Atlantic winter storms in DEMETER and ENSEMBLES seasonal hindcast data

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Winter storms in the North Atlantic/European region may cause tremendous losses to society. Predictions on timescales of a few months would therefore be very helpful. However, little is known about the predictability of winter storm climate on seasonal timescales. In this study, seasonal hindcast data from the European projects DEMETER and ENSEMBLES are analysed in terms of the representation and predictability of winter storms. The data consist of seasonal hindcasts from a total of 11 coupled GCMs (7 in DEMETER, 4 in ENSEMBLES) with 9 ensemble runs per model and start date. The hindcasts started on 1 November are considered.
The innovative winter storm identification is based on coherent exceedances of the local 98th percentile of 10m wind speed and applied on ERA-40 reanalysis data and both hindcast data sets. The climatology of these winter storms, both in terms of their spatial distribution and their temporal occurrence, is sufficiently well represented in the seasonal hindcast models compared to ERA-40.
Predictability of the winter storm frequency in the North Atlantic/European region is analysed. Hindcasts of the probability of 3 equiprobable classes of storm frequency are verified against ERA-40 in terms of the Ranked Probability Skill Score.
The hindcasts of the storm frequency December-January (i.e. with a lead time of 2-4 months) for the period 1980-2001 show significant positive skill for 3 single model ensembles, for the DEMETER and ENSEMBLES multi model ensembles and for the combined grand multi model ensemble with a skill level of about 12-41%. For the storm frequency January-April (i.e. with a lead time of 3-6 months) during the same period, the skills are significant positive for the combined grand multi model ensemble and 2 single model ensembles (about 7-22%). Generally, predictability for the period 1960-2001 seems to be lower. Outstanding is the ENSEMBLES contribution of MeteoFrance with skill scores in the range of 22-41%.
A comparison between the predictability with DEMETER and ENSEMBLES is ambiguous: Whereas skill was markedly improved for the MeteoFrance model suite it changed not very much or even deteriorated for the other models.