



Key factors for seasonal predictability of Northern hemisphere severe winter wind storms

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Wind storms associated with intense synoptic-scale extratropical cyclones rank among the most expensive types of natural hazards in the Northern Hemisphere (NH) during the winter season, carrying a large damage and hence loss potential. We are investigating the role of the Tropics and the stratosphere as well as specified sea surface temperatures/sea ice and atmosphere-ocean coupling for seasonal forecasts of winter storm frequencies, focusing on the strongest and hence potentially damaging storm events. This is done by means of relaxation experiments with the European Centre for Medium-Range Weather Forecast model, which cover the winters from 1979/1980-2013/2014, and allow us to obtain perfect forecasts for specific parts of the coupled atmosphere-ocean system. Previous work used a subset of the experiments analyzed here and found that perfect forecast of the NH stratosphere significantly enhances the seasonal prediction skill of the North Atlantic Oscillation (NAO). Although the relation between the NAO and NH winter storms was shown to be non-linear, and the seasonal prediction of winter storm frequency more than a “second order” prediction deduced from a NAO forecast, we find that the stratosphere is also of importance for winter storm frequency prediction. Correct seasonal predictions of the occurrence of extreme events in the stratosphere, so-called stratospheric sudden warmings, seem to play a decisive role.