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Representation of Winter Storms in the ECMWF's Ensemble Prediction System

Robert Osinski, Philip Lorenz, Tim Kruschke, Maximilian Voigt, Gregor C. Leckebusch, and Uwe Ulbrich
Freie Universität Berlin, Institute for Meteorology, Berlin, Germany (robert.osinski@met.fu-berlin.de)

The focus of this study lies in the investigation of the extreme storms in the Ensemble Prediction System (EPS) of the European Centre of Medium-Range Weather Forecast (ECMWF) compared with ECMWF's reanalysis datasets (ERA-40 and ERA-Interim).

Ensemble forecasts with the EPS are used for operational service by the ECMWF since November 1992. 50 disturbed ensemble members are produced, twice a day, each running over a 15 days period. As the EPS is an operational System, it has been subject to various modifications. Improvements of the model, like the increase of model resolution, result in inhomogeneities over the data period.

For the characterization of extreme storm events, a so called Storm Severity Index (SSI), developed by Leckebusch et al. (2008), is used. Due to the above mentioned inhomogeneities in the EPS, a scaling of the SSI-values is necessary, performed in order to homogenize and compare them with ERA storms.

The different EPS ensemble members describe modifications of the weather situations, which cause also a spread of storm event intensities. Depending on the initialization time and perturbation in the ensemble member, a storm can have different evolutions, regarding track and severity. EPS storms and ERA storms assigned to each other by the date of occurence, and by the location as determined by the tracking algorithm for calculating the SSI. The existence of severe storms in the EPS, not occuring in the reanalysis, is also studied, and the genesis of such storm events is investigated.