Reliability of windstorm predictions in the ECMWF ensemble prediction system

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Windstorms caused by extratropical cyclones are one of the most dangerous natural hazards in the European region. Therefore, reliable predictions of such storm events are needed. Case studies have shown that ensemble prediction systems (EPS) are able to provide useful information about windstorms between two and five days prior to the event.

In this work, ensemble predictions with the European Centre for Medium-Range Weather Forecasts (ECMWF) EPS are evaluated in a four year period. Within the 50 ensemble members, which are initialized every 12 hours and are run for 10 days, windstorms are identified and tracked in time and space. By using a clustering approach, different predictions of the same storm are identified in the different ensemble members and compared to reanalysis data. The occurrence probability of the predicted storms is estimated by fitting a bivariate normal distribution to the storm track positions.

Our results show, for example, that predicted storm clusters with occurrence probabilities of more than 50% have a matching observed storm in 80% of all cases at a lead time of two days. The predicted occurrence probabilities are reliable up to 3 days lead time. At longer lead times the occurrence probabilities are overestimated by the EPS.