



High-resolution ensemble prediction of a polar low development

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Severe weather is frequently associated with polar lows over ice-free waters during Arctic winter. A high-resolution, limited area ensemble prediction system (EPS) to enable early warnings of such events is under development at the Norwegian Meteorological Institute (met.no). The system, UMEPS, employs the UK Met Office non-hydrostatic Unified Model at 4-km resolution to downscale the 21 ensemble members of the HIRLAM-based LAMEPS run twice daily with 12-km resolution at met.no since February 2008. LAMEPS includes a 3DVar-based control forecast, although initial and boundary perturbations are taken from a version of EPS at ECMWF with perturbations targeted to Northern Europe (TEPS). The added value of UMEPS has been extensively evaluated for one polar low during the March 2008 IPY-THORPEX campaign. Very few, if any, polar lows have been observed to this extent. Forecast probabilities, pseudo-satellite pictures, polar low tracks and strike probability maps are compared with observational data. The forecast quality depends crucially on the size and location of the UMEPS domain. When sufficiently large, the influence from data imposed at the lateral boundaries can be reduced by a careful domain selection. The results are sensitive to the model's parameterizations of physical processes. Although preliminary, this case study indicates that with a short-range, high-resolution UMEPS, potentially valuable warnings of extreme weather can be given up to 2 days in advance. Probabilistic forecasts needs, however, to be produced for a representative number of cases to be verified with standard measures for quality and value. Hence, additional results from UMEPS run within an operational environment gives an estimate of the uncertainty introduced by the choice of model domain as well as provide valuable experience with a high-resolution EPS designed for extreme weather events.