



Forecasting of Severe Weather in Austria and Hungary Using High-Resolution Ensemble Prediction System

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The study presents and compares several approaches in EPS (ensemble prediction system) forecasting based on the non-hydrostatic, high resolution AROME model. The PEARP (global ARPEGE model EPS) was used for coupling. Besides, AROME-EPS was also generated upon hydrostatic ALADIN-EPS forecasts (LAEF), which were used as initial and lateral boundary conditions for each AROME-EPS run. The horizontal resolution of the AROME model is 2.5km and it uses 60 vertical levels for the vertical discretization. In most of the tests, the AROME-EPS run with 10+1 members in Hungarian and 16 members in Austrian implementation. The forecast length was usually set to 30-36 hours. The use of high-resolution EPS has advantages in almost all situations with severe convection (mostly in forecasting intense multicell thunderstorms or mesoscale convective systems of non-frontal origin). The possibility of severe thunderstorm was indicated by several EPS runs even if the deterministic (reference) AROME model failed to forecast the event. Similarly, it could be shown that the AROME-EPS can perform better than hydrostatic global or ALADIN-EPS models in situations with strong wind or heavy precipitation induced by large-scale circulation (mainly in mountain regions).

Both EDA (Ensemble of Data Assimilation) and SPPT (Stochastically Perturbed Parameterized Tendencies) methods were tested as a potential perturbation generation method on limited area. The EDA method was able to improve the accuracy of single members through the reduction of the analysis error by applying local data assimilation. It was also able to increase the spread of the system in the early hours due to the additional analysis perturbations. The impact of the SPPT scheme was proven to be smaller in comparison to the impact of this method in global ensemble systems. Further possibilities of improving the assimilation methods and the setup of the AROME-EPS are also discussed.