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Verifying NWP-model chains by using model independent analyses

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Forecasts of a set of three model chains characterising a variety of model versions and types are evaluated. Each model chain consists of three models with increasing resolution nested into one another. Rules for a fair model intercomparison have been defined. Inter alia, they refer to the use of NWP-model independent analyses as reference data which, in this study, are provided by the VERA (Vienna Enhanced Resolution Analysis) system. Observational data and model data have been collected in a combined effort of COPS (Convective and Orographically induced Precipitation Study) and D-PHASE (Demonstration of the Probabilistic Hydrological and Atmospheric Simulation of flood Events in the alpine region). Verification parameters are precipitation and the gradient of equivalent potential temperature as front indicator. The verification domain covers Central Europe. Verification periods range from half a year to single case studies. A choice of novel and traditional verification metrics has been implemented to examine multiple aspects of the model chains.The results only partly confirm previous findings that the models with the highest resolution usually outperform their counterparts of lower resolution. We find a rather different behaviour from model chain to model chain. Additional forecast skill is not stringently added by the nested models with the highest resolution. In the case of frontal propagation it is the coarsest model, which shows the best results. Wavelet transforms are used to study phase and modulus coherence of forecast and analysis on different scales.