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Using regional reanalyses for the spatial verification of high-resolution model output

Sabrina Wahl (1,2), Christian Ohlwein (1,2), Jan Keller (3), Petra Friederichs (1), and Andreas Hense (1)

(1) University of Bonn, Meteorological Institute, Bonn, Germany (wahl@uni-bonn.de), (2) Hans-Ertel Centre for Weather Research - Climate Monitoring Branch, (3) Deutscher Wetterdienst, Offenbach, Germany

Traditional verification methods often lead to misinterpretations concerning the "added value" of high-resolution models in numerical weather prediction (NWP) or climate simulations. When using standard verification approaches, the potential of predictions on high spatial and temporal scales is often disguised by e.g. double penalty error or cannot be seen from a sparse observational dataset. For verification purposes, the model output is often interpolated to a coarser grid or aggregated to longer time scales to match the observational data at hand thereby loosing important information.

The evaluation of high-resolution models requires both the development of new verification strategies (i.e. spatial verification) as well as the exploration of adequate observational systems. Global and regional reanalysis systems are already used for model evaluation on larger scales, and have now entered the convective scale. Dynamical reanalysis systems use a numerical weather prediction model with a fixed data assimilation scheme. The resulting 4-dimensional fields represent our best estimate of the atmospheric state given the observational data. They provide a comprehensive data set for a large number of variables on the model scale which are physical consistent in time and space, and physical consistent between the meteorological parameters.

The Hans-Ertel Centre for Weather Research - RA4 Climate monitoring and diagnostics - has developed a regional reanalysis system for Europe and Germany. The system is based on the COSMO model and uses a nudging scheme for the assimilation of observational data. The European reanalysis covers the CORDEX EUR-11 domain with a horizontal resolution of 6km (COSMO-REA6) and is available for the twenty year time-period 1995 to 2014. The reanalysis system on the convection allowing scale uses an increased grid-spacing of 2km (COSMO-REA2). The model domain covers Germany, the neighboring countries, and the Alpine region. Data from the convective-scale reanalysis is available for the eight year period 2007 to 2014.

This presentation will explore the use of the convective-scale reanalysis for the evaluation of high-resolution model output. Special emphasis will be given to the MAP D-PHASE/COPS time period of investigation.