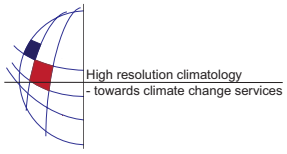
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-409, 2010
10th EMS / 8th ECAC



Ideas for a pattern-oriented approach towards a VERA analysis ensemble

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Ideas for a pattern-oriented approach towards a VERA analysis ensemble

For many applications in meteorology and especially for verification purposes it is important to have some information about the uncertainties of observation and analysis data. A high quality of these “reference data” is an absolute necessity as the uncertainties are reflected in verification measures.
The VERA (Vienna Enhanced Resolution Analysis) scheme includes a sophisticated quality control tool which accounts for the correction of observational data and provides an estimation of the observation uncertainty. It is crucial for meteorologically and physically reliable analysis fields.
VERA is based on a variational principle and does not need any first guess fields. It is therefore NWP model independent and can also be used as an unbiased reference for real time model verification. For downscaling purposes VERA uses an a priori knowledge on small-scale physical processes over complex terrain, the so called “fingerprint technique”, which transfers information from rich to data sparse regions.
The enhanced Joint D-PHASE and COPS data set forms the data base for the analysis ensemble study. For the WWRP projects D-PHASE and COPS a joint activity has been started to collect GTS and non-GTS data from the national and regional meteorological services in Central Europe for 2007. Data from more than 11.000 stations are available for high resolution analyses.
The usage of random numbers as perturbations for ensemble experiments is a common approach in meteorology. In most implementations, like for NWP-model ensemble systems, the focus lies on error growth and propagation on the spatial and temporal scale. When defining errors in analysis fields we have to consider the fact that analyses are not time dependent and that no perturbation method aimed at temporal evolution is possible. Further, the method applied should respect two major sources of analysis errors: Observation errors AND analysis or interpolation errors.
With the concept of an analysis ensemble we hope to get a more detailed sight on both sources of analysis errors. For the computation of the VERA ensemble members a sample of Gaussian random perturbations is produced for each station and parameter. The deviation of perturbations is based on the correction proposals by the VERA QC scheme to provide some “natural” limits for the ensemble.
In order to put more emphasis on the weather situation we aim to integrate the main synoptic field structures as weighting factors for the perturbations. Two widely approved approaches are used for the definition of these main field structures: The Principal Component Analysis and a 2D-Discrete Wavelet Transform.
The results of tests concerning the implementation of this pattern-supported analysis ensemble system and a comparison of the different approaches are given in the presentation.