EMS Annual Meeting Abstracts
Vol. 11, EMS2014-540, 2014
14th EMS / 10th ECAC

Using feedback statistics for evaluating global and regional reanalyses – an example approach applied to wind data

André Obregón (1), Andrea Kaiser-Weiss (1), Liselotte Bach (2), Michael Borsche (1), Hilppa Gregow (3), Paul Poli (4), David Tan (4), and Frank Kaspar (1)

(1) Deutscher Wetterdienst, Offenbach, Germany, (2) Hans-Ertel-Centre for Weather Research, University of Bonn, Germany, (3) Finnish Meteorological Institute, Helsinki, Finland, (4) ECMWF, Reading, United Kingdom

The EU FP7 project CORE-CLIMAX undertakes preparatory work for shaping the envisaged Copernicus Climate Change Service (CCCS). One focus of the project is the intercomparison of reanalyses. The characterization of uncertainties is of paramount importance regarding the use of reanalysis data within CCCS. With increased resolution of the reanalyses, there is an increasing need for evaluation with observations. Since the most valuable data are often ingested into the assimilation system, stable time series of independent observations covering a long time-period are scarce. A way around this obstacle is to use the observations, but not to compare against the reanalysis fields, but against the free forecasts (or background fields) which were started from the (re-)analysis a few hours earlier. These so-called feedback statistics can be routinely produced by the data assimilation system, and relate assimilated observations, so-called free forecasts (i.e. background fields), analysis results or analysis increments to each other. They yield valuable additional information, e.g on upper error bounds of the analysis error or on systematic changes in increments due to biases in observations or model (or both), indicating the deficiencies in the system. Favourable statistics may show that the frequency distribution and time series of observed and reanalysed parameters are matching. Thus, it is potentially of high practical value for the user, to take into account the results of feedback statistics.

The use of observation minus background (o-b) feedback statistics can be used to estimate uncertainties and to compare reanalyses. As a demonstration of concept, we analyse o-b (as well as observation minus analysis and the analysis increments) of wind speed for a global (ERA-Interim) and a regional reanalysis (COSMO-based reanalysis of Hans-Ertel-Zentrum (HErZ), University of Bonn). The assimilated observations used for our analyses include radiosonde data from different German stations. The analyses include comparisons of bias, RMSE, frequency distributions, annual and daily cycles for each reanalysis. User can interprete these feedback statistics, as comparison of the reanalysis fields against chosen observations yielding an estimate on reanalysis uncertainties. The poster illustrates a potential mechanism for deriving and interpreting feedback analyses and the added value for user of a future CCCS.