Geophysical Research Abstracts
Vol. 16, EGU2014-13234, 2014
EGU General Assembly 2014

Assimilation of surface AWS using 3DVAR and LAPS and their effects on short-term high-resolution weather forecasts

Jordi Barcons (1,2), Arnau Folch (1), Abdelmalik Sairouní (2), and Josep Ramon Miró (2)

(1) Barcelona Supercomputing Center, CASE, Spain (jbarcons@bsc.es), (2) Servei Meteorològic de Catalunya, SMC, Spain(jbarcons@meteo.cat)

The progress in Data Assimilation (DA) techniques that incorporate surface weather observations into high-resolution Numerical Weather Prediction (NWP) models remains a challenging problem because of handling surface data in the presence of terrain misrepresentation and balance approximation. In the framework of NWP and its operational applications, this study presents a comparison between two data assimilation systems using conventional observational data from surface Automatic Weather Stations (AWS): the three-dimensional variational analysis (3DVAR) and the Local Analysis and Prediction System (LAPS).

We study the ability of these two systems to assimilate data from surface AWS and assess which one performs better for near-surface wind and temperature fields to initialize a short-range 1-km resolution forecast with the Weather Research and Forecasting (WRF) model. Results show that the 3DVAR assimilation patterns are unrealistic given the inhomogeneous nature of the near-surface fields. In contrast, LAPS analyses without applying a balance routine show an heterogeneous assimilation pattern accounting for the complexity of the terrain. In addition, LAPS produces fields much more consistent with the observations than those of the 3DVAR method. During the model spin-up period, simulations initialized by both DA methods approached rapidly the control simulation without DA. However, 1 km resolution simulations initialized with LAPS analyses exhibit a significant improvement for the wind module forecast.