18–22 September 2017, Pula, Croatia
ECSS2017-137

Assimilation of Radial Winds in an Ensemble Kalman Filter on the Convective Scale

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With the Kilometer Scale Ensemble Data Assimilation System KENDA the German Weather Service and the Consortium for Small Scale Modeling (COSMO) have developed an Ensemble Kalman Filter for Data Assimilation on the convective scale (c.f. Schraff et al, QJRMS 2016). The system has been successfully tested in an operational setup to provide deterministic forecasts as well as initial states for the operational convective-scale ensemble prediction system COSMO-DE-EPS (c.f. Keane et al, MZ 2016). It will become operational in March 2017.

The operational setup of the KENDA system consists of the ensemble data assimilation (EDA) system for conventional observations over central Europe in combination with the assimilation of RADAR data based on latent heat nudging (LHN, Stephan et al 2011). This hybrid approach, where the ensemble data assimilation system is coupled with the traditional latent heat nudging applied to all ensemble members of the EnKF has proven to be an efficient method to assimilate radar composits into the system.

The new weather radar network of the German Weather Service (DWD) includes 17 dual-polarimetric C-Band Doppler radars evenly distributed throughout Germany for complete coverage. The radars offer unique 3-dimensional information about dynamical and microphysical characteristics of precipitating clouds in high spatial and temporal resolutions. First tests on the assimilation of radar reflectivities within the KENDA ensemble data assimilation system have been done by Bick et al, QJRMS 2016. The assimilation is based on the EMVORADO 3D-RADAR forward operator developed by Zheng and Blahak (Zheng et al 2016).

We will present ongoing work on the assimilation of 3D-RADAR radial winds by the ensemble Kalman filter of the KENDA system, based on the EMVORADO forward operator of Zheng and Blahak (see above). The focus will be on a time period with severe convective storms over Germany (May-June 2016). Tests with different types of localization, superobbing/resolution, combination with LHN have been carried out. We will discuss the impact of the radial wind data on the precipitation forecasts of the COSMO model.