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Assimilating all-sky SEVIRI infrared brightness temperatures using the KENDA ensemble data assimilation system

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Infrared brightness temperatures from geostationary satellites provide detailed information about the cloud and water vapor distributions. More effective use of this information in modern data assimilation systems has the potential to greatly improve the forecast accuracy for high impact weather events by producing a more accurate initial state in sensitive regions. The generation of accurate and spatially representative initial conditions within cloudy regions suitable for numerical weather prediction; however, is one of the challenging aspects of modern data assimilation because of the need to account for non-Gaussian error statistics, observation and model biases, and the presence of complex, nonlinear interactions between clouds and other prognostic model variables. Furthermore, water vapor tends to be one of the least accurate variables in initialization datasets due to a lack of in situ observations. Consequently substantial effort is required to utilize more effectively the information provided by infrared brightness temperatures sensitive to clouds and water vapor.

In this presentation, we will discuss results from ongoing efforts to assimilate clear and cloudy sky infrared brightness temperatures from the SEVIRI sensor onboard the MSG satellite in the Kilometer Scale Ensemble Data Assimilation (KENDA) system. In a first approach, we show results from a cycled data assimilation experiment using a statistical error model and a simple data-driven bias correction [1] with and without assimilating the SEVIRI observations.

[1] F. Harnisch, M. Weissmann and A. Perianez, Error model for the assimilation of cloud-affected infrared satelite observations in an ensemble data assimilation system, Q. J. R. Meteorol. Soc., in press (2016)