

Using MSG SEVIRI satellite observations for convective-scale ensemble data assimilation

F. Harnisch (1,2), L. Scheck (1,2), M. Weissmann (1,2)

(1) LMU München, Meteorologisches Institut, Munich, Germany (martin.weissmann@lmu.de), (2) Hans-Ertel-Centre for Weather Research, Munich, Germany

The limited predictability of convective systems requires the assimilation of frequent and spatially dense observations in convective-scale data assimilation systems. Measurements from geostationary satellites are therefore a potentially powerful data set. So far, mainly variational methods have been used to assimilate satellite radiances, while using these observations in ensemble data assimilation is still in its infancy and particularly the assimilation of cloud-affected observations poses significant challenges.

To facilitate the direct assimilation of MSG SEVIRI observations in the experimental km-scale ensemble data assimilation (KENDA) system of Deutscher Wetterdienst (DWD), a variety of issues need to be addressed. These are, among others, accurate and fast forward operators, an effective treatment of clear-sky and cloudy areas and the correction of systematic differences between observations and model equivalents. A new fast forward operator for visible and near-infrared reflectance observations is currently in development. The operator relies on a look-up table based method that is sufficiently accurate and orders of magnitude faster than conventional radiative transfer solvers for the visible spectrum.

KENDA assimilation experiments have been performed with visible and infrared SEVIRI channels. First results show, that assimilating visible reflectance and infrared radiance information can improve the cloud fields and also the humidity analysis. To successfully assimilate such observations, apparent biases needed to be corrected. Furthermore, a cloud-dependent observation error model has been developed to mitigate the effect of a non-Gaussian distribution of differences between observations and model equivalents.