

Assessing the impact of lightning observations in a hybrid data assimilation system

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In this study, a methodology to assimilate real lightning data using a hybrid ensemble-variational data assimilation system is presented. Lightning observations are assimilated into a cloud-resolving scale numerical weather prediction model to correct the intensity and location of deep convection. The Maximum Likelihood Ensemble Filter (MLEF), interfaced with the Advanced Research WRF core of the Weather Research and Forecasting (WRF-ARW) model is employed to assimilate ground-network lightning data used as a proxy for the Geostationary Lightning Mapper (GLM) that will be aboard the next generation of NOAA geostationary satellite (GOES-R). The lightning Forecast Algorithm described in McCaul et al. (2009) is used as a lightning observation operator.

Regional data assimilation experiments are conducted in applications for severe weather. Results that highlight the impact on storm dynamics at the initial time and short-term forecasts are presented. In addition, the results of assimilation of combined lightning and NCEP operational observations are shown.

References

McCaul, E. W., Jr., S. J. Goodman, K. M. LaCasse, and D. J. Cecil, 2009: Forecasting lightning threat using cloud-resolving model simulations. *Wea. Forecasting*, 24, 709-729.