Geophysical Research Abstracts
Vol. 15, EGU2013-3513-1, 2013
EGU General Assembly 2013

The use of radar data assimilation to improve warm season heavy rainfall forecasts for use in hydrologic models

Benjamin Moser (1), William Gallus (1), Ricardo Mantilla (2), and Witold Krajewski (2)

(1) Iowa State University, Geological and Atmospheric Science, Ames, IA, United States (wgallus@iastate.edu, +1 515 294-2619), (2) University of Iowa, IIHR- Hydroscience and Engineering, Iowa City, IA, United States

Warm Season convective rainfall is one of the most poorly forecast parameters in numerical models, which is unfortunate since this rainfall often occurs with very high rates which can lead to flooding if the duration of the event is sufficiently long. Because quantitative precipitation forecasting (QPF) skill has traditionally been poor, these forecasts are not used in hydrologic modeling for stream flow. Instead, stream flow forecasts are made using estimates of precipitation that has fallen, reducing the amount of lead time for warnings from what could exist if forecasts were used. Thus a continued focus in the meteorological community has been on increasing the forecasting accuracy of warm season convective rainfall.

Numerical weather forecasting has always suffered from the inability to accurately observe the state of the atmosphere; thus, model initial conditions cannot accurately portray the true state of the atmosphere. These initial observations (being inaccurate to a certain degree) result in growth of error in the model through time.

This presentation will focus on the the impact of adjusted initial conditions in the Weather Research and Forecasting (WRF) model through the assimilation of radar data to increase the accuracy of the initialization. The WRF has been run with convection-allowing grid spacing over a domain covering roughly 800 x 800 km centered over Iowa. The model is being run for several heavy rain events that occurred over the Midwest. The QPF skill of the model over the first 12 forecast hours with radar data assimilation will be compared to the skill of the same model without radar data assimilation. The use of radar data assimilation in the Center for the Analysis and Prediction of Storms (CAPS) ensemble has been found to noticeably improve forecasts, especially over the first 6-12 hours. This project will focus on quantifying the impact of such assimilation on rainfall forecasts in Iowa, and on hydrologic forecasts that use the QPF. If skill is found on average to improve sufficiently, it may be possible to extend warning lead time by several hours through the use of this QPF.