Lightning Mapping and the Nowcasting of Severe Storms

S. Goodman (1), C. Darden (2), and J. Burks (2)

(1) NASA Marshall Space Flight Center; (2) National Weather Service Forecast Office, Huntsville, AL

This paper describes a successful research and operational collaboration between NASA scientists and NWS forecasters to improve severe storm warnings using real-time data from a regional VHF total lightning mapping array (LMA). Key objectives of our research using LMA data are: a) Identification of intensifying and weakening storms using the time rate-of-change of total flash rate; b) Improved severe storm potential situational awareness; c) Evaluation of the potential of total flash rate trend to improve severe storm probability of detection (POD) and lead time; and d) Validation of mesoscale model forecasts of thunderstorm initiation. The LMA data are distributed for ingest and display in the WFO AWIPS decision support system, and archived at each WFO for case studies, event playbacks, and assessments using the NWS Warning Event Simulator. The Huntsville WFO has upgraded severe thunderstorm warnings to verified tornado warnings and avoided a false alarm on a severe storm through the added information on storm growth, intensification, and decay that can be deduced from the magnitude and temporal trend of total flash rates. We present detailed case studies of the observed relationships between lightning activity and tornadic storm development as determined by radar reflectivity and velocity fields, and thunderstorms forecast by the Weather Research and Forecast (WRF) model. From these collaborative studies, forecasters can evaluate the added value of total lightning data within the forecast and warning decision-making process (http://weather.msfc.nasa.gov/sport).