Convective Storm Forecasting 1-6 Hours Prior to Initiation

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A GOES-R Risk Reduction Project is currently underway to use a data fusion technique that combines satellite information with ancillary data from surface and upper air observations, NWP output, and radar information to improve convective initiation (CI) forecasts. One of the largest difficulties in severe weather forecasting is deciding exactly where and when storms will form before convective clouds have begun to develop, specifically 1-6 hours before CI. The GOES-R ABI will have improved capabilities that will allow for the detection of low-level water vapor convergence, the tracking of low-level clouds on small scales, and the identification of ground-surface heating gradients caused by variations in antecedent rainfall and/or vegetation coverage, all of which play a role in the CI process by helping to form and sustain deep convection. Clear-sky radar echoes may also be used to locate regions of low-level convergence, and hence will be integrated as part of a 1-6 hour CI nowcasting procedure.

This poster will provide the results of the project up to this point, including a detailed case study analysis for 21 May 2012, in which multiple CI events occurred across the central and eastern U.S. Five-minute output from a 4-km version of the WRF-ARW was generated (to match the scanning frequency of the ABI), and then synthetic ABI imagery was created from the model output for which satellite-based products will be generated (for convergence, winds and heating gradients). We will show how multiple satellite inputs and radar data can be combined statistically to provide probabilistic forecasts for CI. Finally, plans for data collection and processing during the upcoming severe weather season will be outlined. The ultimate goal is the development of a robust 1-6 hour CI nowcasting algorithm appropriate for the GOES-R era.