Future Capability for Monitoring and Nowcasting Convective Initiation within the GOES-R Era using a Data Fused Approach

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Presented is the geostationary-based convective initiation (CI) algorithm, the SATellite Convection AnalysiS and Tracking (SATCAST) system as developed at the University of Alabama in Huntsville. In this poster, shown are developments since reaching the requirements of SATCAST as part of the GOES-R Algorithm Working Group (AWG). For AWG, SATCAST was enhanced to include an object-tracking based methodology, providing superior tracking capabilities of small-scale (pre-thunderstorm) convective cloud "objects," and therefore greatly improving the ability to monitor the characteristics of convection in its early stages. The object-tracking version of SATCAST was unveiled in the Springs of 2010 and 2011 and tested at the GOES-R Proving Ground/Hazardous Weather Testbed (HWT) at the Storm Prediction Center (SPC) in Norman, OK. Additional testing is planned for Spring 2012 HWT with a "Strength of Signal" approach to the satellite-derived CI signals, followed by further improvement during Summer 2012 using a version of SATCAST that represents a *fused* approach to nowcast CI, incorporating NWP model fields to constrain (in space) and increase skill of the predictions. The overall SATCAST methodology, its performance, and results from the SPC tests will be provided, in addition to direct feedback from NWS Forecast Offices on how situational awareness, warnings, and thunderstorm forecasts were all improved when using this algorithm. Preliminary discussion will be provided on how SATCAST fields are being assimilated into the High Resolution Rapid Refresh (HRRR) model, and results of a substantial validation effort will also be covered, in addition to new activities in the area of objective CI validation.

The original version of SATCAST utilized only imager data from four infrared channels on the Geostationary Operational Environmental Satellite (GOES) to infer various characteristics about early stage convection, which are cloud-top height, cloud-top glaciation, and updraft strength. SATCAST has been developed, and research has been conducted, on its use with Meteosat Second Generation (MSG) data in preparation for GOES-R ABI, with a reliance on NWP model fields (e.g., CAPE, freezing level, wind shear, precipitable water) so to refine performance in various convective regimes. Day-night capabilities coupled with forthcoming uses of derived cloud property products will be discussed. Recent improvements involving use of various statistical approaches to provide (a) probabilistic nowcasts, and (b) significant (up to 50%) false alarm reductions will be shown. SATCAST's application and feedback from use within the FAA's Corridor Integrated Weather System (CIWS), in support of convective weather foresting for aviation, will be shown.