SATCAST Plans Forward
24 May 2012

In recent months, the UAHuntsville team has been working to incorporate NWS forecaster feedback along with recommendations from the National Weather Service (NWS) Operational Advisory Team (NOAT). In doing so, we have moved away from the old binary "yes/no" CI forecast output, which was an original mandate of the former Option 2 GOES-R Algorithm Working Group convective initiation (CI) product. Instead, the latest research and enhancements performed by UAH have allowed the CI algorithm to evolve to the point of providing probabilistic CI forecast output that *fuses* satellite data with short-term NWP model output. However, there are two sides to this effort. The UAHuntsville team is also working with ESRL to assimilate the UAHuntsville CI 0-1 hour nowcast output (also known as "SATCAST") into the short-term RAP and HRRR models (currently being tested in developmental versions of these models).

The goal is to produce a sort of "Doubly Data-fused CI Product"... One that uses satellite data in combination with the broad environmental information provided by short-term NWP models (CAPE, CIN, Shear, Convective Temp, etc..) to achieve better/smarter CI forecasts. Then these improved CI forecasts will be used as input into the same short-term NWP models (RAP/HRRR) in order to better initialize the placement and timing of convection in the model, which has a profound effect on all of the other variables output by the model. In essence, this would work to produce a sort of a positive feedback effect that significantly enhances both sets of input/output.

The hot start initialization/assimilation project is currently in progress via UAHuntsville and ESRL collaboration. At the present, however, we are currently running a new version of the UAH SATCAST product called the CI "Strength of Signal" (SS). This live version uses a test database of previous CI and Non-CI events to determine the likelihood of near-future CI, based primarily on the characteristics of cloud-tops retrieved from satellite data (with some short-term NWP data to help constrain the output answers). The SS combines all of the satellite variables to produce a single value on a scale from 0-100 that provides the magnitude of satellite derived "signal" that CI is likely to occur in the 0-2 hour timeframe. Our SATCAST product is intended to forecast all scales of CI, both large and small. The SS is not a forecast for intensity of convection, but rather gives more of an indication of near-future CI likelihood for a given atmospheric environment, and the algorithm gets "smarter" as we continue to train it with more satellite based (and, soon, NWP data) information. The SS product is our first step in the direction of a probabilistic and NWP-data fused product, because it lays the foundation for easily plugging in a variety of new input information under the umbrella of a neural network, which will eventually utilize the NCAR random forest (RF) methodology. The goal is to continue training the SS- and RF-based SATCAST algorithm with new input data and to add iteratively infuse more and more NWP information as time progresses in hopes of realizing the vision of a Doubly Data-Fused CI Product