Using Analyses of the Information Content of GOES Moisture Products to Improve Very-Short-Range NearCasts of the Pre-Convective Environment

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Previously, we have described development of the CIMSS NearCasting system and results of forecaster evaluations made during the past several years. Tests of the 1-9 hours forecasts of GOES products were made at US National Weather Service (NWS) Forecast Offices, and both the Storm Prediction Center (SPC) and the Aviation Weather Center (AWC) divisions of the National Centers for Environmental Prediction (NCEP). The tests at the two centers focused both on where/when severe convection **will** occur, as well as ***all*** forms of deep convection **will** *and* **will not** occur. All groups wanted to: a) Increase lead-time, b) Reduce false alarms and increase probability of detection, c) Provide updates / detail to NWP guidance for next several hours, and d) Increase use of satellite products (they currently rely heavily on Numerical Weather Prediction (NWP) models and radar observations). Results showed that the NearCast prediction period could be successfully increased from 6 to 9 hours, that the analysis improved by increasing the number of observations projected forward from previous, that the NearCast wind fields can provide information about low-level triggering mechanisms and storm severity, that the NearCasts enhanced NWP guidance by isolating which forecasts areas were and were not likely to experience convection and when and, very importantly, that successful use of the NearCasting tools requires increased forecaster training and education - both about the NearCast system itself and interpreting satellite observations and derived products.

This presentation will describe plans for additional field-testing of the NearCasting system using GOES data scheduled to be preformed in spring. We will also describe results of efforts: 1) to move the NearCasting model from an isobaric to and an isentropic framework and thereby make the NearCasts more responsive to variations in the peak weighting function levels across different air masses, 2) to identify and remove biases from the GOES moisture retrievals, 3) to determine the seasonally varying information content of the GOES relative to NWP model 'first guess' fields, and 5) lastly, to show month-long loops of the hourly evolution of lower- and mid-level moisture fields across the US.

As an example, GPS Total Precipitable Water (TPW) observations for the entire year 2011 were used as a validation standard to assess the quality and value of GOES TPW products. The analyses show a persistent wet bias, but one that varies with season and time of day. For instance, TPW products produced between 1600 UTC and 2200 UTC (using 'first guess' fields from the 1200 UTC run of NCEP's Global Forecast System, GFS) have a bias substantially larger than that from products generated during the previous and subsequent 6 hours. Although the GOES biases are larger in the warm season, the relative error (bias divided by TPW value) remains relatively constant throughout the year, providing a possible method to remove this systematic error from future NearCasting products. Initial comparisons of the Standard Deviation (random error) from the GOES TPW products and the GFS 'first guess' fields also show that the GOES products show the greatest improvement over the 'guess' during the summer months, a time when precipitation errors in NWP guidance are largest, indicating that the mid-latitude NearCasting products should have their greatest utility in the warm season when IR observations are most plentiful.