

## **Development Progress on the Real Time Mesoscale Analysis (RTMA) and UnRestricted Mesoscale Analysis (URMA) Systems at NCEP/EMC**

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NCEP's Real Time Mesoscale Analysis System (RTMA) is designed to provide the highest quality real time gridded surface analysis for National Weather Service operations [1]. The UnRestricted Mesoscale Analysis is run 6 hours later, which allows for the use of latent observational data and is designed to be used for verification and/or tuning, such as with the National Blend of Models project [2]. In addition to the substantial changes introduced in the system last year, additional improvements are being made to the system, with the help of forecaster feedback. New analysis variables are being added to support URMA's role as the 'analysis of record' for the National Blend of Models project on grids matching those of the National Digital Forecast Database.

### **Quality Control Improvements**

Surface observations (including mesonet observations) are heavily used in the RTMA/URMA, and quality control of these observations is critical since many are not necessarily sited or maintained at the same level as ASOS or AWOS sites. Variational quality control has been introduced to help with this. The variational quality control is designed to alter the weight given to a particular observation based on its match to the background field and neighboring observations. The variational quality control was implemented for temperature, moisture and pressure observations in January 2016. Its use has been shown to reduce the intensity of 'bullseyes' that often occur around isolated observations significantly different than the background.

### **New Variables**

At the request of the National Blend of Models project, a minimum and maximum temperature analysis was added to URMA. One minT analysis and one maxT analysis is run daily for each domain. The analysis selects the highest (lowest) background field value for each point and the highest (lowest) observed value for each temperature observation at each observation site (mobile sites and sites that do not report regularly are not considered) over the time period for maximum (minimum) temperature as defined in the National Digital Forecast Database: 7A-7P LST for maximum temperature and 7P-8A LST for minimum temperature. Min/maxT was implemented for CONUS and Alaska in January 2016 and will be implemented for Hawaii and Puerto Rico in mid-2016.

A ceiling analysis is also being added to the system. The system uses ceiling observations derived from METAR observations and a RAP/HRRR-based background field. Ceiling is being added to support that National Blend of Models project and also at the request of the FAA and NWS/AWC. Towards the end of 2016, we intend to begin running a 15-minute rapidly updating analysis of ceiling and visibility to support FAA and AWC.

Recent feedback from the field has indicated that the RTMA/URMA system's wind analysis does not closely match available observations and often shows wind features which are not physically consistent with local terrain or conditions. RTMA/URMA has thus far not analyzed wind itself, but rather stream function and velocity potential which is converted to and from wind speed and direction. In an attempt to correct the issues seen by field forecasters, wind speed is now being analyzed as a scalar. Wind direction will still be derived from the stream function and velocity potential analysis. The new wind speed analysis ensures that wind speed increments are consistent with available observations and therefore provide a closer match to those observations.

### **Field Feedback**

Since the RTMA/URMA is used as an analysis of record for verification and grid initialization locally and nationally, feedback from field users is critical in furthering development of the system [3]. The wind speed scalar analysis was added at the specific request of users from NWS local and regional offices, for example. An email listserver ([aor-rtma@infolist.nws.noaa.gov](mailto:aor-rtma@infolist.nws.noaa.gov)) and a NOAA Virtual Lab community (<https://vlab.ncep.noaa.gov/group/715073/home>) are used to gather and facilitate feedback and to give updates to the user community on development progress. The developers welcome any feedback or suggestions on improving the analysis; both the listserv and VLab community are open to people both inside and outside of NOAA. A NOAA-only website has also been developed to allow forecasters to compare operational and development versions of URMA against NDFD grids and other analysis schemes such as BDCG and LAPS.

### **References**

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