1. Baron Advanced Meteorological Systems, Raleigh, NC (e-mail: john.mchenry@baronams.com)

1. Operational CMAQ forecasting with MODIS AOD Data Assimilation:

Baron Advanced Meteorological Systems (BAMS) has been engaged in operational numerical air quality prediction (NAQP) for well over a decade. Recently, under a NASA grant, an observation-space variational data-assimilation sub-system was developed and implemented to provide the CMAQ model with remotely-sensed aerosol information. The initial CMAQ DA was run offline for approximately a year, showing good promise in some areas of the country, but more equivocal results in others. Detailed examination of the results suggested that improvements could be made by utilizing available surface PM2.5 observations within the assimilation system. This approach was implemented and based on significant improvements in the cycled-analysis model, forecast runs were then initiated. This poster describes improvements to the DA subsystem and quantitative improvements in day-1 and day-2 24-hr average surface PM2.5 forecast results as compared to the non-data-assimilating CMAQ forecast model.

2. MODIS AOD Acquisition, Q/A and Assimilation into CMAQ

Pairing with the VISTA RPO, NCDENR and NASA, BAMS developed/tested/evaluated assimilation of MODIS AOD data into CMAQ V4.51 (soamods, CB4) using 2002 surface observations and annual run results.

In light of improvements described herein, BAMS now makes the new CMAQ DA analysis and forecast routinely available to clients and customers. Applications for both operational forecasting and exceptional event analysis are available.

3. Initial Performance Analysis of Improved System

Partnering with the VISTA RPO, NCDENR and NASA, BAMS now routine CMAQ V4.51 (soamods, CB4) assimilating MODIS TAU data into the CMAQ DA model.

MODIS-AOD is captured using either “Dark Target” or “Deep Blue” algorithms, the “Deep Blue” providing additional coverage over bright reflecting surfaces

3a. Performance Improvements for Analysis Cycle

Performance improvements for the cycled-analysis model, forecast runs were then initiated. This poster describes improvements to the DA subsystem and quantitative improvements in day-1 and day-2 24-hr average surface PM2.5 forecast results as compared to the non-data-assimilating CMAQ forecast model.

3b. Performance Improvements for Day 1 Forecasts

3c. Performance Results for Day 2 Forecasts

4. Composite and Summary Performance Results

5. Conclusions and Ongoing Work

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