



# A Pilot Study for Near Real-Time Aerosol Modeling and Air Quality Characterization

Christian Hogrefe<sup>1</sup>, Winston Hao<sup>1</sup>, Kevin Civerolo<sup>1</sup>, Jia-Yeong Ku<sup>1</sup>, Gopal Sistla<sup>1</sup>, Jeff Young<sup>2</sup>, Gary Walter<sup>2</sup>, Alice Gilliland<sup>2</sup>, and Kenneth Schere<sup>2</sup>

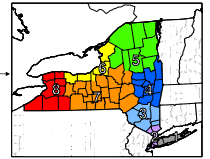
<sup>1</sup>BAQAR/DAR/NYSDEC, Albany, NY <sup>2</sup>ASMD NOAA, In partnership with NERL/ORD/EPA, Research Triangle Park, NC

## New York State Department of Environmental Conservation (NYSDEC) Pilot Study Objectives

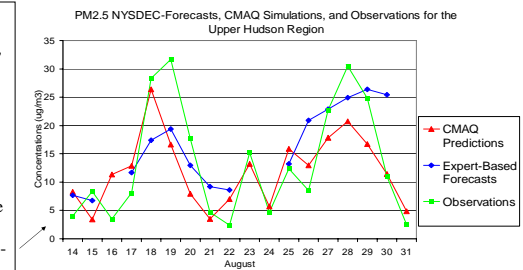
- Partner with the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (EPA) for technology transfer in the area of grid-based photochemical modeling
- Apply and evaluate the Community Multiscale Air Quality (CMAQ) state-of-science photochemical modeling system on an ongoing basis with special emphasis on PM<sub>2.5</sub> predictions
- Assess the potential usefulness of grid-based photochemical models to provide air quality forecasts across New York State
- For this pilot study, NYSDEC utilizes the same modeling tools and databases as the National Weather Service(NWS)/EPA national ETA/CMAQ air quality forecasting system with the exception of the choice of chemical boundary conditions.

## Comparison of Pilot CMAQ PM<sub>2.5</sub> Simulations with the NYSDEC Routine Air Quality Forecasting Program

- NYSDEC issues daily forecasts of same day and next day AQI for O<sub>3</sub>/PM<sub>2.5</sub> to the public for eight "air quality regions" in NYS
- These routine forecasts are based on measured concentrations, climatology, weather forecasts, and expert judgment



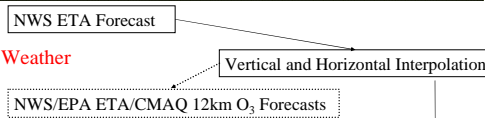
- CMAQ PM<sub>2.5</sub> Simulations and NYSDEC "human" forecasts generally have a comparable skill level
- Example: PM<sub>2.5</sub> forecasts, simulations, and observations for the Upper Hudson Region, August 14 - 31, 2004



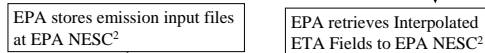
## Data Transfer and Simulation Timeline Summer 2004 and Winter 2005

ET  
08:00  
10:00  
13:00

Location: National Weather Service (NWS)



Location: EPA AMD, National Environmental Scientific Computing Center (NESCC<sup>2</sup>), RTP, NC



NYSDEC runs PREMAQ at EPA NESCC<sup>2</sup> to generate model-ready meteorology and emissions

21:00

Location: NY State Department of Environmental Conservation (NYSDEC), Albany, NY

NYSDEC retrieves CMAQ-ready emissions and meteorology to their Linux cluster

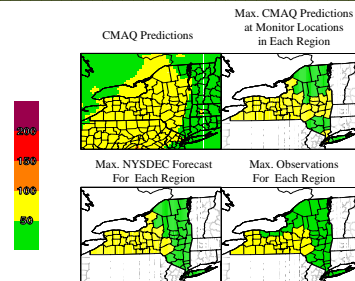
23:00

NYSDEC runs CMAQ for near-realtime O<sub>3</sub> and PM simulations on Linux cluster. Postprocessing finishes by 05:30 EDT  
Research Mode: Run alternate CMAQ version from 5.30 to 9.30 ET

01:00

05:30

## AQI Values Based on 24-hr Average PM<sub>2.5</sub> CMAQ Simulations, NYSDEC Routine Forecasts, and Observations: August 25, 2004



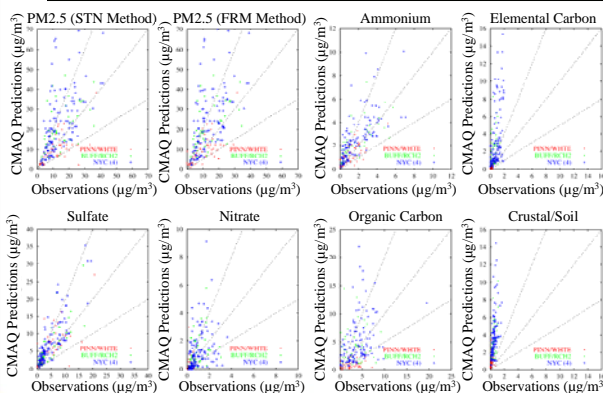
For the upper right panel, CMAQ predictions are interpolated to the location of all monitors. Therefore, the location of the monitors in each "air quality region" determines the maximum CMAQ prediction for that region.

## Summary

- Daily near-realtime ETA/CMAQ simulations for O<sub>3</sub> and PM<sub>2.5</sub> have been successfully performed by NYSDEC in partnership with NOAA and EPA for the summer of 2004 and winter of 2005
- The utilized IT infrastructure is able to handle daily file transfers, simulations, and archival
- When compared against speciated PM<sub>2.5</sub> measurements, CMAQ performed best at simulating sulfate over New York State for the summer of 2004
- The over-prediction of primary PM<sub>2.5</sub> species over New York State during the summer of 2004 points to potential problems with the emission inventory
- Routine expert-judgment based NYSDEC forecasts and ETA/CMAQ near-realtime simulations of PM<sub>2.5</sub> show a comparable skill level over New York State for the summer of 2004.

*Although this work was reviewed by EPA and NYSDEC and approved for publication, it may not necessarily reflect official Agency policy or the policies of NYSDEC. The research presented here was performed in-part under the Memorandum of Understanding between the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) and under agreement number DW13921348. This work constitutes a contribution to the NOAA Air Quality Program. Although it has been reviewed by EPA and NOAA and approved for publication, it does not necessarily reflect their policies or views.*

## Predicted vs. Observed Speciated PM<sub>2.5</sub> Over New York State, July - September 2004



- Data points are color-coded: Upstate rural sites (red), upstate urban sites (green), NYC (blue)
- Best model performance for sulfate
- Large over-prediction of the primary PM<sub>2.5</sub> species



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