

AQRP Monthly Technical Report

PROJECT TITLE	Emission source region contribution to a high surface ozone episode during DISCOVER-AQ	PROJECT #	14-004
PROJECT PARTICIPANTS	Christopher P. Loughner and Melanie Follette-Cook	DATE SUBMITTED	3/9/2015
REPORTING PERIOD	From: February 1, 2015 To: February 28, 2015	REPORT #	8

A Financial Status Report (FSR) and Invoice will be submitted separately from each of the Project Participants reflecting charges for this Reporting Period. I understand that the FSR and Invoice are due to the AQRP by the 15th of the month following the reporting period shown above.

Detailed Accomplishments by Task

We completed re-running CMAQ with the improved WRF simulation for the 36, 12, and 4 km domains and compared CMAQ model output with surface and P-3B aircraft observations. In addition, we re-calculated back-trajectories based on the improved WRF simulation.

Preliminary Analysis

The new 4 km CMAQ simulation is in better agreement with the observations of maximum 8 hour average ozone concentrations than the original simulation (Figures 1-3). For September 24, the new CMAQ simulation is in agreement while the original CMAQ simulation has a high bias compared to observations (Figure 1). For September 25, the new CMAQ simulation generally improves the representation of surface ozone concentrations than the original run (Figure 2). However, a high model bias is present at Galveston and a low model bias is present at LaPorte Sylvan Beach in both the original and new CMAQ simulations. The new 4 km CMAQ simulation did not capture the observed high ozone over Channelview and Deer Park during the 2nd and 3rd circuits and Moody Tower on the 3rd circuit (Figure 4). For September 26, both the new and original CMAQ simulations accurately capture the magnitude and spatial distribution of ozone concentrations throughout the Houston metropolitan area (Figure 3).

Read/Interpolate/Plot (RIP) meteorological back trajectories were performed from the new 4 km WRF model output to suggest transport from Dallas impacted surface ozone concentrations in the Houston metropolitan area on September 25 and 26 (Figure 5).

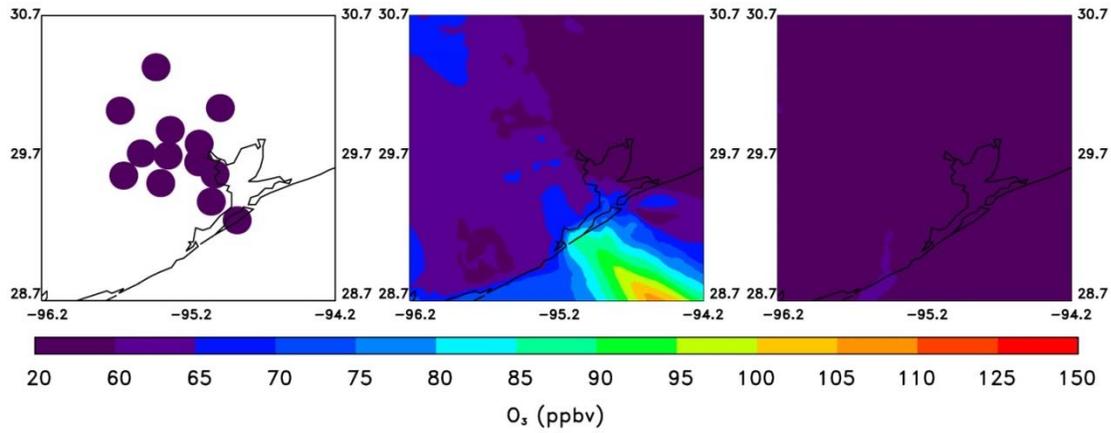


Figure 1: Eight hour average ozone maximum from observations (left), original 4 km CMAQ simulation (middle), and new 4 km CMAQ simulation on 24 September 2013.

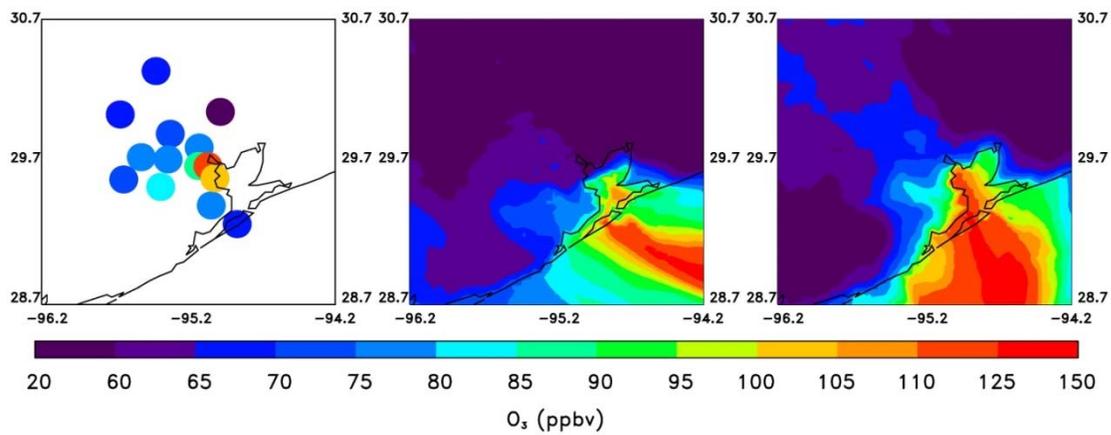


Figure 2: Eight hour average ozone maximum from observations (left), original 4 km CMAQ simulation (middle), and new 4 km CMAQ simulation on 25 September 2013.

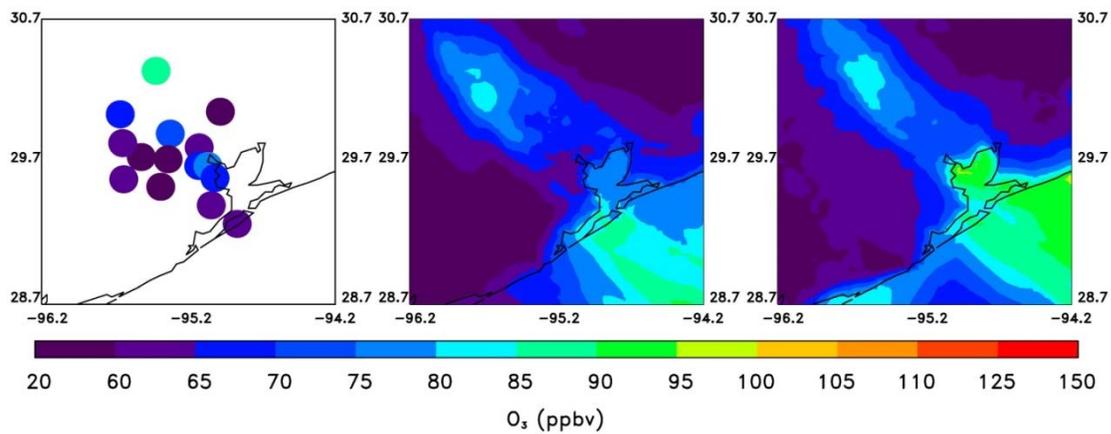


Figure 3: Eight hour average ozone maximum from observations (left), original 4 km CMAQ simulation (middle), and new 4 km CMAQ simulation on 26 September 2013.

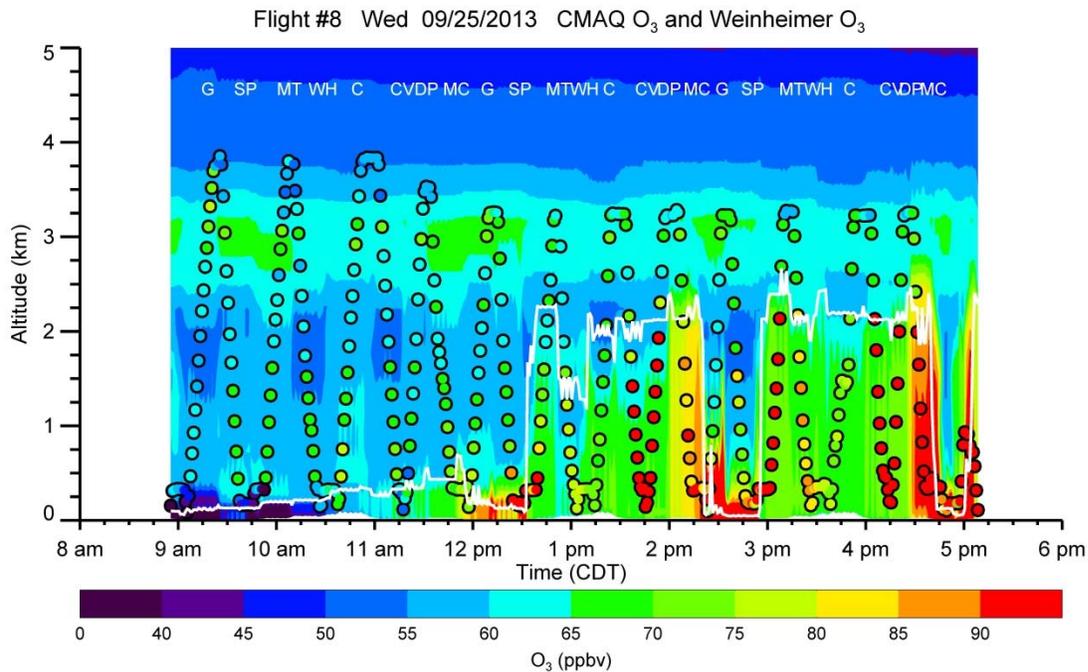


Figure 4: CMAQ simulated (background) and observed (overlay) ozone concentrations along a flight track on 25 September 2013. The white line shows the location of the top of the boundary layer as calculated by the WRF model. The white letters at the top of the figure, “G”, “SP”, “MT”, “WH”, “C”, “CV”, “DP”, and “MC” stand for the spiral locations Galveston, Smith Point, Moody Tower, West Houston, Conroe, Channelview, Deer Park, and Manvel Croix, respectively. CMAQ results are from the new 4 km horizontal resolution domain.

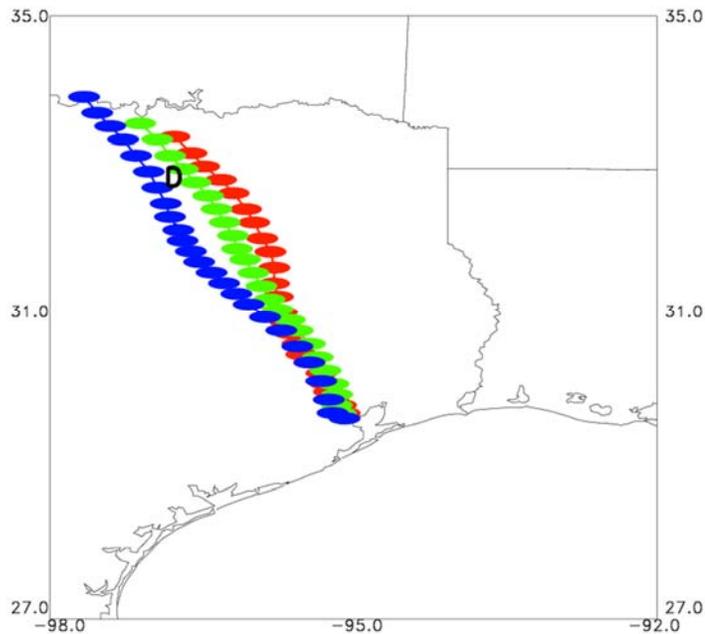


Figure 5: Back trajectories from the new 4 km WRF model output initialized at La Porte Sylvan Beach at 20 UTC at 0.5 km (red), 1 km (green), and 2 km (blue) AGL. The letter ‘D’ shows the location of Dallas, TX.

Data Collected

None.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments

No problems encountered.

Goals and Anticipated Issues for the Succeeding Reporting Period

Perform a CMAQ-observations statistical analysis, identify potential source regions, and set-up begin CMAQ simulation with ozone source apportionment.

Detailed Analysis of the Progress of the Task Order to Date

We don't anticipate delays in the completion of this project.

Submitted to AQRP by: Chris Loughner

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