

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	1/8/2015
REPORTING PERIOD	From: December 1, 2014 To: December 31, 2014	REPORT #	6

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 are in the process of re-running WRF to improve the model representation of sea and bay breezes using a new modeling technique, higher resolution meteorological initial and boundary conditions (North American Mesoscale 12 km model), and the inclusion of a 1 km horizontal resolution domain. We are performing observational nudging on all model domains. We are in the process of running WRF iteratively, where we first run WRF performing analysis nudging based on the NAM 12 km, and then re-run WRF performing analysis nudging based on the previous WRF simulation. This modeling technique prevents the relatively coarse NAM 12 km model from degrading the high resolution WRF modeling domains (4 km and 1 km modeling domains). The initial WRF run has been completed and the iterative 4 km and 1 km runs are anticipated to be completed within a week.

In addition, we have begun analyzing satellite observations to determine if space-based observations detected regional transport into the Houston metropolitan area during this air pollution event.

Preliminary Analysis

The initial 1 km horizontal resolution WRF simulation (not the iterative 1 km WRF run, which is currently running) did a better job capturing the sea and bay breeze circulations than our initial 4 km simulation (Figures 1 and 2).

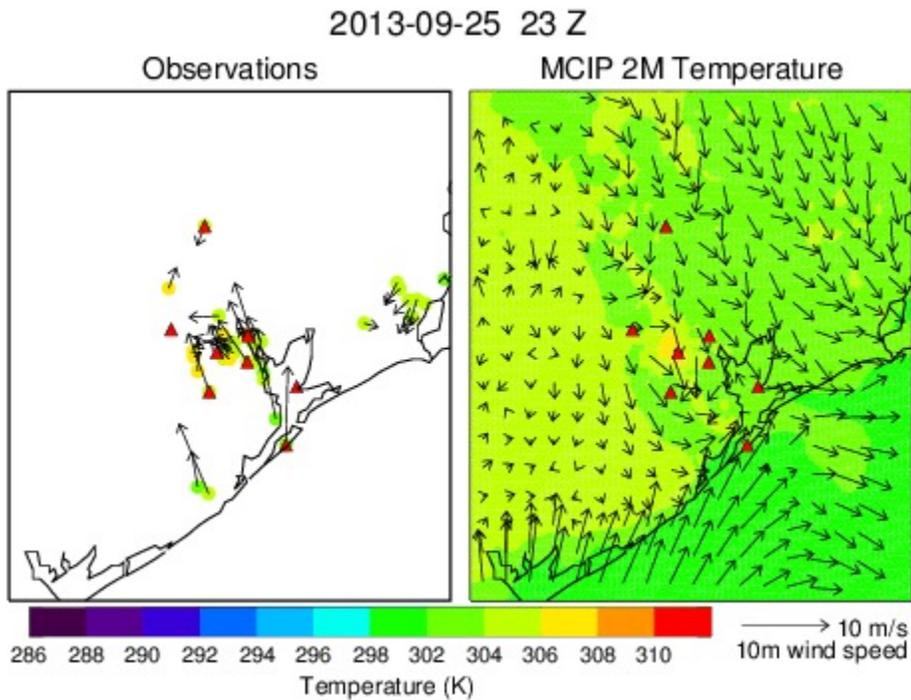


Figure 1. Observed (left) and WRF diagnosed (right) 2 m temperature and 10 m wind velocity at 22 UTC 25 September 2013 from the original 4 km WRF simulation. WRF simulated weaker sea and bay breezes than observed.

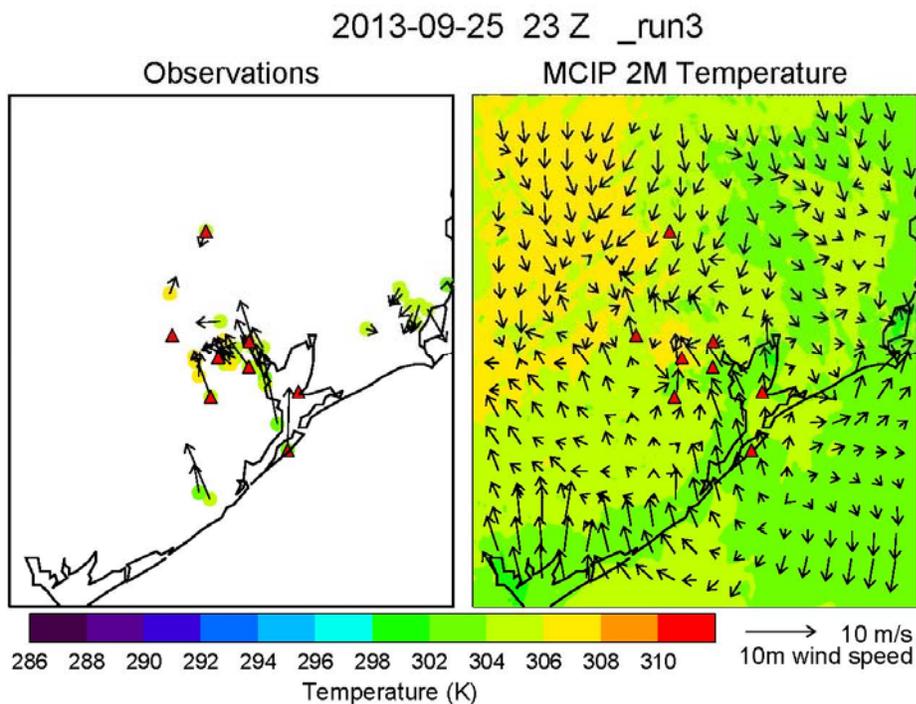


Figure 2. Observed (left) and WRF diagnosed (right) 2 m temperature and 10 m wind velocity at 23 UTC 25 September 2013 from the new 1 km WRF simulation. Strength of WRF simulated bay and sea breezes in agreement with observations.

An analysis of satellite observed aerosol optical depth (AOD) from the Moderate Resolution Imaging Spectroradiometer (MODIS) shows low aerosol loadings over East Texas on September 24, 25, and 26, 2013.

Data Collected

None.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments

Computer maintenance throughout the month of December prevented us from finishing the WRF iterative simulations. Computers maintenance has been completed and we anticipate the WRF iterative simulations to be completed within a week.

Goals and Anticipated Issues for the Succeeding Reporting Period

We will finish the WRF iterative simulation, evaluate the model results with observations including performing a statistical comparison between the new WRF iterative run and the original WRF run, continue analyzing satellite observations, and prepare input files for new CMAQ simulations.

Detailed Analysis of the Progress of the Task Order to Date

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

Submitted to AGRP by: Chris Loughner

Principal Investigator: Chris Loughner