

AQRP Monthly Technical Report

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| 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 | 6/8/2015 |
| REPORTING PERIOD | From: May 1, 2015 To: May 31, 2015 | REPORT # | 11 |

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 our running CMAQ with ozone source apportionment and analyzed the results.

Preliminary Analysis

A CMAQ source apportionment simulation was performed at a horizontal resolution of 4 km. Based on a back-trajectory analysis described in the last Monthly Technical Report, we identified the following anthropogenic source regions to perform an ozone source apportionment simulation: 1) Houston; 2) Dallas; 3) Beaumont; 4) Lake Charles; and 5) marine areas. The anthropogenic source regions are shown in Figure 1.

Observed and simulated maximum 8 hour average ozone for September 25 is shown in Figure 2. Observations show that peak ozone on this day was located along the western shore of Galveston Bay. Figures 3-5 display the contribution of emissions from various source regions to CMAQ simulated maximum 8 hour average ozone. CMAQ results suggest about 50 ppbv of the maximum 8 hour average ozone along the western shore of Galveston Bay are due to anthropogenic emissions from the Houston metropolitan area and about 55 ppbv are due to a combination of anthropogenic emissions from outside of the 5 regions shown in Figure 1, boundary conditions, initial conditions, and natural emissions throughout the entire domain. Dallas emissions contributed about 1-3 ppbv along the western shore of Galveston Bay and downtown Houston and up to 7 ppbv northwest of downtown.

Peak maximum 8 hour average ozone was located near Conroe on September 26 (Figure 6). The contribution of emissions from various source regions to the CMAQ simulated maximum 8 hour average ozone concentrations are shown in Figures 7-9. The CMAQ source apportionment run suggests that anthropogenic emissions from Houston contributed 25-30 ppbv to maximum 8 hour average ozone near Conroe, anthropogenic emissions from Beaumont, Lake Charles, and marine areas had a negligible contribution near Conroe, and Dallas emissions contributed 1-2 ppbv near Conroe. A combination of anthropogenic emissions outside of the 5 source regions shown in

Figure 1, boundary conditions, initial conditions, and natural emissions from the entire domain contributed 50-55 ppbv to CMAQ simulated maximum 8 hour average ozone near Conroe.

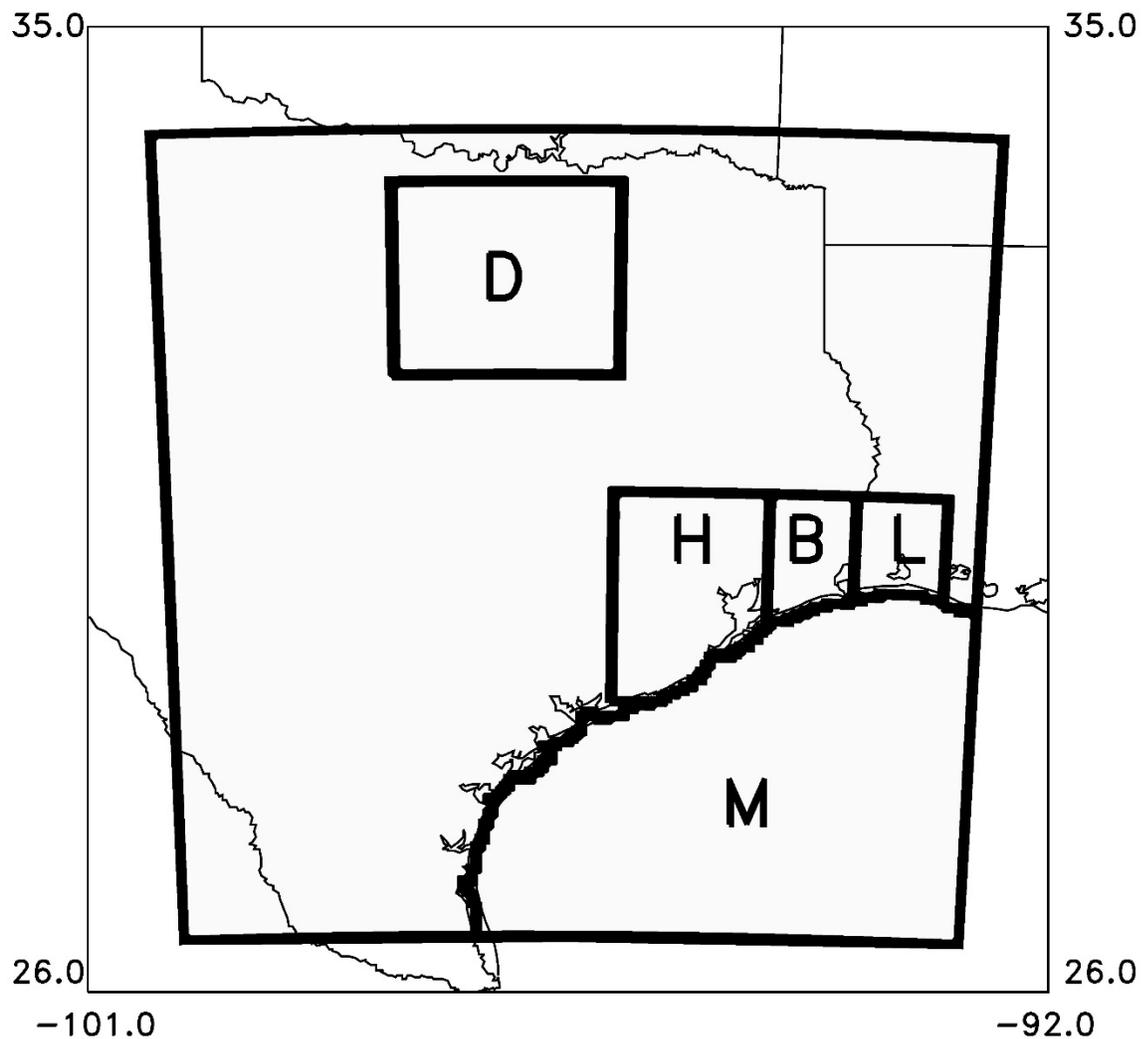


Figure 1: 4 km CMAQ domain showing the five anthropogenic source regions specified in the ozone source apportionment simulation (D=Dallas; H=Houston; B=Beaumont; L=Lake Charles; M=marine).

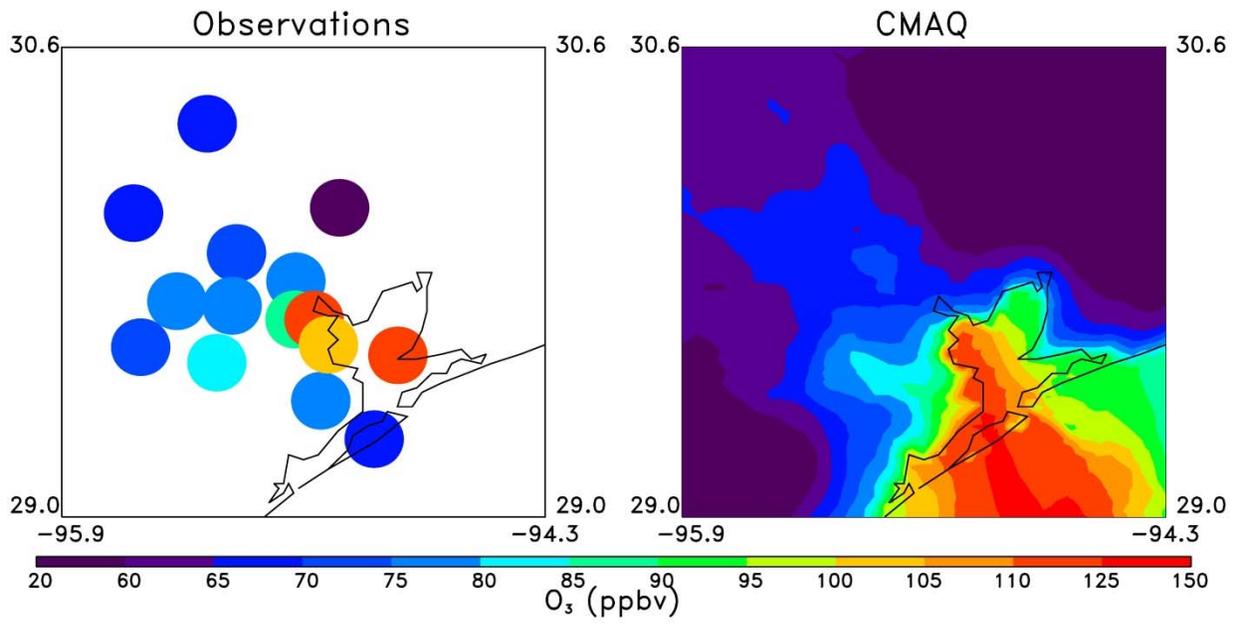


Figure 2: Observed (left) and CMAQ simulated (right) maximum 8 hour average ozone on September 25, 2013.

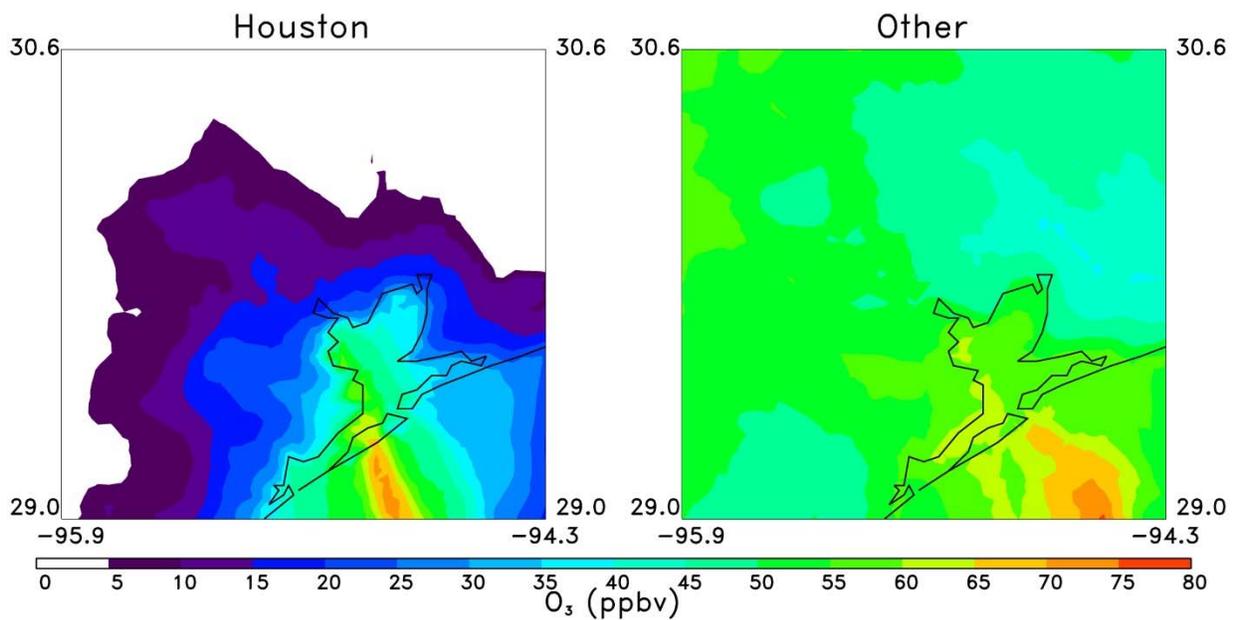


Figure 3: Amount of ozone that contributed to the maximum 8 hour average ozone on September 25, 2013 from anthropogenic emissions in the Houston source region (left) and a combination of initial conditions, boundary conditions, natural emissions throughout entire domain, and anthropogenic emissions not in any of the specified source regions (right).

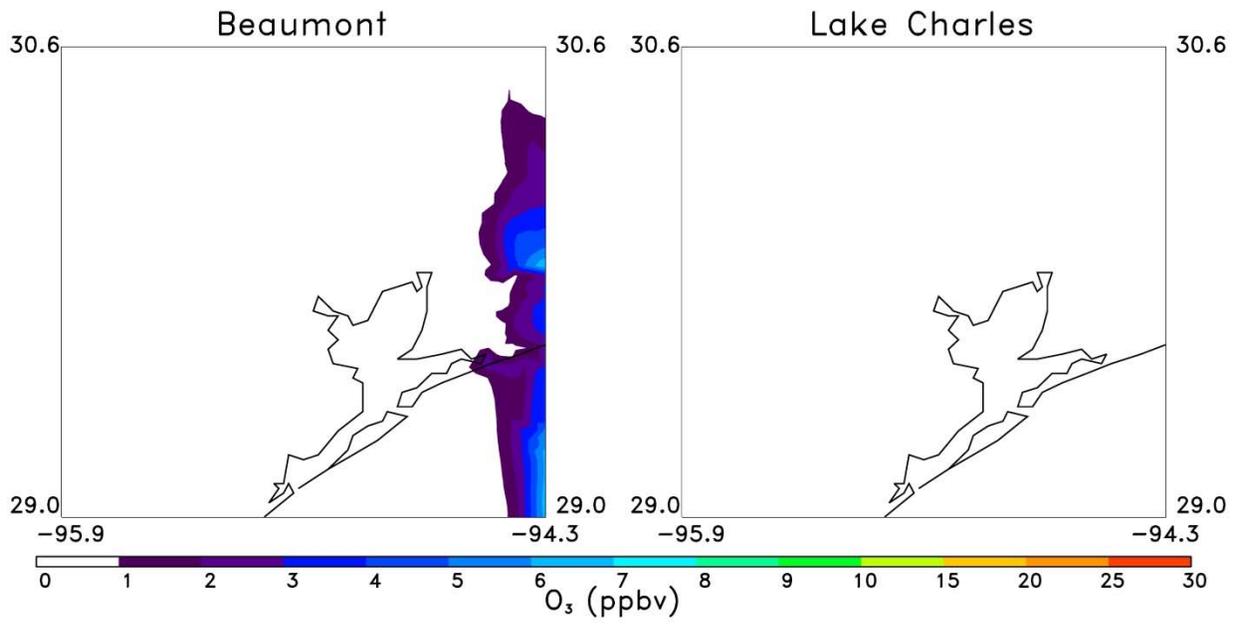


Figure 4: Amount of ozone that contributed to the maximum 8 hour average ozone on September 25, 2013 from anthropogenic emissions in the Beaumont source region (left) and Lake Charles source region (right).

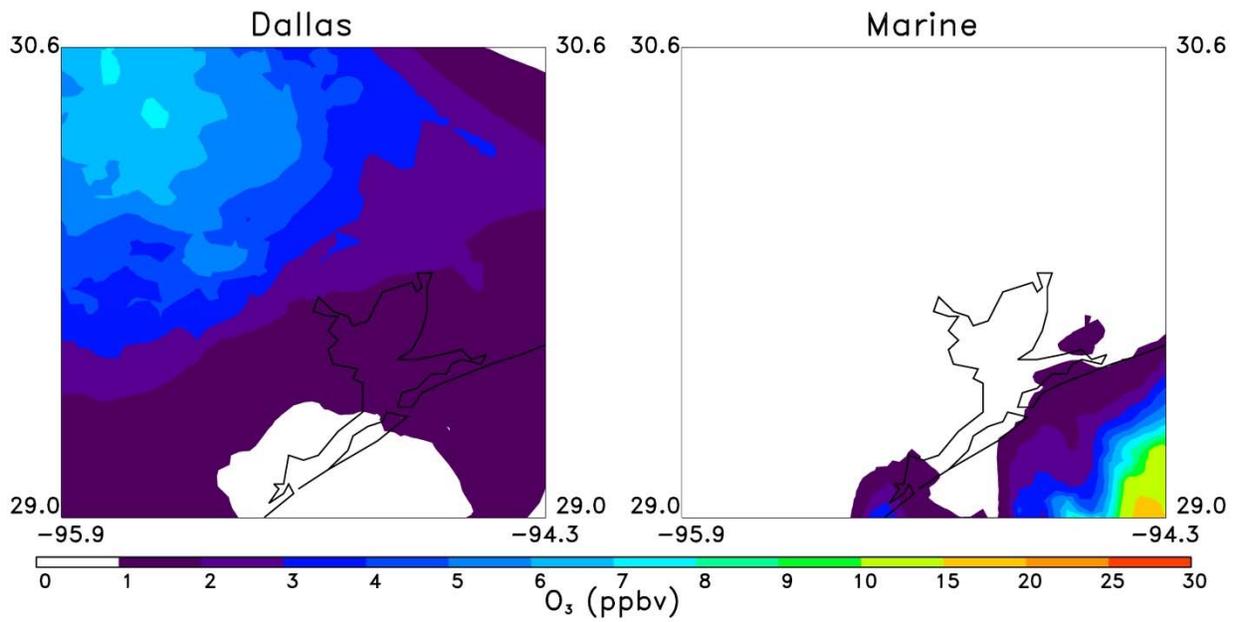


Figure 5: Amount of ozone that contributed to the maximum 8 hour average ozone on September 25, 2013 from anthropogenic emissions in the Dallas source region (left) and Marine source region (right).

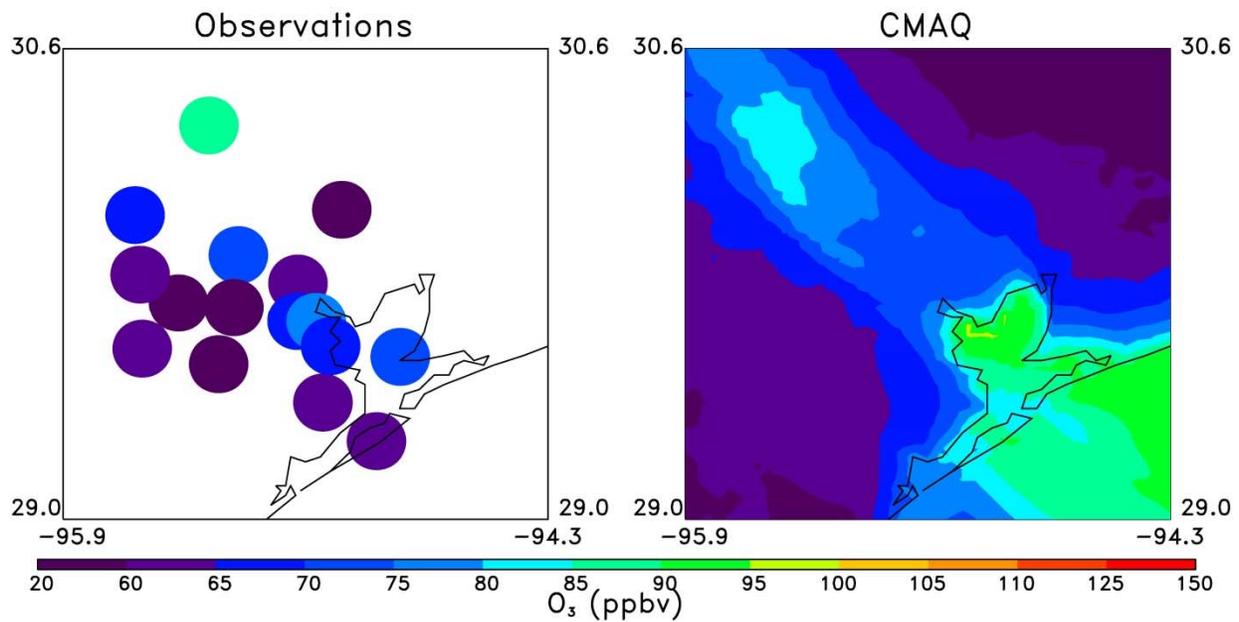


Figure 6: Observed (left) and CMAQ simulated (right) maximum 8 hour average ozone on September 26, 2013.

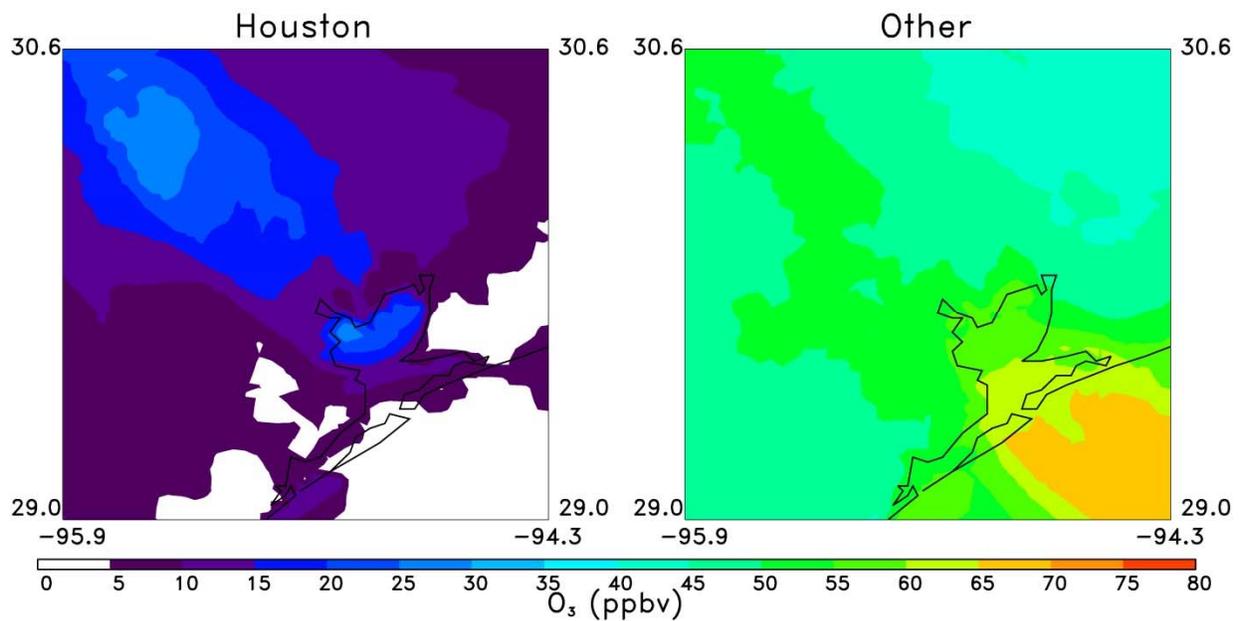


Figure 7: Amount of ozone that contributed to the maximum 8 hour average ozone on September 26, 2013 from anthropogenic emissions in the Houston source region (left) and a combination of initial conditions, boundary conditions, natural emissions throughout entire domain, and anthropogenic emissions not in any of the specified source regions (right).

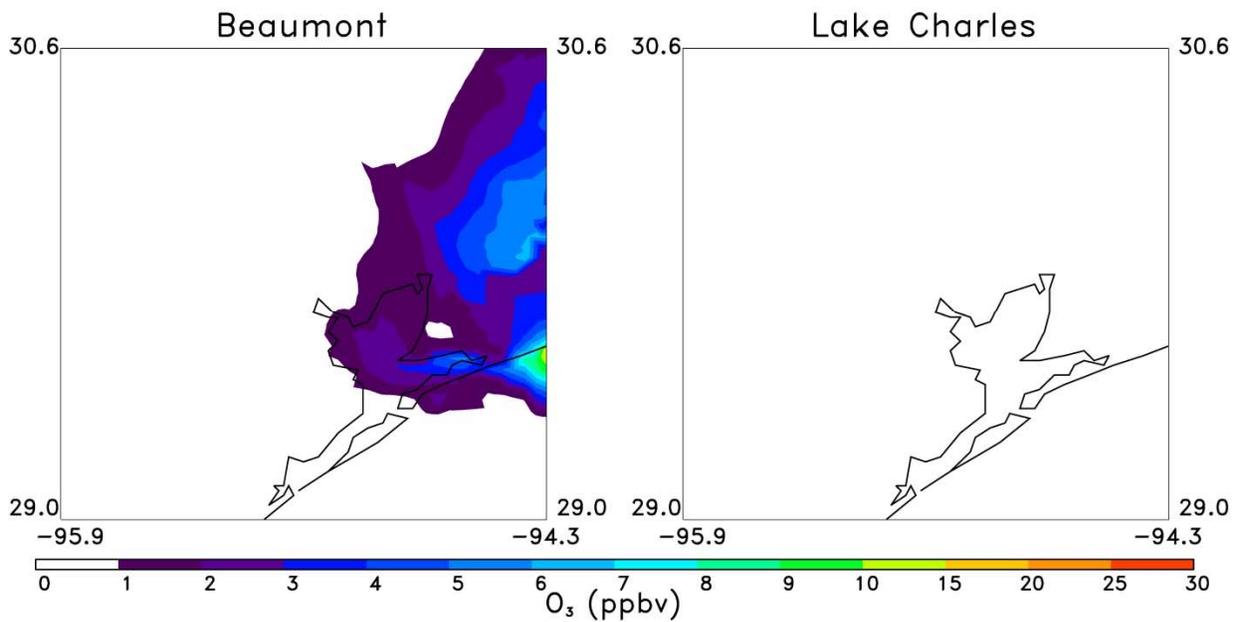


Figure 8: Amount of ozone that contributed to the maximum 8 hour average ozone on September 26, 2013 from anthropogenic emissions in the Beaumont source region (left) and Lake Charles source region (right).

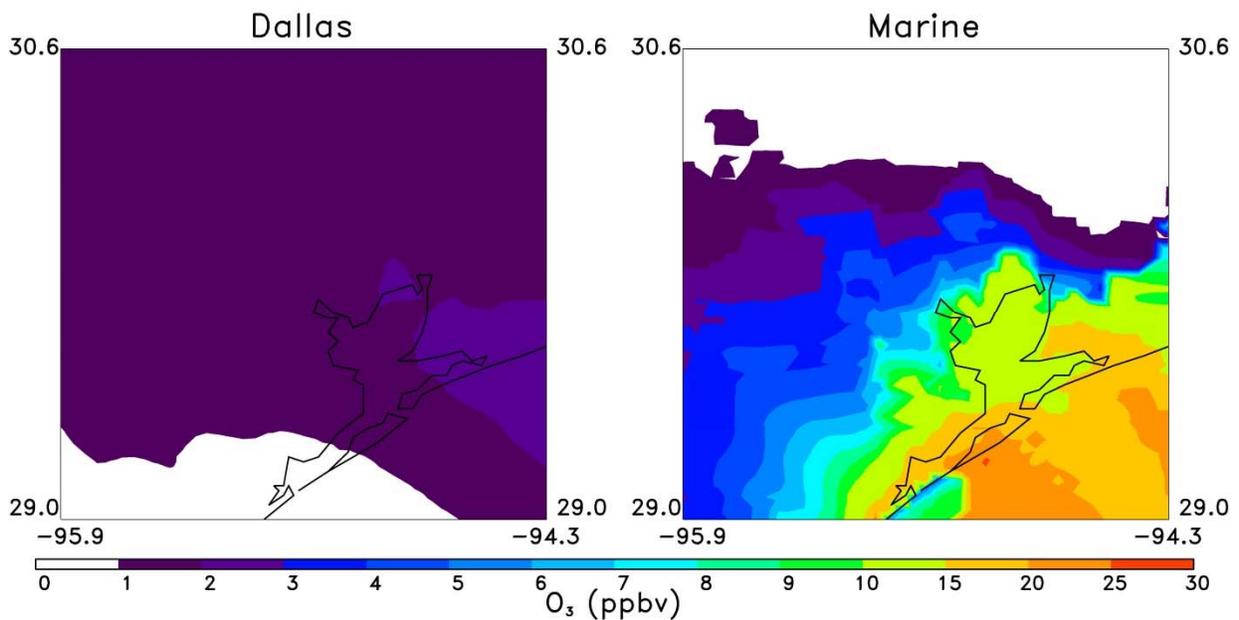


Figure 9: Amount of ozone that contributed to the maximum 8 hour average ozone on September 26, 2013 from anthropogenic emissions in the Dallas source region (left) and Marine source region (right).

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

Prepare draft of Final Report.

Detailed Analysis of the Progress of the Task Order to Date

A 1 month no cost extension was granted. The project completion date is now July 31, 2015.

Submitted to AQRP by: Chris Loughner

Principal Investigator: Chris Loughner