AQRP Monthly Technical Report

PROJECT TITLE	Improving WRF representation of coastal, marine, and residual boundary layers and quantifying the effects on ozone prediction	**PROJECT #**	24-021
PROJECT PARTICIPANTS	Yuxuan Wang, James Flynn	**DATE SUBMITTED**	06/10/2025
REPORTING PERIOD	**From:** 05/01/2025 **To:** 05/31/2025	**REPORT #**	9

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 for reporting period

Task 6:

- Completed regridding of emission files for the Comprehensive Air Quality Model with Extensions (CAMx) domain 3.
- Selected the representative days for the initial CAMx test run and completed the base run for these days.
- Working on running CAMx using the meteorology from the improved Weather Research and Forecasting model(WRF) model
- Working on the Task 6 report

We finished preparing the emission input files for the CAMx simulations. The emissions are based on the 2019 State Implementation Plan (SIP) modeling platform provided by the Texas Commission on Environmental Quality (TCEQ). For domains d01 and d02, the emissions inventories were spatially cropped to match the respective model domains. For domain d03, emissions are regridded from the 4 km inventory following the approach described in Li et al. (2023).

For the initial CAMx test run, we selected four days: September 8–9, 2021, and September 9–10, 2022, representing both high ozone and clean days. The base CAMx simulations for these periods have been completed. Figure 1 presents a time series comparison of observed and modeled ozone over Galveston Bay for September 9–10, 2022. The results show that the CAMx base simulation (red line) tends to overestimate ozone compared to observations (black line), particularly during the afternoon hours on September 9. We are currently running CAMx using meteorology from the improved WRF simulation and will compare those results with the base run as well as other periods from the Tracking Aerosol Convection ExpeRiment – Air Quality (TRACER-AQ) campaign periods.

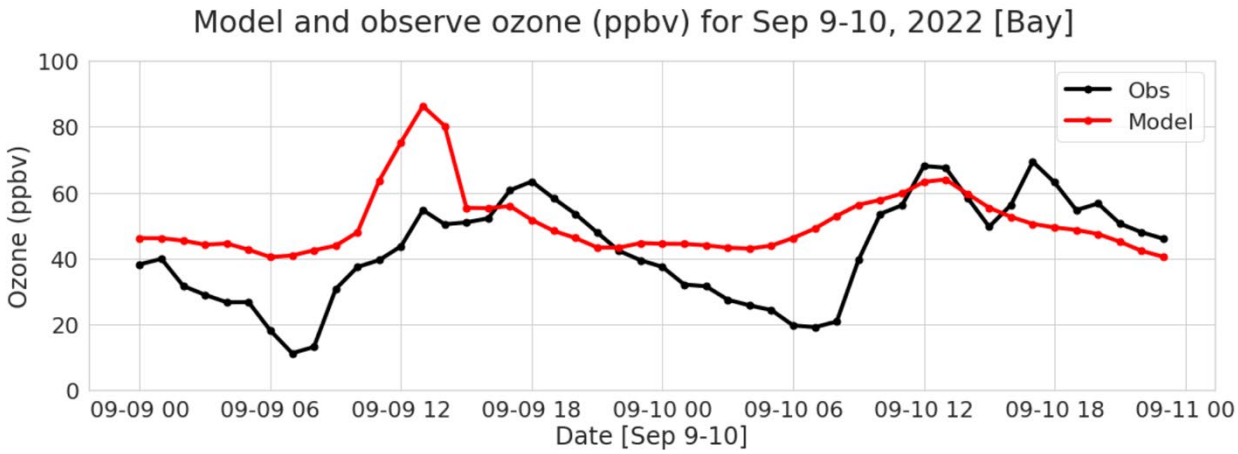

Figure 1 Time series of CAMx base modeled (red) and observed ozone (ppbv) over Galveston Bay for September 9-10, 2022

References:

Li, W., Wang, Y., Liu, X., Soleimanian, E., Griggs, T., Flynn, J., and Walter, P.: Understanding offshore high-ozone events during TRACER-AQ 2021 in Houston: Insights from WRF-CAMx photochemical modeling, Atmos. Chem. Phys., 23, 13685–13699, https://doi.org/10.5194/acp-23-13685-2023, 2023

Data Collected

None

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

None

Goals and Anticipated Issues for the Succeeding Reporting Period

Goals: Continue with Task 6. Run the CAMx model with improved meteorology and the zero-emission case, and work on the Task 6 report.

Anticipated Issues: None.

Detailed Analysis of the Progress of the Task Order to Date

None

Do you have any publications related to this project currently under development? If so, please provide a working title, and the journals you plan to submit to.

☐**Yes** ☒ **No**

Do you have any publications related to this project currently under review by a journal? If so, what is the working title and the journal name? Have you sent a copy of the article to your AQRP Project Manager and your TCEQ Liaison?

☐ **Yes** ☒ **No**

Do you have any bibliographic publications (ie: publications that cite the project) related to this project that have been published? If so, please list the reference information. List all items for the lifetime of the project.

☐ **Yes** ☒ **No**

Do you have any presentations related to this project currently under development? If so, please provide working title, and the conference you plan to present it (this does not include presentations for the AQRP Workshop).

☐ **Yes** ☒ **No**

Do you have any presentations related to this project that have been published? If so, please list reference information. List all items for the lifetime of the project.

☐ **Yes** ☒ **No**

Have any personnel changes occurred that were not listed in the original proposal? If so, please include a detailed description of the personnel change(s) below.

☐ **Yes** ☒ **No**

Are any delays expected in the progress of the research? If so, please include a detailed description of the potential delay below.

☐ **Yes** ☒ **No**

Describe any possible concerns/issues (technical or non-technical) that AQRP should be made aware of.

Are you anticipating using all the available funds allocated to this project by the end date? If not, why and approximately what is the amount to be returned?

☒ **Yes** ☐ **No**

Submitted to AQRP by
Yuxuan Wang