

# AQRP Monthly Technical Report

<b>PROJECT TITLE</b>	Improving WRF representation of coastal, marine, and residual boundary layers and quantifying the effects on ozone prediction	<b>PROJECT #</b>	24-021
<b>PROJECT PARTICIPANTS</b>	Yuxuan Wang, James Flynn	<b>DATE SUBMITTED</b>	10/10/2024
<b>REPORTING PERIOD</b>	<b>From:</b> Project Start <b>To:</b> 09/30/2024	<b>REPORT #</b>	1

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 15<sup>th</sup> of the month following the reporting period shown above.

## Detailed Accomplishments by Task for reporting period

Task 1: Finished. We submitted the Work Plan and QAPP to AQRP project manager and TCEQ liaison on August 20<sup>th</sup> and revised them in response to comments on September 19<sup>th</sup>.

Task 3:

- We found based on the boat measurements in September 2022 that the daily PBL variability over Galveston Bay is significantly correlated with the surface dewpoint temperature and relative humidity (Table 1).

Table 1. Correlation coefficients between the observed surface meteorology and the observed PBL over the Galveston Bay in September 2022.

Boat measurements	Surface temperature	Surface dewpoint	Relative humidity	Surface pressure	Surface wind speed
<b>Correlation with PBL</b>	-0.32 (p-value=0.09)	-0.49 (p-value=0.007)	-0.49 (p-value=0.01)	-0.14 (p-value=0.47)	-0.05 (p-value=0.81)

- We finalized the WRF domains for simulations over the Houston area and the SCOAPE campaign region.
- We implemented and tested the new version of WRF v4.6.0 with the defined domains.

## Preliminary Analysis

Analyzing our previous simulations for September 2022 done with the older version of WRF (version 3.9.1.1), we found that the model's PBL bias was large in the afternoon time frame (11am – 19pm) over the Galveston Bay (Figure 1). This preliminary analysis indicates that we should focus on some physical processes in the afternoon to improve the modeled PBL over the Galveston Bay.

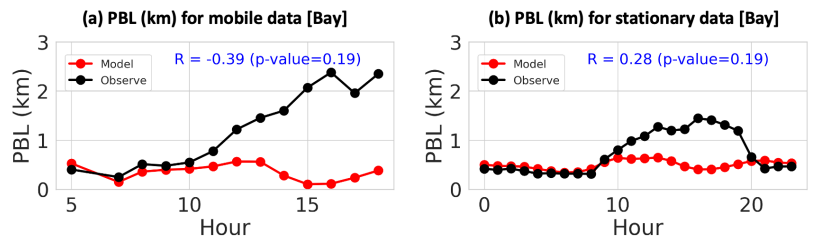


Figure 1. Diurnal variation of the observed PBL (Black) and the modeled PBL (Red) over the Galveston Bay in September 2022. (a) The mobile data is based on the measurements when the boat is moving, and (b) the stationary data is based on the measurements when the boat is at dock. The correlation (R) and its p-value are given in blue in each panel.

**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 3 and start compiling a preliminary list of physical parameters in WRF for used by the PPEs in Task 4.

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 AQR 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 AQR 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

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Submitted to AQRP by  
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