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**	02/10/2025
REPORTING PERIOD	**From:** 01/01/2025 **To:** 01/31/2025	**REPORT #**	5

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 3:

- Finished. Task 3 Technical Report was submitted on 01/10/25.

Task 4:

- Selected the days for the WRF model perturbation
- Compiled a list of the physics parameter and their expected perturbation values.

Based on the model evaluation in Task 3, the days for the model perturbation were selected. These days were chosen based on the baseline performance of the WRF model in simulating the PBL over various locations in the Galveston Bay and Gulf of Mexico. The selected days are as follows:

- July 27-28 and September 9, 2021
- August 26 and September 8-10, 2022
- May 19 and September 9-10, 2023

These days will be used for the model perturbation. Additionally, we have selected an initial set of parameters along with their expected perturbation values to conduct the ensemble simulations. **Table 1** shows the parameters, their default values and the corresponding expected perturbation.

Table 1:

	Physical quantity	Parameter/constants	Default Values	Expected perturbation
1.	Dissipation rate	B1	24	12, 36
2.	Dissipation rate	B2	0.625xB1	7.5
3.	Mixing length scale	α1	0.23	0.2-0.3
4.	Prandtl number	Pr	0.74	0.7,1
5.	Mixing length scale	α1	0.65	0.5,1.0

6.	Surface Roughness	Z0	0.0185	0.01,0.03
7.	Closure constant	C3	0.33	0.5
8.	MYNN	bl_mynn_closure	2.5	3.0
9.	Cumulus option	cu_physics	16	96

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 4. Run the WRF by making changes in the physics parameters given in **Table 1**.

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