

## AQRP Monthly Technical Report

<b>PROJECT TITLE</b>	Galveston Offshore Ozone Observations (GO3)	<b>PROJECT #</b>	20-004
<b>PROJECT PARTICIPANTS</b>	James Flynn (UH) Yuxuan Wang (UH) Paul Walter (St. Edward's University) Gary Morris (St. Edward's University)	<b>DATE SUBMITTED</b>	8/31/2021
<b>REPORTING PERIOD</b>	<b>From:</b> August 1, 2021 <b>To:</b> August 31, 2021	<b>REPORT #</b>	14

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

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### Detailed Accomplishments by Task for reporting period

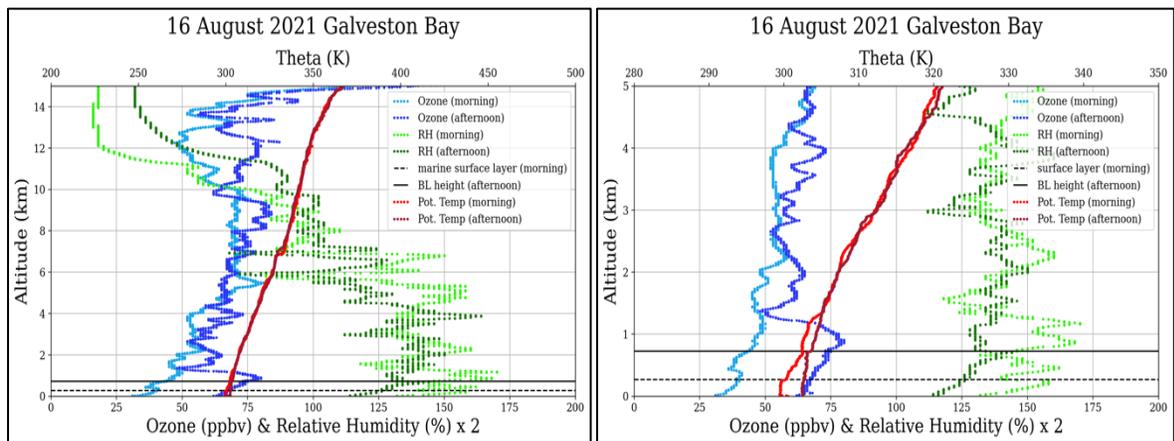
- Launched one ozonesonde the morning of 8/12/21 from the Southeast side of the bay.
- Launched 2 ozonesondes from Galveston Bay on August 16.
- Performed monthly maintenance on Red Eagle set up on 8/10/21. Made some adjustments to Airmar setup to protect it when sea is rough.
- Went out to Trinity Bay for morning and afternoon launches on 8/4/21. Launches were cancel due to low ozone and a storm development offshore heading our way.
- NASA Pandora was installed on pontoon boat the week of 8/23/21
- Made collocated measurements with the University of Houston's Mobile Air Quality Lab 1 (MAQL1) for an hour on 8/24/21 on Sylvan Bay.
- Conducted WRF-GC simulation for July 2021 over Houston-Galveston region.

Notes:

WRF-GC v2.0 is a regional air quality model (Feng et al., 2021) that couples the Weather Research and Forecasting (WRF) meteorological model (v3.9.1.1) and the GEOS-Chem atmospheric chemistry model (v12.7.2).

### Data Collected

Twice daily ozonesondes were launched from the pontoon boat in Galveston Bay on 16 August, the first in the morning (14:35 UTC) and the second in the afternoon (18:56 UTC). The vertical profiles of ozone, relative humidity, and potential temperature shown in **Figure 1**. The launches occurred at 29.67 N, 94.98 W near Morgan's Point and east of La Porte.



**Figure 1:** Left: Tropospheric profiles (ascents only) of ozone (morning: light blue; afternoon: dark blue), relative humidity (morning: light green; afternoon: dark green), and potential temperature (morning: red; afternoon: dark red) from ozonesondes during 16 August 2021 launched from the pontoon boat in Galveston Bay. The boundary layer heights of afternoon soundings are shown by the horizontal black line the marine surface layer of the morning profile is shown by the black dashed horizontal line. Right: Same profile zoomed in to show the first 5 km of the ascent and a narrower range for the potential temperature scale.

On August 30<sup>th</sup>, high ozone in Galveston (C1034) was noted by the TRACER-AQ science team in the late afternoon. An inspection of the Red Eagle data showed that the boat had been out into the Gulf at the anchorage area where ozone levels approached 120 ppbv (Fig. 2).

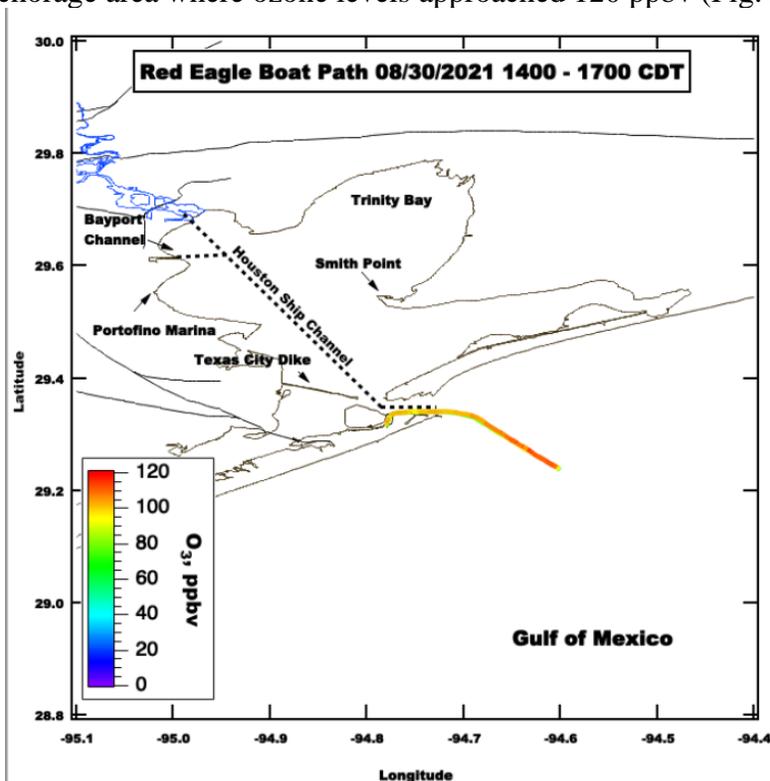


Figure 2. Spatial plot of Red Eagle ozone data on August 30, 2021.

### Preliminary Analysis

Comparison of ozonesonde measurements with WRF-GC model in Figure 3 and Figure 4. More detailed analysis is ongoing.

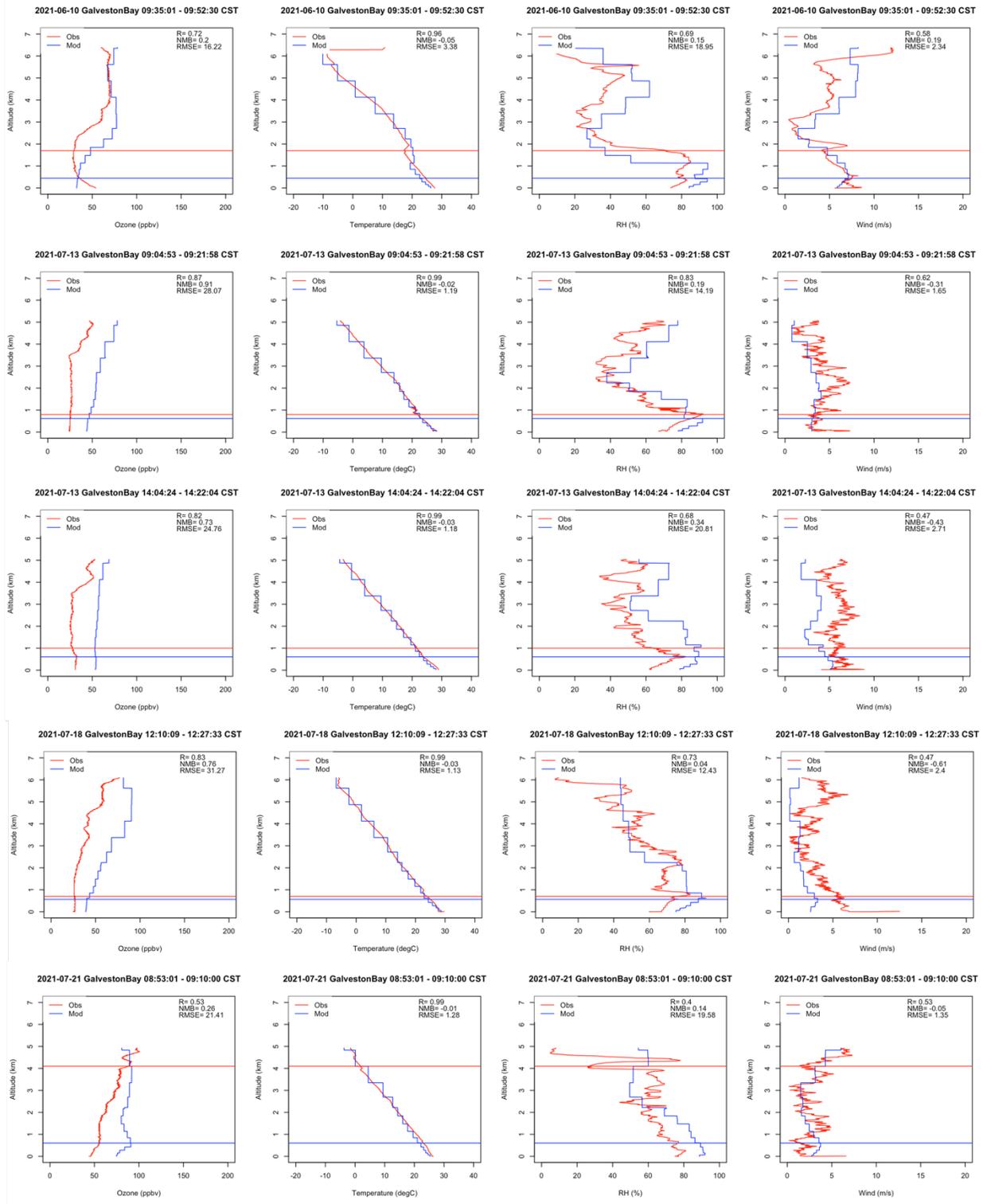


Figure 3. Comparison of WRF-GC and ozonesonde measurements at Galveston Bay for (a) ozone, (b) temperature, (c) relative humidity and (d) wind. Horizontal line denotes for planetary boundary layer height.

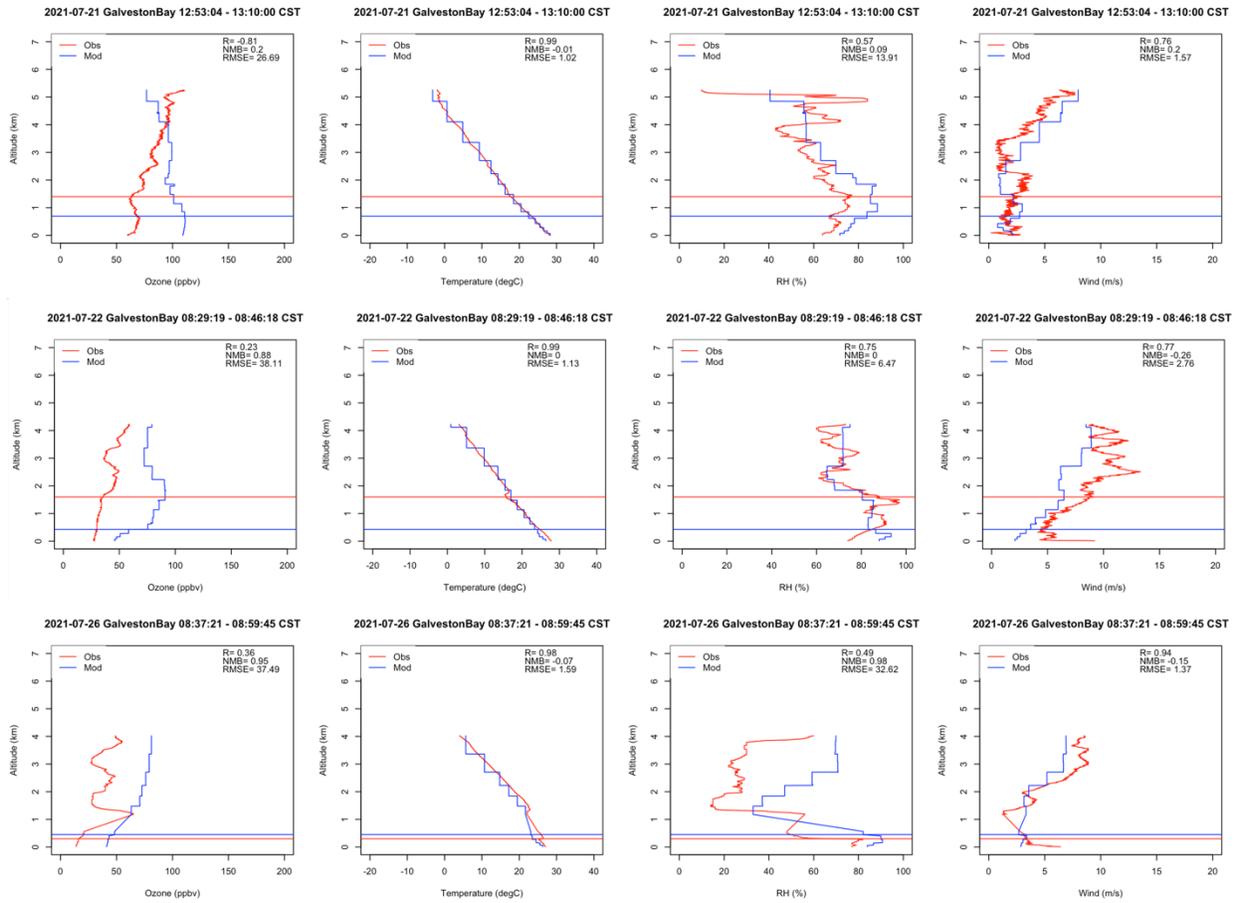


Figure 3. Continued.

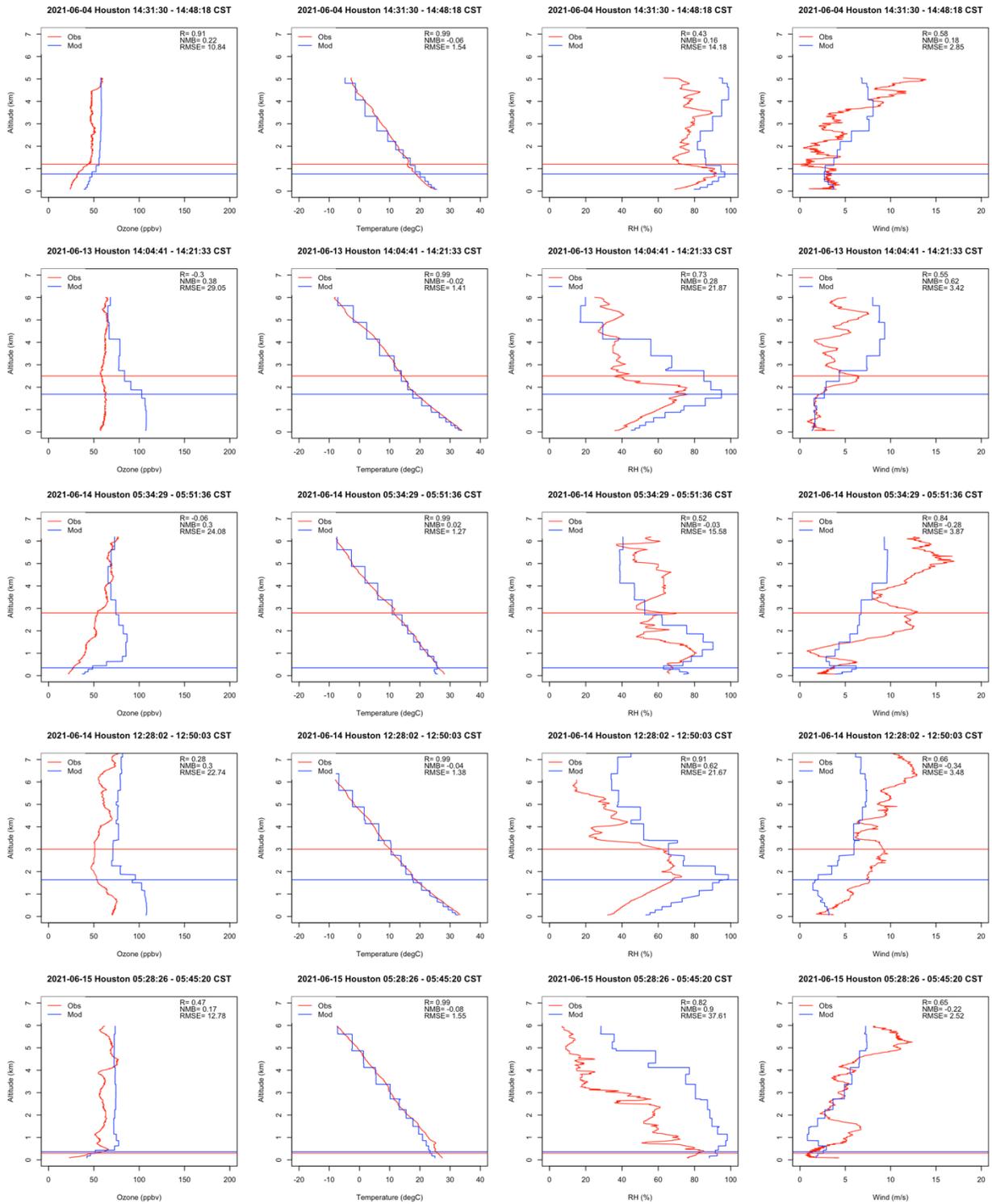


Figure 4. Comparison of WRF-GC and ozonesonde measurements at University of Houston for (a) ozone, (b) temperature, (c) relative humidity and (d) wind. Horizontal line denotes for planetary boundary layer height.

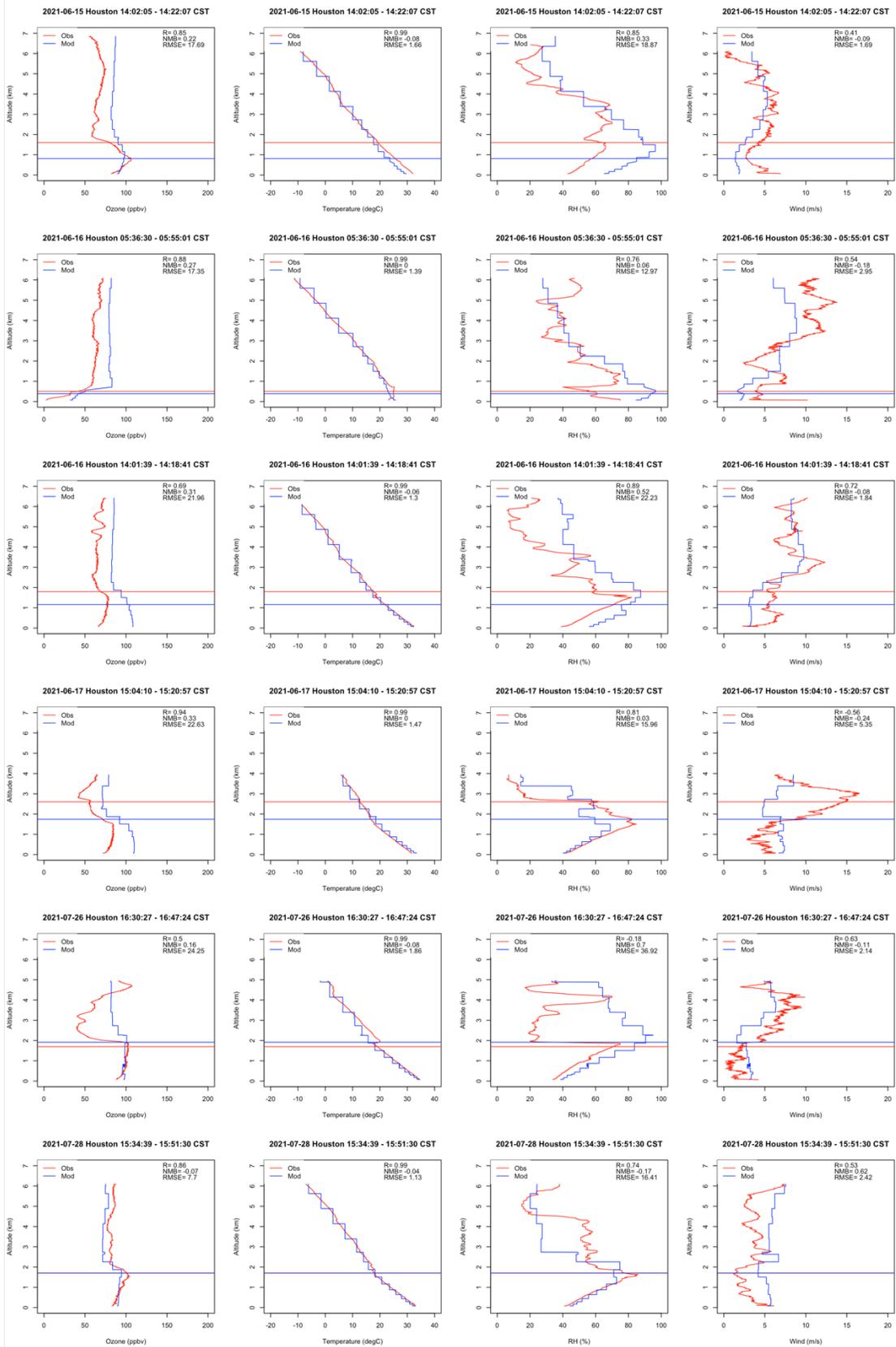


Figure 4. Continued.

### **Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments**

- The previous monthly report noted an issue on two flights where the inlet straw likely came loose when launching the sonde when the payload is slightly jerked. We have made adjustments where the ozonesonde will not be able to move inside the Styrofoam box, making this issue less likely to occur in the future.
- The shrimp boat ceilometer started to show a 'window contamination' alert on 8/6/21. Most likely due to seagull presence.
- Occasional engine/battery troubles with pontoon boat lead to the purchase of a portable jumpstart battery pack and new battery. A throttle linkage to engage cylinders 3 & 4 occasionally comes loose, however this is easily identifiable and is a simple correction.

### **Goals and Anticipated Issues for the Succeeding Reporting Period**

- Continue to support and maintain the commercial boat packages
- Continue to sample with the UH pontoon boat on days conducive to sampling on the Bay (no storms, winds less than 10–15 kts, water conditions calm, small swells)
- Shrimp boat went offline on 8/19/21. It is suspected a connection was not established during the power switch in the morning. Issue was fixed unplugging and re-plugging the power source.
- Worked on installing and troubleshooting Pandora instrument on the boat from 8/23/21 to 8/25/21. There is an issue with a bad relay board in the Pandora head unit.

### **Detailed Analysis of the Progress of the Task Order to Date**

Now that most of the initial hurdles have been cleared the project is going quite well and a significant O<sub>3</sub> data continues to be collected. The biggest disappointment is still that the NO<sub>2</sub> photocell supplier has not been able to deliver working units despite several trips back and forth for repairs. We hope that we can get at least one system, likely the UH Pontoon, outfitted with NO<sub>2</sub> measurements during September using an older style photocell. Replacement lamps should be arriving the first few days of September to refurbish the unit. Beyond that, the project team continues to be excited about the progress being made with the modeling and the ongoing sampling and sonde launches. We look forward to a more in-depth analysis of this data in the future.

**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

The AQRP and TCEQ have requested the deployment to be delayed into CY2021.

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

Yes       No

**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

**Acronyms/Abbreviations:**

MAQL: Mobile Air Quality Lab  
ppbv: Parts per billion by volume  
UTC: Universal Time Coordinated

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Submitted to AQRP by

James Flynn