

AQRP Monthly Technical Report

PROJECT TITLE	Galveston Offshore Ozone Observations (GO3)	PROJECT #	20-004
PROJECT PARTICIPANTS	James Flynn (UH) Yuxuan Wang (UH) Paul Walter (St. Edward's University) Gary Morris (St. Edward's University)	DATE SUBMITTED	11/18/2021
REPORTING PERIOD	From: October 1, 2021 To: October 31, 2021	REPORT #	16

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 14th of the month following the reporting period shown above.

Detailed Accomplishments by Task for reporting period

- Conducted visits to all three boats and performed routine maintenance on October 4, 2021.
- Launched 2 ozonesondes during the month of October.
- Pulled instrumentation off the shrimp boat on October 25, 2021.
- Pulled pontoon boat and instrumentation off the Portofino Marina on October 26, 2021. The Pontoon boat was returned to the University of Houston for storage.
- Pulled instrumentation out of Red Eagle boat on October 26, 2021.
- Prepared draft final report

Data Collected

October 6th, 2021 *Ozone Action Day

The day's plan was to head South towards Texas City and then circle back to the N/NW portion of the Bay in the afternoon. Ozone was moderate in the south, ~50ppb at 11:00am CST, but began to increase on the transit North, getting up to 75-80ppb by 1:00pm CST, in the NW area of the Bay. On the way back to the Marina another uptick to nearly 100ppb ozone was observed. It was decided to launch the ozonesonde (GB029) that was prepared. A successful launch occurred at 2:00pm CST, just outside of the Clear Lake Channel. Fuel was exhausted for the day and the pontoon boat was refueled and docked at ~ 3:00pm CST.

October 7th, 2021 *Ozone Action Day

High ozone (~60 ppb) was observed from morning onward. The pontoon initially went South towards San Leon, then east across the Houston Ship Channel (HSC) at the south cut. The pontoon then worked North and crossed back west over the HSC at the north cut. Ozone concentrations exceeded 100 ppb at approximately 10:30 am (CST) near the intersection of the Bayport channel and the main ship channel. The science team decided to anchor and launch an

ozonesonde (GB030 launched at 11:27 pm CST) north of the Bayport Channel. The ozone concentration was at 100 ppb on the pontoon boat at the time of release. After the launch a gradient pattern in the NW quadrant where the highest observed ozone of the year was recorded, with max concentrations exceeding 130 ppb in the afternoon. When fuel was approaching reserve levels, course was set to Kemah for refuel and to dock.

Preliminary Analysis

In October 2021, an ozonesonde was launched from the UH pontoon boat on Galveston Bay on two days: October 6 and October 7, 2021. Figure 1 shows the locations of the sonde launches as well as some of the Continuous Air Monitoring Stations (CAMS) that measured high ozone on either or both days.

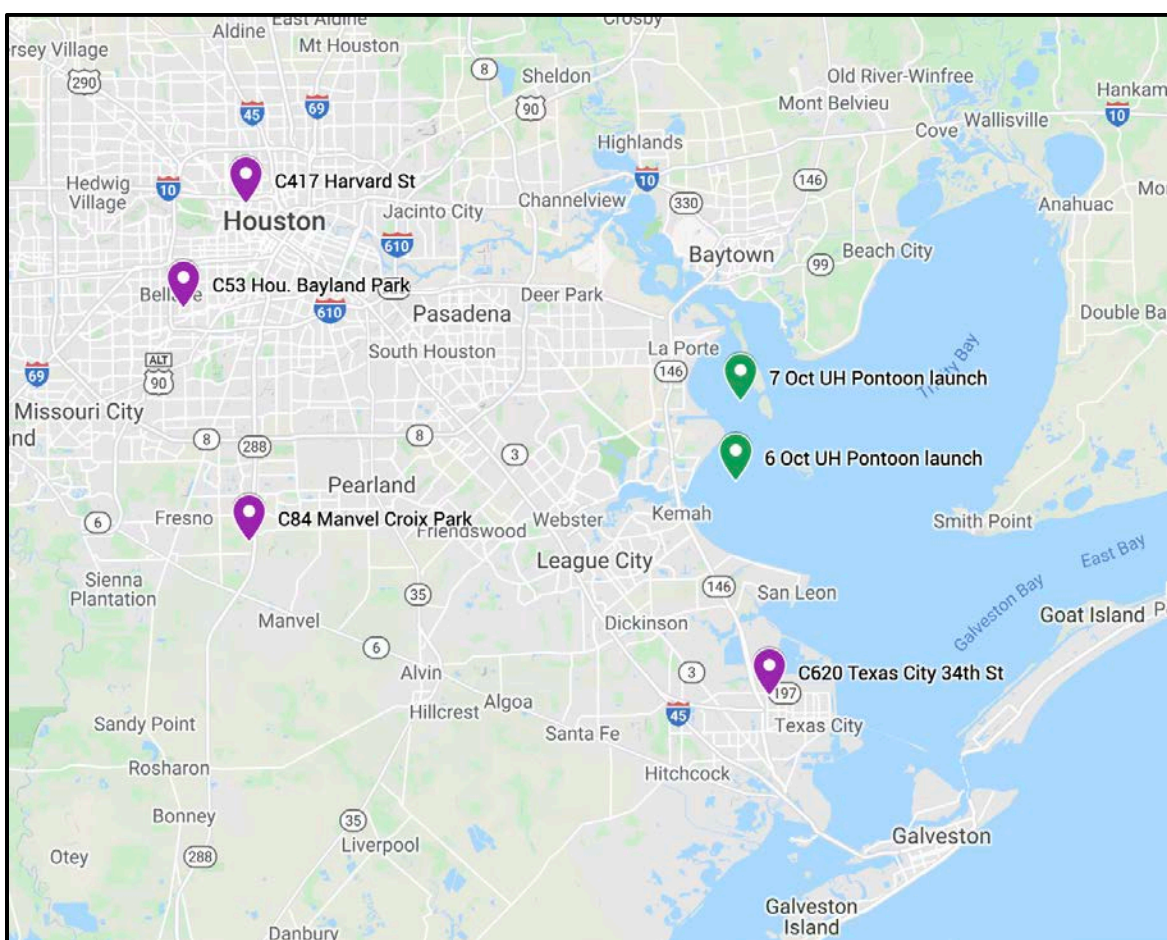


Figure 1. A map showing the locations of ozonesonde launches from the pontoon boat on October 6, 2021 and October 7, 2021 as well as the locations of some CAMS sites that measured high ozone on either or both days.

The profiles from the ozonesonde launches from Galveston Bay are shown in Figure 2. Both launches occurred in the NW quadrant of Galveston Bay. In both profiles there may be some titration of ozone near the surface, particularly in the first 400 m of the ascent on the October 7

profile. On 7 October, the launch occurred from near the intersection of the Houston Shipping Channel and the cutoff toward the Bayport Channel.

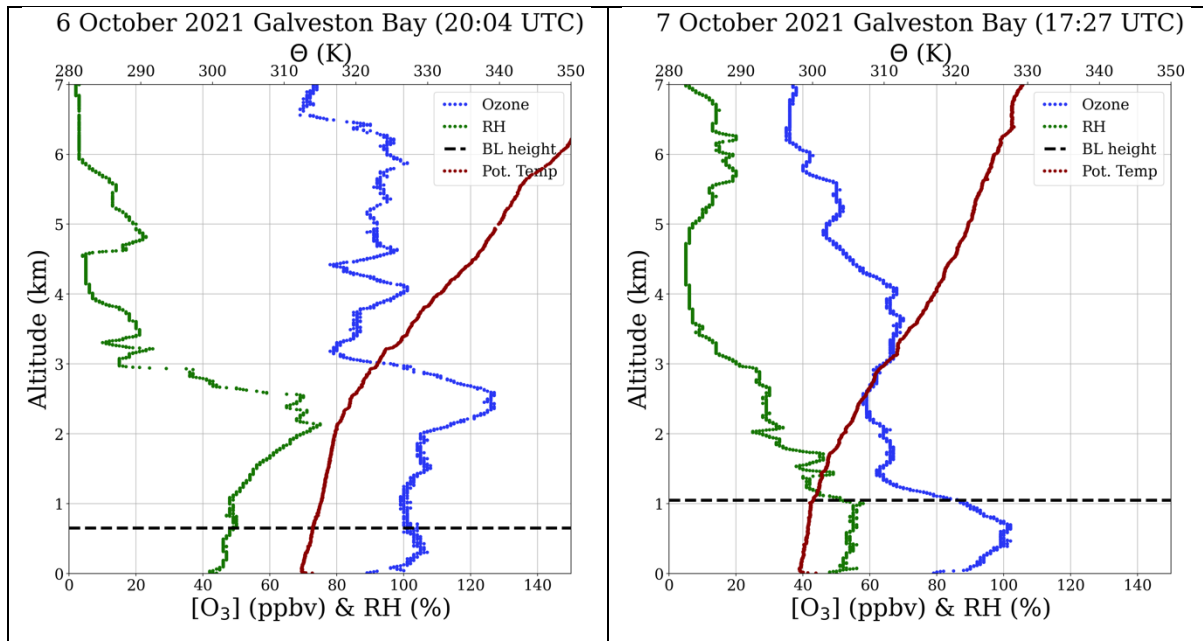


Figure 2. Ozonesonde profiles for launches from the UH pontoon boat on 6 October 2021 (left) and 7 October 2021 (right).

On October 6, 2021, the C84 Manvel Croix monitoring site had the highest MDA8 ozone concentration of 76 ppbv. The 24-hour wind run (Figure 3) for that monitoring site shows slow winds and suggests the higher ozone concentrations observed was when winds were out of the north.

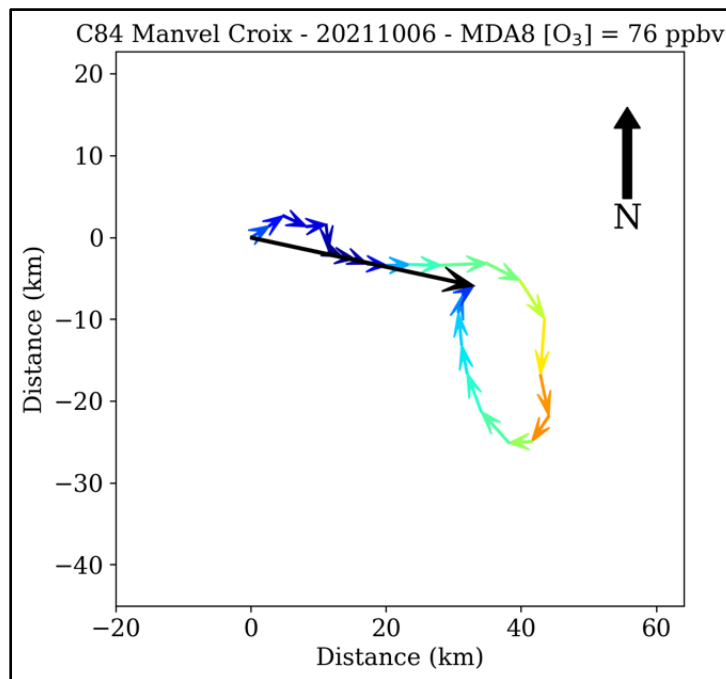


Figure 3. The 24-hour wind run for the C84 Manvel Croix for October 6, 2021.

On October 7, the surface ozone measurements from the UH pontoon boat had the highest maximum concentrations (~130 ppbv) observed during the sampling period of July–October 2021. The monitoring sites that had the highest MDA8 ozone concentrations on that day were C53 Houston Bayland Park (92 ppbv) and C620 Texas City 34th Street (87 ppbv). The 24-hour wind runs for each monitoring site on October 7 are shown in Figure 4. The C417 Harvard monitoring site had an MDA8 ozone concentration of 86 ppbv but it does not have coincident surface winds data. The surface winds at C53 Houston Bayland Park were very slow and suggest that the high ozone observed in Galveston Bay by the UH pontoon boat was not transported to the C53 monitoring site. The high ozone concentrations measured by the C620 Texas City 34th Street may have been impacted by the high ozone that was observed over the NW quadrant of Galveston Bay. The NNE and NE surface winds at the C620 monitoring site during the hours with the highest ozone concentration suggest Galveston Bay was upwind of the site.

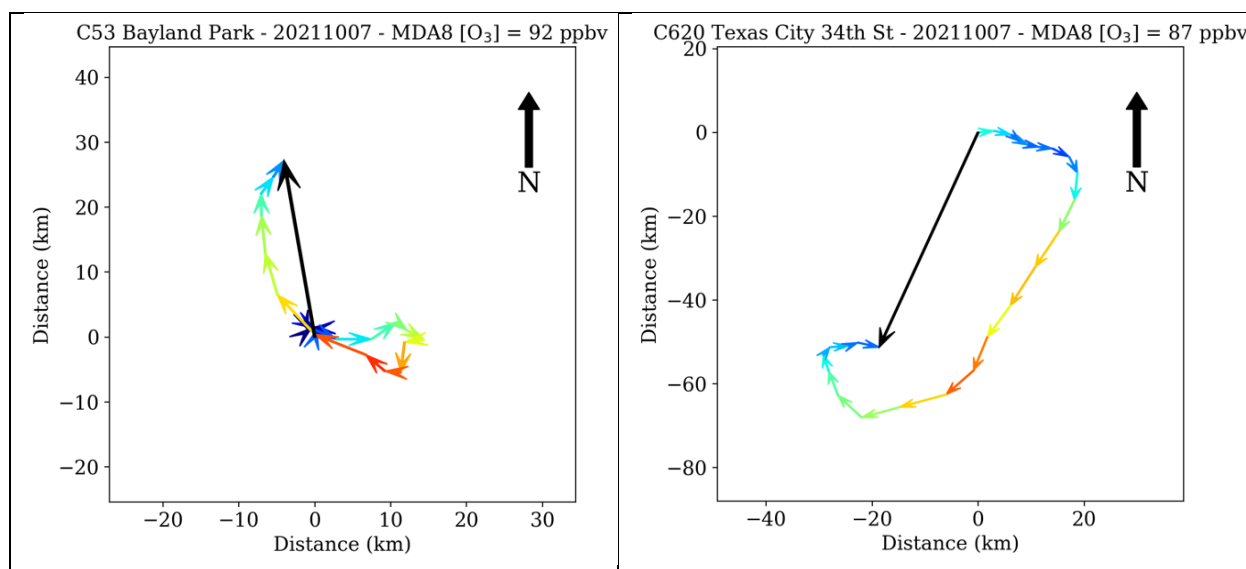


Figure 4. The 24-hour wind runs for C53 Bayland Park (left) and C620 Texas City 34th St (right) for October 7, 2021.

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

No major problems were encountered during this period

Goals and Anticipated Issues for the Succeeding Reporting Period

Submit final report and final data.

Detailed Analysis of the Progress of the Task Order to Date

Measurements were complete and draft final report was written.

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

Travis Griggs has applied to present results from this project at the AMS meeting in Houston in January 2022. The current working title is “Galveston Offshore Ozone Observations (GO3) Field Campaign: Unique Surface and Vertical Profiles of Ozone and Boundary Layer Measurements in Galveston Bay and the Gulf of Mexico” however preparation of the material has yet to formally begin as measurements are still ongoing.

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:

CAMS: Continuous Air Monitoring Stations

CST: Central Standard Time

HSC: Houston Ship Channel

MDA8: Maximum Daily Averaged over an 8-hour period

ppbv: Parts per billion by volume

UTC: Universal Time Coordinated

Submitted to AQRP by

James Flynn