

# AQRP Monthly Technical Report

<b>PROJECT TITLE</b>	Source-sector NO <sub>x</sub> emissions analysis with sub-kilometer scale airborne observations in Houston during TRACER-AQ	<b>PROJECT #</b>	22-023
<b>PROJECT PARTICIPANTS</b>	George Washington University Ramboll	<b>DATE SUBMITTED</b>	12/9/2022
<b>REPORTING PERIOD</b>	<b>From:</b> November 1, 2022 <b>To:</b> November 30, 2022	<b>REPORT #</b>	4

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: Simulate NO<sub>2</sub>, HCHO, O<sub>3</sub> at 444 × 444 m<sup>2</sup> spatial resolution using WRF-CAMx*

The WRF simulation has been run for the full period (August 20, 2021 - September 27, 2021) and for all of the domains (36, 12, 4, 1.333, and 0.444 km). The emissions for the CAMx simulation are being processed. This includes downloading and processing the CEMS data, line source data, and meteorology needed for the biogenic emissions data.

### *Task 2. Process the GCAS measurements*

Preliminary comparison between GCAS and Pandora NO<sub>2</sub> and HCHO in the TRACER-AQ domain has been completed. This is assuming the NASA GEOS-CF simulation *a priori* profiles. GCAS agrees with Pandora to within ± 21% for NO<sub>2</sub>.

The native files of the GCAS data are being re-processed to better account for missing data. New files with very minor adjustments should be available by the end of December 2022.

The GCAS data has been successfully re-gridded in three-dimensions (x, y, time) to the WRF-CAMx grid. Spatial plots of the full monthly and daily averages have been developed.

### *Task 3. Process the satellite NO<sub>2</sub> data*

The satellite data has been processed to the WRF-CAMx grid. Code has been developed to ingest model simulation output. Waiting on model simulation in order to re-process the air mass factor.

### *Task 4. Calculating NO<sub>x</sub> from NO<sub>2</sub> airshed measurements*

Re-gridding and processing of the GCAS data for this analysis has begun (See Task 2).

### *Task 5. Comparison of NO<sub>2</sub>, HCHO, O<sub>3</sub> between model, aircraft, and satellite*

Task 5 has not yet been initiated.

### *Task 6. Use of machine learning to estimate emission factors for individual sectors*

Task 6 has not yet been initiated.

**Preliminary Analysis**

None.

**Data Collected**

None.

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

Project approvals occurred later than anticipated. Development of the WRF-CAMx simulation is delayed by approximately one month. Model simulation output now expected in January 2023 instead of December 2022. All other Tasks are proceeding as planned.

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

Continue developing WRF-CAMx modeling platform by processing biogenic, line-source (on-road mobile, rail and shipping) and EGU emissions. A full set of emissions should be expected by the end of December.

The GCAS NO<sub>2</sub> data will be compared to operational TROPOMI NO<sub>2</sub> data now that both are on the same grid.

**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.**

None.

**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      Daniel Goldberg

Principal Investigator      Daniel Goldberg