

AQRP Monthly Technical Report

PROJECT TITLE	Source-sector NO _x emissions analysis with sub-kilometer scale airborne observations in Houston during TRACER-AQ	PROJECT #	22-023
PROJECT PARTICIPANTS	George Washington University Ramboll	DATE SUBMITTED	3/10/2023
REPORTING PERIOD	From: February 1, 2023 To: February 28, 2023	REPORT #	7

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 1: Simulate NO₂, HCHO, O₃ at 444 × 444 m² spatial resolution using WRF-CAMx

The first WRF-CAMx simulation was completed in February 2023. There is model output for September 1, 2021 – September 28, 2021 with 10 additional days of spin-up that will not be utilized. The QA/QC of the simulation – comparison with ground monitor data – is currently on-going. Model output for September 8, 2021 has been provided to the full team concurrently with the QA/QC.

Task 2. Process the GCAS measurements

The reprocessing of the GCAS aircraft measurements with very minor adjustments was completed in February 2023, and all new files were made available to the full team, and posted on the TRACER-AQ data archive (<https://www-air.larc.nasa.gov/cgi-bin/ArcView/traceraq.2021>).

Task 3. Process the satellite NO₂ data

Waiting on model simulation (See Task 1) in order to re-process the satellite air mass factor. This task will re-initiate in March 2023.

Task 4. Calculating NO_x from NO₂ airshed measurements

This task was re-initiated in February 2023. NO_x emissions from three point sources (Parish Power Plant, Texas City, and Mont Belvieu) were calculated from the new GCAS data. The team was able to generate reasonable NO_x emissions estimates from these point sources. Additional QA/QC on the methodology – comparison with the CEMS data when available – will occur in March 2023.

Task 5. Comparison of NO₂, HCHO, O₃ between model, aircraft, and satellite

An in-depth comparison between the aircraft, satellite, and Pandora instruments for NO₂ was initiated, and code was prepared to handle the model simulation.

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 was delayed by approximately 8-weeks. Model simulation output was delivered to the full team at the end of February 2023 instead of the end of December 2022. Effort for Tasks 3 – 6 will be back-loaded, and we do not anticipate any end-of-project delays.

The TEMPO launch has been delayed to April 2023, and data is not expected to be made public until September 2023 and therefore will not be available during our project period. The inclusion of TEMPO data was a minor aspect of Task 3 of this project, and therefore exclusion of its data will not affect any end-of-project deliverables.

Goals and Anticipated Issues for the Succeeding Reporting Period

Task 1 – Relevant WRF-CAMx model output (NO₂, HCHO, O₃, etc.) for September 1, 2021 through September 28, 2021 will be provided to the full team. The model output will go through a QA/QC check and a comparison of the model output with the ground monitors will be conducted.

Tasks 2 & 3 – Re-processing of the air mass factor for the satellite and aircraft (GCAS) data will commence.

Task 4 – NO_x emissions estimates from the point sources will be go through QA/QC. NO_x emissions estimates using the flux divergence method will re-initiate.

Task 5 – Intercomparison between the aircraft (GCAS), satellite (TROPOMI), and model (WRF-CAMx) will begin in earnest.

Task 6 – This will start in April 2023.

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 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.

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

Submitted to AQRP by Daniel Goldberg

Principal Investigator Daniel Goldberg