

AQRP Monthly Technical Report

PROJECT TITLE	Improving Estimates of Wind-Blown Dust from Natural and Agricultural Sources	PROJECT #	20-011
PROJECT PARTICIPANTS	Chris Emery, Tejas Shah, Uarporn Nopmongcol, Greg Yarwood (Ramboll)	DATE SUBMITTED	7/2/2021
REPORTING PERIOD	From: June 1, 2021 To: June 30, 2021	REPORT #	12

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: Review Current CAMx WBDUST Estimates

This task was completed in September 2020.

Task 2: Review Alternative Methods and Datasets

Task 2.1 was completed in November 2020.

Task 2.2 was completed in February 2021.

Task 3: Update the WBDUST Model and Evaluate Impacts in CAMx MP

Continued to apply CAMx with the 2016 EPA Modeling Platform to assess windblown dust estimates from the updated WBDUST model. Inert 2-month test runs were completed in April. In June we completed a CAMx chemistry run for the entirety of 2016 using the final WBDUST configuration with elemental speciation, and using all emission sectors.

Task 4: Project Reporting and Presentation

Developed April MTR and FSR and submitted to AQRP on June 3 and 22, respectively.

Continued assembling the project final report.

Preliminary Analysis

Model-observation agreement for fine soil and coarse mass has improved substantially with the updated WBDUST model over the original version. Whereas previously the original WBDUST model resulted in practically zero dust everywhere at all times, the new model is capable of generating sufficient dust that agrees fairly well with measured concentrations all year round. Across the entirety of 2016, the model reproduces component concentration within a factor of two of measurements, which is perhaps the best we can expect for such a highly variable and challenging emission source.

Model performance varies substantially across months and sites. Generally, the model over predicts fine dust components and total coarse mass in the spring and autumn, but under predicts during the summer when measured levels increase. Model performance for coarse mass tends to

be better than for individual fine dust elemental components or their sums. Many more sources beyond WBD contribute to the total coarse mass budget, and so superior agreement may be more of a corroboration of the overall coarse PM emission inventory. There are no clear performance tendencies for fine elemental concentrations across the sites, but overall, the relative elemental compositions are appropriately characterized with the majority of mass contained in silicon, aluminum, and iron. This suggests that the various sources of dust speciation applied in WBDUST are adequately characterizing US soil composition.

In CAMx, ambient dust concentrations impact the rate of heterogeneous sulfate formation and the partitioning of several inorganic compounds (sulfate, nitrate, ammonia, sodium, chloride) among gas and particle phases. Given their important influences on the chemistry of other inorganic species, we will conclude our analysis by investigating the chemical impacts arising from the substantially higher dust concentrations derived from the updated WBDUST model.

Data Collected

No data collected during the reporting period.

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

None during the reporting period.

Goals and Anticipated Issues for the Succeeding Reporting Period

Complete the project final report. Begin development of a presentation for the AQRP Workshop in August. No anticipated issues for the succeeding reporting period.

Detailed Analysis of the Progress of the Task Order to Date

This project initiated on July 28, 2020 with the execution of the AQRP Task Order. All remaining tasks remain on schedule and budget according to our work plan.

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.

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
Chris Emery, Ramboll