AQRP Monthly Technical Report

PROJECT TITLE	Development and Evaluation of the FINNv.2 Global Model Application and Fire Emissions Estimates for the Expanded Texas Air Quality Modeling Domain	PROJECT #	18-022
PROJECT PARTICIPANTS	University of Texas at Austin Sonoma Technology, Inc. Dr. Christine Wiedinmyer	DATE SUBMITTED	4/8/2019
REPORTING PERIOD	**From:** 3/1/2019 **To:** 3/31/2019	REPORT #	6

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.
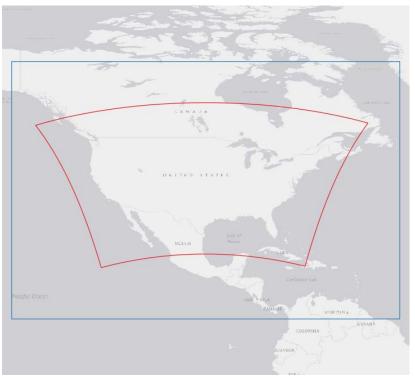

Detailed Accomplishments by Task

Task 1. Development and Release of the FINN v.2 Global Application
The objective of this work is to introduce the next generation of the FINN modeling system that will be designated and publicly released as FINNv2. The development of FINNv2 has largely been completed, although the speciation profile for non-methane organic compounds (NMOCs) from FINN for the MOZART-T1 chemical mechanism is continuing to undergo evaluation.

Task 2. FINN v.2 Global Emissions Estimates
Preprocessing has been completed for seven North American FINNv2 simulations: one for 2012 based on active fire detections from MODIS only and six with fire detections based on MODIS and VIIRS in combination for 2012 through 2017. Preliminary emissions estimates have been completed for both of the 2012 simulations. Preprocessing for two global simulations, for 2016 and 2018, has also been completed.

Task 3. Assessment of FINN Performance Using Satellite Observations
FINNv2 performance will be assessed using a new satellite algorithm, the Multi-Angle Implementation of Atmospheric Correction (MAIAC), for aerosol optical depth (AOD) retrievals. Two approaches will be used for the performance assessment. First, smoke emissions inventories from FINNv2 for 2012 through 2017 in North America will be run through the HYSPLIT dispersion model using Global Data Assimilation System (GDAS0P5) meteorological data. HYSPLIT will be run using the BlueSky modeling framework. Results from the dispersion model runs will be compared to satellite-measured AOD. The spatial domain for this analysis was set this month as the outer (blue) rectangle in Figure 1. The teams currently expect that the approaches for the vertical allocation and diurnal profiles of fire emissions used in project 14-011 will be adopted for this work.

Figure 1. Spatial domains for the FINNv2 performance assessments using the MAIAC AOD retrievals. The outer rectangle (blue) is the domain to be used for the emissions input for the HYSPLIT dispersion model simulations. The inner domain (red) is the 36-km domain to be used in the 2012 CAMx simulations.

The second approach examines hourly predictions of air quality based on the Texas Commission on Environmental Quality's (TCEQ's) CAMx 2012 baseline episode with daily estimates of fire emissions from FINNv2. Model-estimated AOD will be compared with MAIAC AOD retrievals. Sensitivity studies will compare the effects on CAMx predictions of using the MODIS active fire detection product alone or in combination with the VIIRS product, in addition to the application of emissions estimates from FINNv2 versus the previous version of the model, FINNv1.5. Greg Yarwood and Chris Emery from Ramboll worked with the University of Texas at Austin team this month to complete a mapping from the MOZART T-1 chemical species to those of the CB6r4 mechanism that will be needed for the CAMx simulations.

Preliminary Analysis
As above.

Data Collected
None.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments
None.

Goals and Anticipated Issues for the Succeeding Reporting Period
Major goals for the next reporting period include finalizing the FINN v2 speciation code and completing all planned FINN simulations.

Detailed Analysis of the Progress of the Task Order to Date
The project is proceeding as planned.

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   __X_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   _X__No

Do you have any bibliographic publications 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   __X_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).
_X__Yes   __No
Two abstracts have been accepted for presentation at the 2019 Emission Inventory Conference to be held July 29-August 2, 2019 in Dallas, Texas.

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   _X__No

Submitted to AQRP by

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