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	3/8/2019
REPORTING PERIOD	From: 2/1/2019 To: 2/28/2019	REPORT #	5

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 overall objective of this task is to produce a fully operational, documented global FINN application that is reflective of the state of the science. Dr. Kimura traveled to UC Boulder to work collaboratively with Dr. Wiedinmyer and Mr. Joseph during February 4th-8th.

The FINN modeling system consists of three primary components, including the preprocessor, emissions model, and chemical speciation code. The new model will be designated and publicly released as FINNv.2. The implementation of the FINN preprocessor within the Docker environment has been completed and quality assurance is on-going. An initial draft of a detailed user's guide has been developed. Three updates were implemented to the preprocessor. The algorithm was implemented in PostGIS, a database that supports geospatial data types and operations, which resulted in improved performance (i.e., shorter execution time) for the model. Active fire detections from the Visible Infrared Imaging Radiometer Suite (VIIRS) sensor were incorporated as an option that could be applied alone or in combinations with the Moderate Resolution Imaging Spectroradiomeer (MODIS) detection data. Finally, in order to facilitate the comparison of FINN emissions estimates with observational data, the FINN preprocessor was modified to use local time in the specifications of the date of a fire. Within the main FINN code, updates were made to the emissions factors and fuel loadings to reflect findings from recent field campaigns and laboratory studies. Dr. Wiedinmyer has been working on updates to the chemical speciation code, including the mapping of nonmethane organic compounds (NMOC) to MOZART species, based on data from recent field campaigns and laboratory studies.

Task 2. FINN v.2 Global Emissions Estimates
The team is currently focusing on completing FINNv.2 simulations for 2012 because a CAMx episode developed by the TCEQ is available for this year. FINN v.2 simulations will also be conducted for 2013-2017 in accordance with the project work plan. The 2012 FINN v.2 and

CAMx simulations will examine the effects of different fire activity datasets on emissions estimates and air quality predictions. In addition, comparisons between FINN v.1.5 and FINN v.2 for 2012 are planned. In order to determine the impacts of fires on air quality predictions, Dr. Kimura requested and received an emissions files for the 2012 CAMx episode from the TCEQ that had fire emissions removed. Consequently, air quality predictions using the FINN inventories can be compared to a "no fire" case.

Task 3. Assessment of FINN Performance Using Satellite Observations
The University of Texas at Austin and Sonoma Technology, Inc. have been establishing a procedure to calculate Aerosol Optical Depth (AOD) from air quality model predictions for comparison with retrievals from a new satellite algorithm, the Multi-Angle Implementation of Atmospheric Correction (MAIAC).

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 completion the FINN v.2 speciation code and planned CAMx simulations for 2012.

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 submitted for consideration for 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

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Submitted to AQRP by

Elena McDonald-Buller