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 (UT Austin) Sonoma Technology, Inc. (STI) Dr. Christine Wiedinmyer	**DATE SUBMITTED**	6/8/2019
REPORTING PERIOD	**From:** 5/1/2019 **To:** 5/31/2019	**REPORT #**	8

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 v2 Global Application
The objective of this work is to introduce the next generation of the FINN modeling system that will be designated as FINNv2.2 to distinguish it from previous versions of the model that were publicly released and/or developed in previous AQRP projects (12-018 or 14-011). The development of FINNv2.2 has largely been completed but quality assurance has been on-going. During this past month, the team recognized that the biomass loadings needed to be modified. Revised FINNv2.2 simulations were completed for North America for 2012-2017 with MODIS and VIIRS active fire detections, as well as for 2012 with MODIS fire detections only. These results were provided by the UT Austin team to STI for their HYSPLIT analyses (Task 3).

Tesh Rao at the U.S. Environmental Protection Agency (EPA) provided Bluesky output for 2012, which has been used in limited comparisons with FINNv.2.2 results. STI also obtained operational fire perimeters from GeoMAC (http://geomac.gov/) that were used in limited evaluations of selected wildfires to examine area burned estimates from the FINNv2.2 algorithm.

The team has begun to document the methodology used in the FINNv2.2 development.

Task 2. FINN v2 Global Emissions Estimates
Two revised global simulations for 2016 and 2018 (to include modifications to the biomass loadings noted above) with FINNv2.2 using MODIS and VIIRS active fire detections are on-going.

Task 3. Assessment of FINN Performance Using Satellite Observations
Predictions of air quality from the Comprehensive Air Quality Model with Extensions (CAMx) with FINNv2.2 fire emissions estimates for 2012 will be compared with the Multi-Angle Implementation of Atmospheric Correction (MAIAC) aerosol optical depth (AOD) product to

assess FINN performance. CAMx simulations are being conducted with all fire emissions removed ("no fires") as a basis for reference, with processed FINNv2.2 emissions with MODIS and VIIRS active fire detections, and with processed FINNv2.2 emissions with only MODIS detections. The team spent considerable time this month conducting CAMx sensitivity simulations, in particular focusing on the vertical and temporal distributions of fire emissions in the Emission Preprocessing System version 3 (EPS3), to try to understand CAMx predicted ozone and $PM_{2.5}$ concentrations. Case studies have been analyzed for specific fire events in the 36-km and 4-km domains that exhibited large hourly peak concentrations of these compounds. The TCEQ shared the EPS3 processing stream for their FINNv1.x emission estimates which was a beneficial basis for comparison.

Dispersion modeling of smoke emissions from FINNv2.2 has begun, and runs are ongoing for March through September for years 2012 through 2017. The dispersion modeling uses Global Data Assimilation System (GDAS0P5) meteorological data, and runs are facilitate using the BlueSky modeling framework. Following completion of the runs, HYSPLIT results will be compared with the Multi-Angle Implementation of Atmospheric Correction (MAIAC) aerosol optical depth (AOD) product. MAIAC data for the relevant periods have been obtained in preparation for the assessment.

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 completing the CAMx simulations, as well as continuing to work on the assessment of model performance.

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 presentations will be made at the 2019 Emission Inventory Conference on 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

Elena McDonald-Buller