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	11/5/2018
REPORTING PERIOD	**From:** 9/1/2018 **To:** 10/31/2018	REPORT #	1

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.

Task 1.1 Preprocessor and Model Development
Dr. Kimura traveled to Boulder, Colorado during September 24-28, 2018 to work collaboratively with Dr. Wiedinmyer on the FINN development. On-going efforts through October have included the addition of the Visible Infrared Imaging Radiometer Suite (VIIRS) fire detection product (VNP14IMGTDL_NRT) along with the default Moderate Resolution Imaging Spectroradiometer (MODIS) Active Fire product (MCD14DL) within the FINN preprocessor. The two products are obtained from the FIRMS website: https://earthdata.nasa.gov/earth-observation-data/near-real-time/firms/active-fire-data and can be applied individually or in combination to create a unified fire detection representation within the FINN preprocessor.

Algorithms to estimate burned area and characterize underlying land cover were developed as part of AQRP 14-011 and are being revisited by Dr. Kimura, Dr. Wiedinmyer, and Dr. McDonald-Buller. The MODIS Collection 6 burned area mapping product (C6 MCD64A1), recently described by Giglio et al (2018), is provided for monthly time periods at a spatial resolution of 500-m and is also being investigated by the project team. On October 10, 2018, Dr. McDonald-Buller gave an invited presentation about fire emissions and air quality effects at the Texas Public Safety UAS Summit, which was designed to introduce Texas first responders to emerging technologies that could improve preparation and response. Both the Texas A&M University Forest Service and Austin Fire Department offered ground-based fire information for Texas, possibly including identification, date/time, location, and burn perimeter or area. This type of data could support evaluation of the burned area estimation approach used in FINN for Texas. The project team is currently working on the information exchange.

1.2 Accessibility for Global Scale Application
In this work, the FINN preprocessor will be implemented on a public domain spatial database PostGIS for better scalability to a global application. The new preprocessor tool and Interactive Data Language (IDL) code for FINN are being designed to run at a global scale. To facilitate portability, the Docker (https://www.docker.com/) environment has been tentatively selected to house the FINN tools. Docker allows a developer to establish a Linux-based environment customized for the application that will run on multiple hosts such as Windows, MacOS, Linux. The Dockerfile (i.e., the environment created on Docker) will have necessary applications and libraries such as PostGIS along with the FINN processor code. Any computing system that has Docker installed should be able to run the FINN tools. Docker is an open source software development system platform available via https://github.com/docker/docker-ce or https://www.docker.com.

1.3. Porting and Testing
Not yet initiated.

Task 2. FINN v.2 Global Emissions Estimates
Not yet initiated.

Task 3. Assessment of FINN Performance Using Satellite Observations

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
Goals for the next reporting period include

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
Estimating Atmospheric Emissions from Fires using the FINN Model
E. McDonald-Buller, Y. Kimura, C. Wiedinmyer
Texas Public Safety UAS Summit, October 10, 2018, Burnet, Texas.
(A copy of the presentation is attached)

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

References
Giglio, L., Boschetti, L., Roy, D. P., Humber, M. L., and Justice, C. O., 2018, The Collection 6 MODIS burned area mapping algorithm and product. Remote Sensing of Environment, Volume 217, November 2018, Pages 72-85.