Monthly Technical Report

(Due to AQRP Project Manager on the 8th day of the month following the last day of the reporting period.)

PROJECT TITLE	Targeted Improvements in the Fire INventory from NCAR (FINN) Model for Texas Air Quality Planning	**PROJECT #**	14-011
PROJECT PARTICIPANTS **(Enter all institutions with Task Orders for this Project)**	The University of Texas at Austin ENVIRON International Corporation	**DATE SUBMITTED**	11/7/14
REPORTING PERIOD	**From:** October 1, 2014 **To:** October 31, 2014	**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

Dr. Wiedinmyer had an invited presentation that included some of the fire emissions work in Texas at American Association for Aerosol Research 33rd Annual Conference in Orlando during October 20-24, 2014. The abstract was included in the previous monthly technical report; a copy of her presentation is available upon request.

The team's primary emphasis this month has been on the development and processing of several regional and global land cover products that will be used in FINN for sensitivity studies. A summary of these data resources is presented in Table 1. The number and type of land cover classes vary across the data products; crosswalks are being developed between land cover classes for each product and a single common set of classes for which fire emission factors are available. An expanded set of emission factors for the FINN model has been developed, which includes crop-specific factors from the work of Jessica McCarty of Michigan Technological University (ref. Table 2). The new land cover classes will be also be mapped to fuel loadings. A summary of planned FINN sensitivity runs is presented in Table 3. This work will serve as the basis for a poster to be presented at the American Geophysical Union Fall Meeting in December 2014. The poster will be submitted to the AQRP for review as soon as it is completed.

Kevin Sampson, a GIS specialist from NCAR, completed work to update the FINN code, specifically focusing on fire detection and burned area characterization.

Table 1. Summary of data resources for land cover characterization.

Data ID	Description	Source
LCT	MODIS Land Cover Type (FINN Default)	https://lpdaac.usgs.gov/products/modis_products_table/mcd12q1
VCF	Vegetation Continuous Field	
GLC	Global Land Cover-SHARE 2014 - Beta-Release 1.0	http://www.glcn.org/databases/lc_glcshare_en.jsp
FCCS	Fuel Characteristic Classification System	http://www.fs.fed.us/pnw/fera/fccs/maps.shtml
CDL	National Agricultural Statistical Service Crop Data Layer	http://www.nass.usda.gov/research/Cropland/SARS1a.htm
TCEQ	Popescu et al. (2011); TCEQ sponsored development	Personal Communication, C. Harper

Table 2. Summary of FINN emission factors.

FINN Land Cover Code		Emissions Factor (g/m^2)								
		CO	NO_x	NMOC	NH_3	SO_2	$PM_{2.5}$	PM_{10}	OC	BC
1	Grassland	63	3.90	12.4	0.52	0.48	7.17	15.8	2.62	0.37
2	Shrub	67	3.65	17.4	1.2	0.68	12.6	15.4	3.7	1.31
3	Tropical Forest	93	2.55	26	1.33	0.4	9.1	18.5	4.71	0.52
4	Temperate Forest	88	1.91	23.5	0.84	1.1	12.6	13	7.6	0.56
5	Boreal Forest	127	0.90	29.3	2.72	0.4	15.3	18.5	7.6	0.56
6	Temperate Evergreen Forest	88	1.92	23.5	0.84	1.1	12.9	18.5	7.6	0.56
7	Pasture	135	0.75	44.8	1.47	0.32	14.8	28.9	9.64	0.91
8	Rice	53	2.04	35	1.24	1.4	5.8	5.8	2.3	0.75
9	Crop (generic)	64	1.83	25.7	2.17	1.2	6.2	8.5	2.3	0.75
10	Wheat	55	1.30	33.8	0.64	0.44	4	6.6	2.3	0.75
11	Cotton	73	2.24	25.7	2.17	1.6	6.2	8.9	2.3	0.75
12	Soy	69	2.06	25.7	2.17	1.6	6.2	8.9	2.3	0.75
13	Corn	53	1.50	25.7	2.17	1.2	5	10.7	2.3	0.75
14	Sorghum	64	1.83	25.7	2.17	1.2	6.2	8.5	2.3	0.75
15	Sugar Cane	59	1.98	57.7	1.14	1.7	4.4	4.9	2.3	0.75

Table 3. Summary of planned land cover sensitivity studies with FINN.

Run #	Simulation ID	Objective	TX, CONUS within 12-k Domain	Portion of Mexico within 12-km Domain	Remainder of CONUS	Remainder of Mexico and Canada
1	LCT	FINN Default: Global land cover product	MODIS LCT	MODIS LCT	MODIS LCT	MODIS LCT
2	GLC	2014 global land cover product; International quality-control standards and harmonization	GLC-SHARE	GLC-SHARE	GLC-SHARE	GLC-SHARE
3	FCCS_LCT	FCCS is most detailed fuel loadings for CONUS;	FCCS	MODIS LCT	FCCS	MODIS LCT
4	FCCS_CDL_LCT	CDL is comprehensive cropland characterization for CONUS	FCCS/CDL	MODIS LCT	FCCS/CDL	MODIS LCT
5	TCEQ_FCCS_LCT	High resolution regional land cover for Texas and neighboring states	TCEQ	TCEQ	FCCS	MODIS LCT
6	TCEQ_FCCS_CDL_LCT	Merged database representing best available land cover characterization	TCEQ/CDL	TCEQ	FCCS/CDL	MODIS LCT

Preliminary Analysis (*Include graphs and tables as necessary.)*
As described above.

Data Collected *(Include raw and refine data.)*
As described above.

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

Goals and Anticipated Issues for the Succeeding Reporting Period
The team will continue to pursue several goals, including the development of alternative land cover representations for Texas and the CONUS, incorporation of new emission factors and fuel loadings for croplands, and improvements in the model processing and approaches for fire detection and estimates of area burned. A series of sensitivity studies are anticipated that will compare the new version of FINN to previous versions and the individual effects of land cover, emissions factors, and area burned assumptions. A poster is being developed for presentation at the AGU meeting in December 2014.

Detailed Analysis of the Progress of the Task Order to Date *(Discuss the Task Order schedule, progress being made toward goals of the Work Plan, explanation for any delays in completing tasks and/or project goals. Provide justification for any milestones completed more than one (1) month later than projected.)*
Ongoing.

Submitted to AQRP by:

Principal Investigator: Elena McDonald-Buller