

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	Soil Moisture Characterization for Biogenic Emissions Modeling in Texas	PROJECT #	14-008
PROJECT PARTICIPANTS (Enter all institutions with Task Orders for this Project)	The University of Texas at Austin	DATE SUBMITTED	7/3/14
REPORTING PERIOD	From: 6/1/2014 To: 6/30/2014	REPORT #	2

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 *(Include all Task actions conducted during the reporting month.)*

Initially, our goal has been to develop a preliminary summary of available gridded volumetric soil moisture datasets by depth, season, and year for 2006-2012 within the 12km domain (blue) below (<http://www.tceq.texas.gov/airquality/airmod/rider8/modeling/domain>).



Table 1 presents an initial screening of datasets available for Texas. Among these networks, the West Texas Mesonet includes the largest number of stations (i.e., 73). Measurements are made at 3 (5, 20, 50 cm) or 4 (5, 20, 60, 75 cm) layers, with soil property information provided at each depth. The dataset covers certain time periods within 1994 to 2012, varying from site to site. The data format is standardized. One caveat of this dataset is that measurements are intensively made in northwestern Texas, with very sparse efforts for the rest of state.

Both the Soil Climate Analysis Network (SCAN) and US Climate Reference Network (USCRN) have fewer sites, but a greater number of layer measurements (i.e., 2”, 4”, 8”, 20”, and 40” for SCAN, and 5, 10, 20, 50, 100 cm for USCRN). SCAN primarily focuses on agricultural areas, while USCRN sites are located in national parks or wildlife refuges. A potentially beneficial feature of USCRN is that it has hourly measurements.

COSMOS only has a single site in Texas, which is also the only flux tower site in Texas within the Ameriflux network. It provides two or three layer measurements, depending on the time period.

The above observational datasets are available from the North American Soil Moisture Database (NASMD) maintained by a collaborative effort between the Texas A&M University Department of Geography’s Climate Science Lab & GeoInnovation Service Center. The NASMD is a harmonized, quality controlled soil moisture dataset comprised of several soil moisture observation networks in the U.S., Canada, and Mexico (<http://soilmoisture.tamu.edu/About/>).

Continuously updated soil moisture data is available from the North American Land Data Assimilation System-Phase II (NLDAS-2). The NLDAS-2 model output has 1/8th degree resolution and is available from 1979 to the present. Soil moisture is simulated with three different land surface models, i.e., VIC, MOSAIC, and NOAH. Through the joint use with available water storage data from the USDA Soil Survey Geographic Database, NLDAS soil moisture data has been used to map drought conditions in Texas, e.g.,

http://www.twdb.texas.gov/publications/reports/contracted_reports/doc/1200011387_final%20report.pdf

Table 1. Preliminary inventory of soil moisture data networks available for Texas.

Description	West Texas Mesonet	Soil Climate Analysis Network (SCAN)	US Climate Reference Network (USCRN)	Cosmic-ray Soil Moisture Observing System (COSMOS)	Ameriflux	NLDAS
# of Sites in Texas	73	14	8	1	3 (same location)	1/8 degree
# of Layers	3 or 4	5	2 or 5	3	2 or 3	
Soil Properties	percentage of sand, silt, clay; soil type	percentage of sand, silt, clay	-	yes	yes	external from USGS
Years	1994-2012	1995-2014	2003-2014	2011-2014	2004-2006	
Time Step	daily	daily	hourly	30 min	30 min	
Link	http://soilmoisture.tamu.edu/	http://www.wcc.nrcs.usda.gov/scan/	http://www.ncdc.gov/crn/	http://cosmos.hwr.arizona.edu/	http://ameriflux.ornl.gov/	http://ldas.gsfc.nasa.gov/drought/index.php

Dr. McDonald-Buller met with Dr. David Maidment, a hydrologist and Professor in Environmental and Water Resources Engineering at the University of Texas at Austin. Dr. Maidment shared a recent graduate student thesis characterizing available soil moisture in Texas during 1976-2013. This work integrated the predicted 1-meter soil moisture from NLDAS with information from SSURGO (Soil Survey Geographic Database). SSURGO provides information on the physical and chemical soil attributes synthesized from county-level soil surveys (e.g., available water capacity, particle size distribution, organic matter) but not volumetric soil moisture. Nevertheless, this type of data may be a useful supplemental resource for the project.

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

Initial screening of soil moisture datasets for Texas as described above.

Data Collected *(Include raw and refine data.)*

On-going collection of relevant soil moisture datasets 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 focus on fully investigating and summarizing all available soil moisture databases (observations and predictions) for Texas, focusing on the 2006-2012 time period.

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

(Printed or Typed)