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**	1/8/15
REPORTING PERIOD	**From:** December 1, 2014 **To:** December 31, 2014	**REPORT #**	7

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.)*

During December 2014, initial analyses were performed to investigate the seasonal and interannual variability of estimates of soil moisture provided by the NLDAS-2 Noah and Mosaic land surface models during the years 2006-2013.

BEGIN PRELIMINARY RESULTS

Our current and continuing analysis for soil moisture is for: (1) individual climate divisions in eastern Texas (North Central, South Central, East, and Upper Coast; ref. Figure 1) and (2) four sub-regions within the 12km grid domain referred to (from east to west) as East, East Central, West Central, and West (ref. Figure 2). The NLDAS-2 datasets provide soil moisture predictions at a horizontal grid resolution of 1/8th degree; results for all grid cells within the 12km grid domain (ref. Figure 2) were retrieved and processed to generate monthly average values.

Figure 3 shows the monthly region-averaged soil moisture values for the 0-10cm and 100-200cm soil depths for the eastern Texas climate divisions; the analogous results for the 12km grid sub-regions are shown in Figure 4. For the eastern Texas regions, near-surface soil moisture values are generally drier for Mosaic compared to Noah with largest differences for the central regions. In contrast, soil moisture for the deeper layer is greater for Mosaic compared to Noah. The monthly data demonstrate greater temporal variability for Mosaic in the 0-10cm layer compared to Noah but the opposite tendency for deeper soil moisture. Year 2011 is the driest period for the East and Upper Coast regions, while Mosaic simulates for central regions conditions of similar dryness during mid-2008 to mid-2009 to 2011.

Results for the four sub-regions within the 12km grid domain (Figure 4) show that soil moisture decreases from east to west with a stronger spatial gradient simulated by Mosaic compared to Noah. For the 0-10cm layer, Mosaic is wetter than Noah for the East region and substantially drier than Noah for the West Central and West regions. Processing and analyses of results are on-going.

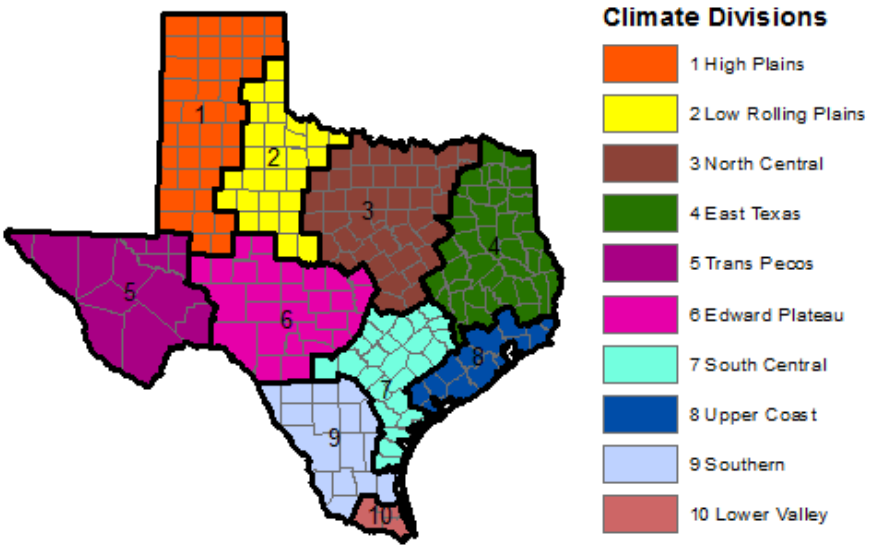


Figure 1. Texas climate divisions including North Central (3), East (4), South Central (7) and Upper Coast (8).

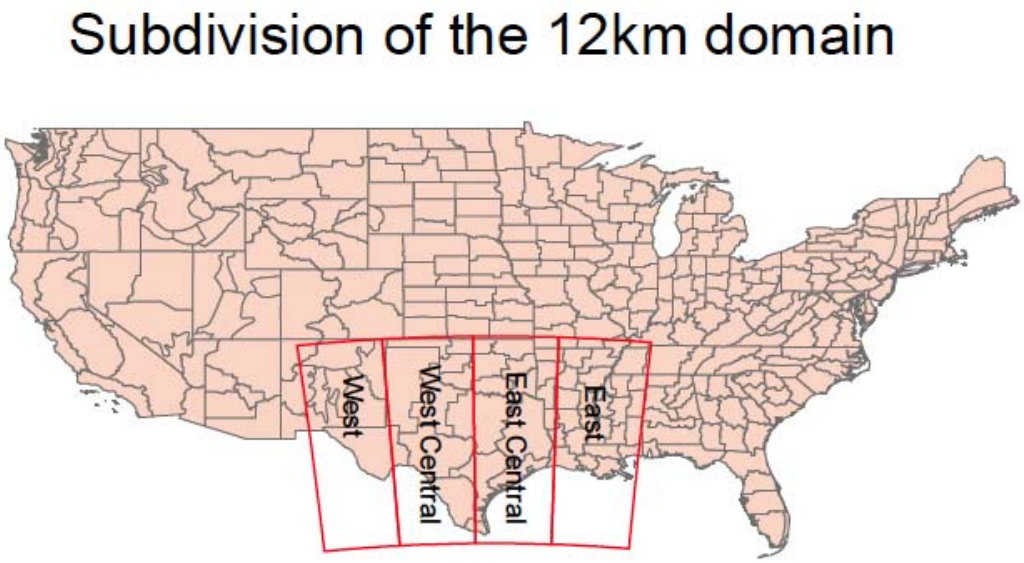
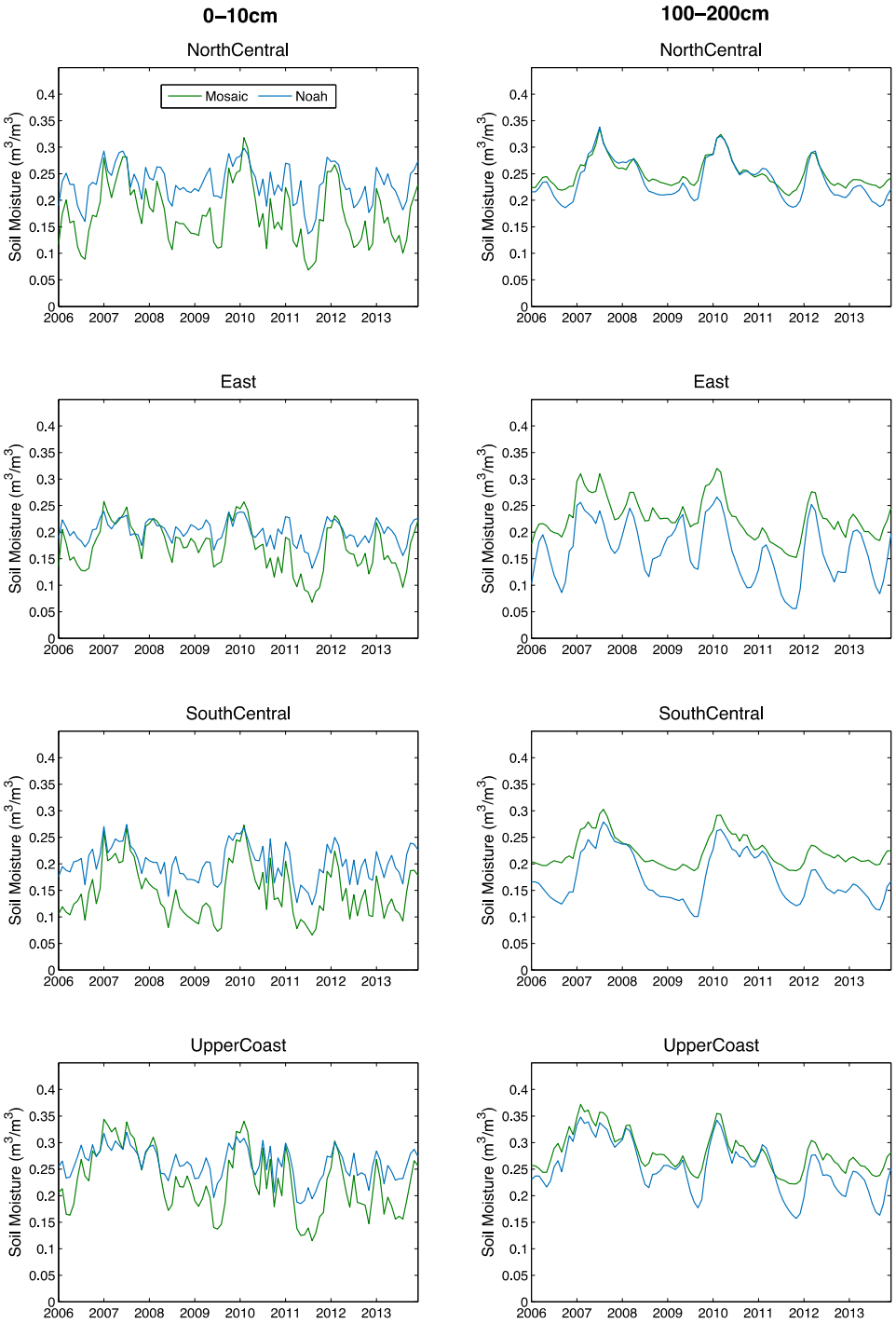


Figure 2. Sub-regions within the 12km grid domain (longitude boundaries of -93°, -98°, and -103°) used for analysis of NLDAS-2 soil moisture.


0–10cm
100–200cm
NorthCentral
East
SouthCentral
UpperCoast
Mosaic
Noah
Soil Moisture (m3/m3)
2006
2007
2008
2009
2010
2011
2012
2013

cm (left

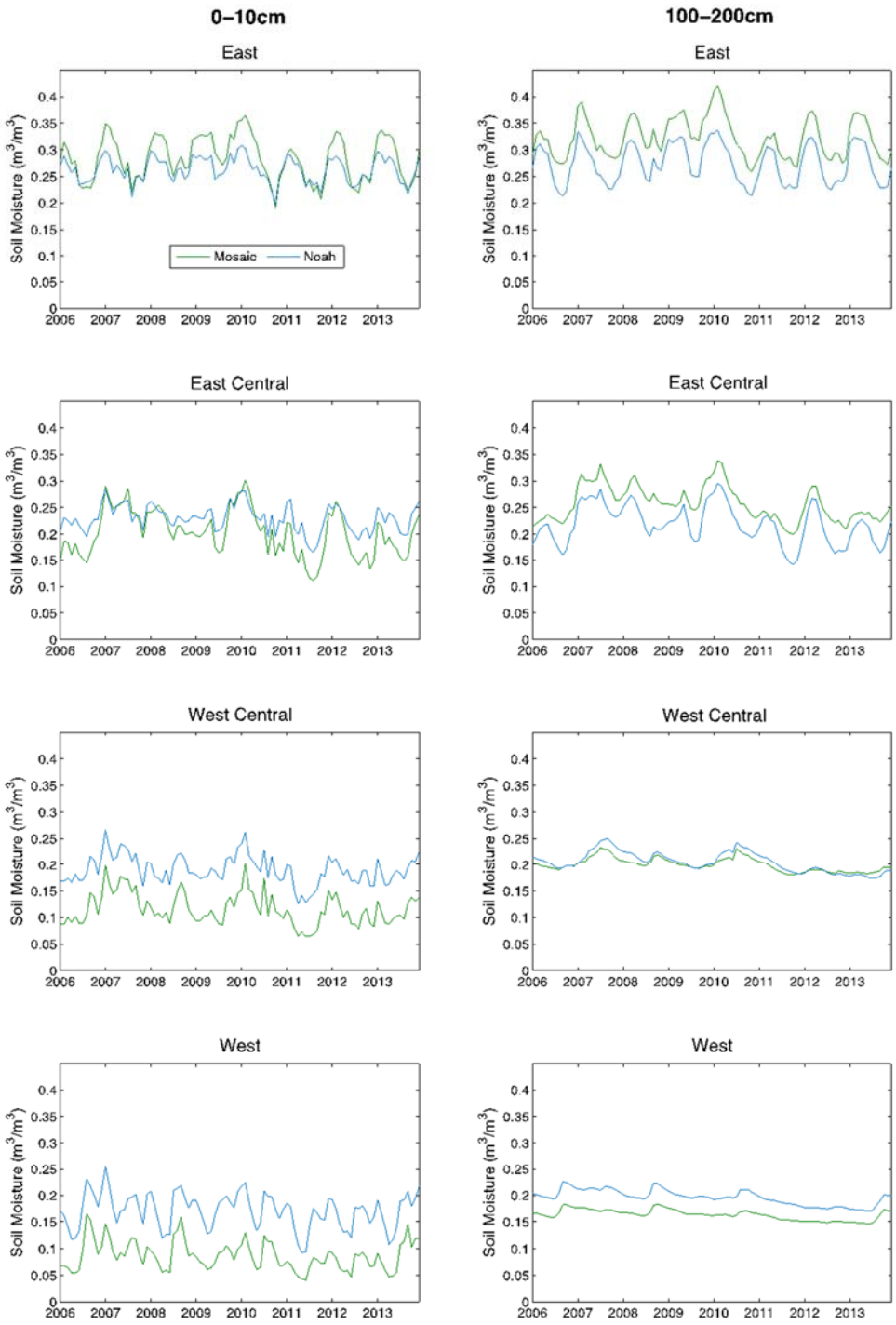


Figure 4. Similar to Figure 3 but for the 4 sub-regions within the 12km domain.

END PRELIMINARY RESULTS

Preliminary Analysis (*Include graphs and tables as necessary.)*
A comparison of soil moisture predictions for Noah and Mosaic has been performed as summarized in the previous section. Efforts to expand this analysis to include Noah MP and VIC are on-going.

Mr. McGaughey presented a poster on the project at the American Geophysical Union (AGU) Fall Meeting during December 15-19, 2014. Dr. McDonald-Buller, the project PI, was also at the conference and attended poster sessions associated with soil moisture research.

Data Collected *(Include raw and refine data.)*
All soil moisture datasets of potential interest to the project (NLDAS-2 Mosaic, Noah, Noah MP, and VIC) have been retrieved and processed in support of continuing analyses. In parallel with the analysis of the soil moisture datasets, our team is moving forward to MEGAN simulations that incorporate selected soil moisture datasets for selected time periods to predict isoprene concentrations. We are currently expanding the MEGAN modeling application so that processing of additional input datasets (e.g., land cover, LAI, PAR, other meteorological inputs such as temperature and winds) is required. The MEGAN simulations are anticipated to be initiated during February 2014.

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

Goals and Anticipated Issues for the Succeeding Reporting Period
We completed testing of the initial MEGAN simulations that utilized the NLDAS-2 datasets to predict hourly isoprene emissions for Apr-Oct for years 2006, 2007, and 2011 for eastern Texas regions. We are currently planning to expand MEGAN simulations to include areas in addition to eastern Texas.

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)