

AQRP Monthly Technical Report

PROJECT TITLE	Improving Modeled Biogenic Isoprene Emissions under Drought Conditions and Evaluating Their Impact on Ozone Formation	PROJECT #	14-030
PROJECT PARTICIPANTS	Qi Ying, Gunnar W. Schade, John Nielsen-Gammon, Huilin Gao	DATE SUBMITTED	7/17/2015
REPORTING PERIOD	From: May 1, 2015 To: May 31, 2015	REPORT #	11

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: Meteorology simulation with WRF.

We performed additional WRF simulations to try to improve performance of the meteorological variables and model performance of ozone. Previously, all simulations were done in segments of 8-days (including one day spin-up). As an alternative, we performed simulations in 1-day segments with 3-hour spin-up. All 2007 and 2011 simulations are now completed.

Task 2: Perform field and laboratory measurements on common Texas tree species

Task 3: Evaluate drought parameterization for isoprene emissions

Isoprene emissions measured during the 2011 drought season in east Texas as well as soil moisture measurements at the top soil were used evaluate the default parameterization scheme in the MEGAN model. Two sets of soil moisture data were used in the evaluation. The first set of soil moisture data were based on observed top soil moisture and derived root zone soil moisture from a simple model. Two possible root zone depths (1 m and 2 m) were used in the analysis. The second set of soil moisture data were predicted using WRF, using the Noah land use scheme. The results indicate ambiguity of the drought response of isoprene emitting oaks that results from 1) the root-zone soil depth of the species, and 2) the drought response parametrization. They demonstrate that a uniform root-zone depth selection and a uniform drought response parametrization may lead to regionally paradoxical results. In regions dominated by drought resistant oak species such as *Quercus stellata* a deeper root zone may have to be considered alongside a narrower range of soil moistures that affect isoprene emissions, while the opposite should be considered in regions dominated by less drought resistant species such as *Quercus nigra*.

Task 4: Perform regional BVOC modeling using MEGAN

We have regenerated year 2007 BVOC emissions using MEGAN and the new meteorological simulation results as reported in Task 1.

Task 5: Perform regional air quality simulations

We completed 2011 simulations with the new meteorological and emission inputs next month. We are running 2007 simulations and will complete the simulation in early June.

Preliminary Analysis

Goals and Anticipated Issues for the Succeeding Reporting Period

Detailed Analysis of the Progress of the Task Order to Date

Task 1: Completed.

Task 2: Major delay on task 2 due to inconclusive data last summer/fall. Commencing new measurements this spring.

Task 3: Should be able to finish with updated results in June

Task 4: Completed.

Task 5: 2011 simulations are completed. 2007 simulations should complete in June.

Submitted to AQRP by: Qi Ying

Principal Investigator: Qi Ying