AQRP Monthly Technical Report

PROJECT TITLE	**Improved Land Cover and Emission Factor Inputs for Estimating Biogenic Isoprene and Monoterpene Emissions for Texas Air Quality Simulations**	**PROJECT #**	14-016
PROJECT PARTICIPANTS	Alex Guenther (Battelle/PNNL) Joost de Gouw (NOAA) Greg Yarwood, Sue Kemball-Cook (ENVIRON)	**DATE SUBMITTED**	8/18/2014
REPORTING PERIOD	**From:** July 1, 2014 **To:** July 31, 2014	**REPORT #**	3

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 4: Development of MEGAN Biogenic Emission Inventories and Inventory Evaluation using Regional Photochemical Modeling

ENVIRON continued evaluation of Weather Research and Forecast (WRF) Model (Skamarock et al. 2008) 12 km grid output fields for the period June 1-July 15, 2013 against CAMS station wind and temperature data within Texas and ds472 data within and outside of Texas.

ENVIRON prepared a biogenic emission inventory for June 1-July 15, 2013 using the Model of Emissions of Gases and Aerosols from Nature (MEGAN) (Guenther et al., 2012). In the past, ENVIRON has used MEGAN input data available in ArcGIS format, but the developers of MEGAN plan to release future MEGAN inputs (including inputs for this project) in NetCDF format. ENVIRON developed software that takes MEGAN input data in NetCDF format and reformats the data into the ASCII format used by MEGAN. Using the WRF output from the initial model run to generate weather data for MEGAN, we ran MEGAN for the June 1-July 15, 2013 episode with default landcover inputs. We verified that the NetCDF reformatting tool and MEGAN modeling system are functioning properly by comparing the magnitude and spatial patterns of episode average isoprene and terpenes across the 36 km and 12 km grids with July episode average maps from the biogenic emission inventory prepared for the Western Governors Association by ENVIRON and Dr. Guenther (Sakulyanontvittaya et al., 2012). If no further WRF runs are needed, this MEGAN emission inventory will serve as the base case default biogenic emission inventory against which we will compare MEGAN inventories developed with new inputs in this project.

Task 5: Project Management

ENVIRON worked toward developing subcontracts with NOAA and PNNL/Battelle for work to be done under Tasks 1-3.

Preliminary Analysis

Model performance at Houston-Galveston-Brazoria and Beaumont-Port Arthur CAMS sites indicates that temperature is reasonably well-simulated, but that the WRF model has a high bias in wind speed at coastal sites and often mistimes wind shifts associated with the sea breeze. Difficulties in simulating local-scale wind circulation patterns are not surprising given the relatively coarse resolution of the model.

Data Collected

Default MEGAN inputs were obtained from Dr. Guenther.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments

None to date

Goals and Anticipated Issues for the Succeeding Reporting Period

Tasks 1-3: Begin work on Tasks 1-3.

Task 4: Complete WRF model performance evaluation for initial run against ds472 surface observations within the 12 km grid, observed precipitation, and satellite cloud observations. Rerun WRF in different configuration if needed based on results of performance evaluation of initial run. Develop software to perform CAMx model performance evaluation along aircraft flight tracks.

Detailed Analysis of the Progress of the Task Order to Date

The project remains on schedule and budget for completion and delivery of the final AQRP-reviewed report by the AQRP contract end date of June 30, 2015.

References

Guenther, A. B., X. Jiang, C. L. Heald, T. Sakulyanontvittaya, T. Duhl, L. K. Emmons, and X. Wang (2012), The Model of Emissions of Gases and Aerosols from Nature version 2.1 (MEGAN2.1): an extended and updated framework for modeling biogenic emissions, Geosci. Model Dev., 5(6), 1471-1492.

Sakulyanontvittaya, T., G. Yarwood and A. Guenther. 2012. Improved Biogenic Emission Inventories Across the West. Final Report. Prepared for: Western Governors' Association, 1600 Broadway, Suite 1700, Denver, CO 80202. http://www.wrapair2.org/pdf/WGA_BiogEmisInv_FinalReport_March20_2012.pdf.

Skamarock, W. C., J. B. Klemp, J. Dudhia, D. O. Gill, D. M. Barker, W. Wang, and J. G. Powers, 2008. A description of the Advanced Research WRF Version 3. NCAR Tech Notes-475+STR. http://www.mmm.ucar.edu/wrf/users/docs/arw_v3.pdf.

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