AQRP Monthly Technical Report

PROJECT TITLE	**Use of Satellite Data to Improve Specifications of Land Surface Parameters**	**PROJECT #**	**17-039**
PROJECT PARTICIPANTS	Richard McNider, Arastoo Pour –Biazar, Kevin Doty, Yuling Wu	**DATE SUBMITTED**	December 7, 2017
REPORTING PERIOD	**From:** September 1, 2017 **To:** September 30, 2017	**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

(1) Applicable to Tasks 2,3,4,6 and 7 – Defining Control Case Inputs:
Control Cases were run for 2013 and 2012 using the EPA NERL set ups. Initial statistics have been calculated. Diurnal plots of bias and RMSE were made.

(2) Subsequent Runs: Using the EPA set-ups we have made the control runs for 2013. We have also decided on the sequence of satellite assimilation runs. These are:

(1) Control Using EPA setups
(2) **Task 6** Satellite Insolation (but with WRF albedo)
(3) **Task 4** Veg Fraction – adding MODIS derived vegetation fraction
(4) Soil Moisture Nudging
(5) **Task 3** - Heat Capacity Nudging
(6) **Task 2** Use of Tendencies in Moisture Nudging

Of September 14, 2017 all model runs have been made for the above.

Task 7 - Additional Model Evaluation Period: As noted in the proposal for this project, the 2012 August period was chosen as the second evaluation period. Preliminary analyses show that the temperature bias and RMSE was much higher than the 2013 period. This is being further evaluated.

Preliminary Analysis:

Simulations for 2013: The preliminary analysis of the 2013 simulations shows that the satellite assimilation worked as expected. For each successive satellite assimilation employed the daytime performance in temperature improved. In general the satellite assimilation moistened and cooled the atmosphere in the Eastern U.S. Nighttime performance was initially degraded by the moisture nudging as more moisture in the soil reduced nighttime cooling. However, the heat capacity adjustment did increase the nighttime cooling.

Simulations for 2012: A similar set of satellite assimilation runs were made for August 2012. 2012 was an extraordinary hot and dry year especially in the Midwest extending into Texas. The initial control case was much to dry and hot. The satellite assimilation showed improvement for the entire domain. However, in the 2012 case most of the improvement came from the use of satellite insolation. This is because the Control case had very few clouds compared to observations.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments
While issues with the control case for 2013 put the project behind schedule up to August, in September it got back on schedule.

Goals and Anticipated Issues for the Succeeding Reporting Period

We anticipate having all model runs completed and analyzed by the 3rd week of September and a draft final report to AQRP will be submitted by October 15.

Do you have any publications related to this project currently under development? If so, please provide a working title, and the journals you plan to submit to.

_X_Yes __No

Toward the use of Satellite Skin Temperature Data to Improve Land Surface Parameters in Air Quality Studies, to be submitted to Journal of Applied Meteorology.

Do you have any publications related to this project currently under review by a journal? If so, what is the working title and the journal name? Have you sent a copy of the article to your AQRP Project Manager and your TCEQ Liaison?

___Yes __X_No

Do you have any bibliographic publications related to this project that have been published? If so, please list the reference information. List all items for the lifetime of the project.

___Yes __X_No

Do you have any presentations related to this project currently under development? If so, please provide working title, and the conference you plan to present it (this does not include presentations for the AQRP Workshop).

___X Yes ___No

We are developing a paper - Toward the use of Satellite Skin Temperature Data to Improve Land Surface Parameters in Air Quality Studies, to be submitted to Journal of Applied Meteorology.

Do you have any presentations related to this project that have been published? If so, please list reference information. List all items for the lifetime of the project.

___Yes __X_No

Submitted to AQRP by

Principal Investigator

Richard T. McNider
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