

AQRP Monthly Technical Report

PROJECT TITLE	Use of Satellite Data to Improve Specifications of Land Surface Parameters	PROJECT #	16-039
PROJECT PARTICIPANTS	Richard McNider, Arastoo Pour –Biazar, Kevin Doty, Yuling Wu	DATE SUBMITTED	July 7, 2017
REPORTING PERIOD	From: June 1, 2017 To: June 30, 2017	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

Task 1 - Focus on Small Scale Performance Around Houston and Dallas and Other Metrics Such as Wind Performance

Under the prior project, in concentrating on implementing the skin temperature assimilation, attention was given to performance statistics over the entire domain. Because of limited time only cursory examination was given to fine scale performance, although the work did show that statistical improvements were even greater in the Texas domain than in the national domain. We are focusing on wind performance. There have been different strategies for nudging winds. For consistency with TCEQ set ups the previous 2013 runs employed wind nudging in the boundary layer. However, we have concerns that wind nudging may be countering the satellite assimilation so we are running 2013 with only nudging above 2 km.

Task 4 - Vegetative Fraction. However, in processing the 2013 data and preparing to process the data for the 2012 case, it was found that the data only extended back to September 2012. NASA MODIS greenness product for the 2012 case has been processed and has been employed in 2012 runs.

Task 6 - Satellite Derived Insolation and Albedo – The 2013 Discover AQ case that was run during the project last year was run with satellite insolation but not satellite albedo. As part of rerunning the 2013 Discovery AQ a consistent set of satellite insolation and cloud albedo was developed. The new insolation and albedo data have been processed and incorporated in the WRF system. The rerun of the 2013 case has employed this new data has been employed.

Task 7 - Additional Model Evaluation Period: Data has been collected for the 2012 model evaluation period. A control run for 2012 with no satellite assimilation has been completed. Base line statistics are being calculated. A second run using only insolation assimilation has also been

completed. Two additional runs are being started – one with new MODIS vegetative green and a second run with skin temperature assimilation.

Preliminary Analysis

Two model runs were made for the 2013 case using the new insolation and albedo data. Also two 2012 runs have been completed. The preliminary analysis indicates that the performance statistics against NWS data were improved. A new 2013 case has been started with new nudging protocols.

Data Collected

As mentioned above satellite greenness data has been collected and processed for the 2012 period.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments

We have had some delays in making some model runs in part because of some issues we have found with the analysis nudging. In the past for Texas we have used wind nudging in the boundary layer. However, we feel that nudging in the boundary layer should only be used as a last resort to improve performance. Thus, our new reruns are not nudging within the boundary layer or below 2km.

Goals and Anticipated Issues for the Succeeding Reporting Period

We anticipate have initial model runs for the 2012 and 2013 cases in June.

Detailed Analysis of the Progress of the Task Order to Date

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.

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 **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 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 AQRW Workshop).

Yes No

We are including some of the land surface work in a presentation at the Meteorology and Air Quality Conference at UC Davis in September 2017.

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 No

Submitted to AQRW by

Principal Investigator

Richard T. McNider
University of Alabama in Huntsville