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**	4/5/2017
REPORTING PERIOD	**From:** March 1, 2017 **To:** March 31, 2017	**REPORT #**	5

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) ***Task 2 - Use of Skin Temperature Tendencies Sources of Skin Temperature –*** In evaluation of the 2013 Discovery AQ period which had considerable cloudiness we have concerns that clouds may be causing some problems in the skin temperature assimilation in the PX scheme. In the re-run of the 2013 case we are taking a very stringent test of clear sky criteria in the model and in satellite data (see February report on cloud screening in satellite data). We will not carry out assimilation if either the model had clouds or the new satellite data have clouds flagged.

Evaluation of satellite skin temperature retrievals also indicated that cloud contamination remains an issue and further screening of satellite data is necessary. When a pixel with smaller scale cloud is not masked, the retrieval will produce a colder skin temperature, causing erroneous adjustment by the assimilation technique. To alleviate this problem, A new set of retrievals for June-August 2012 was produced. An atmospheric adjustment was implemented as a first pass for removing cloudy pixels. We are devising additional filtering and implementing a rigorous quality control procedure to ensure that cloudy pixels are removed from the data.

(2) 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 case we are going to use a consistent set of satellite insolation and cloud albedo. This will use reprocessed insolation and satellite albedo using calibrations previously reported.

(3) Task 7 - Additional Model Evaluation Period – As part of running the new 2012 simulation period we decided to review all of the model set ups in WRF. This came in light of

initial evaluation of the 2013 case in which we found that some setups that came from prior runs needed some changes. For example the height at which we do analysis nudging. The model setup had nudging above only above the PBL. But the PBL at night can be only 200 meters so nudging may totally take out the real residual layer inertial oscillations that control winds aloft and low level jets. This may be the reason model jets are underestimated. Second, the WRF model has been run for five day segments with a new startup at the start of the period (with a 24 hour spin-up period). We found that we had not carried forward the moisture adjustments into the next simulation in our simulations. This will be corrected. Also, we have revisited the radius of influence in the analysis nudging. This was necessitated by a change in the most recent WRF.

Preliminary Analysis

Data Collected
We plan to start 2013 rerun during April. We are continuing data collection for new 2012 run including processing of skin temperature data. As stated above, GOES skin temperature retrievals for June-August, 2012 was produced. We are in the process of devising techniques to remove all pixels that might be affected by cloud contamination.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments
In light of some recent simulations we are revisiting some of the basic model set ups used in the 2013 cases (see above)

Goals and Anticipated Issues for the Succeeding Reporting Period
We were delayed in making 2013 simulations in March. We are preparing to redo 2013 period and plan to carry out 2013 simulations in April.

Detailed Analysis of the Progress of the Task Order to Date
Because of some issues which required some analytical redirection as discussed above we are a bit behind on making some simulations but believe we can catch up in coming months.

Submitted to AQRP by: Richard McNider

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