1. Title Slide

Title: Validation and Improvement of the GOES-R Rainfall Rate Algorithm

Authors and Affiliations

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Topics: Hydrology

Program: AWG

2. Introduction

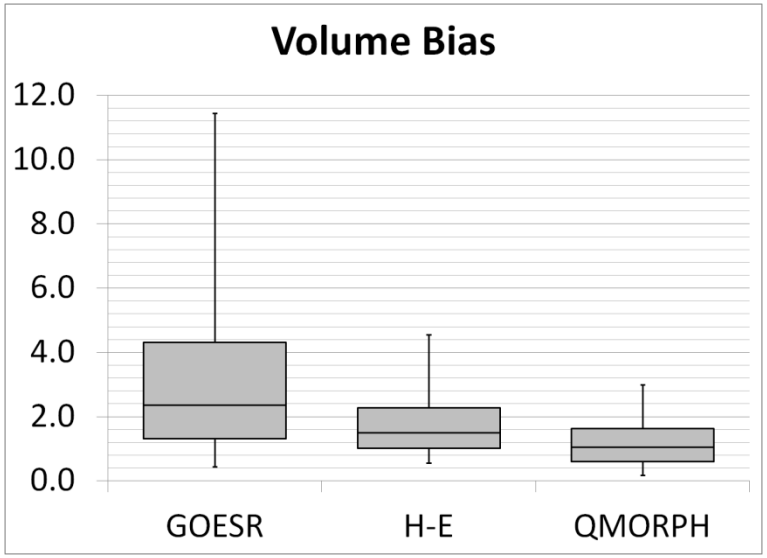
- The GOES-R Rainfall Rate algorithm will produce estimates of instantaneous rain rate for every 15 min on the ABI full disk.
- The rain rates will be retrieved using relationships calibrated against rain rates from MW instruments to enhance accuracy while minimizing data latency.
- A version of this algorithm modified for current GOES has been running in real time since August 2011.

3. Methodology/Expected Outcomes

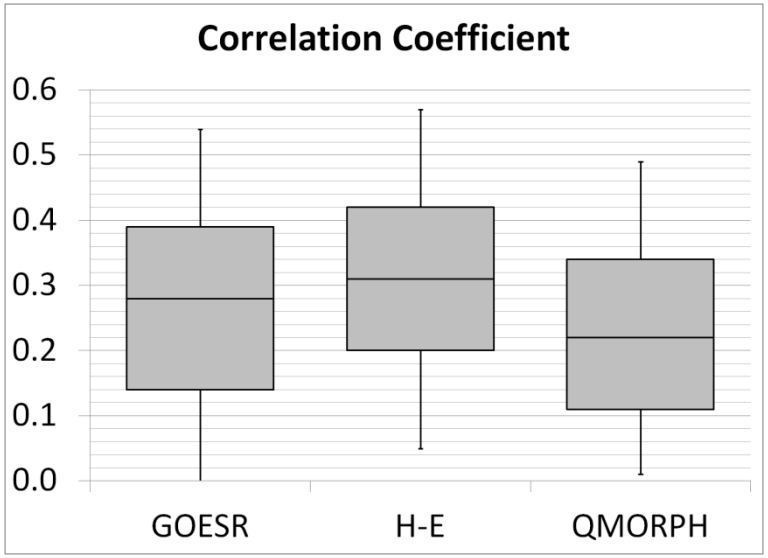
- Since validation data is limited over the SEVIRI coverage area where the full algorithm can be run, validation efforts are being focused on the CONUS using the real-time current-GOES version.
- Validation is being performed against Stage IV radar/gauge data at various scales to identify algorithm weaknesses and potential solutions.

4. Results (1/4)

- Validation of simplified (2 bands vs. 5) algorithm for 22 Aug 2011 – 1 Sep 2012



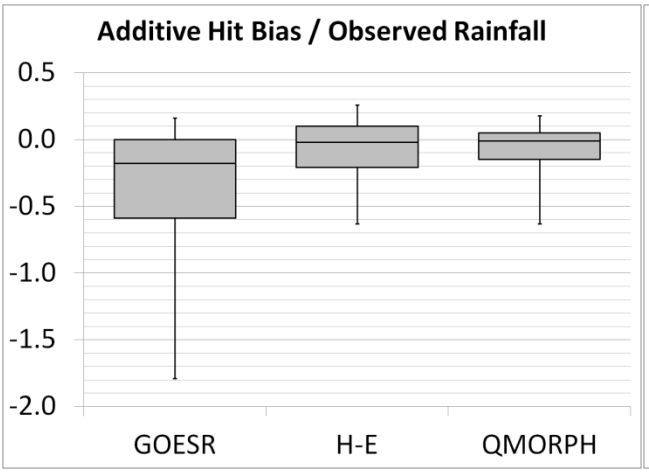
Significantly stronger wet bias than H-E (current algorithm

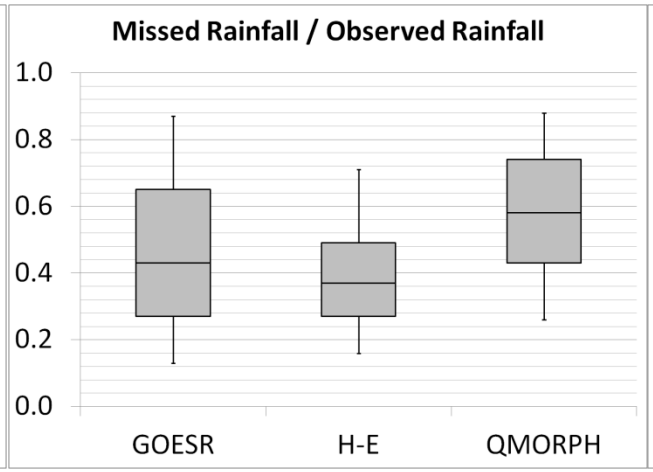


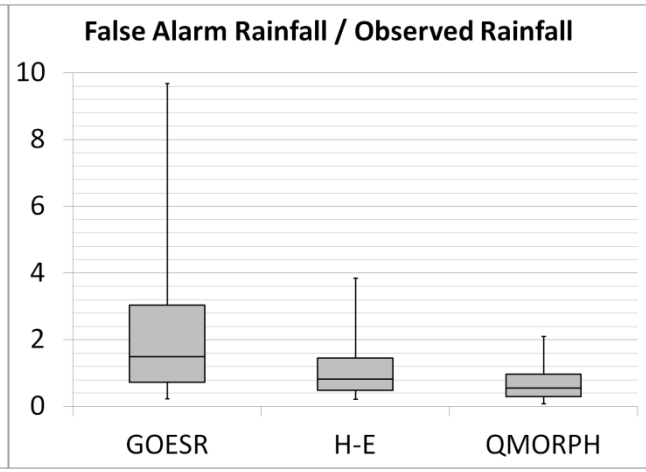
Slightly worse correlation coefficient than H-E

4. Results (2/4)

- Validation of simplified (2 bands vs. 5) algorithm for 22 Aug 2011 – 1 Sep 2012







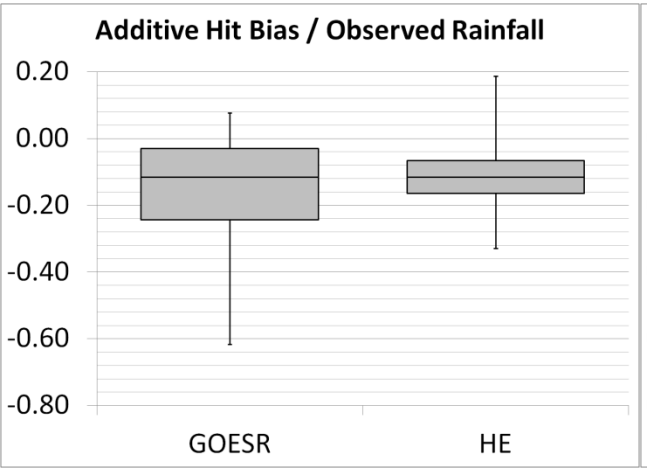
Stronger dry bias compared to H-E for “hit” pixels

Slightly more missed rainfall than H-E

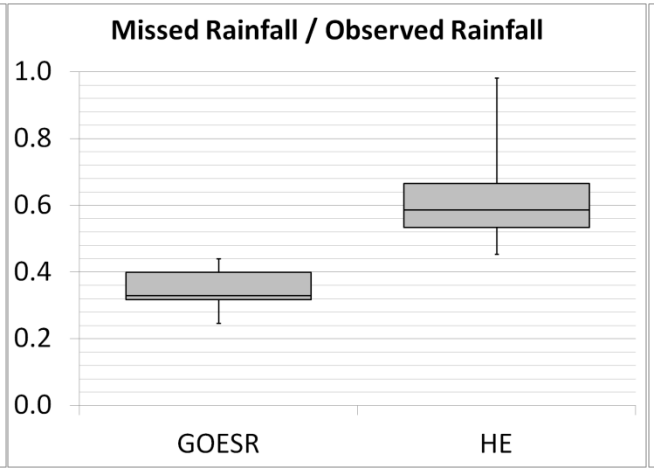
Significantly more false alarm rainfall than H-E

4. Results (3/4)

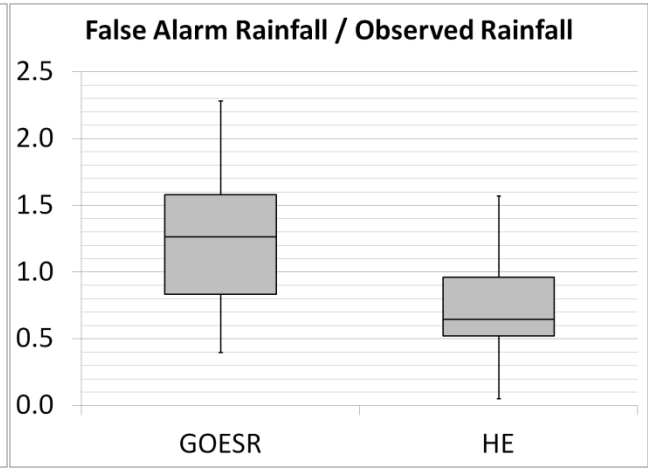
- Validation of the full algorithm (SEVIRI) vs. TMI shows that it performs much better than the 2-band current-GOES version:



Similar slight dry bias to H-E for “hit” pixels



Significantly <u>less</u> missed rainfall than H-E



Still more false alarm rainfall than H-E

4. Results (4/4)

- The specific cause of the false alarm rainfall (which appears in both versions) has not yet been identified, though some minor issues have been identified and addressed. Each step of the calibration and validation process is currently being evaluated to determine possible sources of bias.

5. Possible Path to Operations

- Since this is an AWG project, modifications to the algorithm that are developed based on these findings will be incorporated into the operational code at the first available opportunity.

6. Future Plans

- Once the cause of the false alarms has been addressed, additional work will be done to evaluate other possible algorithm enhancements, including:
  - Using cloud properties as predictors
  - Orographic modification of rainfall
  - Model-based moisture correction to account for evaporation of hydrometeors

7. Publication List

- References
  - The full version of the algorithm can be found in the Algorithm Theoretical Basis Document; earlier versions are described in:

Kuligowski, R. J., 2002: A self-calibrating GOES rainfall algorithm for short-term rainfall estimates. *J. of Hydrometeor.*, **3**, 112-130.

Kuligowski, R. J., Y. Li, and Y. Zhang, 2013: Impact of TRMM data on a low-latency, high-resolution precipitation algorithm for flash flood forecasting. *J. Appl. Meteor. Cli*, accepted.