Probabilistic Precipitation Estimates from GOES-R for Hydrological Applications

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1. Introduction

Goal: To derive unified, consistent, accurate and fine-resolution precipitation rates over the Contiguous U.S., by leveraging GOES-R satellite observations and ground-radar based precipitation product from the Multi-Radar/Multi-Sensor (MRMS) system.

Specific Objective: To investigate the potential for improving precipitation estimation using multi-spectral data from the GOES-R satellite w.r.t. deterministic retrieval algorithms such as SCaMPR (Kuligowski et al. 2016).

2. Self-Calibrating Multivariate Precipitation Retrieval (SCaMPR): NOAA’s Operational Precipitation Algorithm for GOES-R satellite (Kuligowski et al. 2016)

3. Challenges at different stages of SCaMPR

4. Proposed Algorithm: Preliminary Results

5. Conclusions and Perspectives

Challenge: Effective utilization of high resolution (Spatial, Temporal and Spectral) GOES-R observations to explore the potential of high resolution, low latency, and more spectral bands from ABI, a reference better than MWCOMB is required;

High resolution, more physically based precipitation rates and types retrieved from MRMS are ideal to effectively mine data from GOES-R for precipitation retrieval

Conclusion: The potential of high-resolution ABI data remains underutilized due to consideration of coarser scale data as reference solution: to address this issue, we are utilizing high resolution and accurate precipitation estimates from MRMS.

Challenge: satellite precipitation has been deterministically computed despite the under-constrained relation between the satellite sensor measurements to precipitation rate; solution: preliminary results on new satellite precipitation approaches which focuses on probabilistic quantification of precipitation (Kirstetter et al. 2018) show promising results with unbiased estimates.

Challenge: Effective utilization of high resolution (Spatial, Temporal and Spectral) GOES-R observations to derive reference solutions confirms the usefulness of GOES-R infrared and water vapor absorption bands, as well as newly derived indices for precipitation detection, classification and quantification.

Challenge: simple unsupervised techniques are currently being used for precipitation classification; solution: the detection and classification results using ML guided approach by better reference highlights the potential of GOES-R satellite observations in identifying precipitation types from ground radar i.e. MRMS system

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