Accounting for Surface Ice and Snow in the Goddard Profiling Algorithm Rain Rate Retrievals

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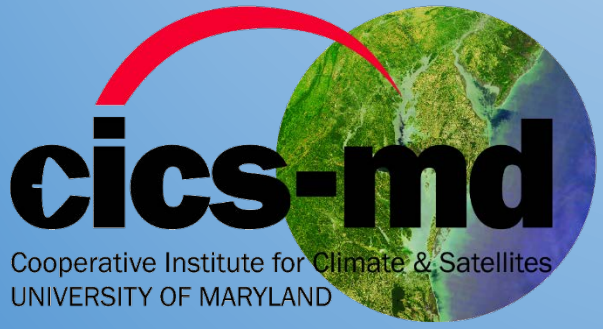
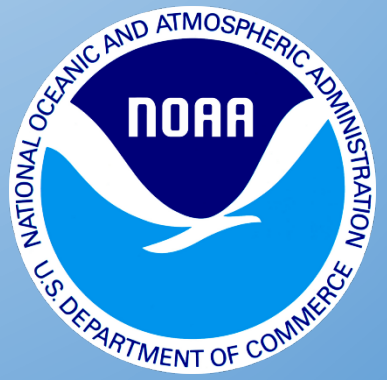


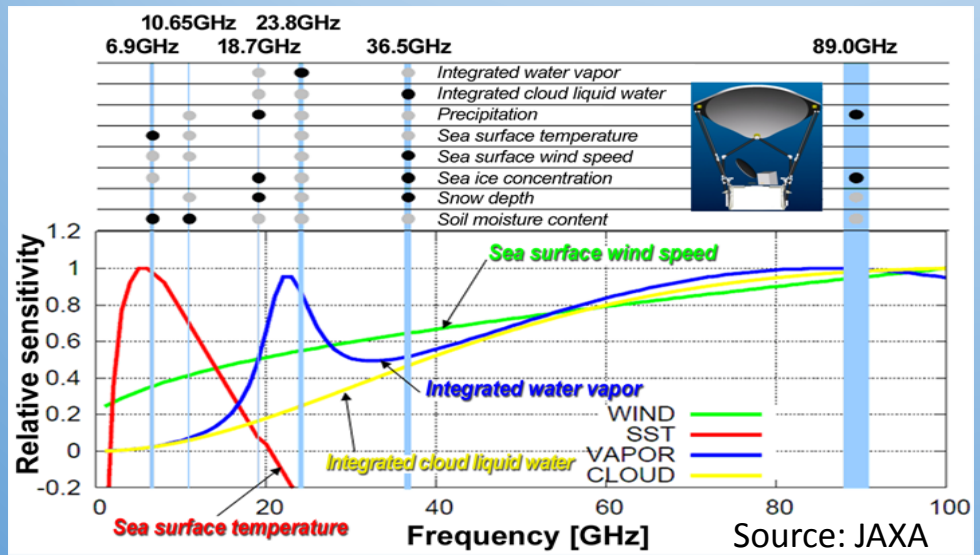
CoRP Symposium 2015

September 16, 2015



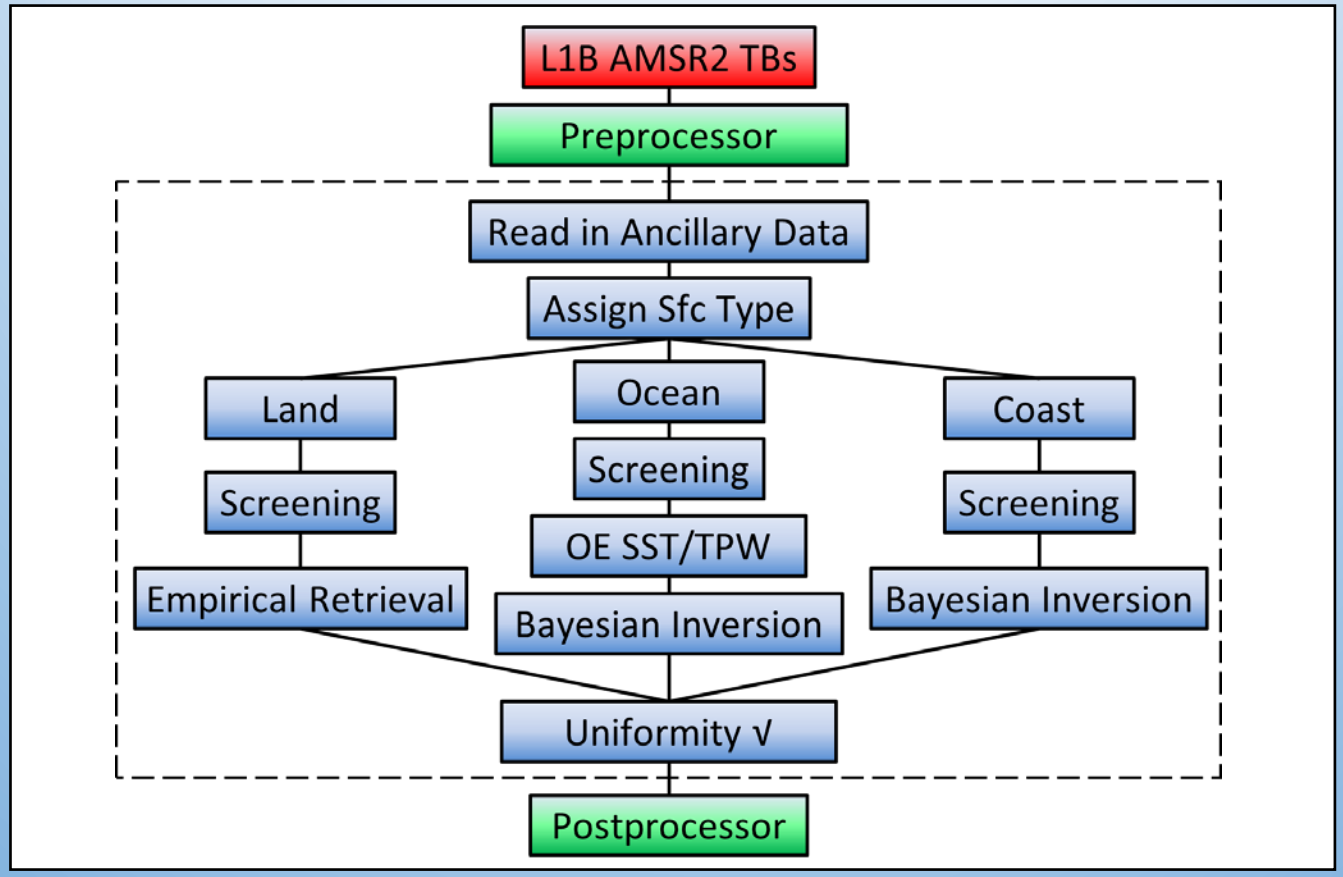
NOAA GCOM-W/AMSR2 Rain Retrievals GPROF2010V2

- GPROF2010V2 (Gopalan et al. 2010; Meyers et al. 2015) adapted for use with AMSR2
- Brightness temperature (Tb) correction addresses nonlinearity of Tb calibration
- For more NOAA GCOM-W contributions see: An overview of NOAA's GCOM-W1/AMSR2 Product Processing and Utilization – Friday 14:30



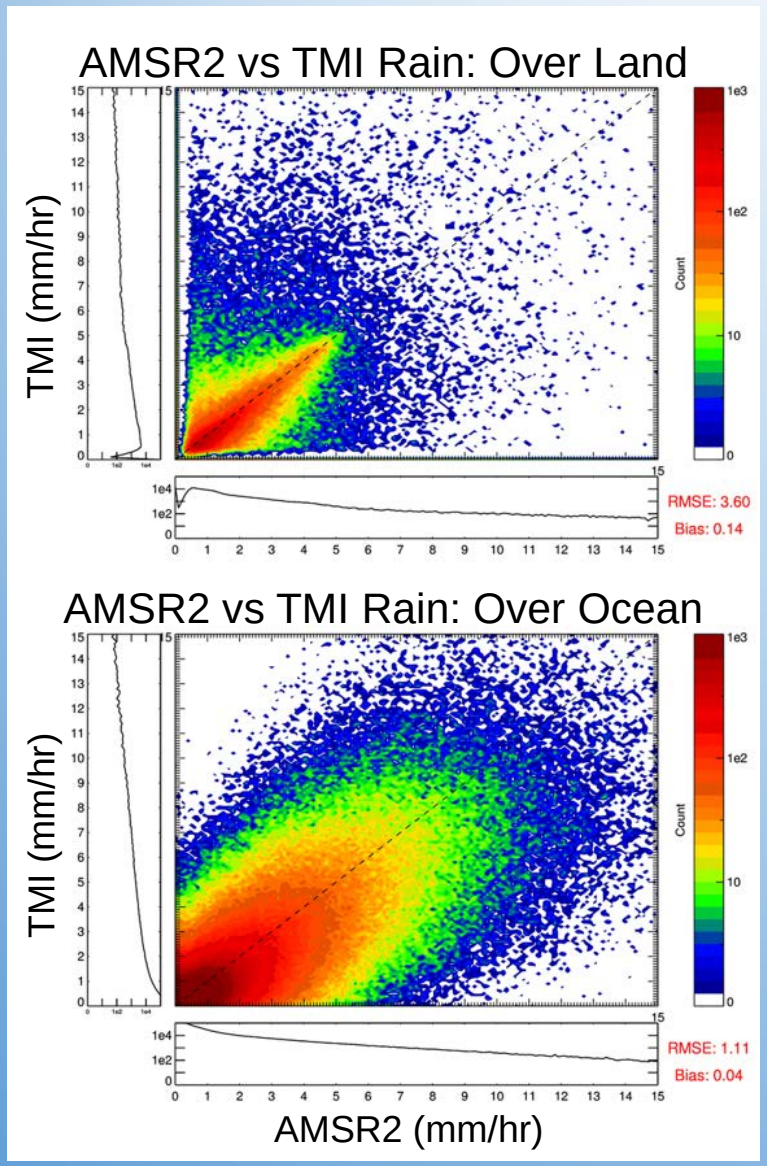
Source: JAXA

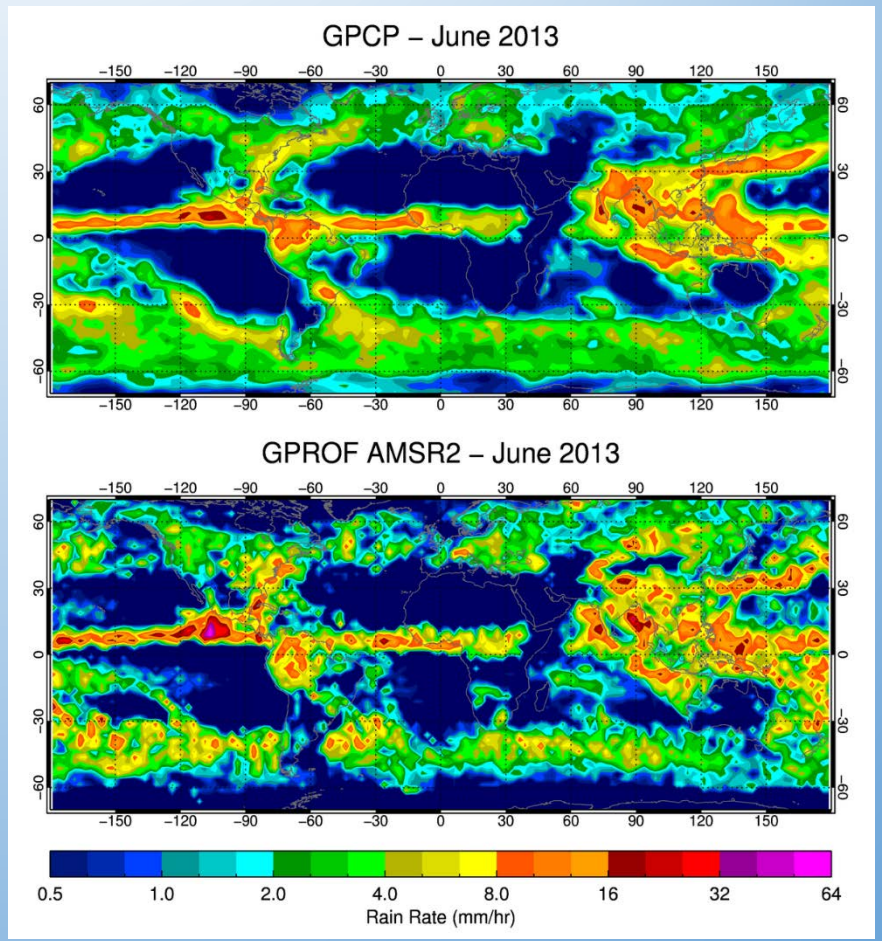
AMSR2 GPROF2010V2 Structure



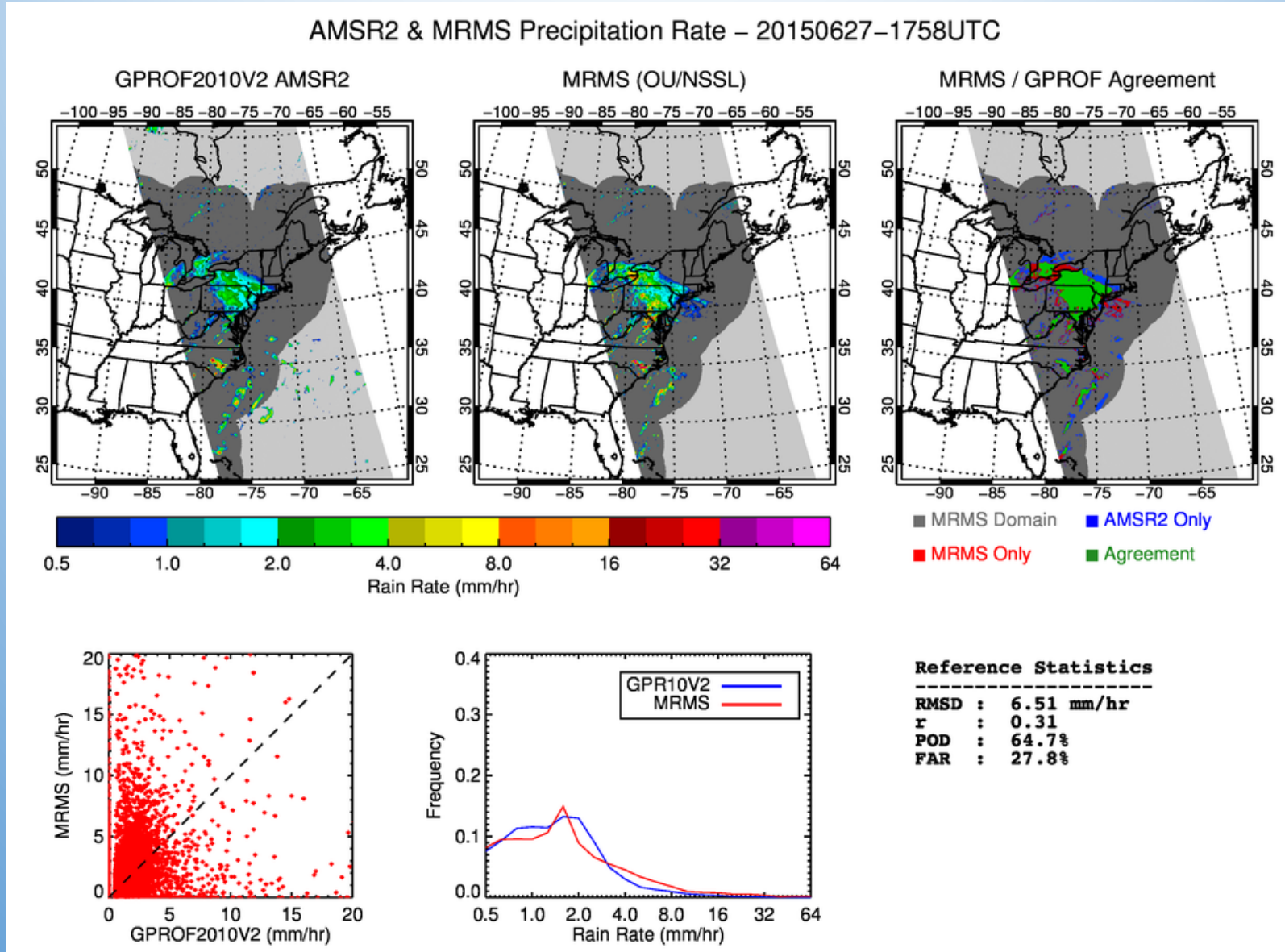
- Updated screening procedures to address snow/semi-arid surface (Meyers et al. 2015)

AMSR2 Precipitation Validation

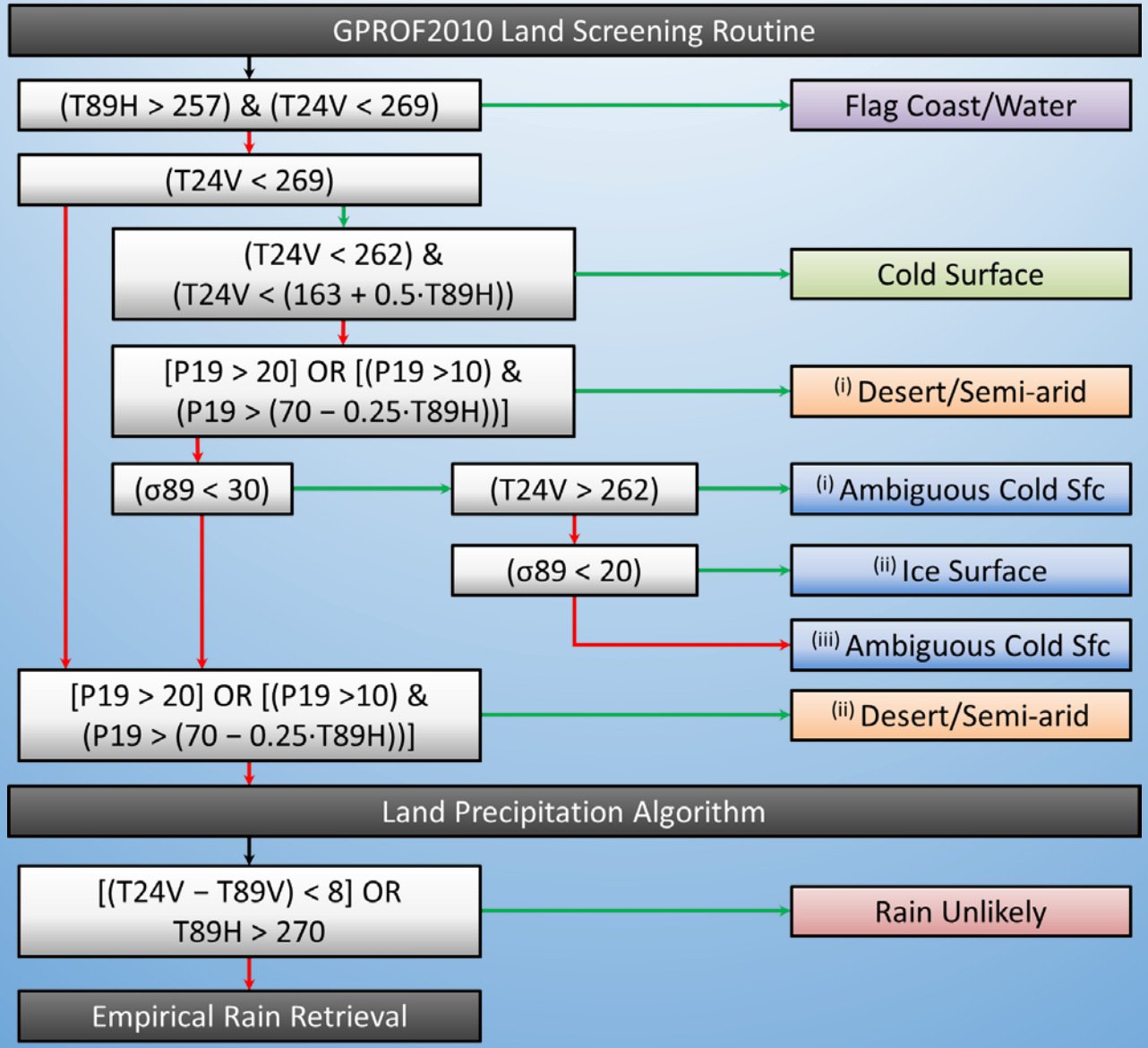




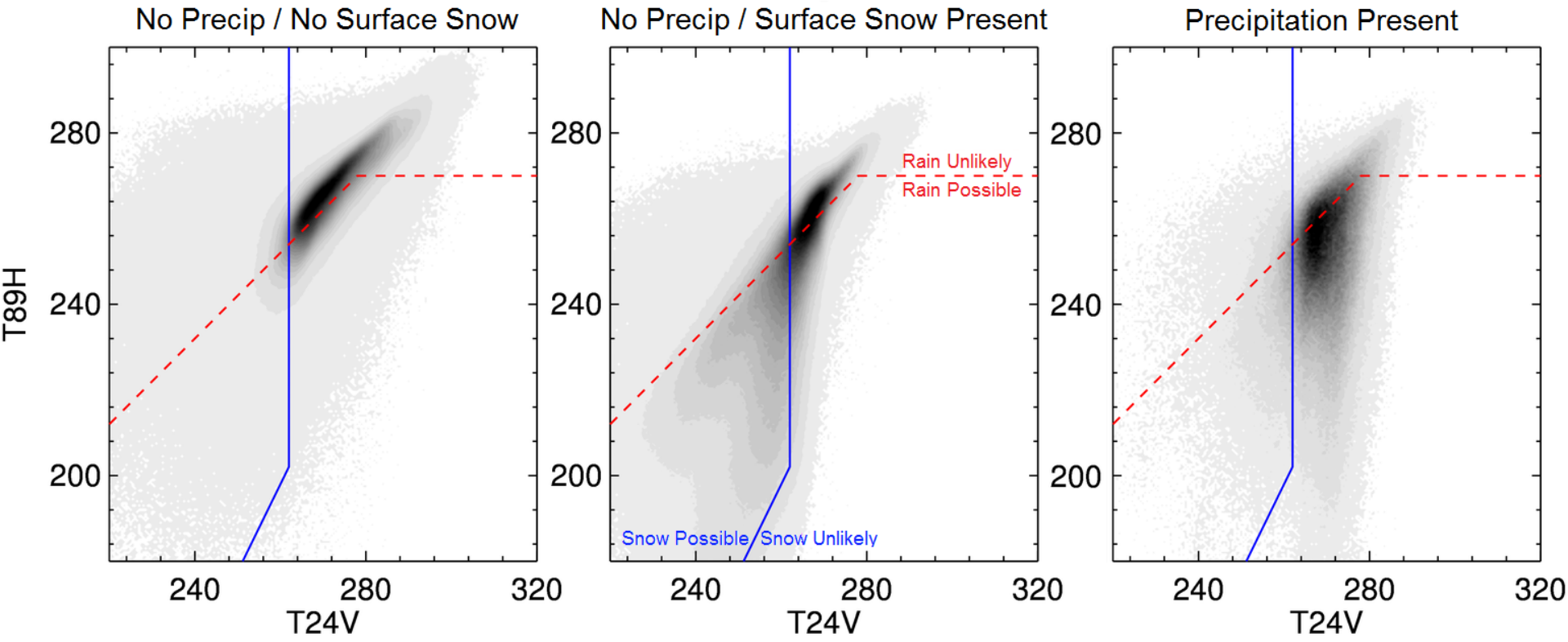
Routine Validation



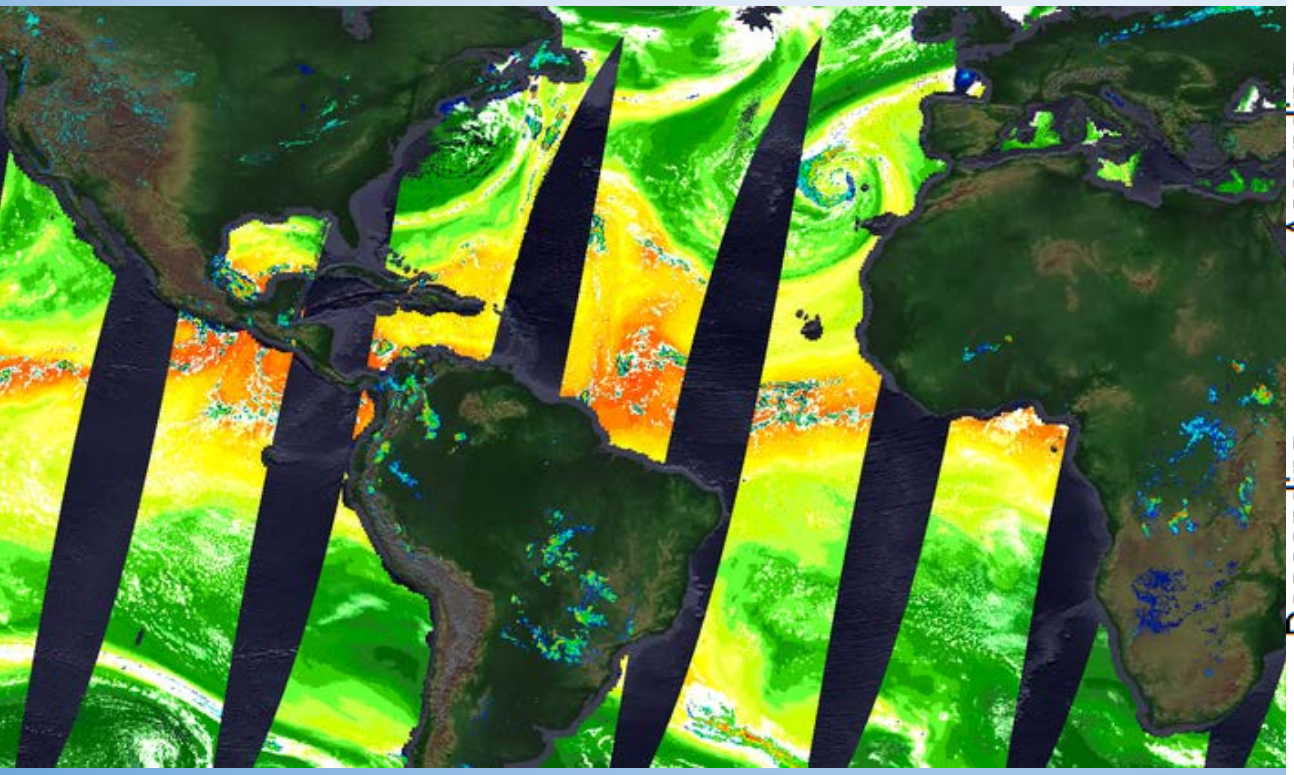
GPROF2010V2 Land Screening

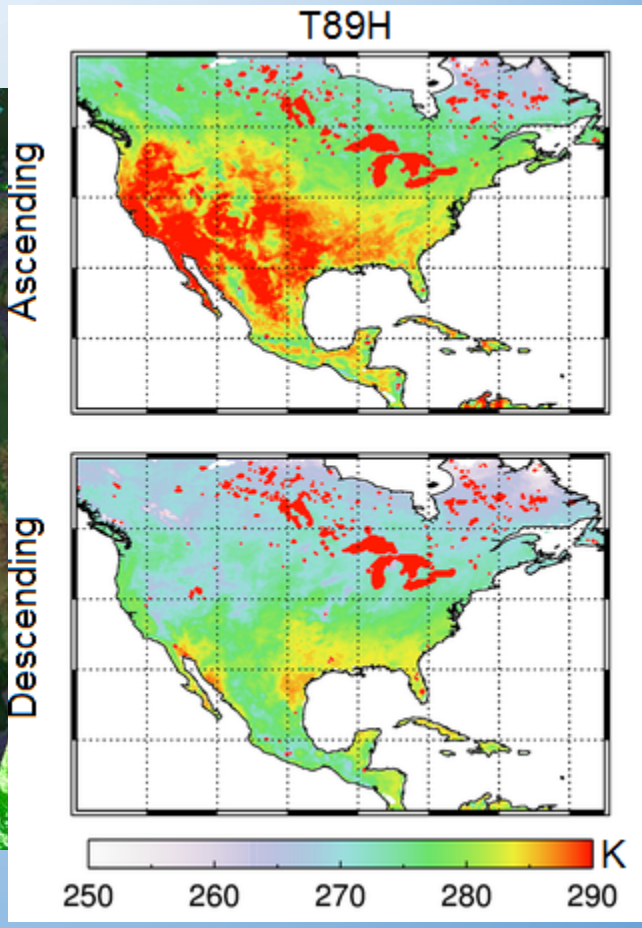


Similar Signals, Different Realities

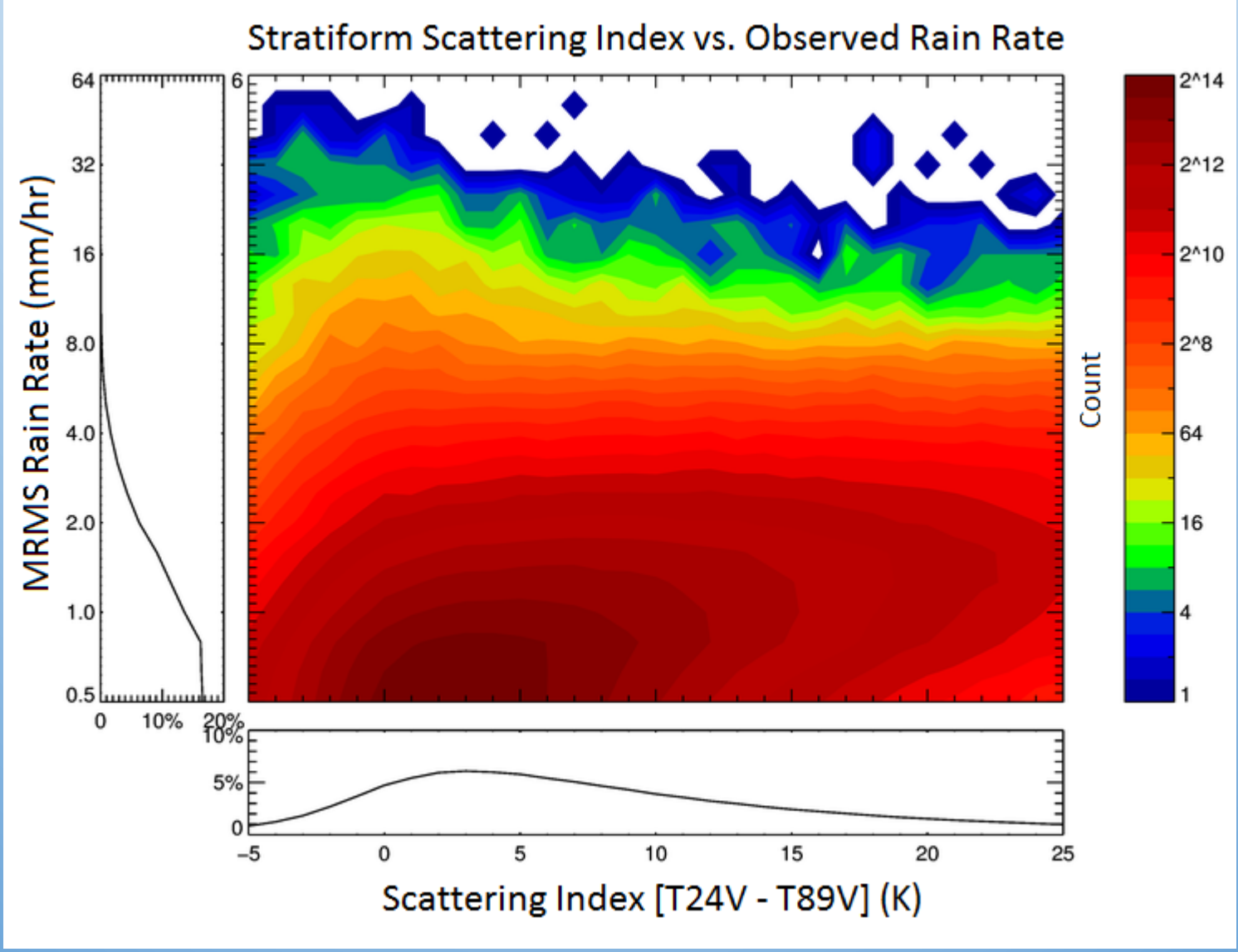


Low-End Noise in Overnight Rain

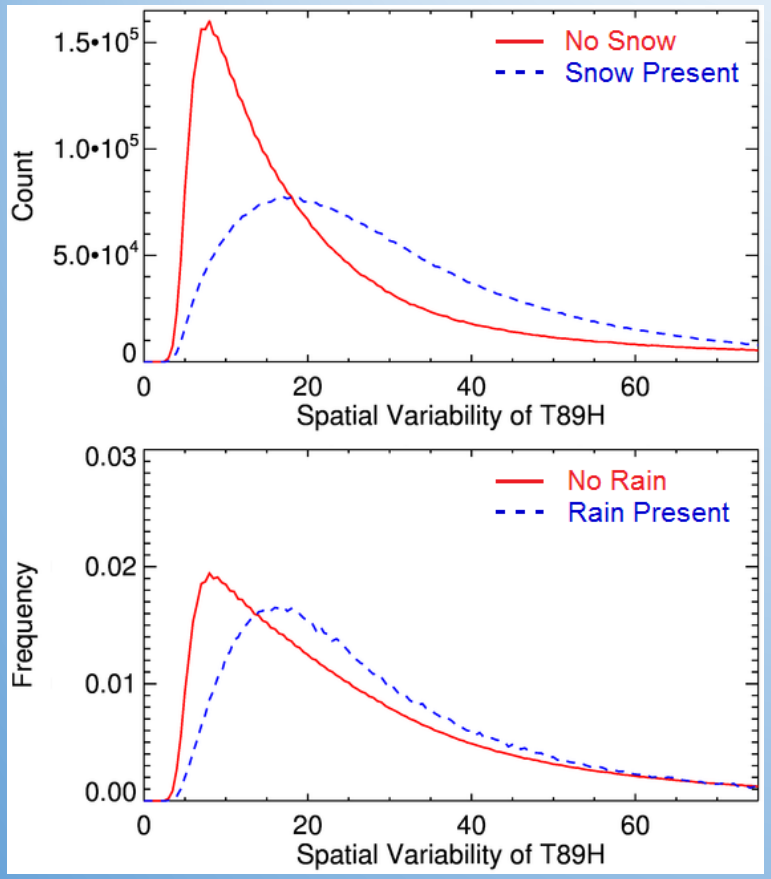




Stratiform Precipitation



Spatial Variability of T89-GHz

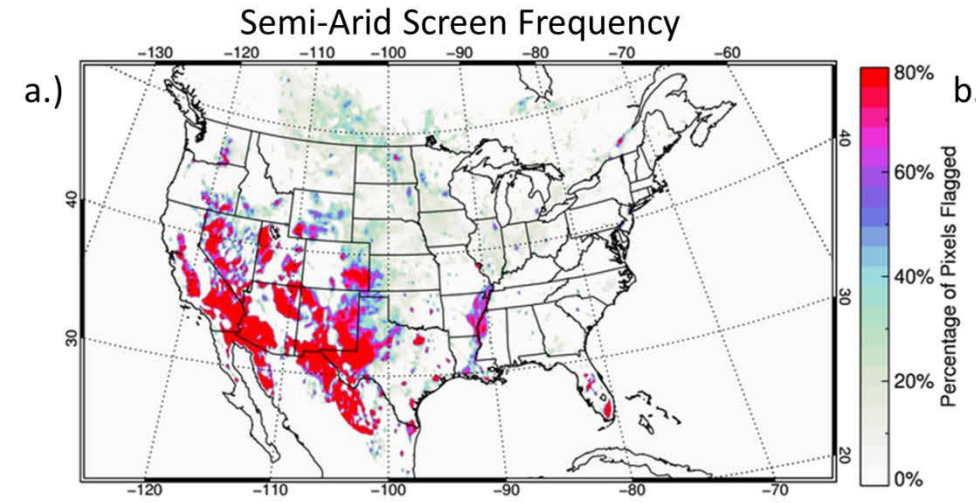


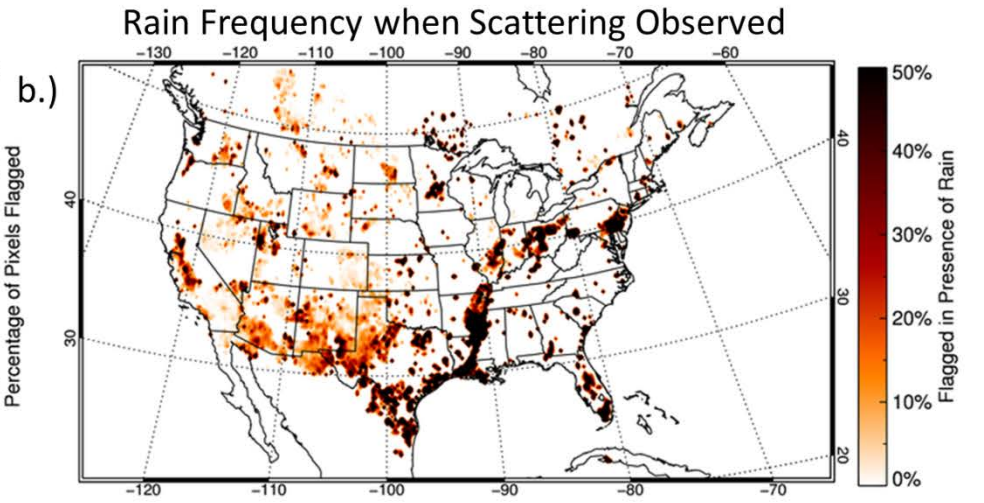
- Brightness temperature at 89-GHz is more sensitive to ice aloft

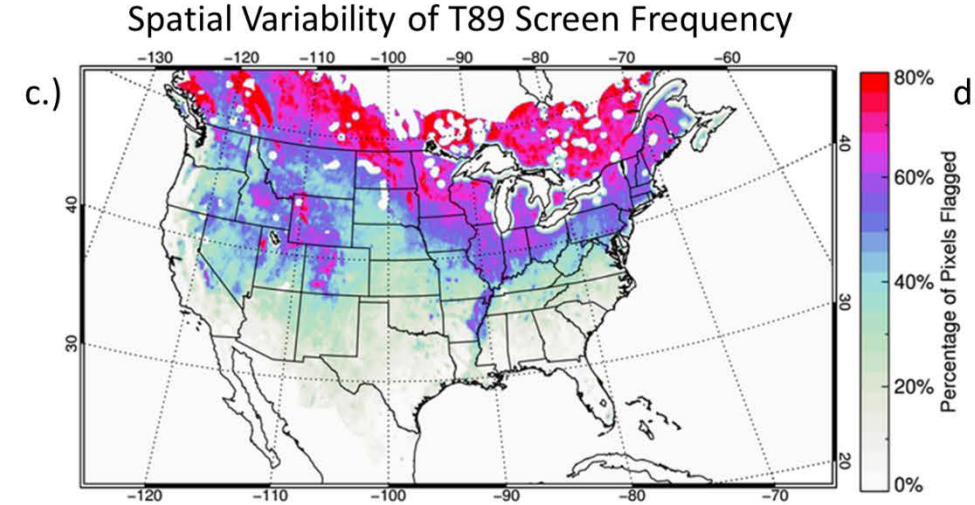
$$\sqrt{\frac{n^2 \sum T_{89H}^2 - \left(\sum T_{89H}\right)^2}{n^2 - 1}}$$

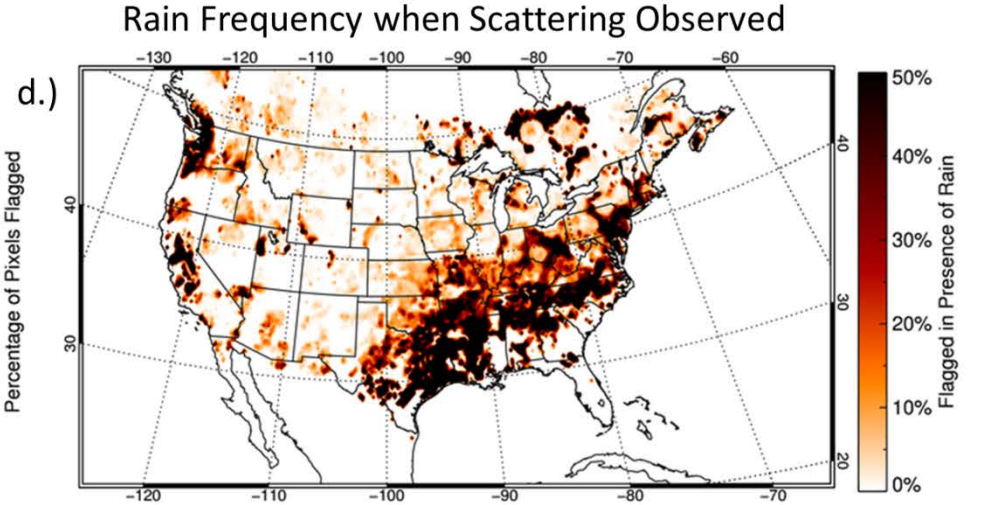
- Rain is spatially non-uniform, hence σ(T89)
- Snow/frozen surfaces expected to be much more uniform
- Not necessarily the case…

Flagging Frequency and False Flagging

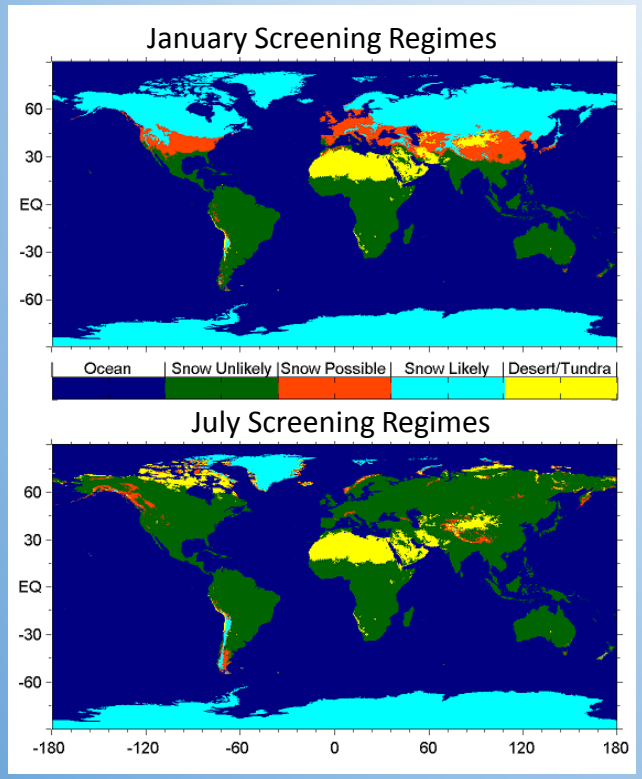


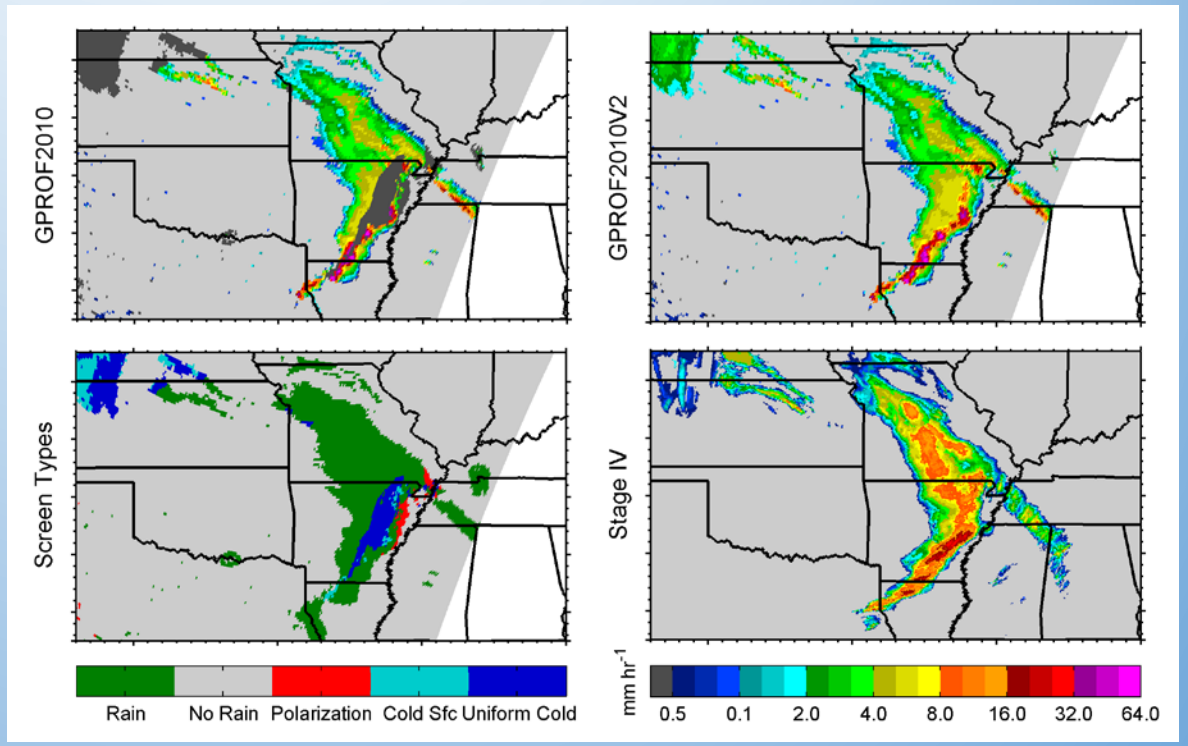






Changes to Screening: Conditional Approach

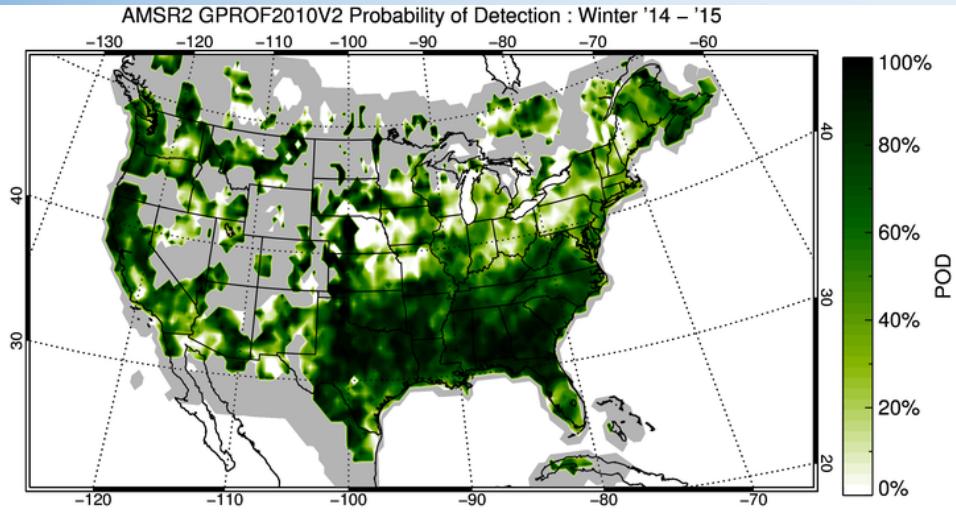


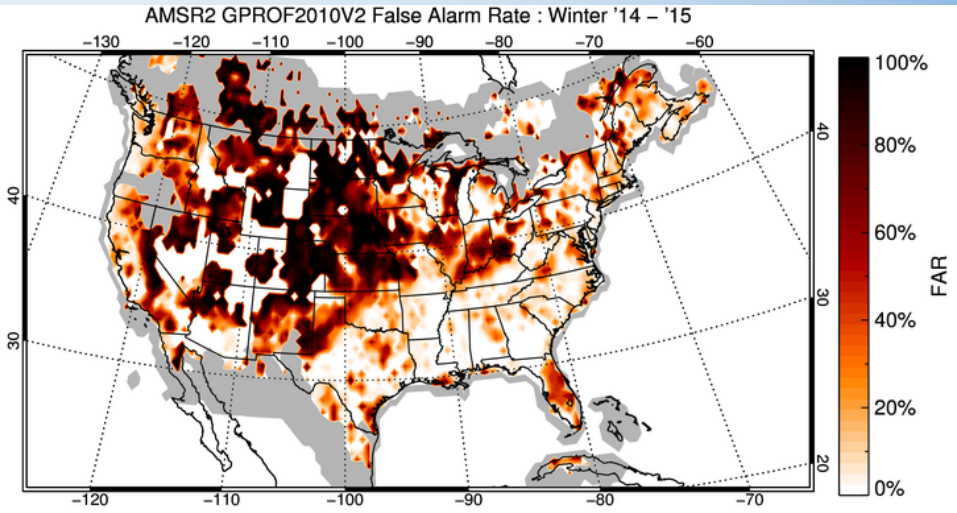


- Automatically screen where:

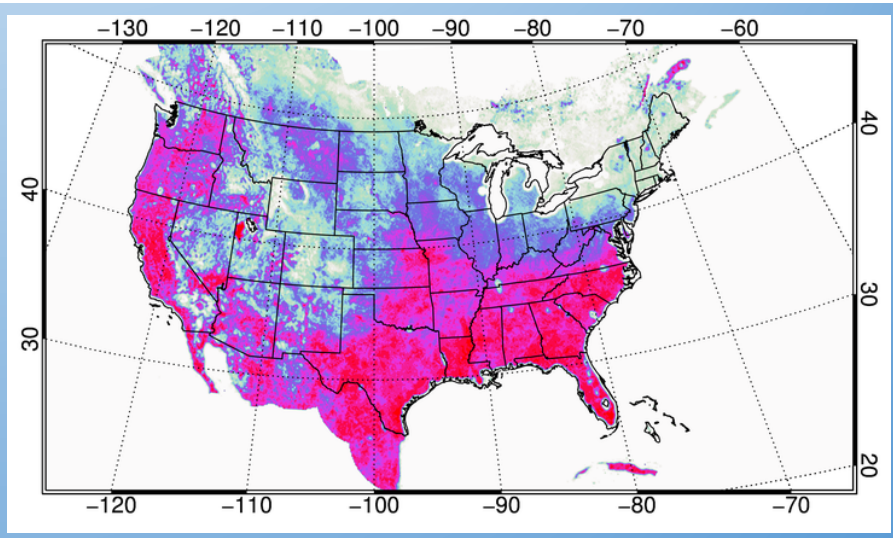
1. IMS monthly snow climatology indicates snow is likely
2. Over IGBP desert scenes

Probability of Detection / False Alarms

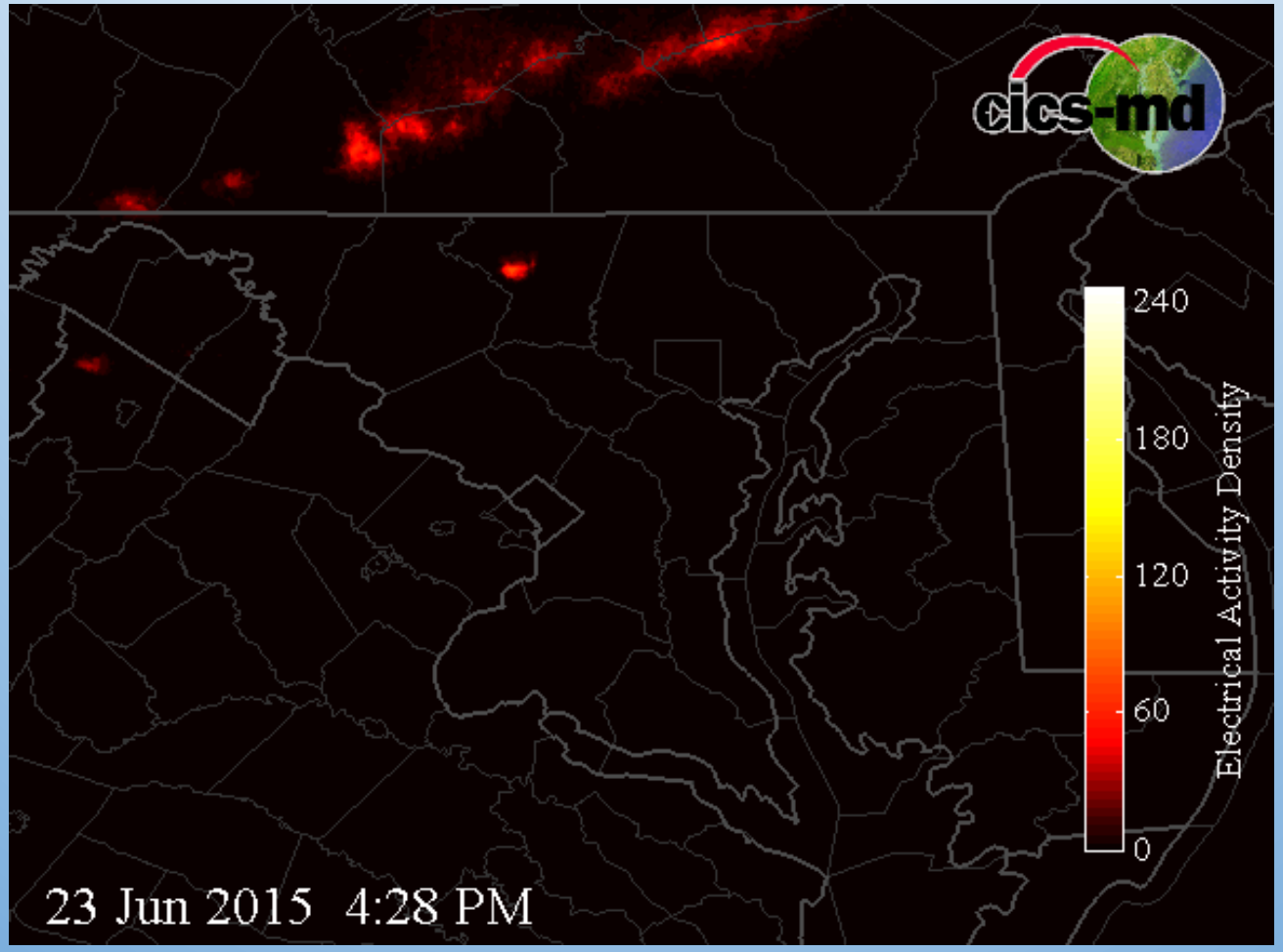




- Poor detection in winter areas
- Lack of scattering of light precipitation



Future Work


cics-md
240
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120
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Electrical Activity Density
23 Jun 2015 4:28 PM

Summary

- GPROF2010V2 is operational for AMSR2 and meets NOAA's accuracy and latency requirements
- Empirical Tb relationships are insufficient in identifying light precipitation
- Geographic thresholds needed
- GPROF2014 employs a fully-parametric approach over all surface types (Kummerow et al. 2015)