

Transitioning GridSat-B1 CDR Intercalibration from HIRS to VIIRS: Maintaining 45+ Year Satellite Continuity

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Problem

Designed in 2012, GridSat-B1 provides spatially and temporally consistent Infrared Window brightness temperature (T_b) observations by normalizing data to HIRS channel 8 data.

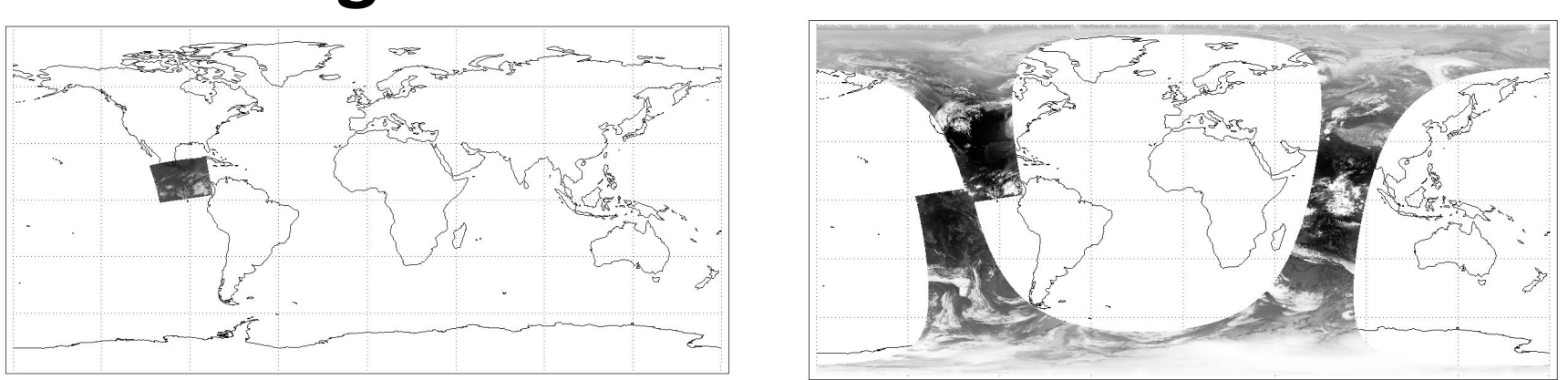
However, HIRS data is ending. Hence a new inter-calibration source is needed to continue the Gridsat-B1 Climate Data Record (CDR).

Solution

Use VIIRS Global Area Coverage (VGAC) data to inter-calibrate IR Window T_b data.

What is VGAC?

- VGAC is a smaller, simpler version of VIIRS data.
- Data provided in orbits (14 files per day)
 - Spatial resolution nearly constant at 4 km (~AVHRR)
 - 1 year of data:
 - VIIRS: ~9,500,000 files, 118 TB
 - VGAC: 5250 files, 2.2 TB
 - **1 day of VIIRS has same volume as 53 days VGAC**
 - **1 VIIRS granule** **1 VGAC orbit**

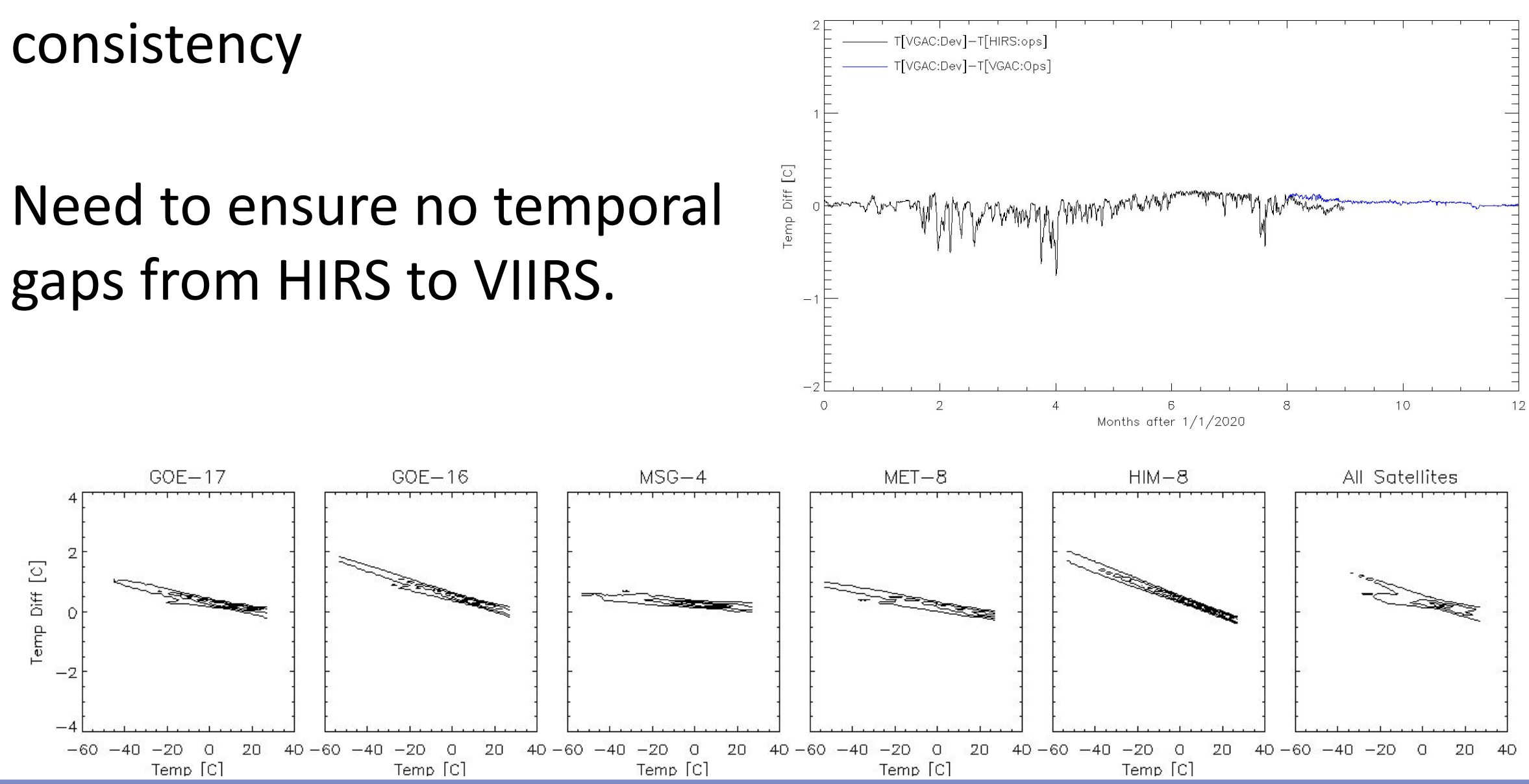


To learn more: Paper 12.1, Wednesday @ 4:30 p.m. in Room 370D

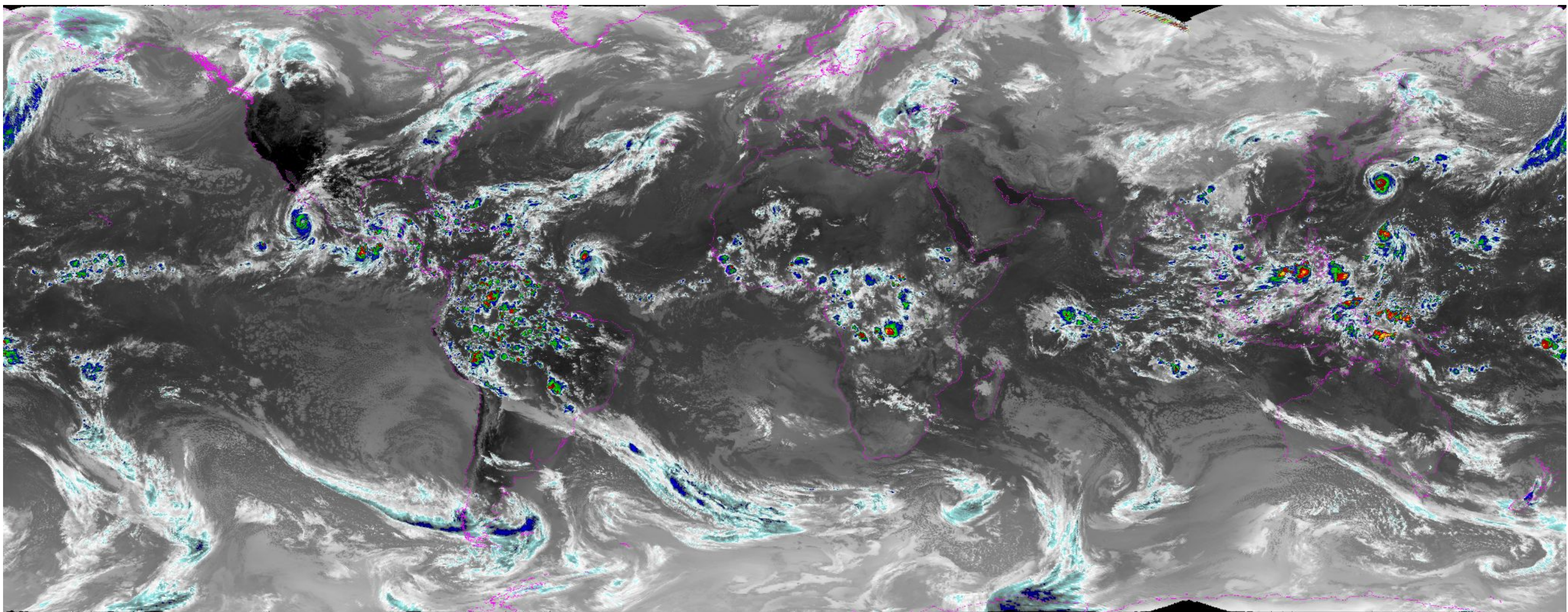
Why adjust VGAC to HIRS?

Temporal consistency: HIRS was used for temporal consistency

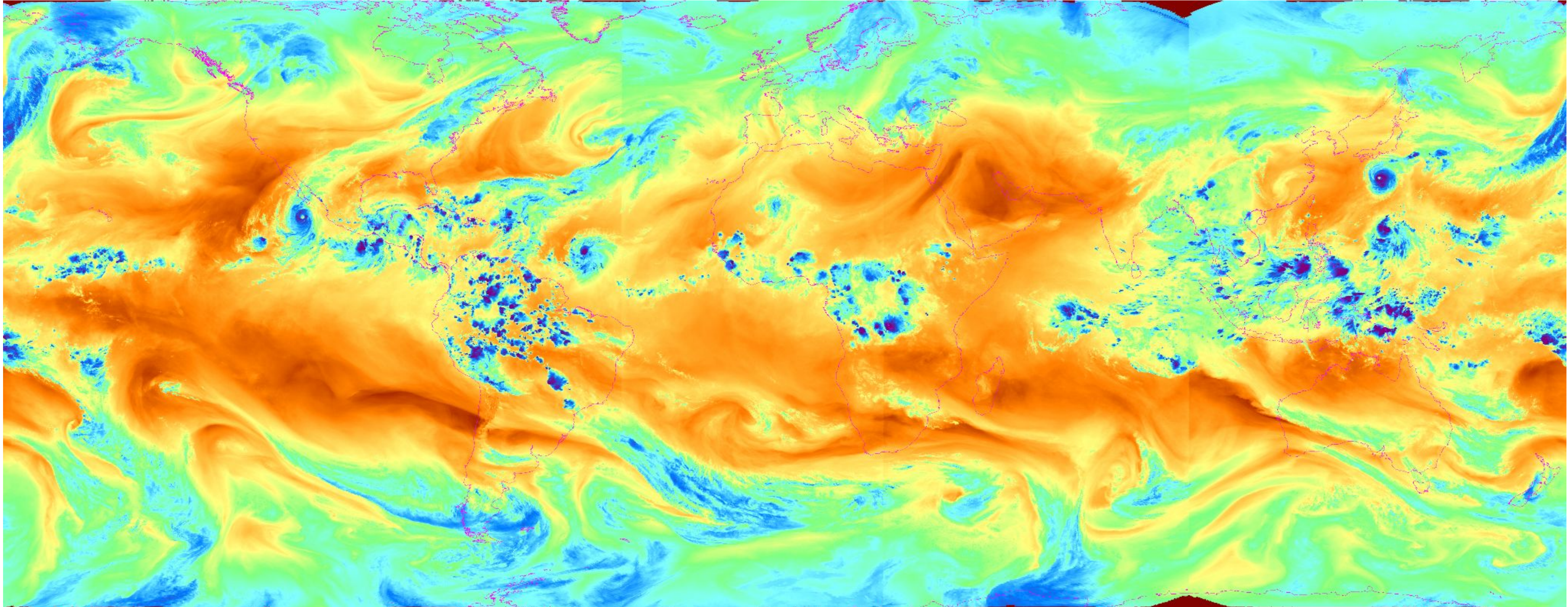
Need to ensure no temporal gaps from HIRS to VIIRS.



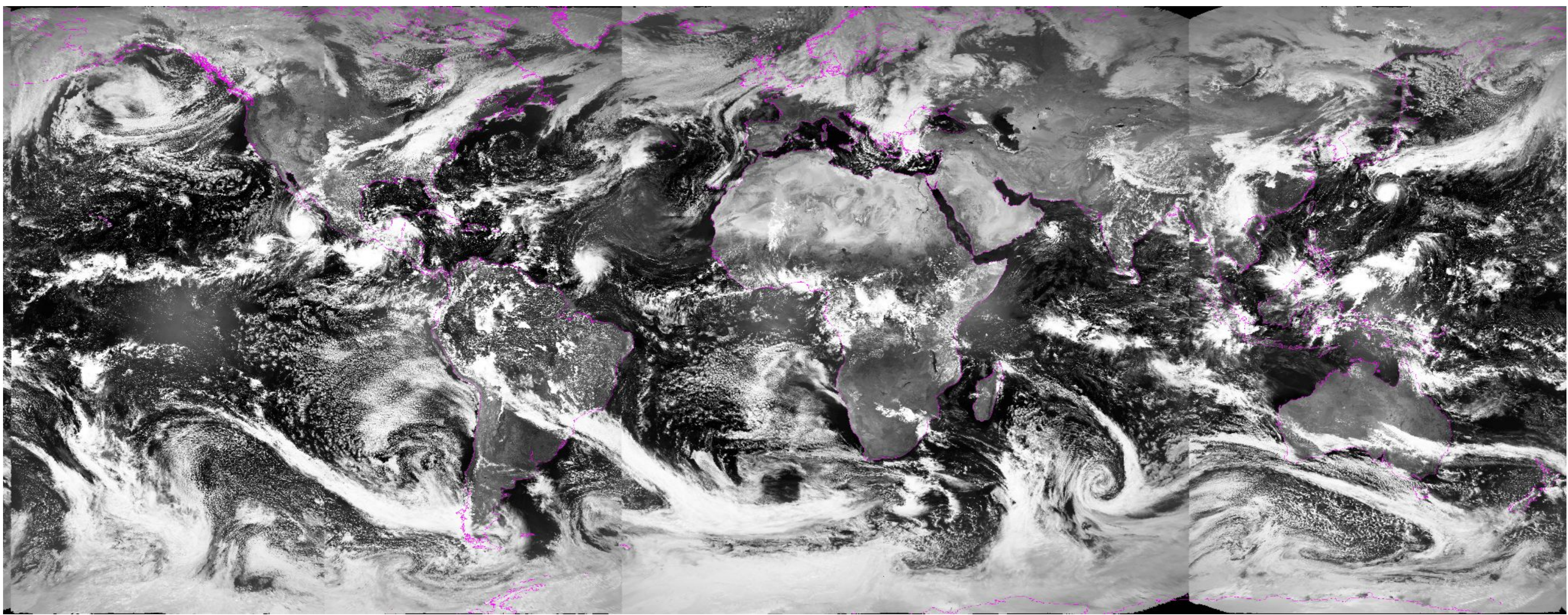
Climate Data Record of the GridSat-B1 global merged IR window (~11 μ m)



GridSat-B1 IR water vapor (~6.7 μ m) channel using a simulated channel for MSG satellites.

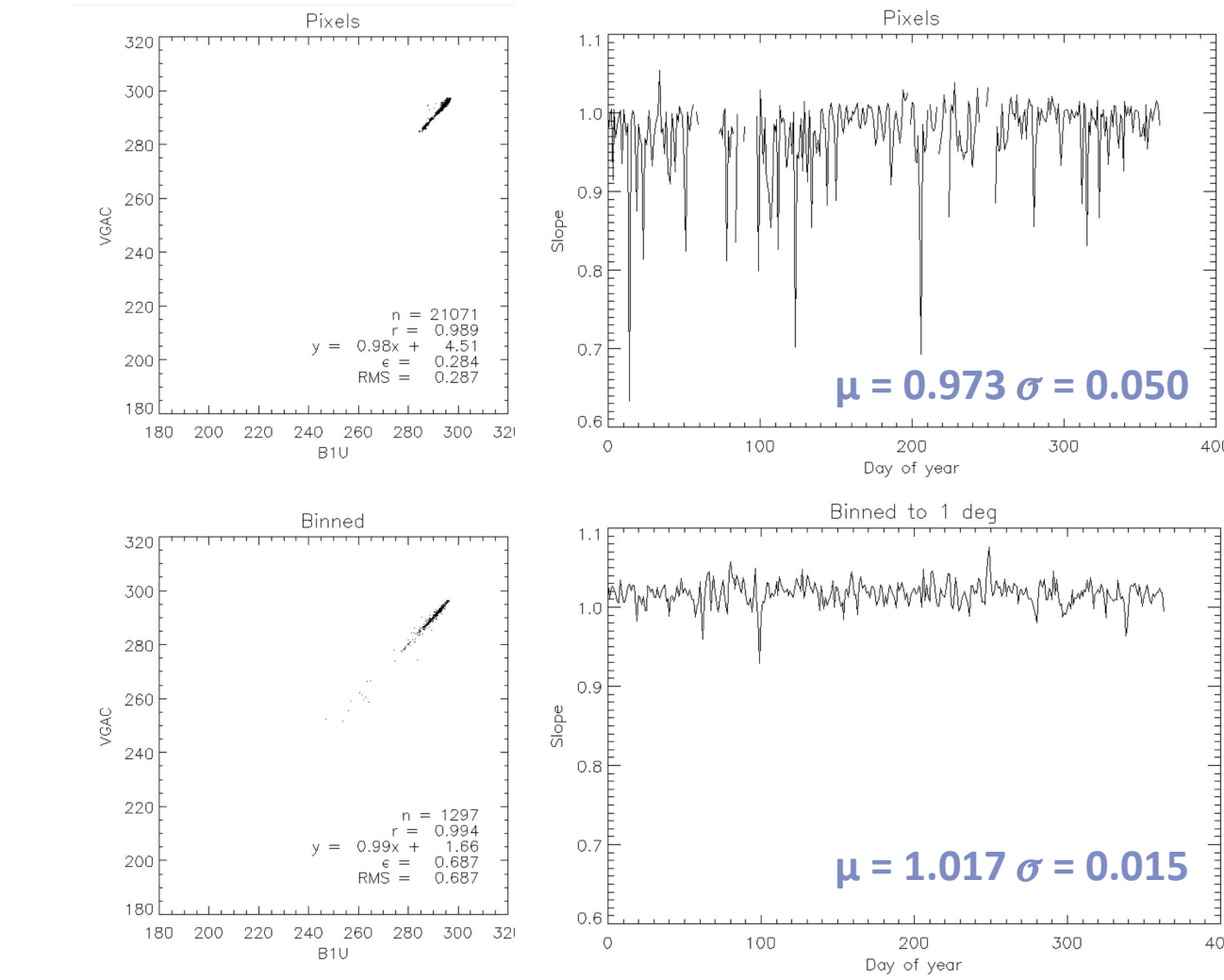


GridSat-B1 visible channel (~0.6 μ m) merged from local noon images



Matchups: Pixels vs. bins

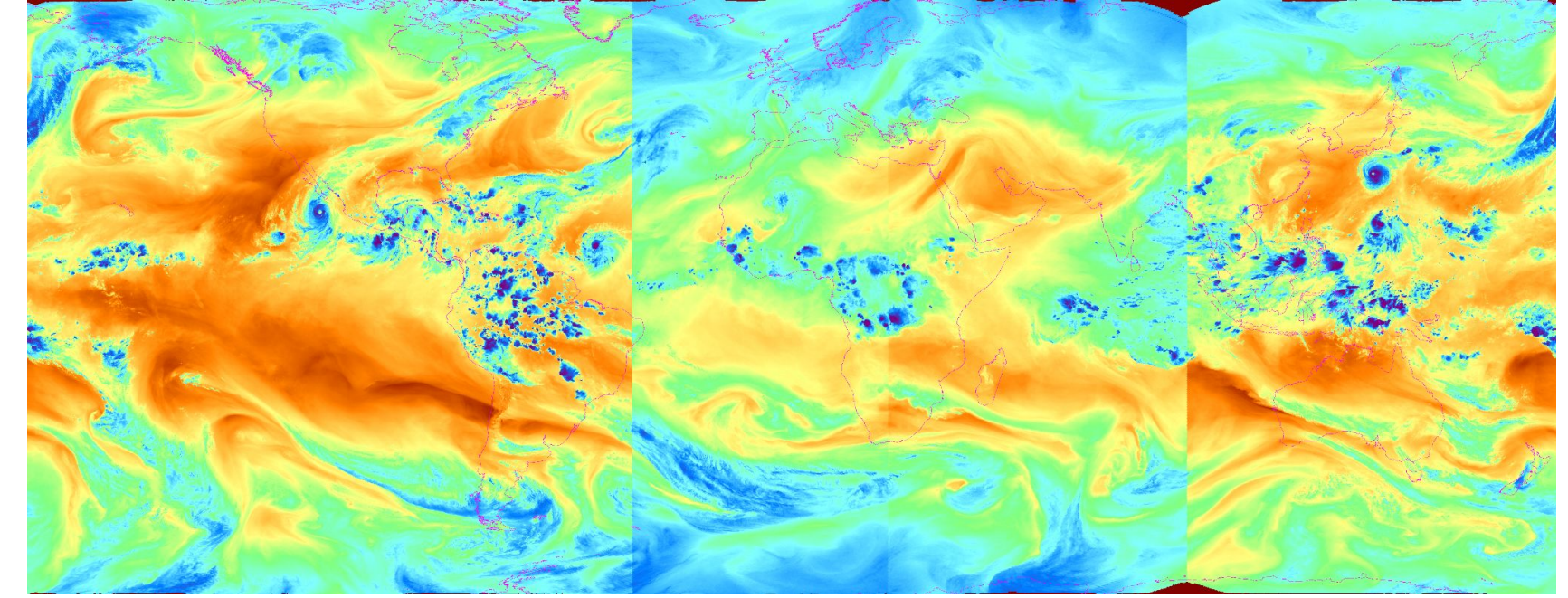
- Co-location errors/uncertainties average out by collecting matchups at larger bins: ~1 deg
- Number of matches decreases, but the signal to noise increases



Aside: Global Water Vapor

- GOES and Himawari had 6.7 μ m water vapor channels
- Meteosat Second Generation (MSG) has 6.2 and 7.3 μ m
- MSG channels can be combined to simulate 6.7 μ m

Global water vapor channel with *no adjustment*



Compare with image at left

Summary

- The Gridsat dataset continues.
- Updated monthly.
 - Intercalibration with HIRS and VGAC ensures temporal consistency
 - GridSat-B1 CDR: 1981 - present (45 years and counting)
 - 0.07 resolution (~8 km)
 - Useful for clouds, hurricanes, precipitation, surface properties, and more

