

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

Ken Knapp, Knapp WeatherSat Services



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).

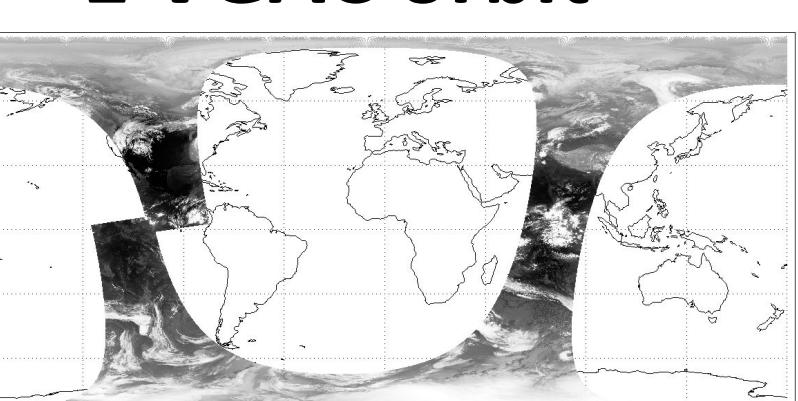
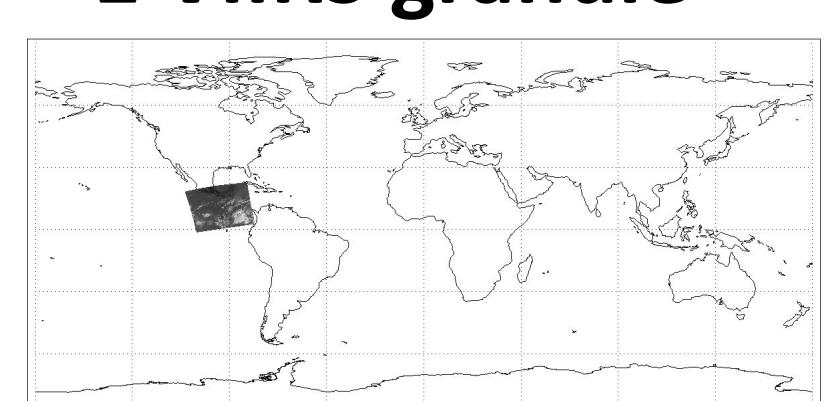
Solution

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**

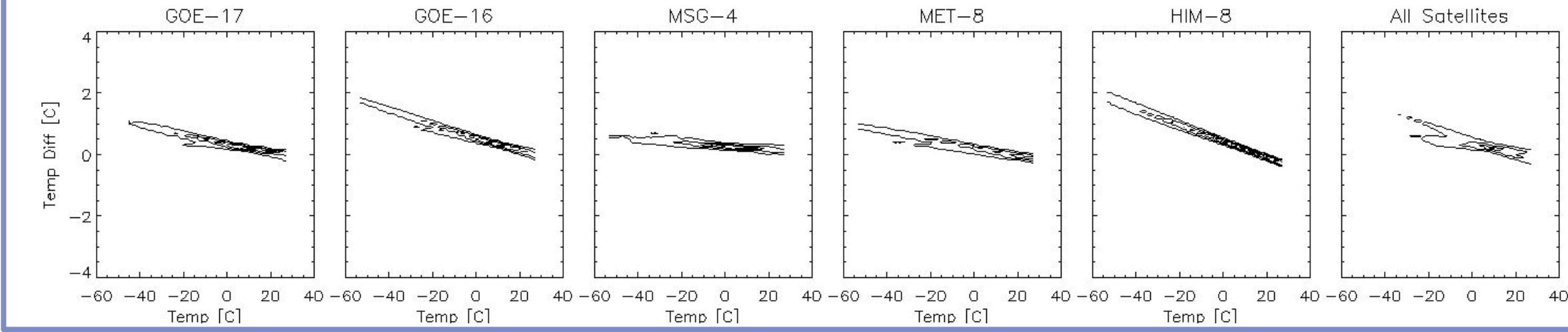
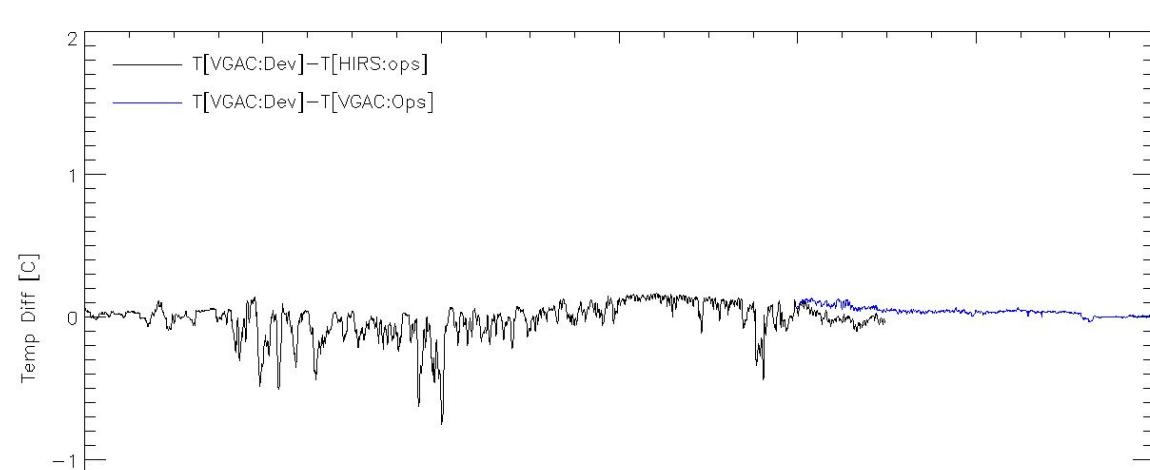


To learn more: Paper 12.1, Wednesday @ 4:30 p.m. in Room 370D

Why adjust VGAC to HIRS?

Temporal consistency: HIRS was used for temporal consistency

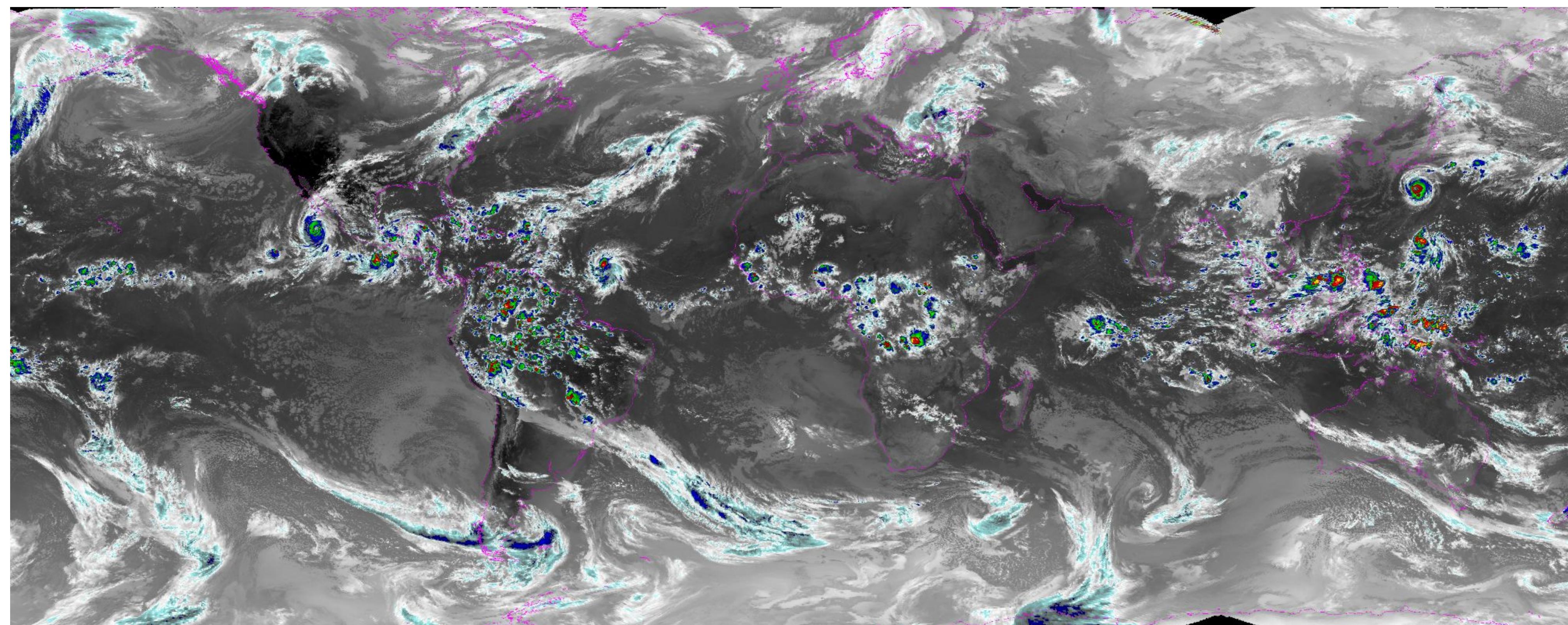
Need to ensure no temporal gaps from HIRS to VIIRS.



In partnership with

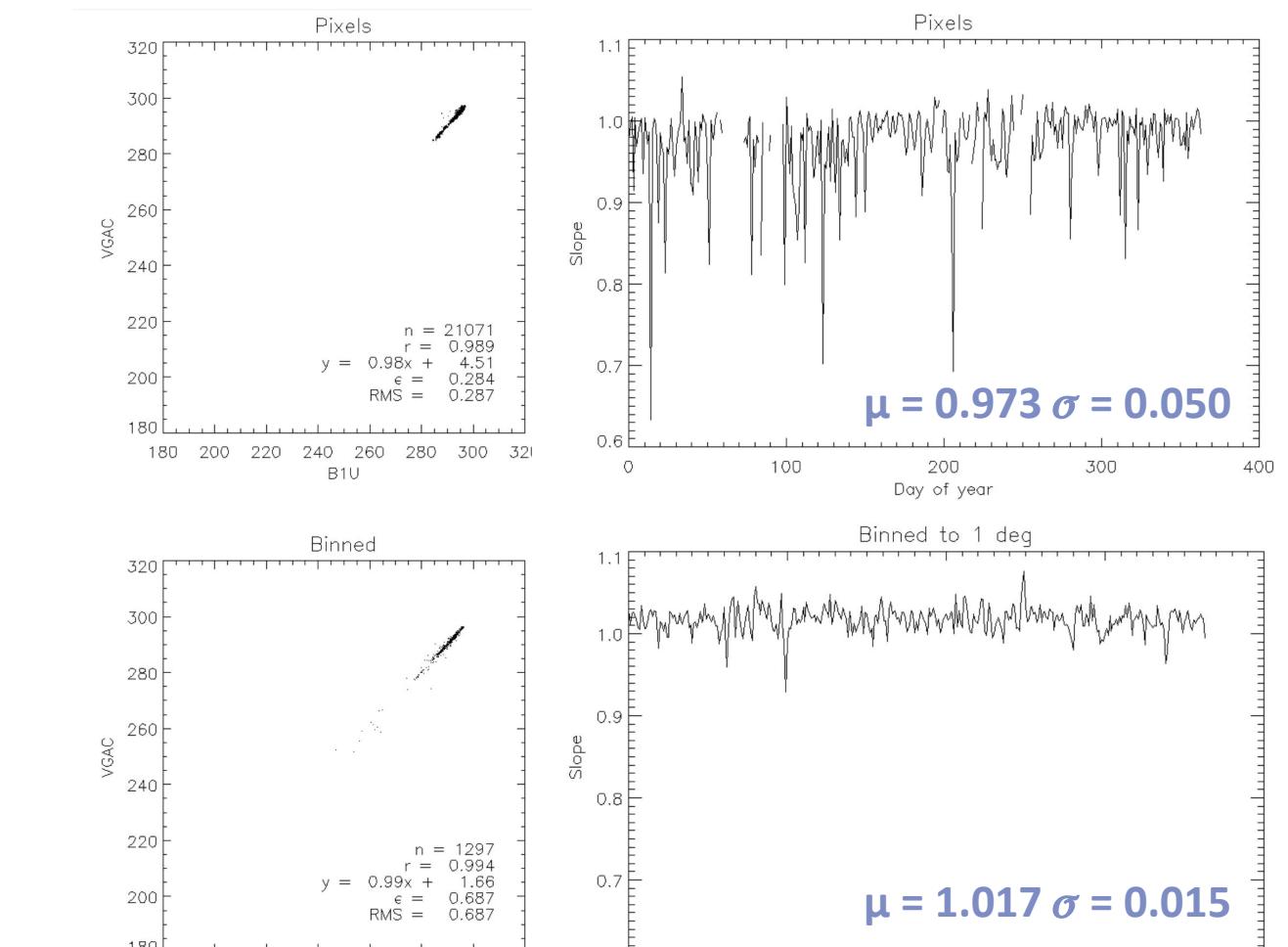


Climate Data Record of the GridSat-B1 global merged IR window (~11 um)

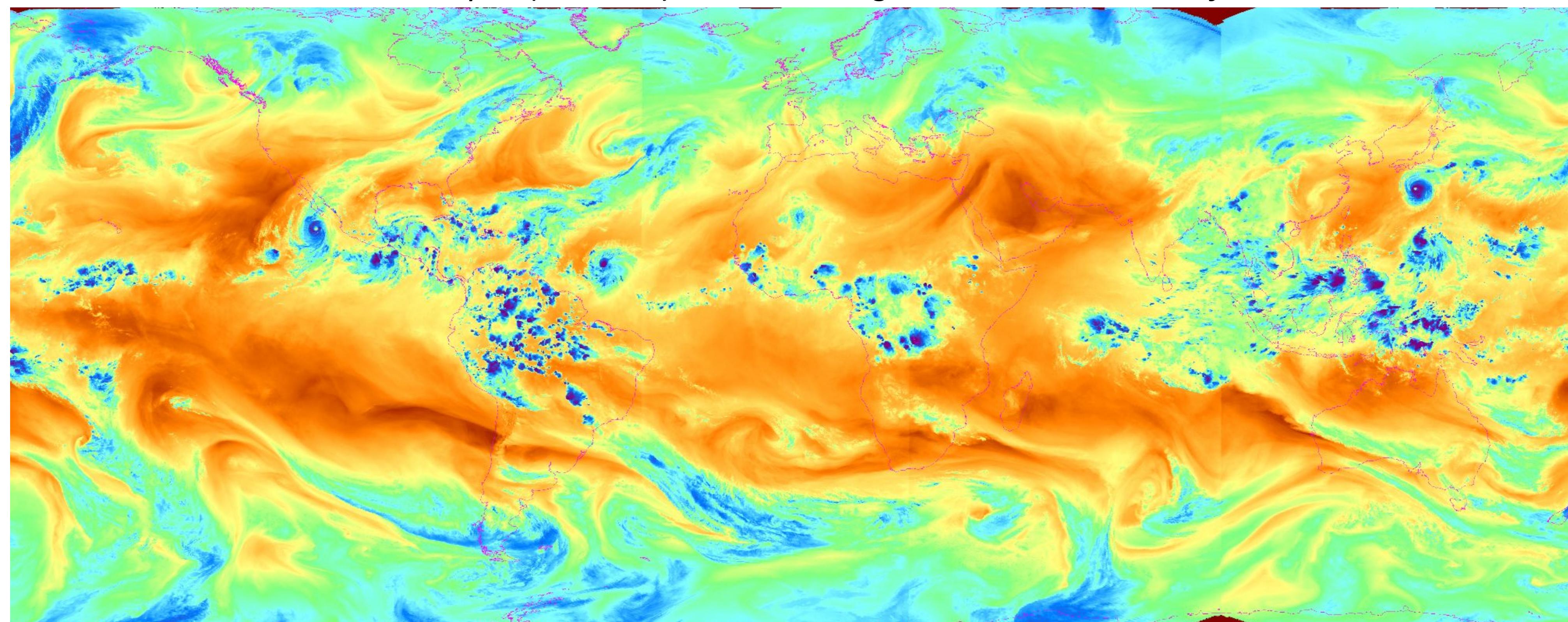


Matchups: Pixels vs. bins

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



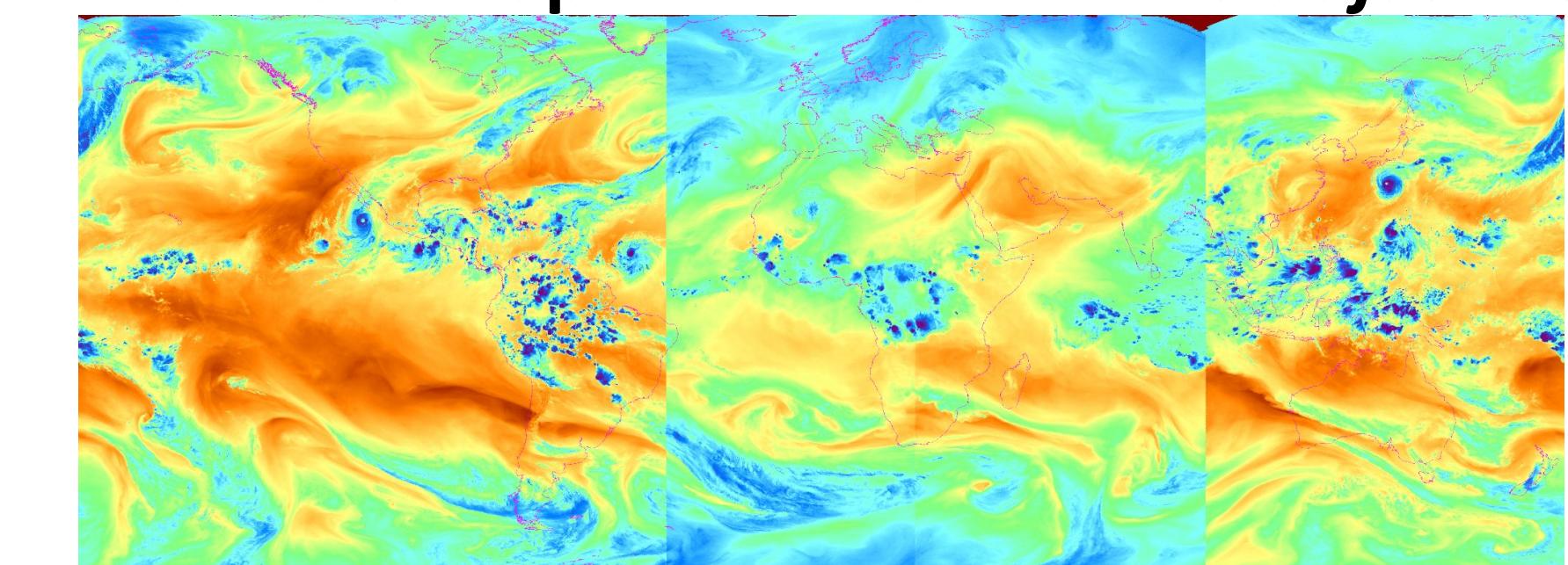
GridSat-B1 IR water vapor (~6.7 um) channel using a simulated channel for MSG satellites.



Aside: Global Water Vapor

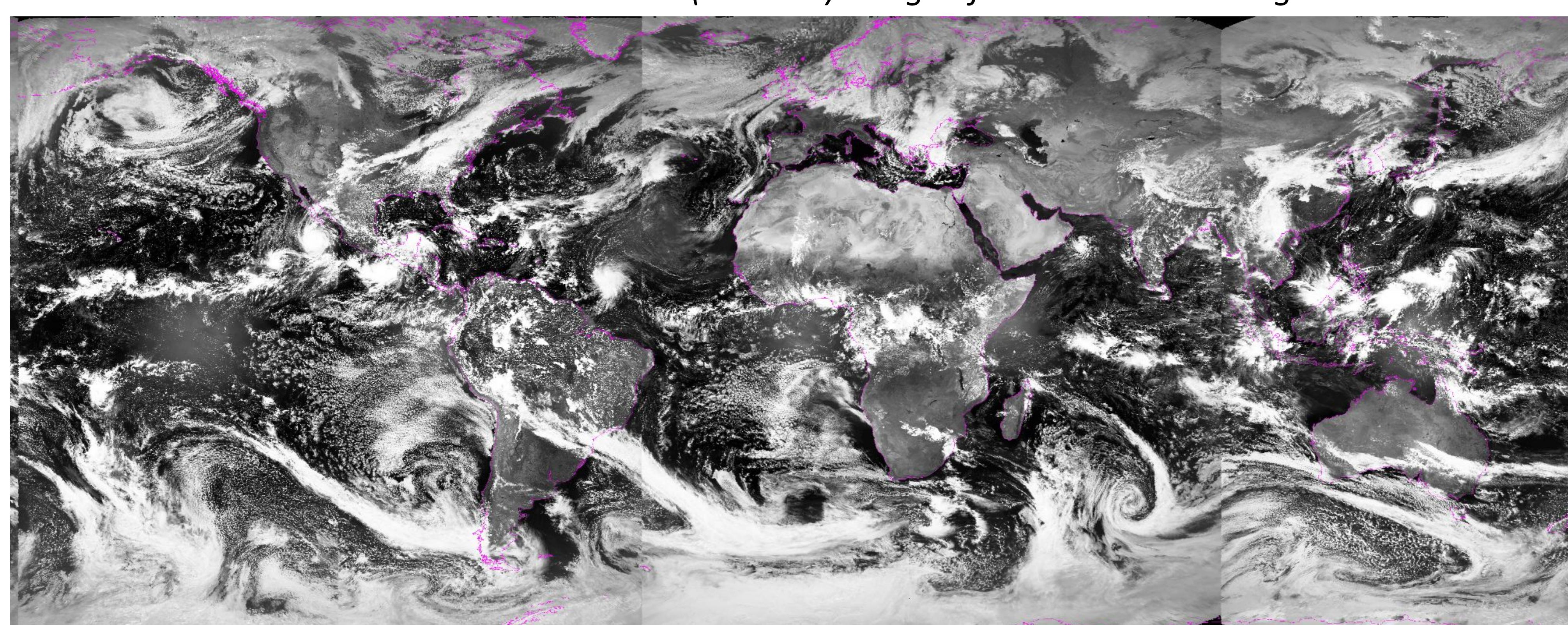
- GOES and Himawari had 6.7 um water vapor channels
- Meteosat Second Generation (MSG) has 6.2 and 7.3 um
- MSG channels can be combined to simulate 6.7 um

Global water vapor channel with *no adjustment*



Compare with image at left

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



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