

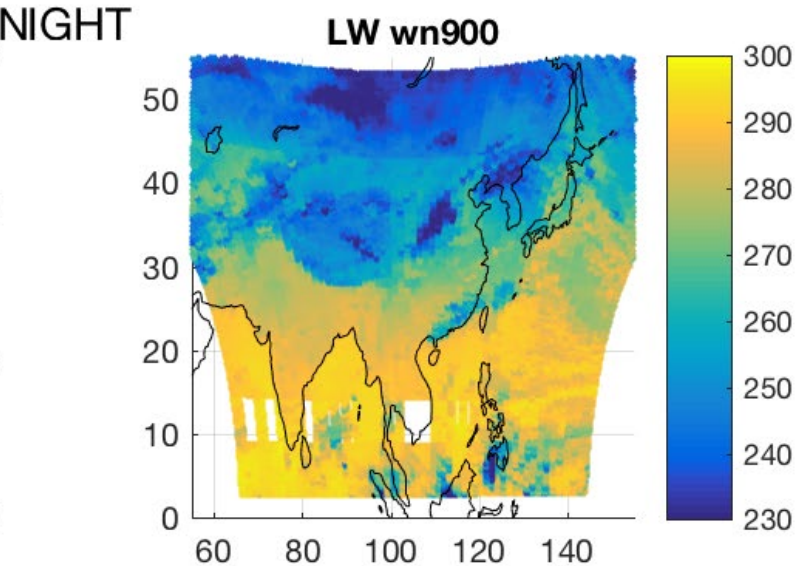
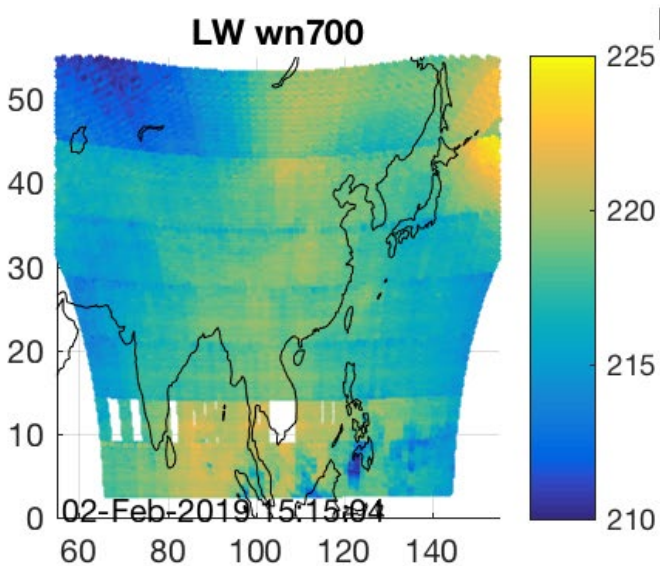
# GIIRS L1B Assessment

## Summary:

1. Currently receiving L1B data with low latency
  - 2 hour scans of northern hemisphere disk
  - Interlaced with mesoscale obs of China
  - Unsure of L0-L1B processing steps
2. Findings regarding L1B data quality:
  - Occasionally out-of-family bad "rows" of data
  - Large spectral calibration errors
  - Large, time and detector dependent, radiometric differences wrt CrIS
3. Recent communications suggest
  - new L0-L1B calibrations will be put in place soon
  - New mesoscale data collection strategy

2 Feb 2019

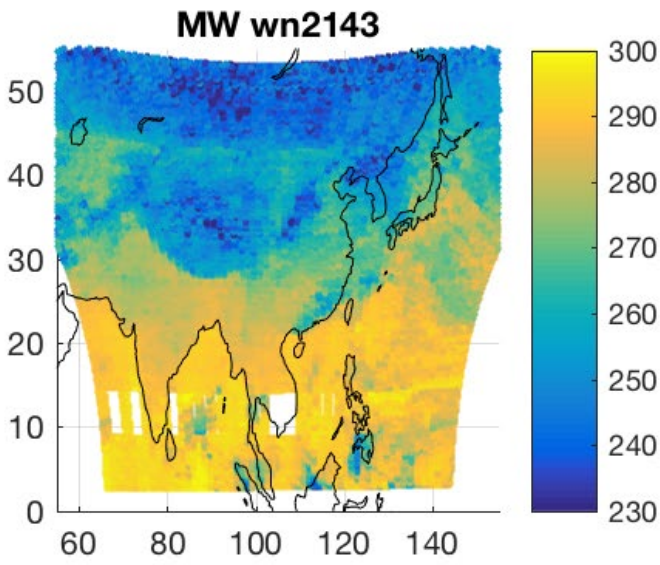
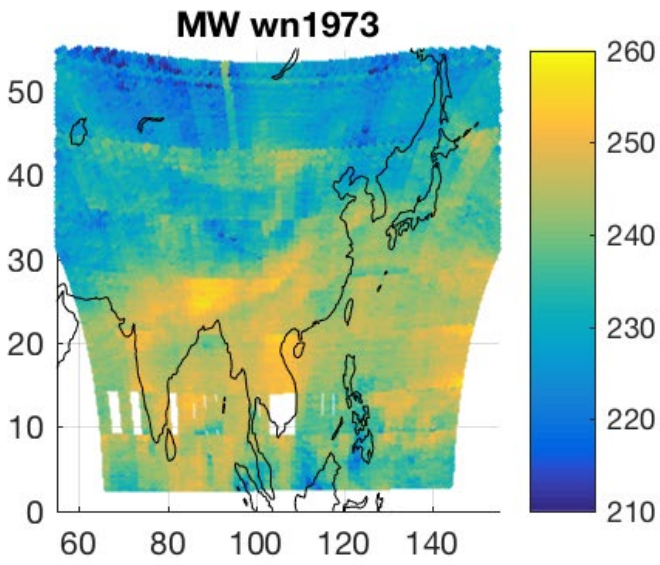
Tropopause  
in CO2 band



CMA GIIRS L1B

LW Window

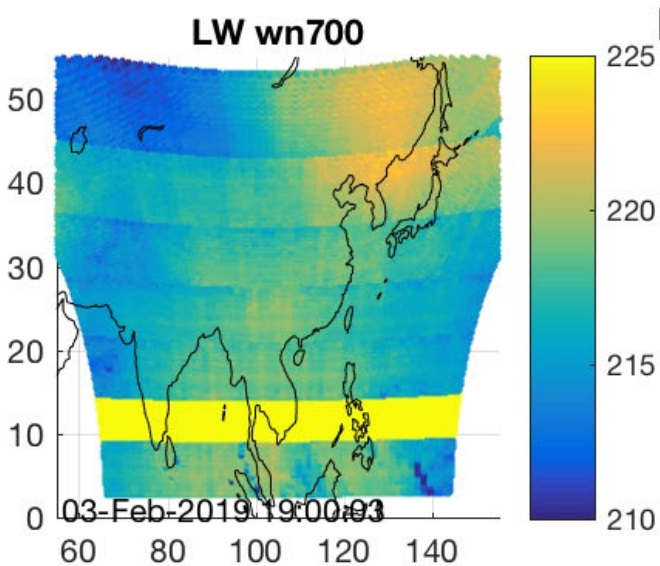
Water Vapor



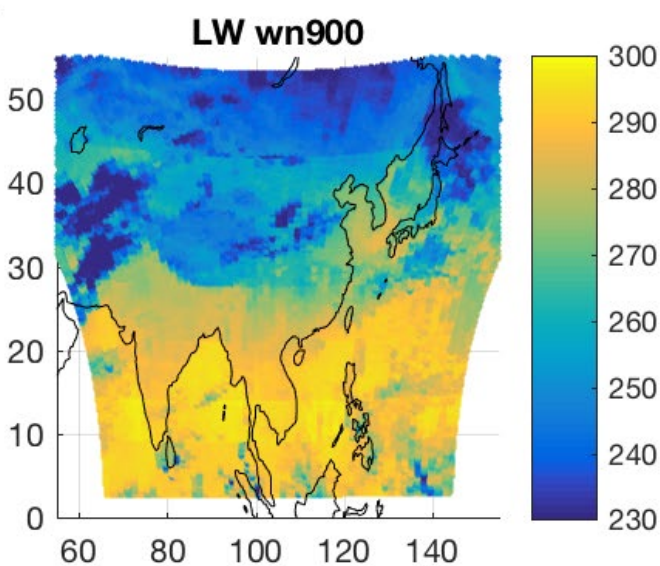
SW Window  
near CO

3 Feb 2019

Tropopause  
in CO2 band



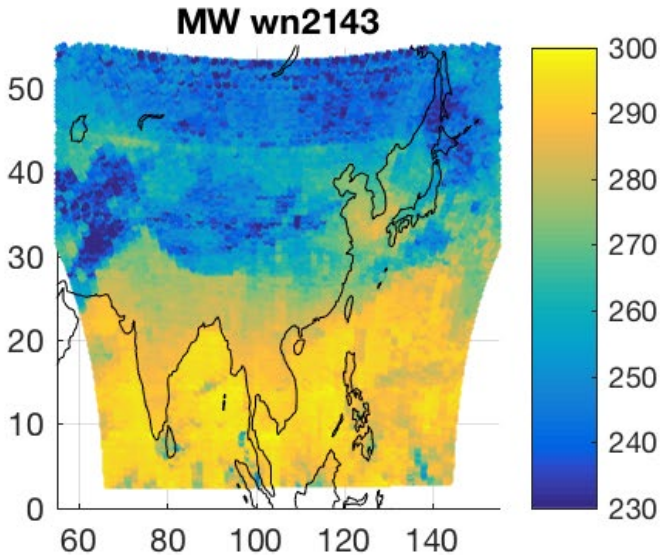
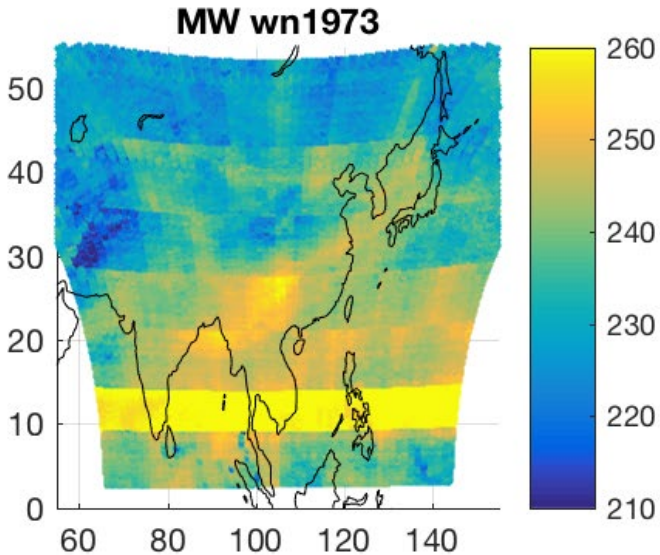
NIGHT



CMA GIIRS L1B

LW Window

Water Vapor

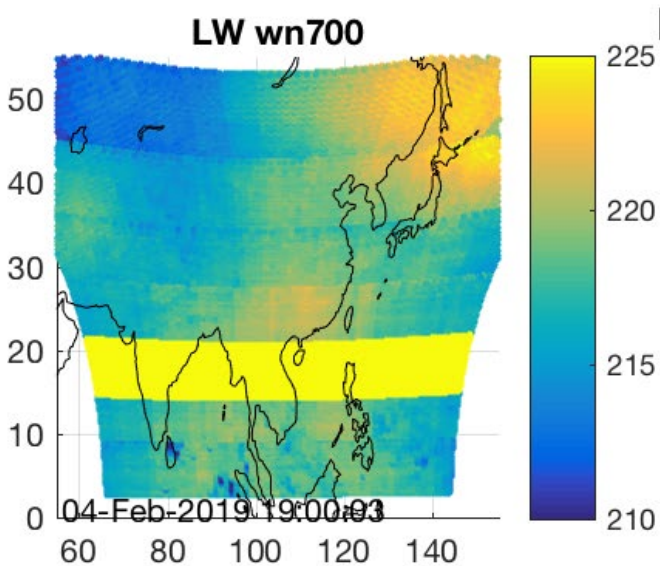


SW Window  
near CO

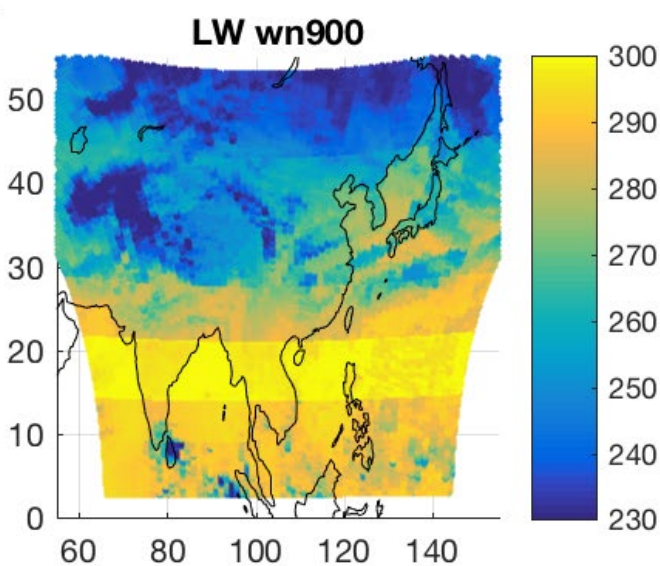


4 Feb 2019

Tropopause  
in CO2 band



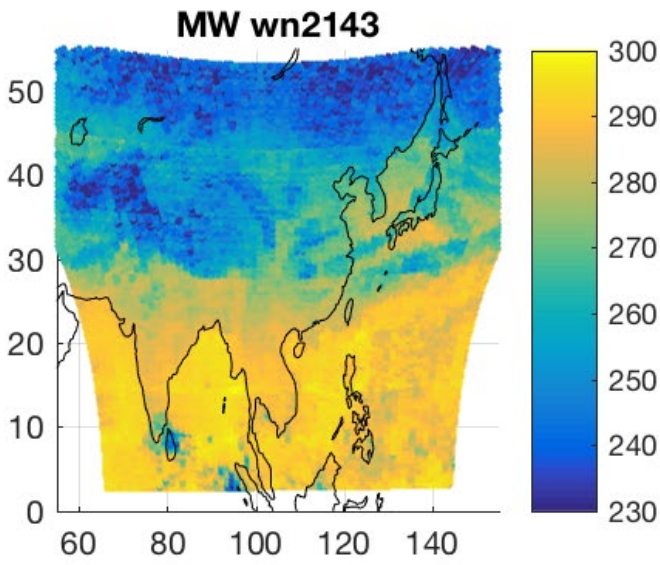
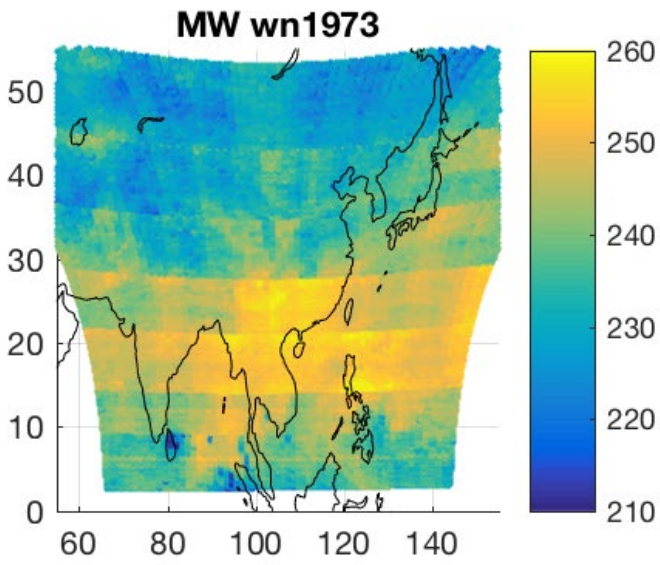
NIGHT



CMA GIIRS L1B

LW Window

Water Vapor



SW Window  
near CO



## GIIRS/CrIS Simultaneous Nadir Overpass Method

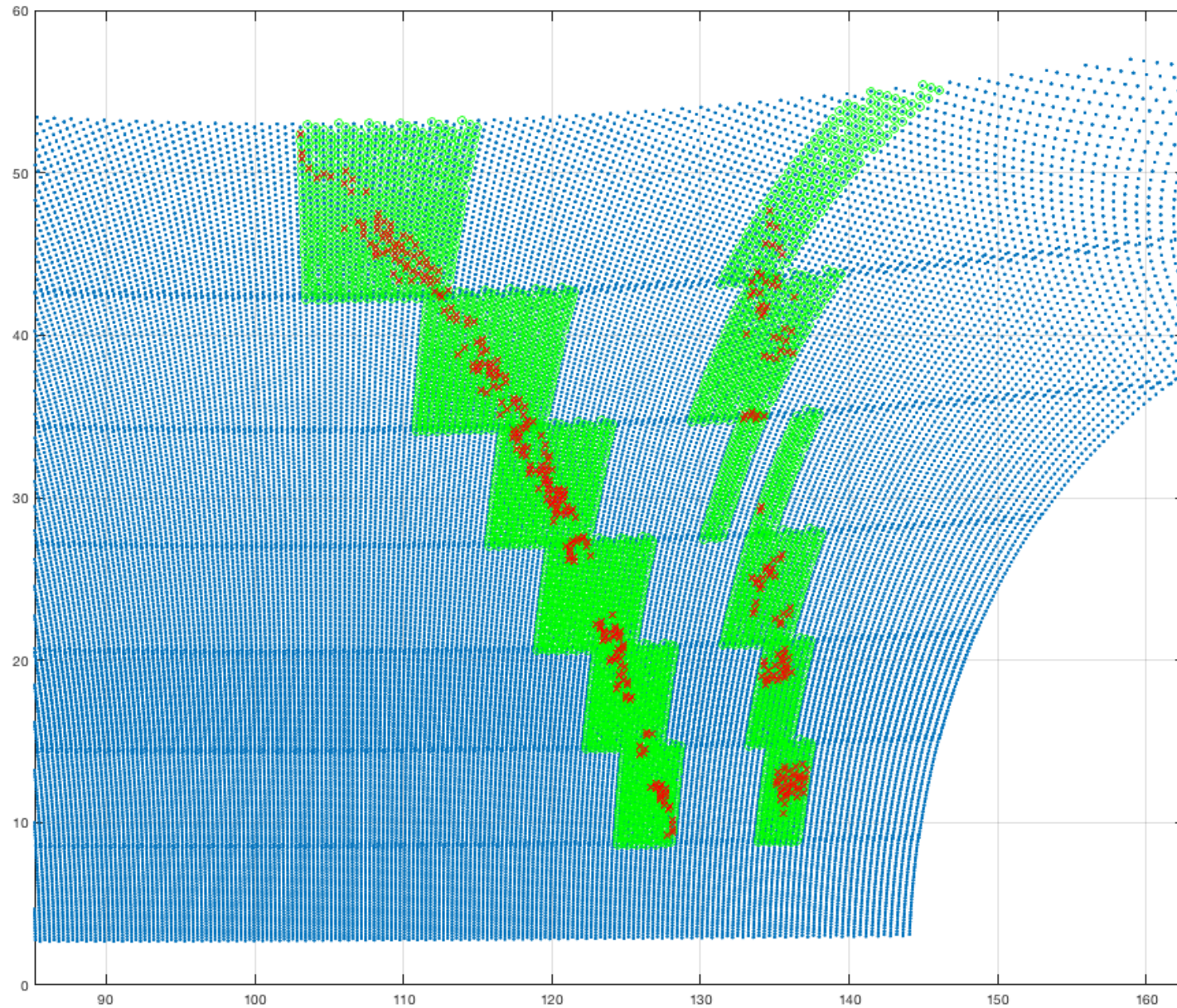
### GIIRS/CrIS SNO:

distance < 10 km,

view angle < 5 deg,

time < 1 hour,

CrIS 3x3 longwave  
window  $900\text{ cm}^{-1}$   
radiance standard  
deviation < 2 RU



Blue:  
GIIRS footprints

Green:  
GIIRS Focal Plane  
Matchups

Red:  
GIIRS Footprints  
Matching Criteria

FY4A\_GIIRS\_20190124040000\_001V1\_20190124210000\_060V1

# GIIRS/CrIS Simultaneous Nadir Overpass Method

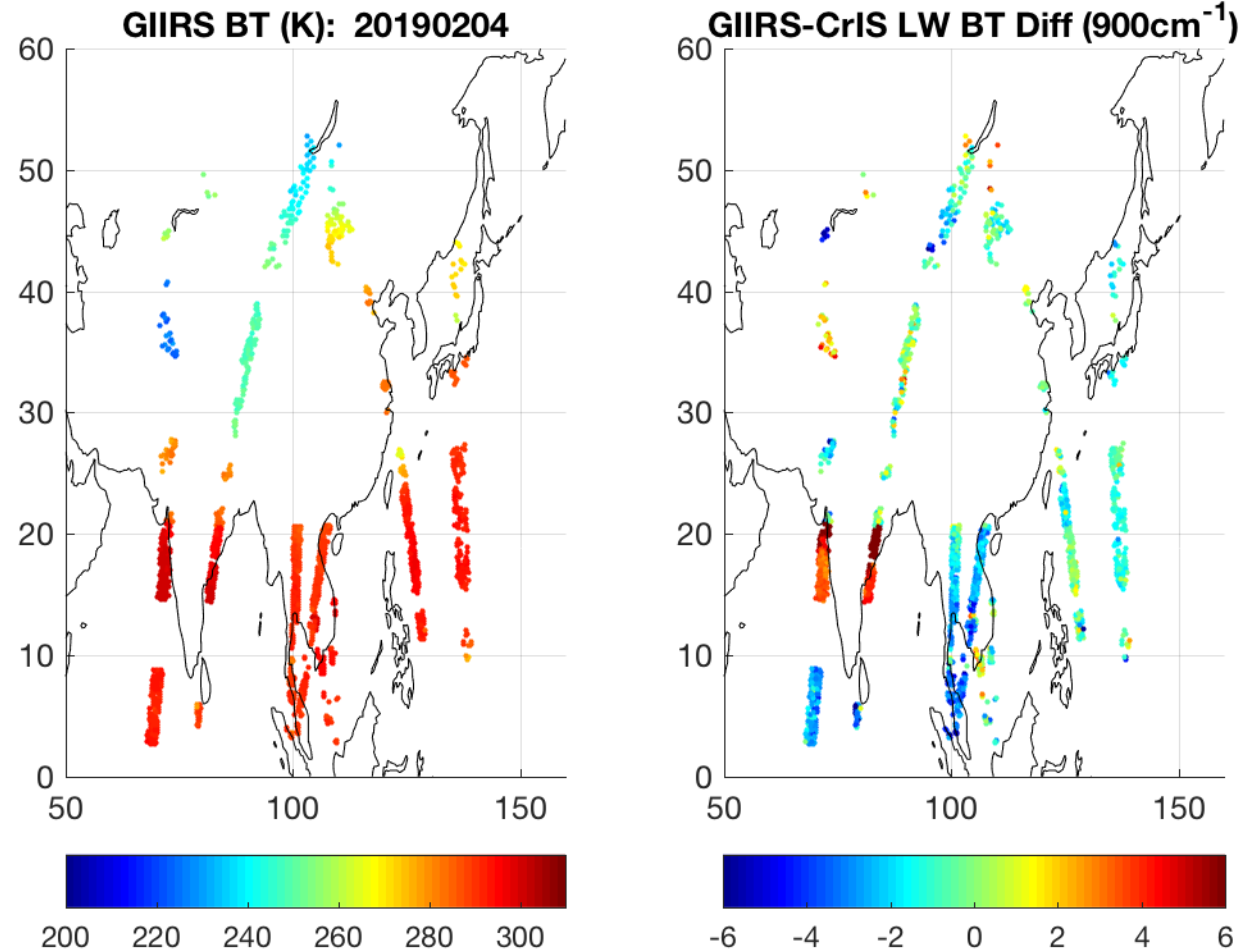
## GIIRS/CrIS SNO:

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CrIS 3x3 longwave  
window  $900\text{ cm}^{-1}$   
radiance standard  
deviation < 2 RU



LW Window Brightness Temperature (K)

## GIIRS/CrIS SNO:

distance < 10 km,

view angle < 5 deg,

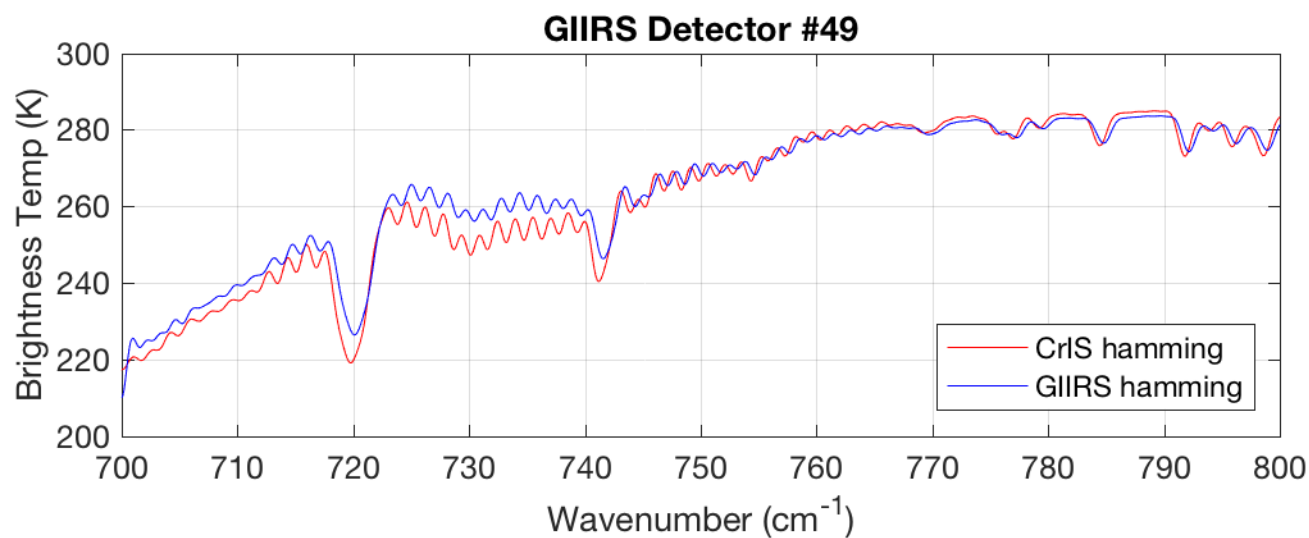
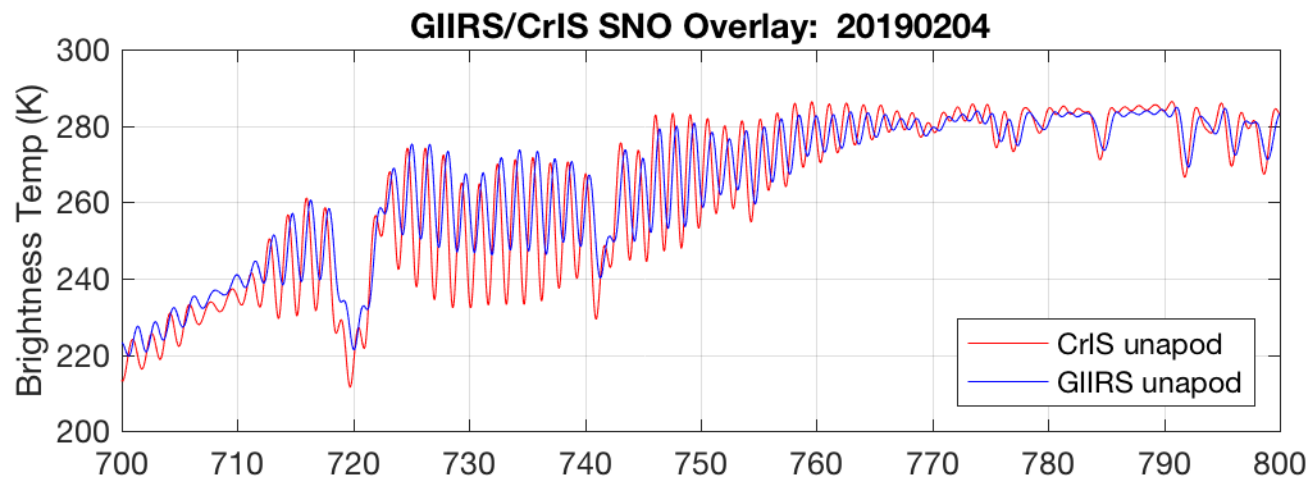
time < 1 hour,

CrIS 3x3 longwave

window  $900\text{ cm}^{-1}$

radiance standard

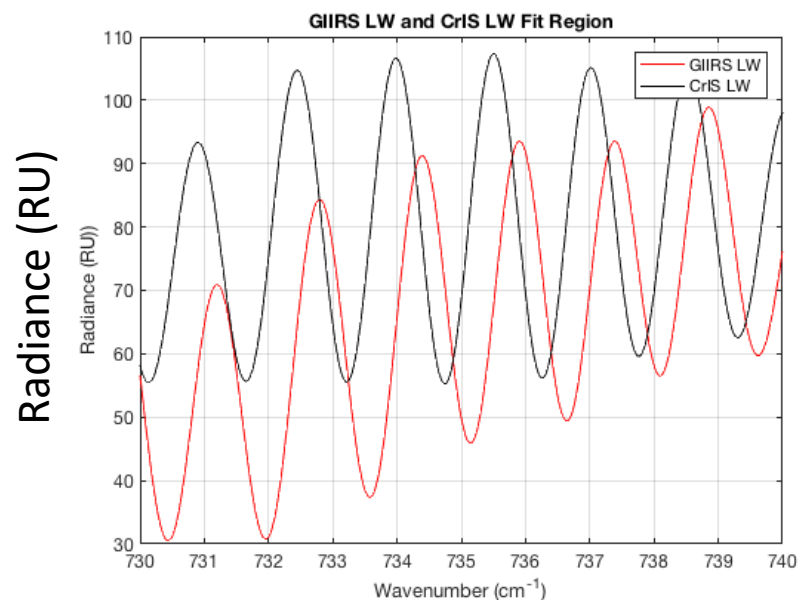
deviation < 2 RU



- Notes:
- 1) Obvious spectral shift in GIIRS spectra
  - 2) Curious radiometric calibration error between  $720\text{-}740\text{ cm}^{-1}$

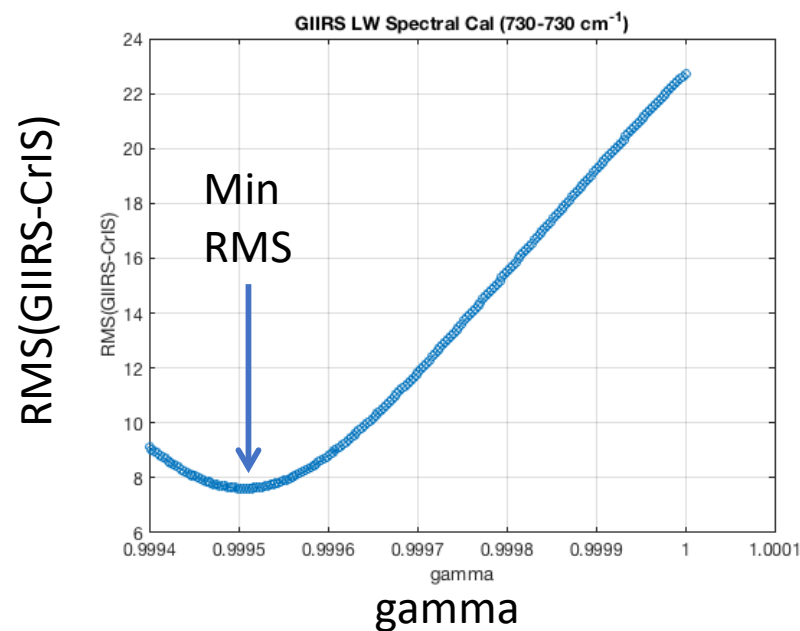


# GIIRS-CrIS Spectral Inter-Calibration



## GIIRS LW Band

- Zero-fill GIIRS and CrIS radiance (oversampled)
- Multiply GIIRS wavenumber scale by “gamma” ( $<1$ )
- Linear interpolate GIIRS to CrIS wavenumber scale
- Compute  $\text{RMS}(\text{GIIRS}-\text{CrIS})$  over  $730-740 \text{ cm}^{-1}$
- Adjust gamma to find minimum RMS error
- $\text{PPM} = (1-\text{gamma}) * 1\text{E}6$



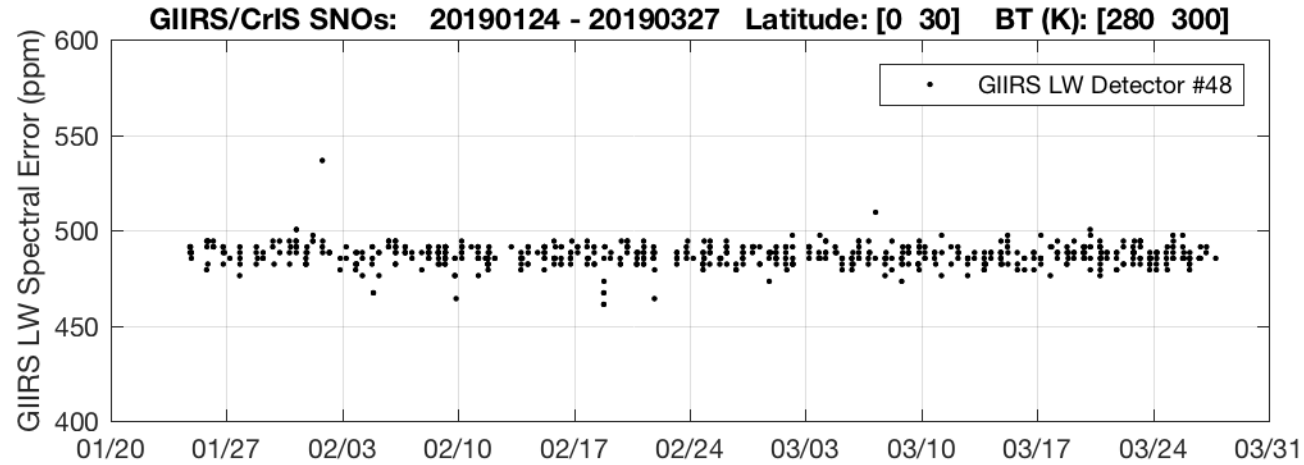
## Caveat:

The choice of  $730-740 \text{ cm}^{-1}$  is traditional at UW, however the FY4A GIIRS LW band has a radiometric artifact in this region which may be distorting the spectrum slightly. Should try  $740-760 \text{ cm}^{-1}$  to see if it improves fit across the entire band.



# GIIRS-CrIS Spectral Inter-Calibration

GIIRS LW  
Detector #48



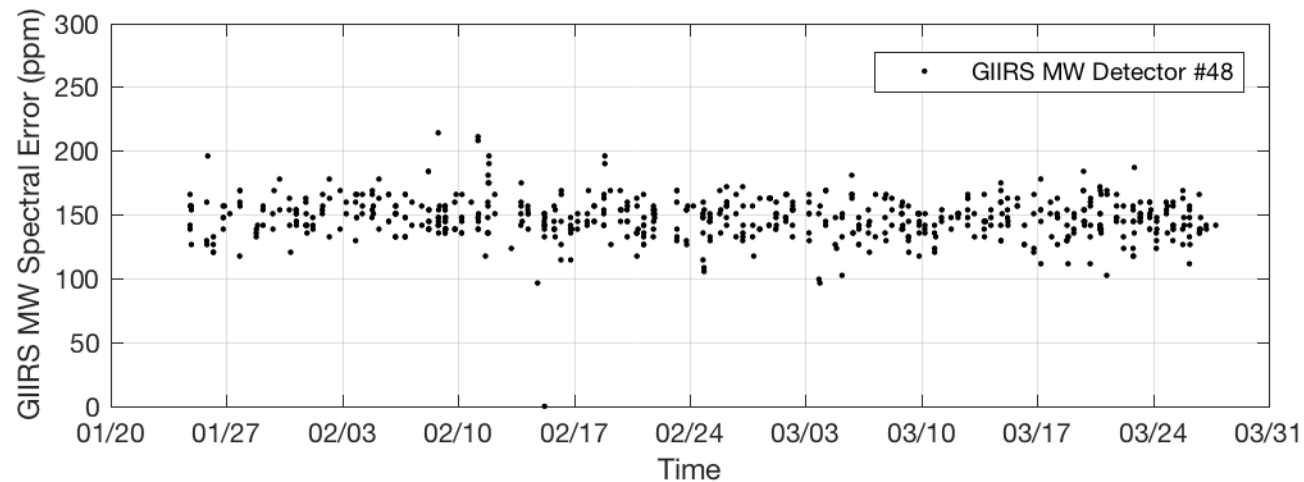
## Filter Results

LW Window BT:  
280 – 300K

Latitude:  
0 – 30N

Outliers Excluded:  
keep < 4\*sigma

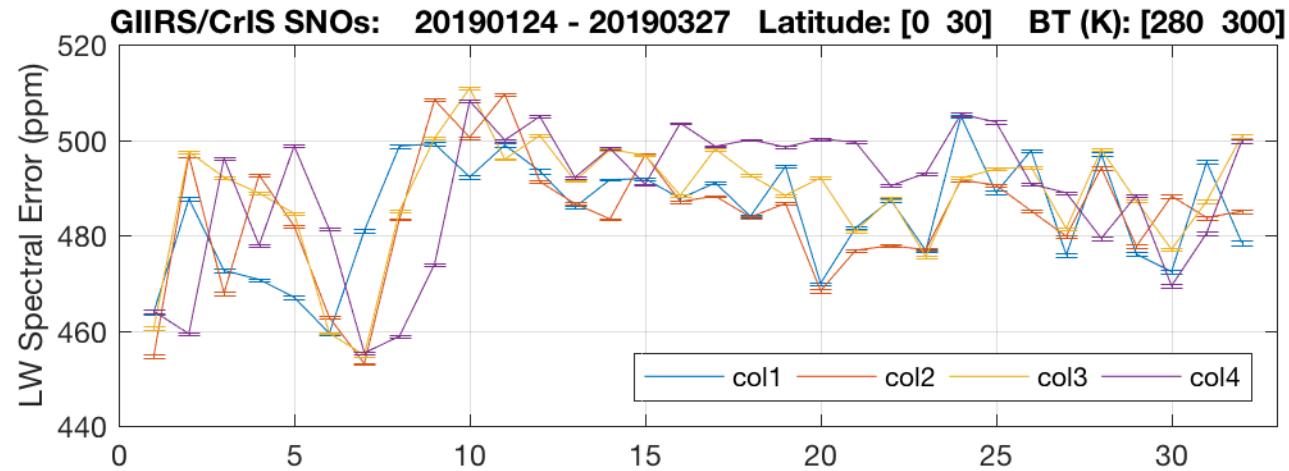
GIIRS MW  
Detector #48



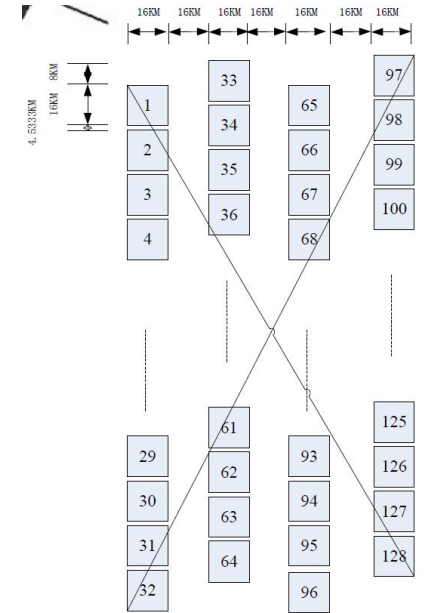
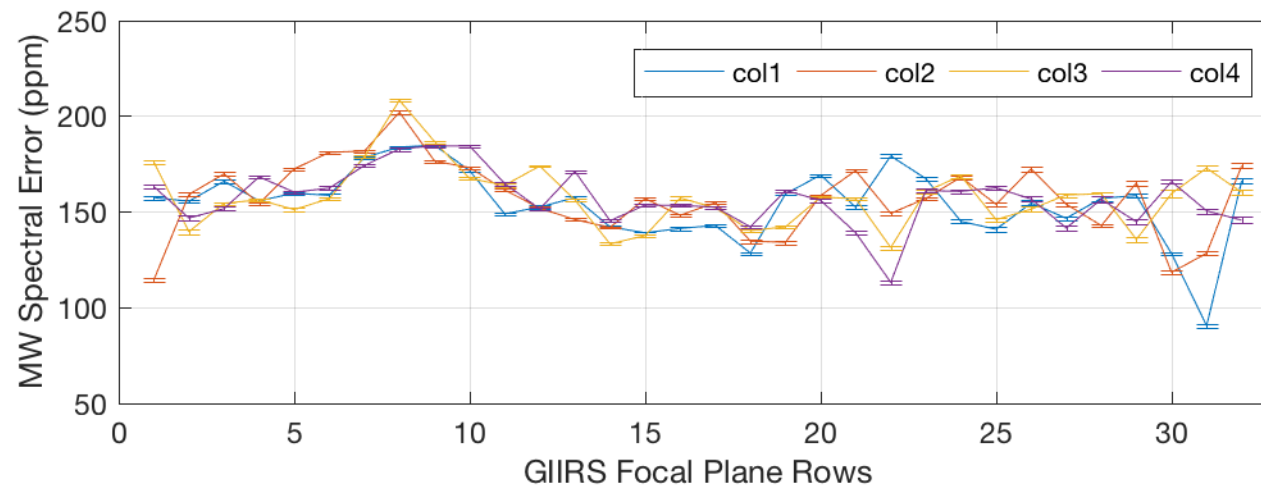
Time 24 Jan – 27 March 2019

# GIIRS-CrIS Spectral Inter-Calibration

GIIRS LW  
Mean Spectral Error  
(PPM)



GIIRS MW  
Mean Spectral Error  
(PPM)

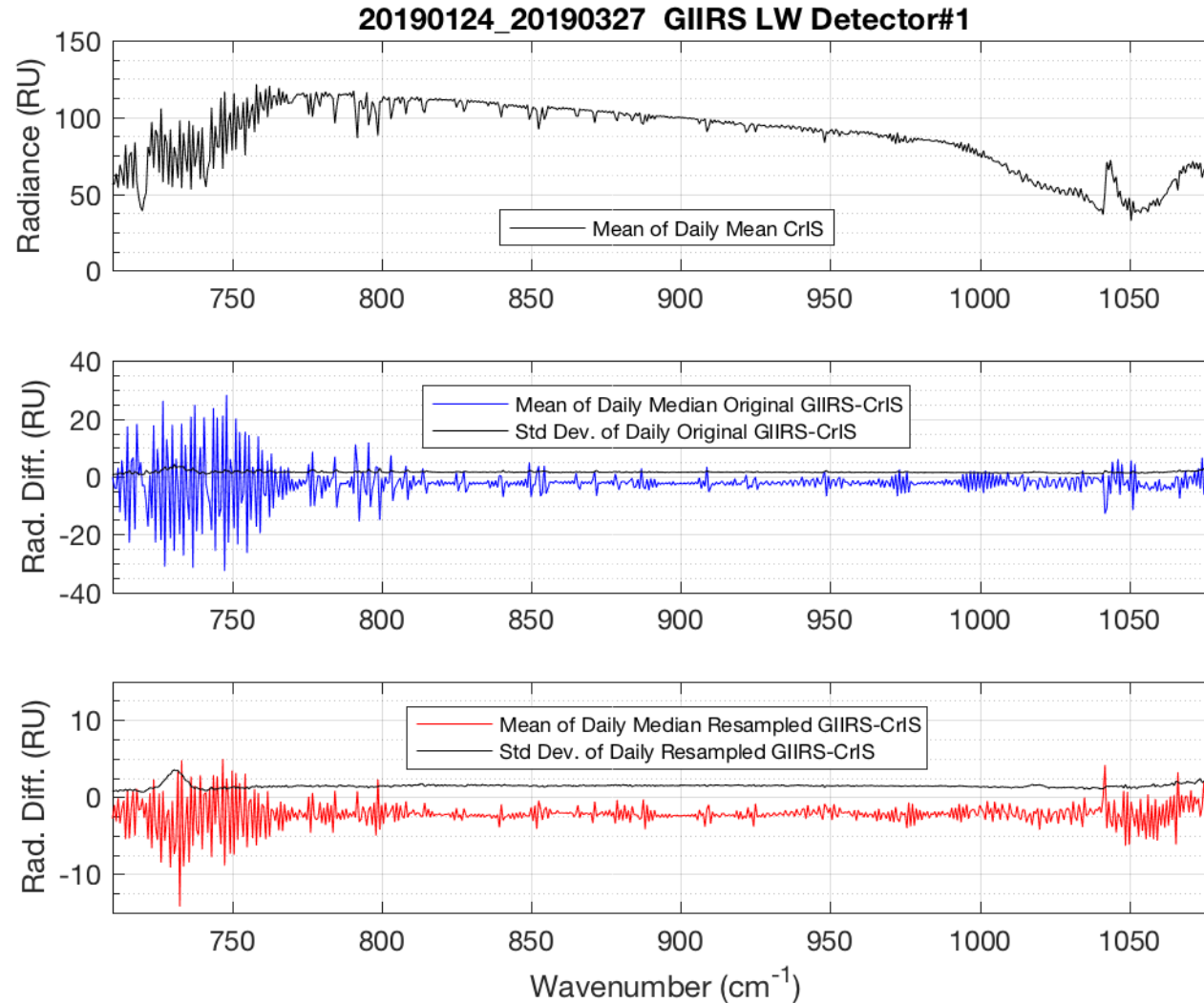


Note: CMA has corrected most of the variation over the focal plan array (up to 1000 ppm).  
But errors should be < 5 ppm for all detectors to meet radiometric accuracy requirements.

# GIIRS-CrIS Radiance Bias: Resample GIIRS LW to CrIS LW Wavenumber

LW Detector #1

Corner Pixel



**24 Jan 2019  
to  
27 Mar 2019**

**64 days**

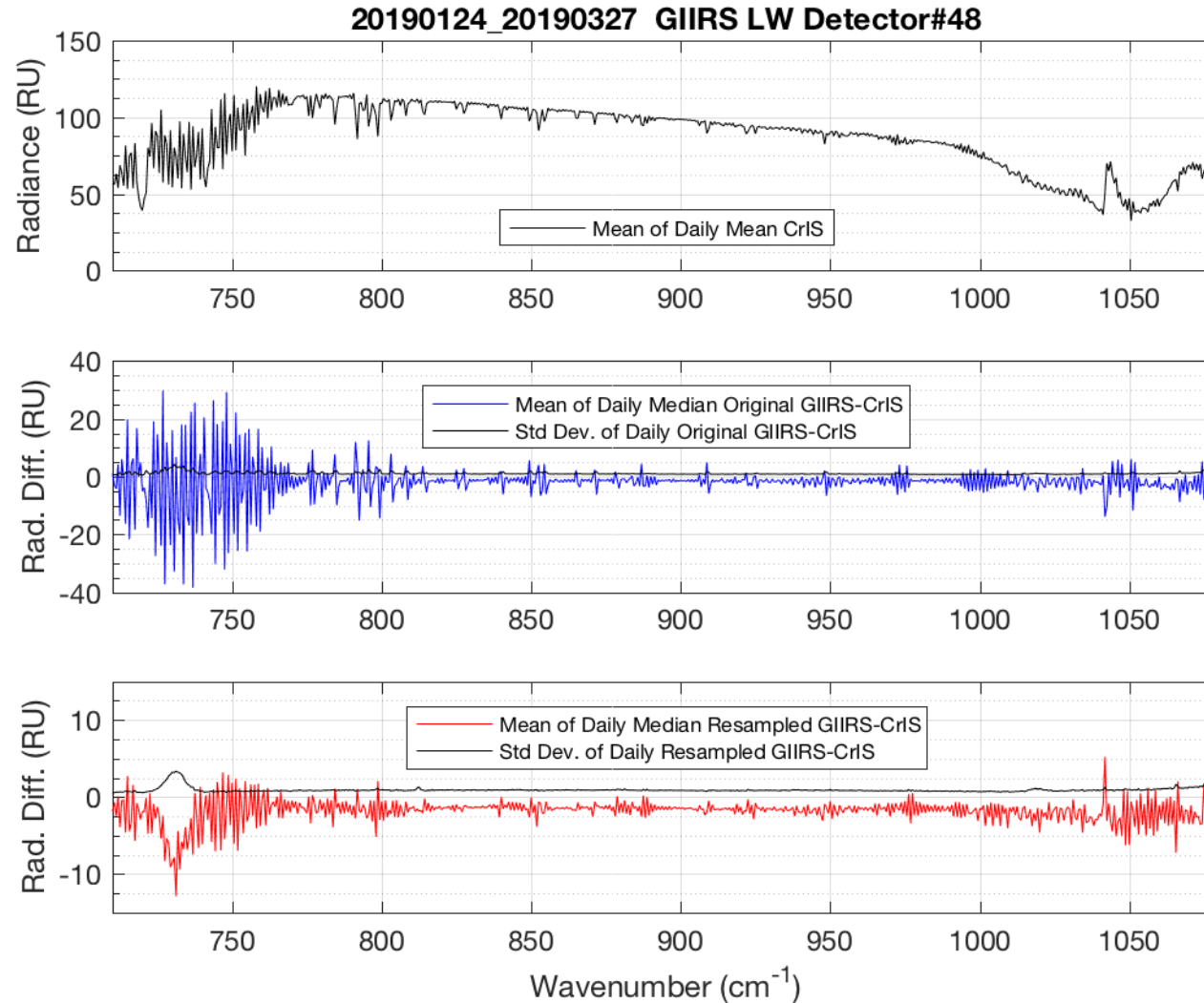
Fit using 730-740  $\text{cm}^{-1}$  does not appear to be optimal for removing spectral line features.



# GIIRS-CrIS Radiance Bias: Resample GIIRS LW to CrIS LW Wavenumber

LW Detector #48

Near focal plan center



**24 Jan 2019  
to  
27 Mar 2019**

**64 days**

The calibration error at 720-740  $\text{cm}^{-1}$  is highly variable but present in all LW detectors.

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2. Findings regarding L1B data quality:
  - Occasionally out-of-family bad "rows" of data
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