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Pasadena, California

Recent Activity at Sounder PEATE

SOAT Meeting

Greenbelt, Maryland

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Topics

- Forward model comparisons
  - SARTA and OSS for CrIS
  - MIT RTA and OSS for ATMS
- Issues with IDPS Software
  - Geolocation Issue
  - IP to EDR pressure interpolation
  - Surface Pressure Issue
  - IP files are not aggregated
- Request for Additional Output
- AIRS lessons forgotten

Forward Model Differences(1)

- Comparison of OSS from AER and SARTA from UMBC.
  - For IASI, but same physics and same model
  - OSS was extracted from EDR Science software
- Both models were applied to ECMWF profiles, T/q/O3.
- The statistics is over a random night granule (~3 minutes).
- Some differences can be explained by difference in background trace gases, including CO2, OCS, CFCs, etc
  - OSS uses CO2 at 380 PPM while SARTA uses 385 PPM.
  - Our OSS tables (AIRS, CrIS and IASI) have no OCS or CFCs
  - Other reference gas profiles for OSS match those of SARTA
- One (or both) of the models may have issues at band boundaries (both CrIS and IASI)
- Non-LTE is not handled by OSS
- OSS does not handle reflected solar radiance correctly

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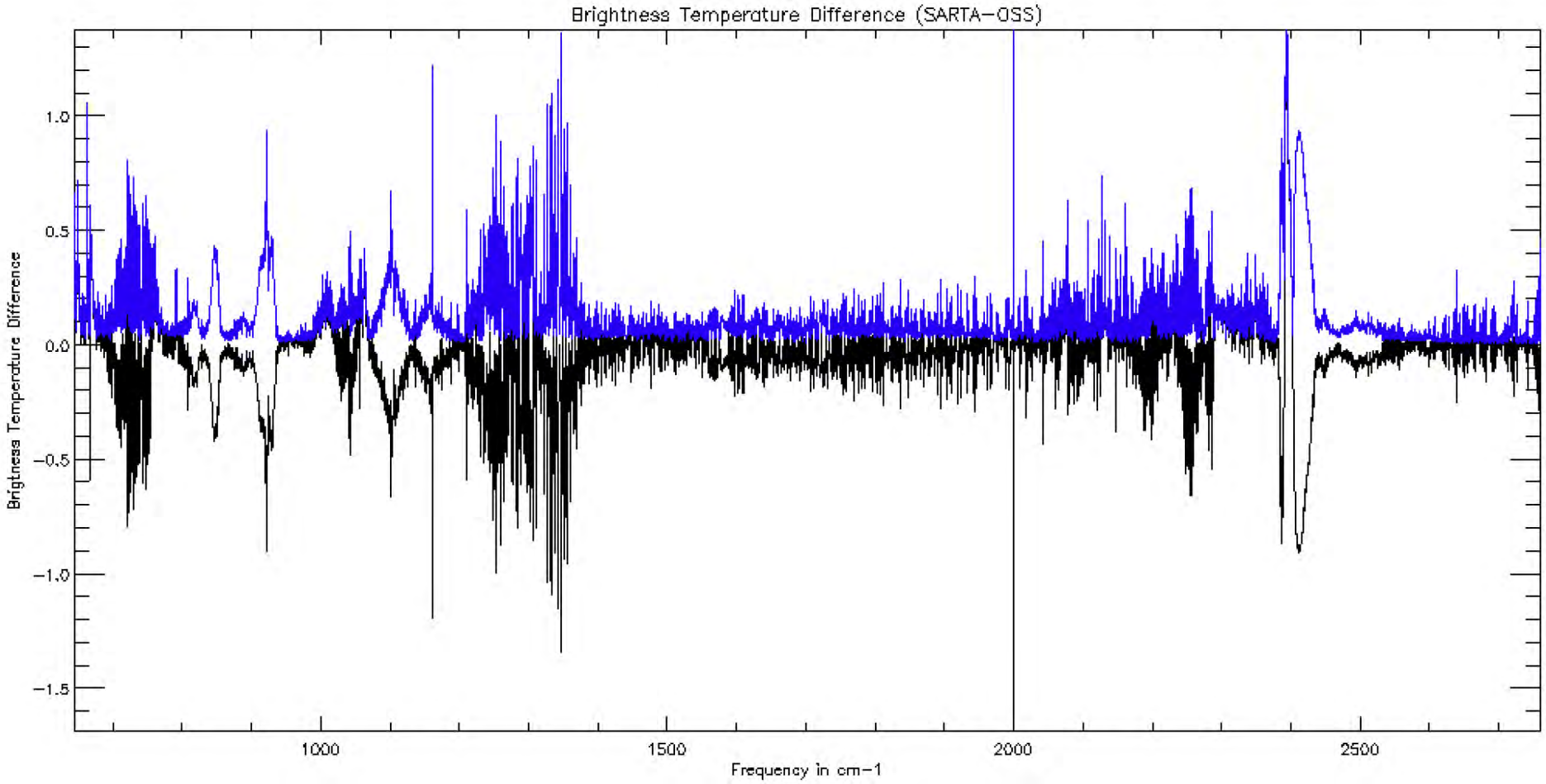
Forward Model Differences(IASI)



IASI OSS Table supplied by AER

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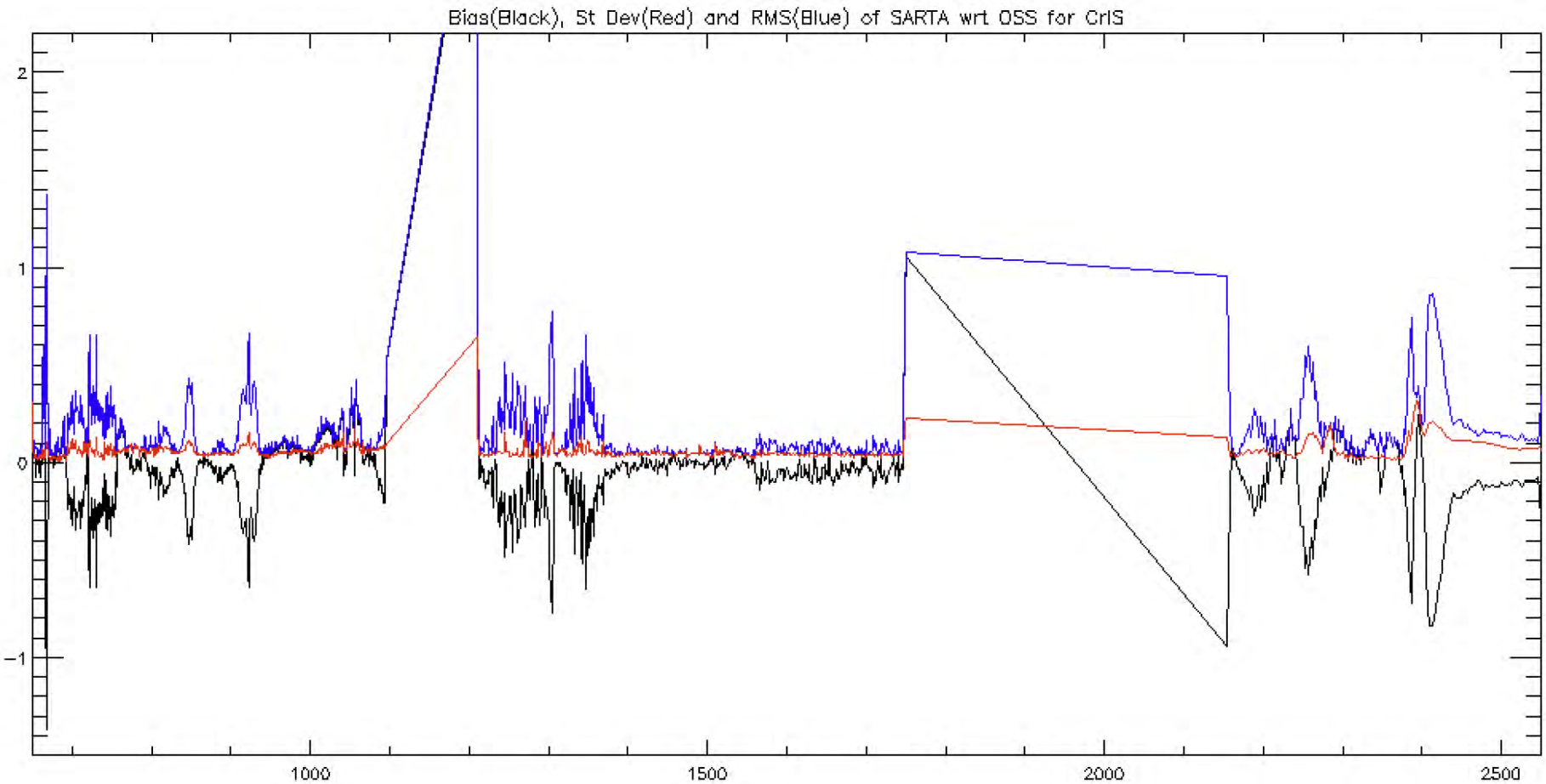
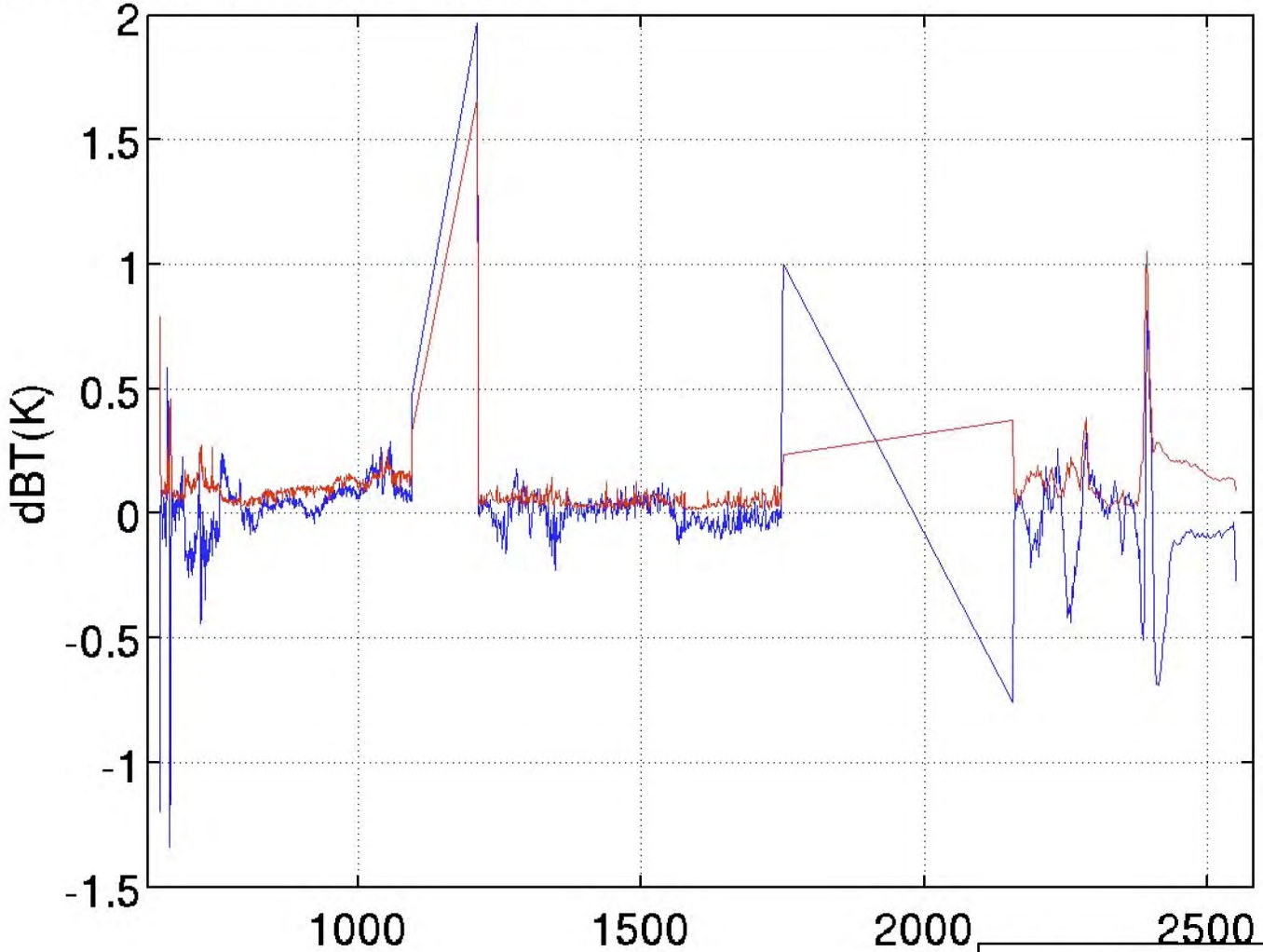
Forward Model Differences(CrIS)



Night granule (8 minutes)

Difference between SARTA and OSS for CrIS

CrIS with Hamming Apodization



Scott Hannon, UMBC

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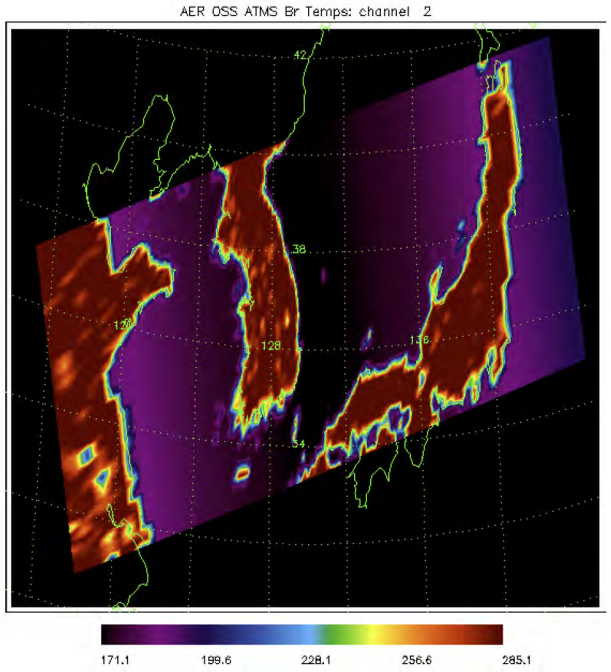
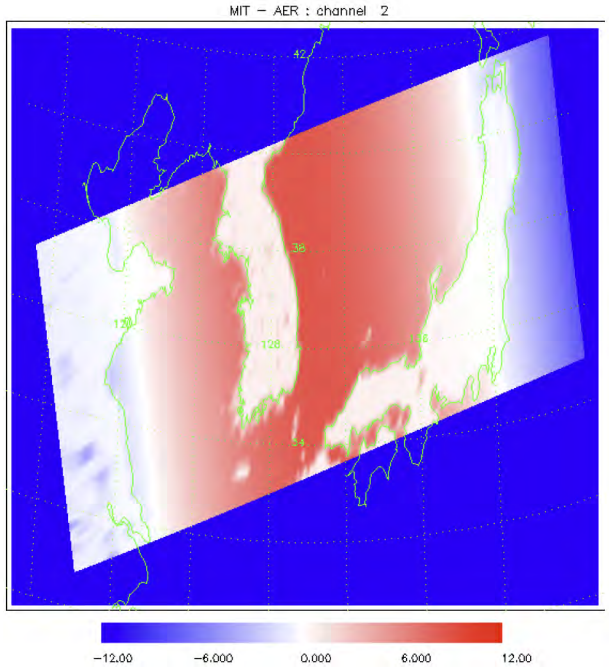
Comparison of MIT RTA and OSS for ATMS

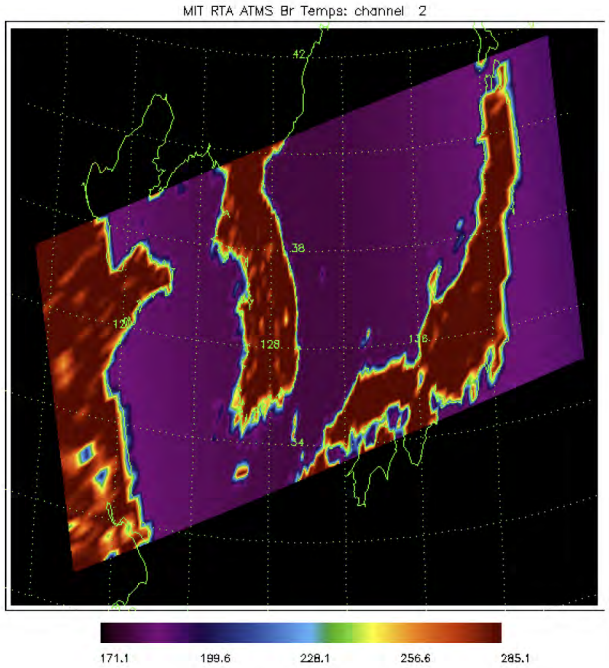
- The agreement is very good for opaque channels
  - OSS seems to lack the ability to account for Ziemann splitting for ATMS channel 15.
- Transparent channels do not compare well



AER OSS



MIT - AER



Sounder PEATE: - 7
MIT RTA

OSS Look Up Tables

- Sounder PEATE has access to:
  - OSS tables for Science Software version 2.1.4
    - For AIRS and IASI as well as CrIS
  - OSS tables for IDPS software Mx4 (I.5.04.00)
  - They are not equivalent
  - Neither has OCS or CFCs
  - We would like OSS tables in science software format that is equivalent to Mx4 LUTs.

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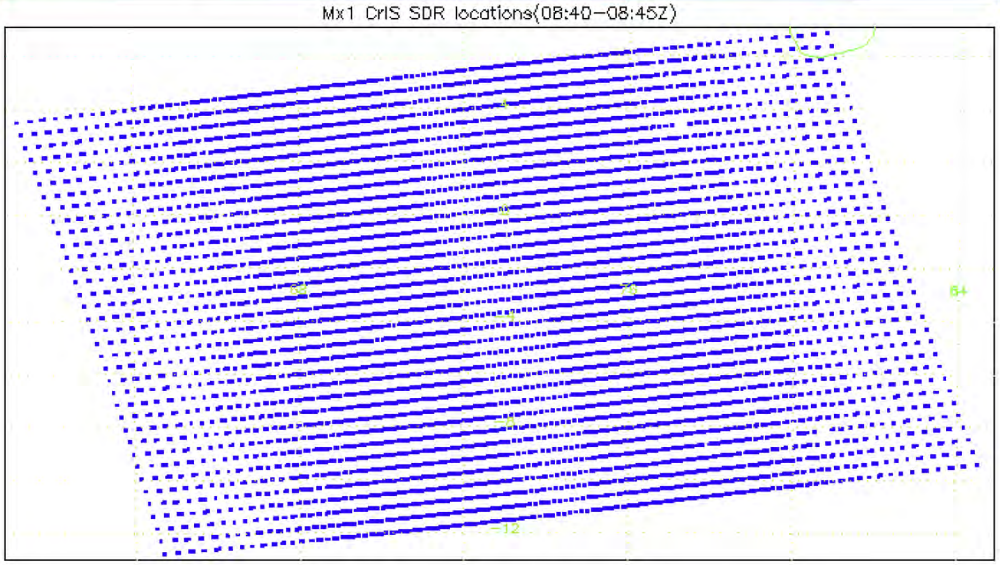
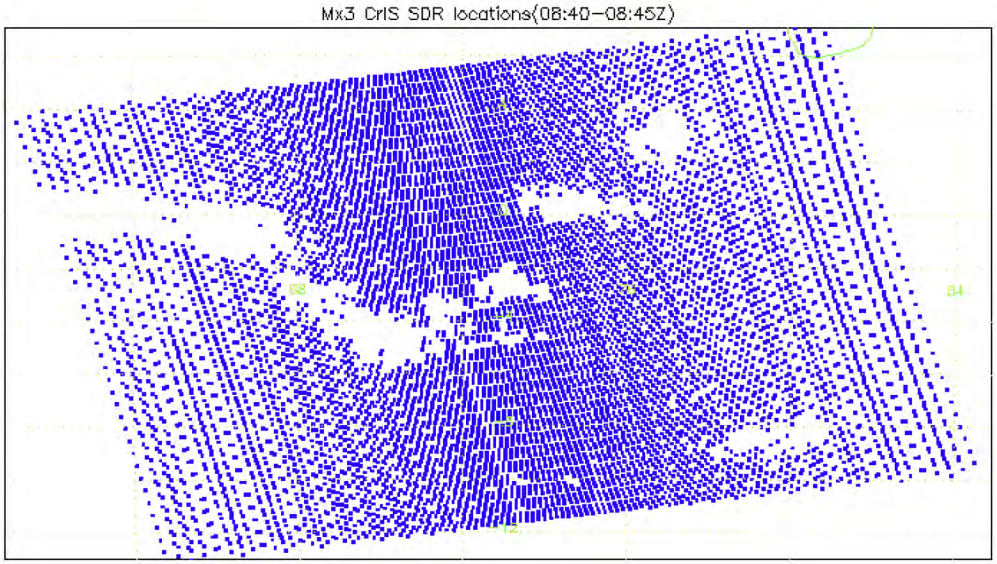
CrIS Geolocation Issues (Mx3)

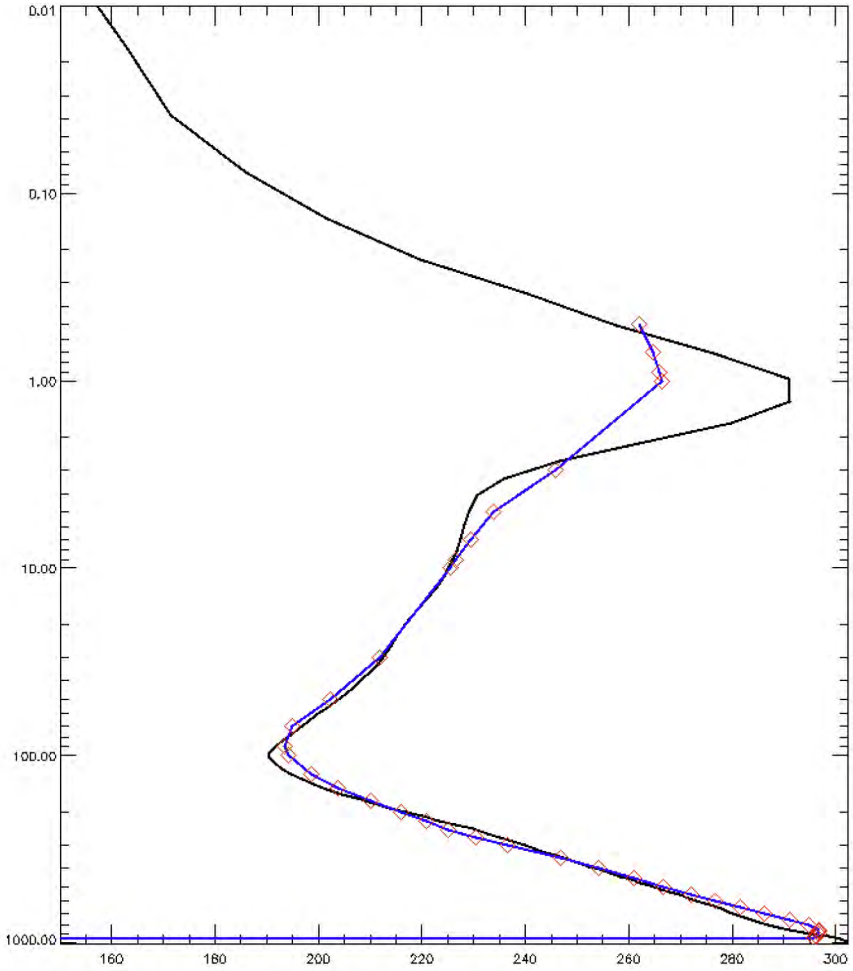




- CrIS FOV locations for 08:40 to 08:45Z
  - Top is for Mx1
  - Bottom is for Mx3
- The island of Sri Lanka is visible at the northeastern corner.
- nine FOVs line up in Mx1
- Mx3 has many missing FOVs
  - lat/lon set to -9999.

Comparison of EDR and IP temperatures

- Plot of EDR and IP temperatures
  - Black is IP temperature
  - Blue is EDR temperature
- The EDR pressure levels are marked with diamonds
  - 1, 3, 5, 7, 9, 10 mb
- The EDR temperature seems to be shifted up
  - Need to verify

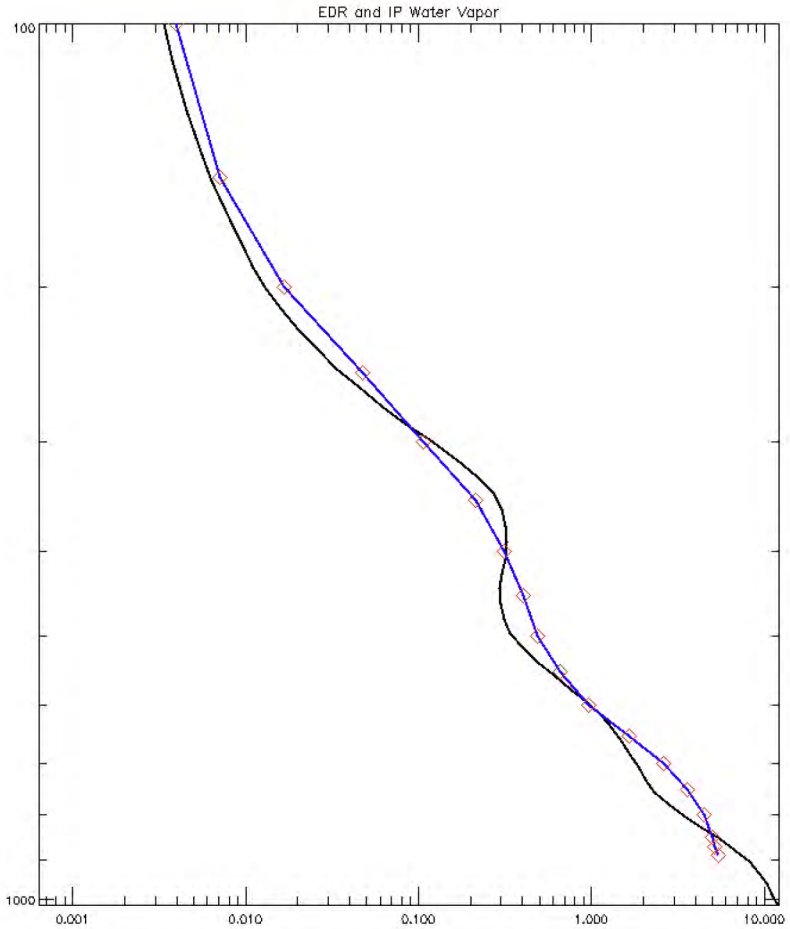


EDR Pressure Levels

- IP temperature is at the 101 levels used by the forward model
- Requirement (information from Xu Liu)
  - Surface-850 mb, interval: 20 mbar 1 km averaging
  - 850 - 300 mb, interval: 50 mb 1 km
  - 300-100 mb, interval: 25 mb 3 km
  - 100- 30 mb, interval: 20 mb 3 km
  - 10, 9, 7, 5, 3, 1, .9, .7, .5 mb 5 km
- These are in general oversampled, but with huge gaps between 10 to 30 mb and 1 to 3 mb.
- AIRS uses 100 levels for support level and coarser standard level (close to WMO mandatory levels)

EDR and IP Water Vapor Profiles

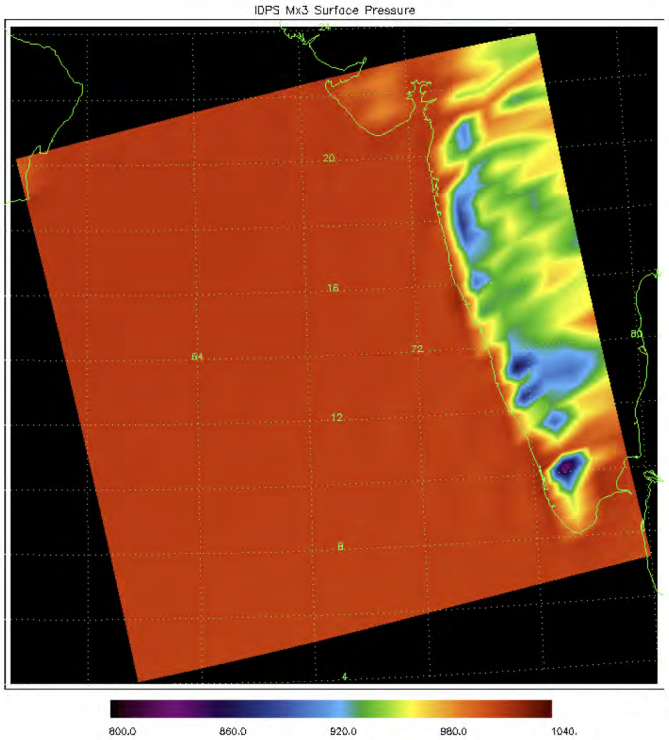
- Black is IP water vapor
- Blue is EDR water vapor
- Both X-Y axes are log scale

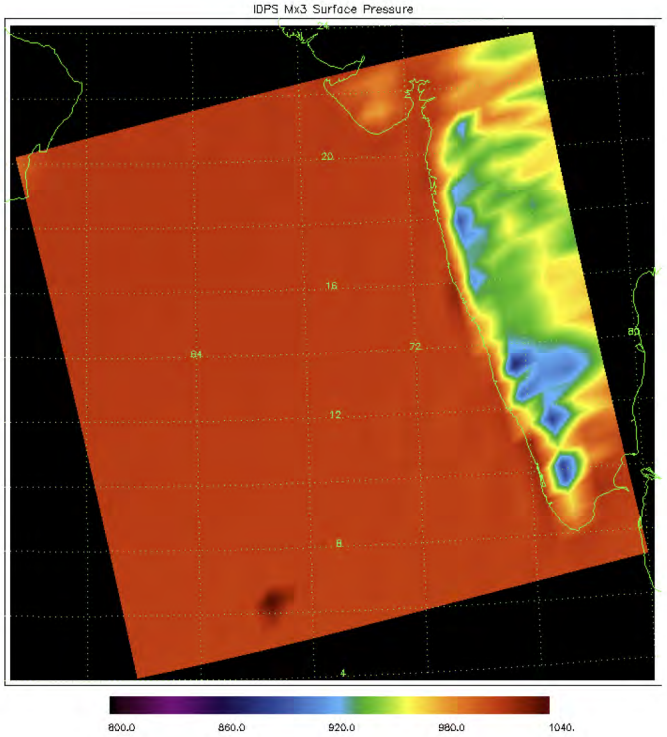


Additional EDR Output

- CrIMSS EDR retrieves MW cloud, but does not output
  - Cloud Top
  - Cloud Thickness
  - Cloud liquid amount
  - Surface Skin Temperature from MW only retrieval
- The output is required to study MW brightness temperature residual.
- Previous requests have been ignored
- Suggests adding the parameters to MW Surface Emissivity IP

Issue with Surface Pressure





- The issue with surface pressure still remains
  - The dark blob on the right(Mx3)
  - Mx1 has a blob to the south (not shown)

Sample Output

- Sounder PEATE will use the mini-IDPS at SDS for EDR work, at least until ADL works on EDR
- Need to verify SDS products before making any changes/improvements to the ops software
- The version Mx1 duplicates Raytheon outputs
  - The first and only version so far.
  - For Mx3, the software and the sample output have different minor revision number
  - I1.5.0.37 CrIS SDR at SDS has bias of ~10K over AIRS
- Raytheon needs to release sample outputs with every release of IDPS software.

Sounder PEATE Needs Aggregated Files

- There are many file types and many files per day
  - A few RDRs, a few SDRs, EDR, a few IPs, most with its own geolocation files
  - Granule size is about 32 seconds. 60*60*24/32 granules a day
- During NCT3 part 2 test, the Sounder PEATE had tough time ingesting the files
- We have asked for 15 granule aggregated files, almost 8 minutes
- NCT4 Dry run data indicate all datatypes can be aggregated.

Lessons learned from AIRS

- Averaging Kernels are required for Validation Exercises
- Day Night Threshold is not 85 solar zenith angle
- Expect the loss of some ATMS channels

Summary

- Forward Model Comparison (OSS vs SARTA for CrIS and MIT RTA vs OSS for ATMS)
  - OSS needs to include the missing trace gases
  - OSS tables in Mx3 are different from those of science software v2.1.4. Need to update science software tables.
- The following issues were communicated to JPSS
  - CrIS geolocation error
  - Surface Pressure Issue
  - IP (101 levels) to EDR (coarse layers) conversion
    - Vertical layering and sampling
  - Quick glance of Mx4 sample data show improvement
- Need Additional Parameters to MW IPs