CRIS SDR OVERVIEW

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Outline

- Team Members
- S-NPP CrIS Status
- Reprocessing and LTM
- CrIS SDR Team Accomplishments
- JPSS-1 Readiness
- Summary and Path Forward

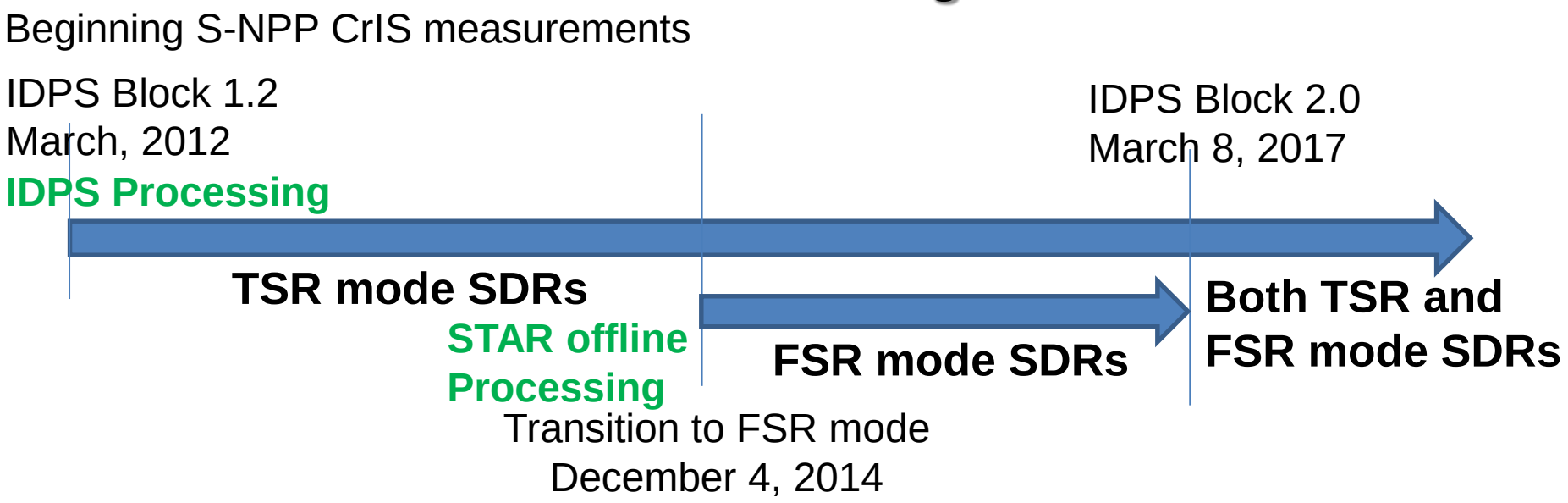
Team Members

PI	Organization
Changyong Cao (acting)	NOAA/STAR
Dave Tobin	U. of Wisconsin (UW)
Larrabee Strow	U. of Maryland Baltimore County (UMBC)
Deron Scott	Space Dynamic Lab (SDL)
Dan Mooney	MIT/LL
Dave Johnson	NASA Langley
Lawrence Suwinski	Harris
Joe Predina	Logistikos
Deirdre Bolen	JPSS/JAM
Wael Ibrahim	Raytheon

S-NPP CrIS Status: SDR Processing

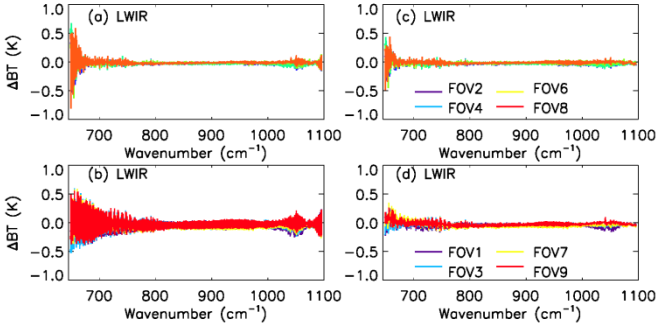
- IDPS Block 2.0 operational, both truncation spectral resolution (TSR) SDR (1305) and full spectral resolution (FSR) SDR (2211) were operationally generated on March 8, 2017 with A1 calibration algorithm
- IDPS Block 2.0 Mx1 operational, FSR SDR with A4 calibration algorithm were generated on April 10, 2017
- Engineering Packet Version 37 with updated Geolocation mapping parameters was uploaded on June 7, 2017

IDPS SDR Processing Time Line

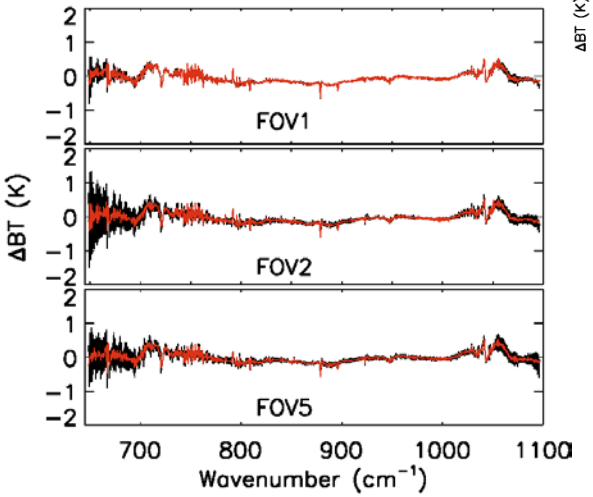


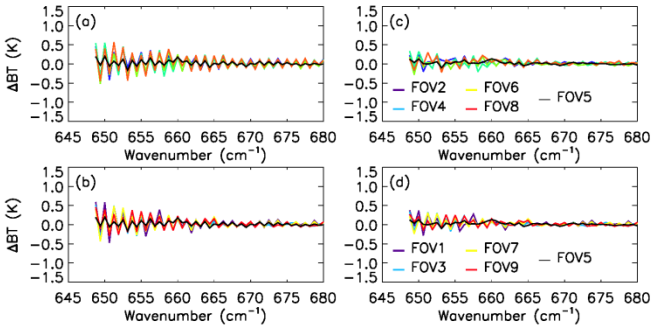
S-NPP CrIS Status: Calibration Algorithm Improvement for FSR

- The FSR calibration algorithm A4 is an improvement over the previous TSR calibration algorithm A1.
- Major changes include the calibration equation, self-apodization correction, resampling matrices, and calibration filter.
- Compared to the previous algorithm, the improvement reduces the calibration inconsistencies among the nine fields of view and between the forward and reverse interferometer sweep directions by up to 0.5 K, and the differences between observed and simulated spectra by up to 0.4 K.



A1 A4

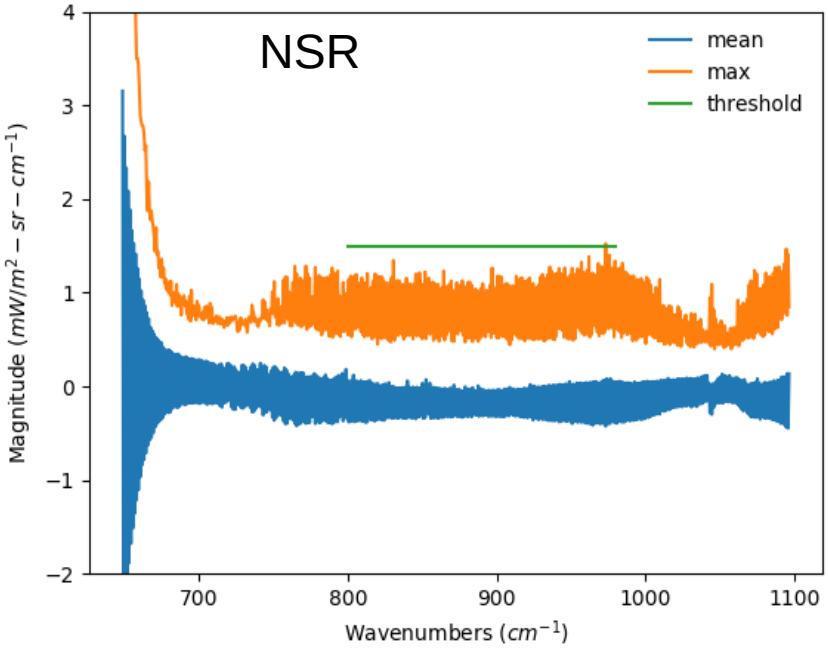


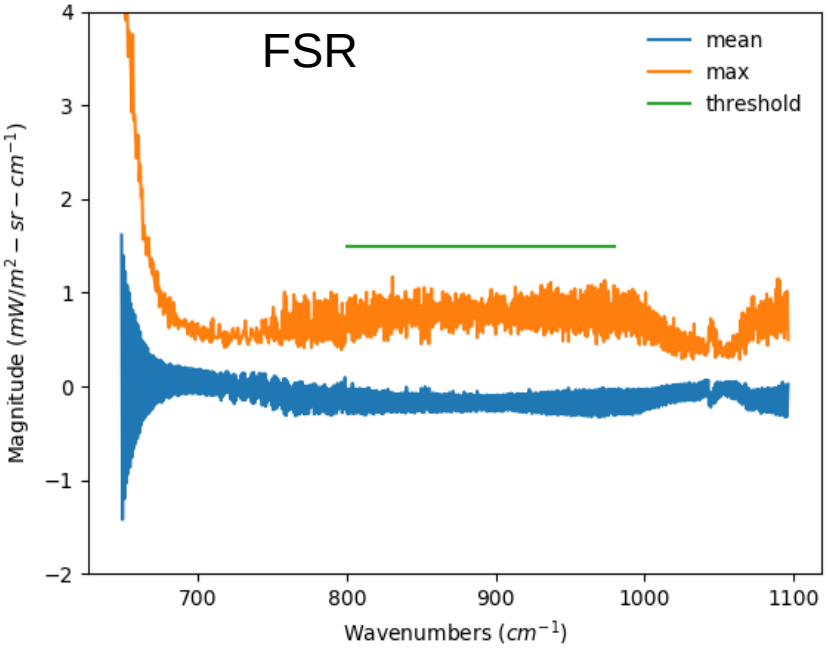


A1 A4

S-NPP CrIS Status: Lower Imaginary Magnitude for FSR

SDL





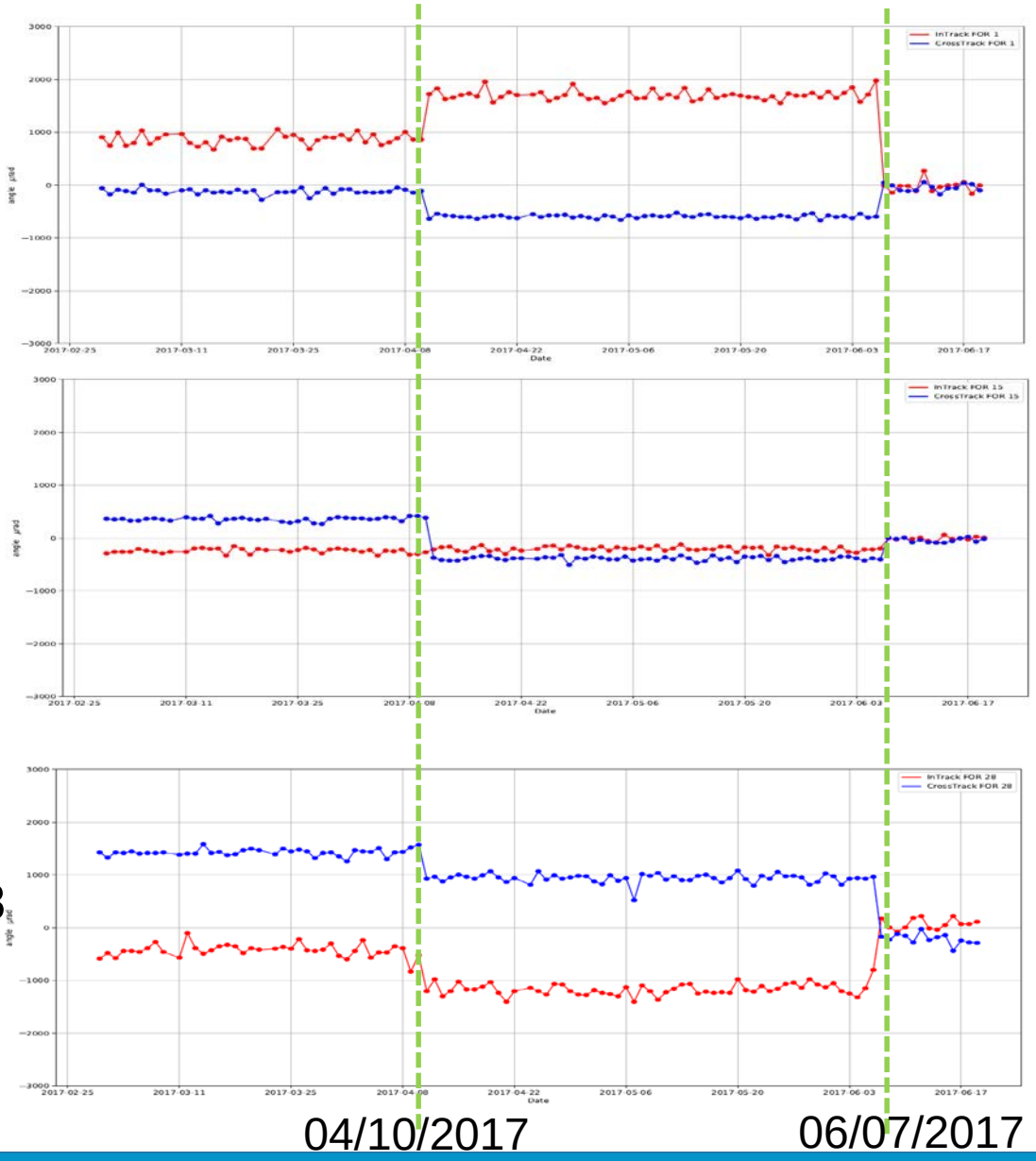
- LW Imaginary Magnitude
- Updated algorithm with same spectral resolution
- TSR triggered max imaginary magnitude flag
- Lut Desert in Iran, June15, 2017 09:17:20 to 09:18:54

S-NPP CrIS Status: Geolocation Improvement

FOR Position 1

FOR Position 15

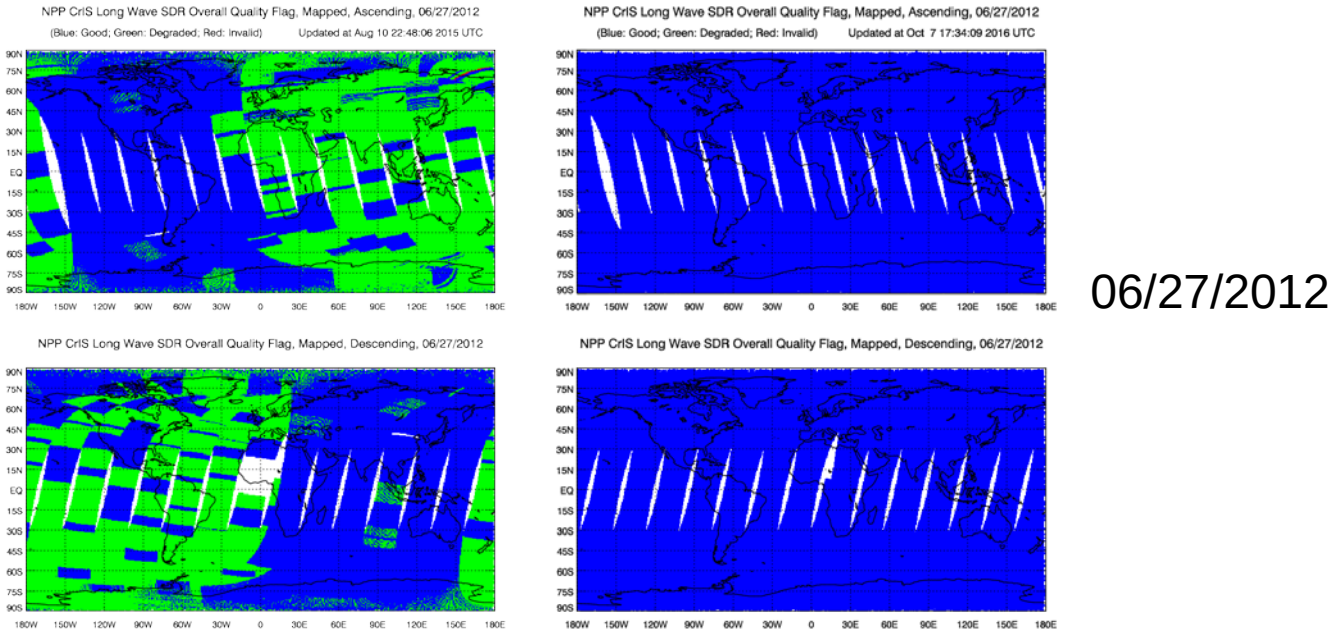
FOR Position 28



The FOV size is 16808 μrad, 1000 μrad ≈ 850 m at nadir

STAR CrIS Data Reprocessing (1/3)

- Engineering packet version 37 and new MW FOV7 NL a2 coefficient
- ADL Block 2.0 with A4 calibration algorithm and improved geolocation algorithm
- TSR SDR for the whole history
- FSR SDR since December 4, 2014
- Latest RDR version
- CrIS TSR data reprocessing from February 20, 2012 to August 31 2016 completed



06/27/2012

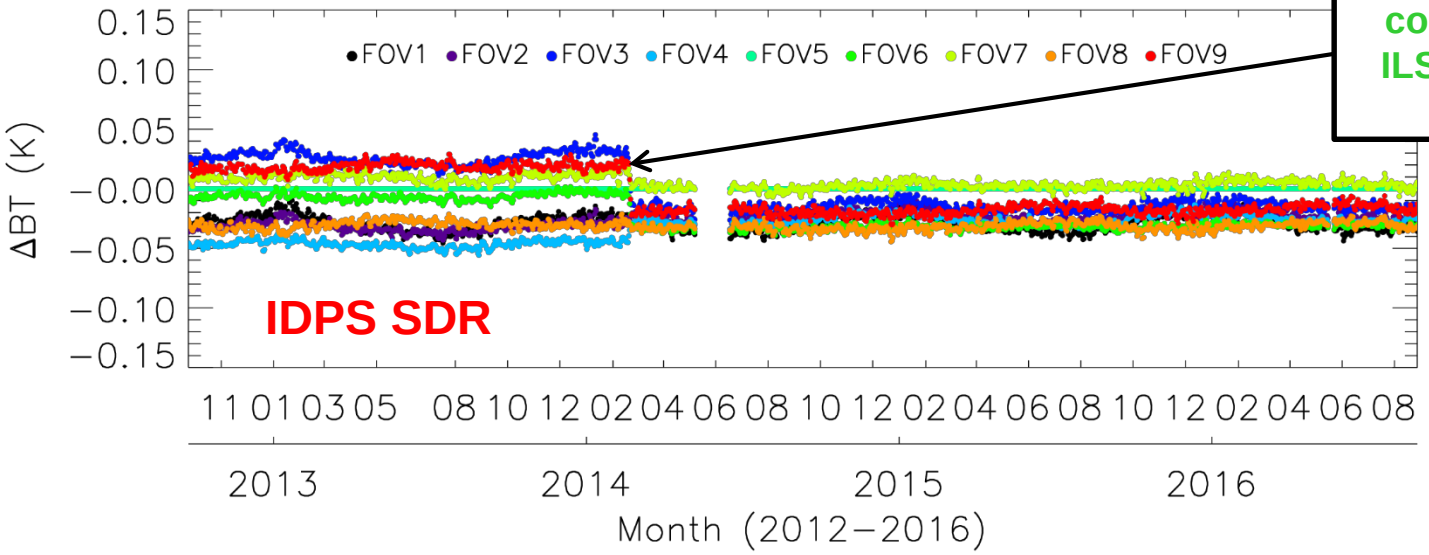
IDPS SDR **Reprocessed SDR**

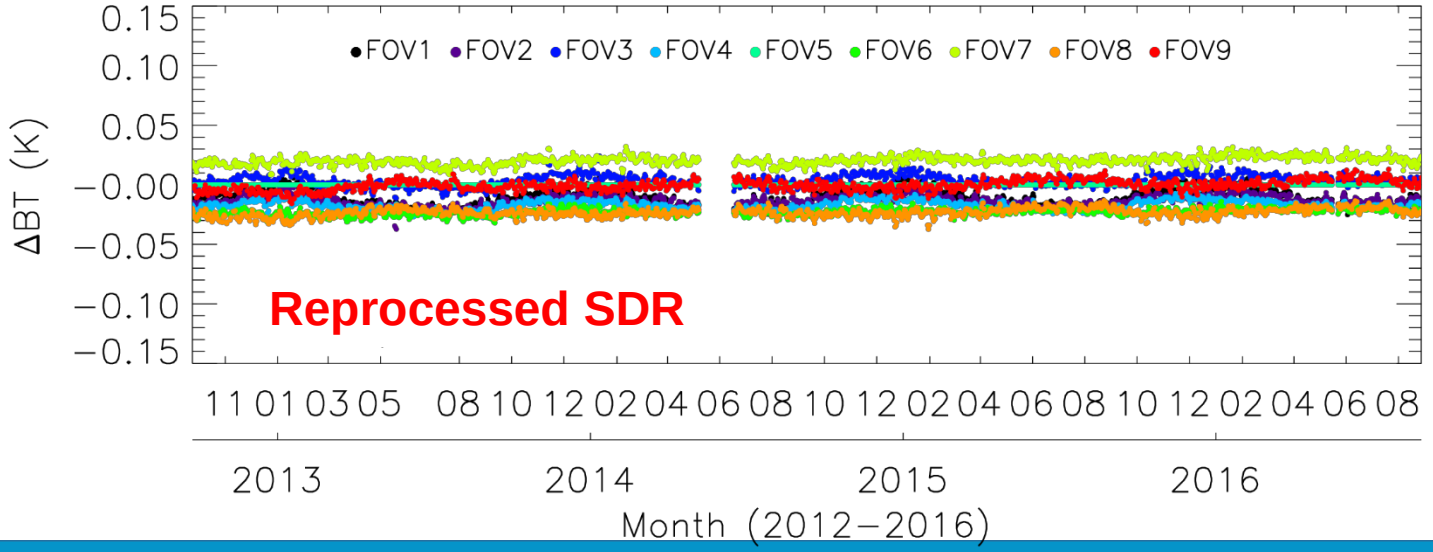
STAR CrIS Data Reprocessing (2/3)

CrIS Radiometric Stability:
Daily Mean FOV-2-FOV Difference wrt FOV5

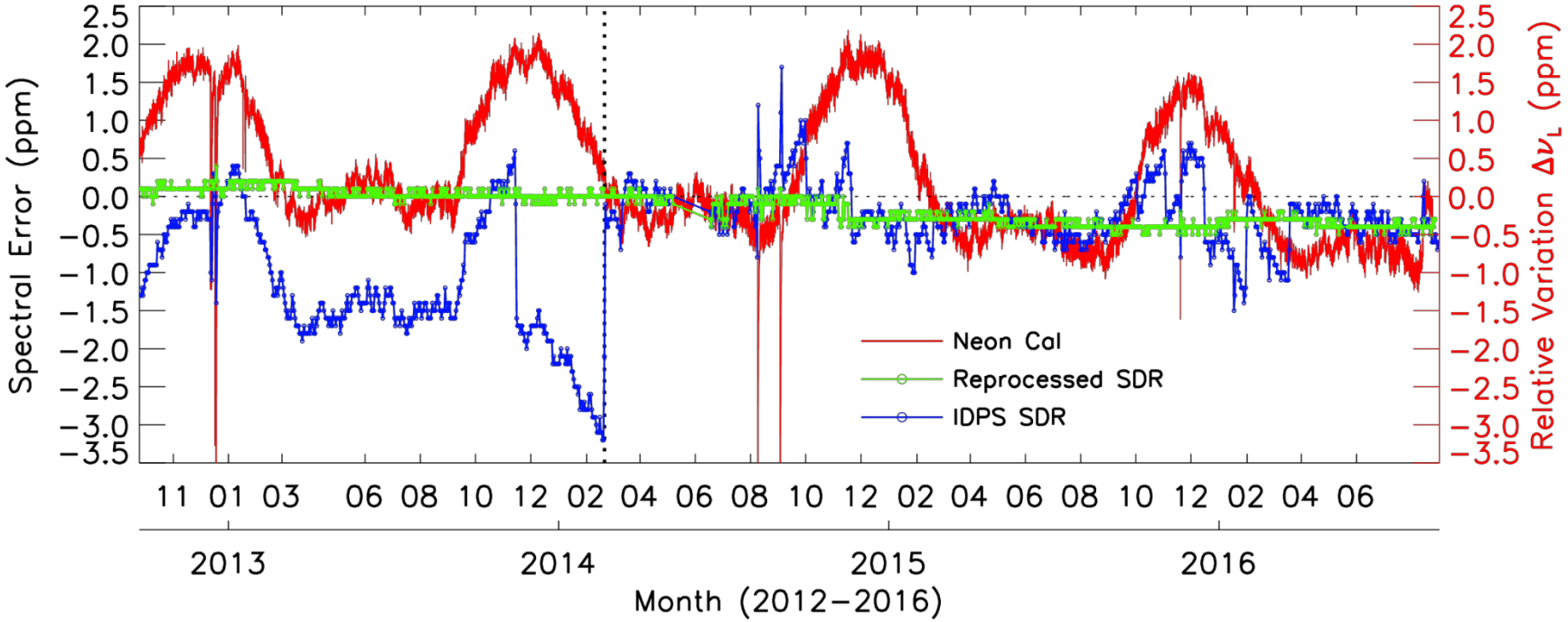
LW, 672-682 cm^{-1}

02/20/2014
CrIS non-linearity coefficient and ILS parameters update





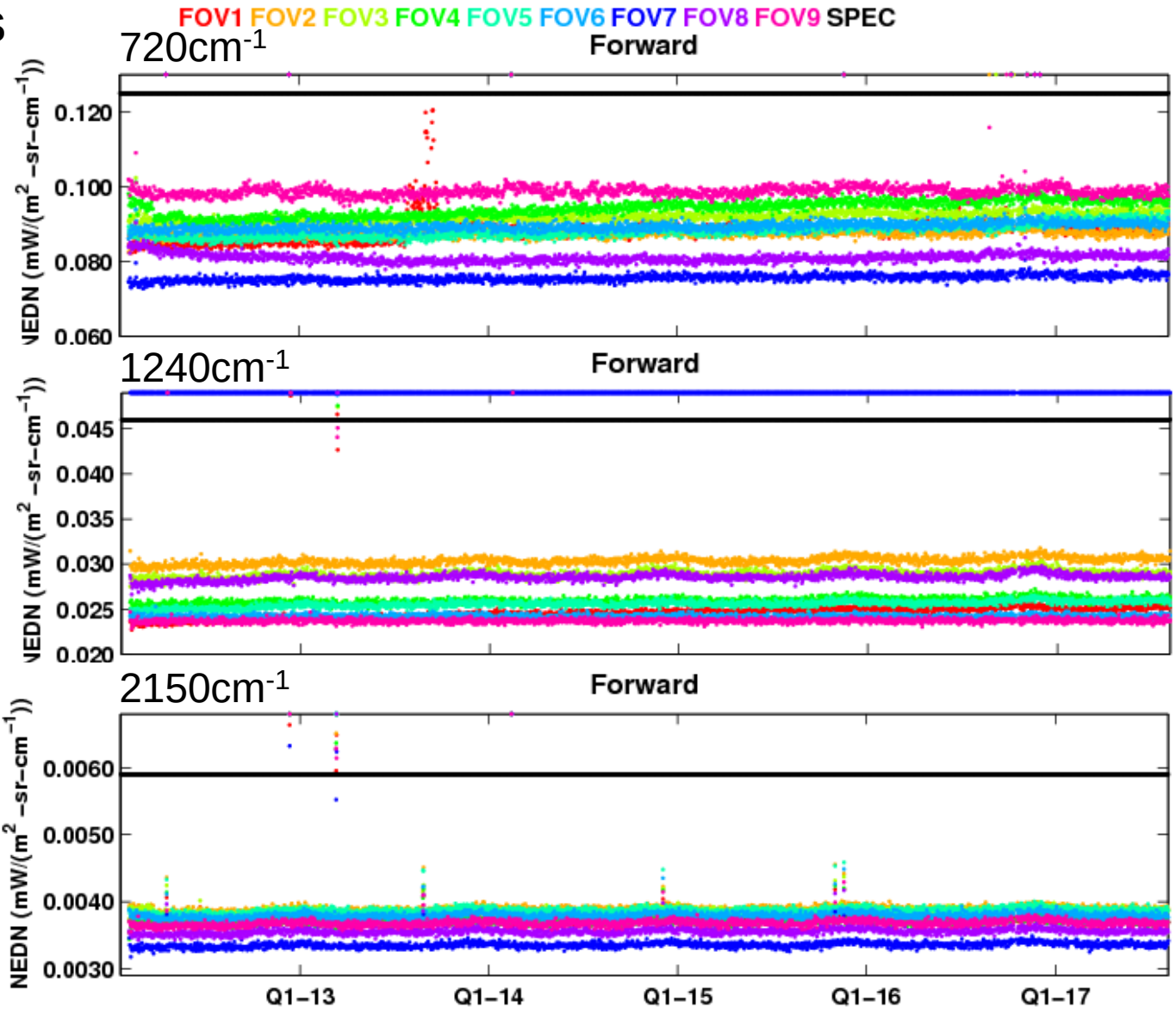
STAR CrIS Data Reprocessing (3/3)



- Comparison of the Neon subsystem spectral calibration versus calibration using the upwelling radiances for IDPS and reprocessed SDRs from September 22, 2012 to August 31, 2016.
- The upwelling calibration has been offset by -0.6 ppm.
- The Neon zero shift time is determined by the Correction Matrix Operator (CMO) update on December 19, 2012. The several sharp spikes in the December 19, 2012, August 9, 2014, and September 2, 2014 are due to NPP spacecraft issues, not CrIS malfunctions.
- The upwelling calibration is for the daily average of FOV5 at nadir (FOR 15 or 16), descending orbit over clear tropical ocean scenes.

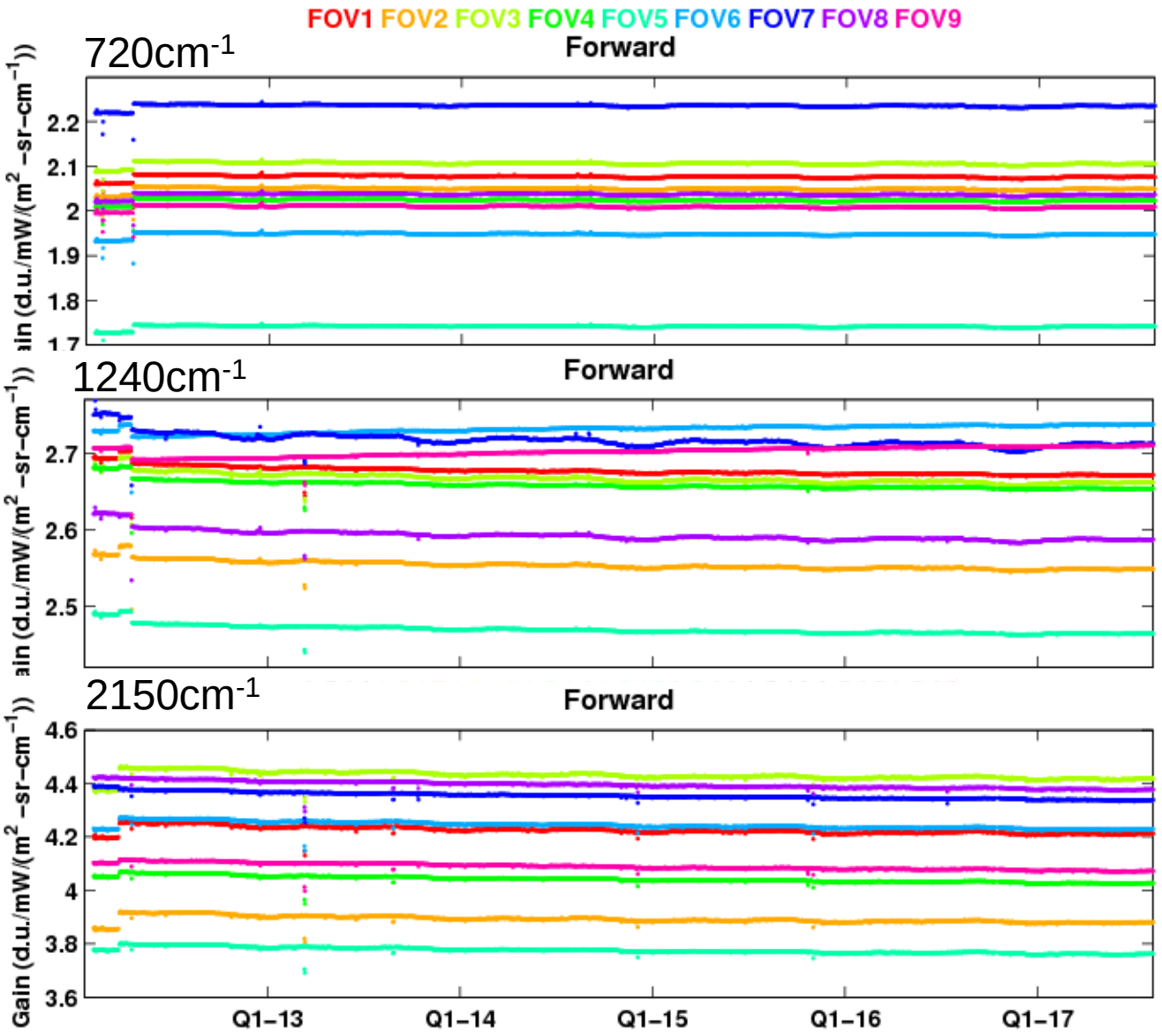
S-NPP CrIS LTM: Stable NEdN

STAR ICVS



S-NPP CrIS LTM: Stable Gain

STAR ICVS



CrIS SDR Team Accomplishments (FY17)

- J1 CrIS FSR calibration algorithm in IDPS Block2
- Engineering Packet Version 37 upload
- LW FOV5 cold scene anomaly
- Polarization correction and preliminary validation
- Interferogram spike detection and correction
- J1 spacecraft-level TVAC data analysis
- CrIS noise and O-B channel correlation
- SNPP anomaly analysis

J1 CrIS Readiness

- J1 CrIS status at the 2016 annual meeting
  - Successfully completed the EMI testing and Spacecraft-level testing
  - Initial mounting matrix for the SDR algorithm was computed and delivered
  - Improved SDR algorithm was delivered in July 2016
- J1 CrIS current status
  - FSR SDR data was successfully generated by IDPS Block 2.0 using J1 calibration algorithm after April 10, 2017
  - J1 Spacecraft-level TVAC with FCE (September 2016) during transition to different plateaus were successfully detected and corrected with FCE module turn on using latest ADL code based on IDPS Block 2.0
  - J1 Spacecraft-level TVAC1 data on March 2017 and TVAC2 data on May 2017 were successfully processed using latest ADL code based on IDPS Block 2.0
  - There is no critical issue

Summary

- The J1 CrIS SDR algorithm/software is ready for J1 mission
- SNPP CrIS performance is stable and there is no significant SDR performance degradation
- FSR SDRs are routinely generated for the NWP and retrieval communities
- Great progress was made in advancing CrIS SDR science, including calibration algorithm, LW FOV5 cold scene anomaly root cause, polarization signals and correction, and spike detection and correction

Path Forward

- For the J1 mission, the team will
  - Support validation and development of the operational SDR software
  - Execute post-launch Cal/Val plan
  - Provide the provisional, and validated SDR products on schedule
- The team will continue working to address the issues: Lunar intrusion detection algorithm, LW FOV5 cold scene anomaly, and polarization
- SNPP CrIS observation approached 6 years; the team will
  - Analyze the history of the data
  - Continue monitoring its performance and SDR health