NPP/JPSS
Instrumental Performance & Data Quality Long-Term Monitoring (LTM) in STAR Integrated Cal/Val System (ICVS)

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- Primary Users
- System Components/Interface
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- Path Forward

Objectives

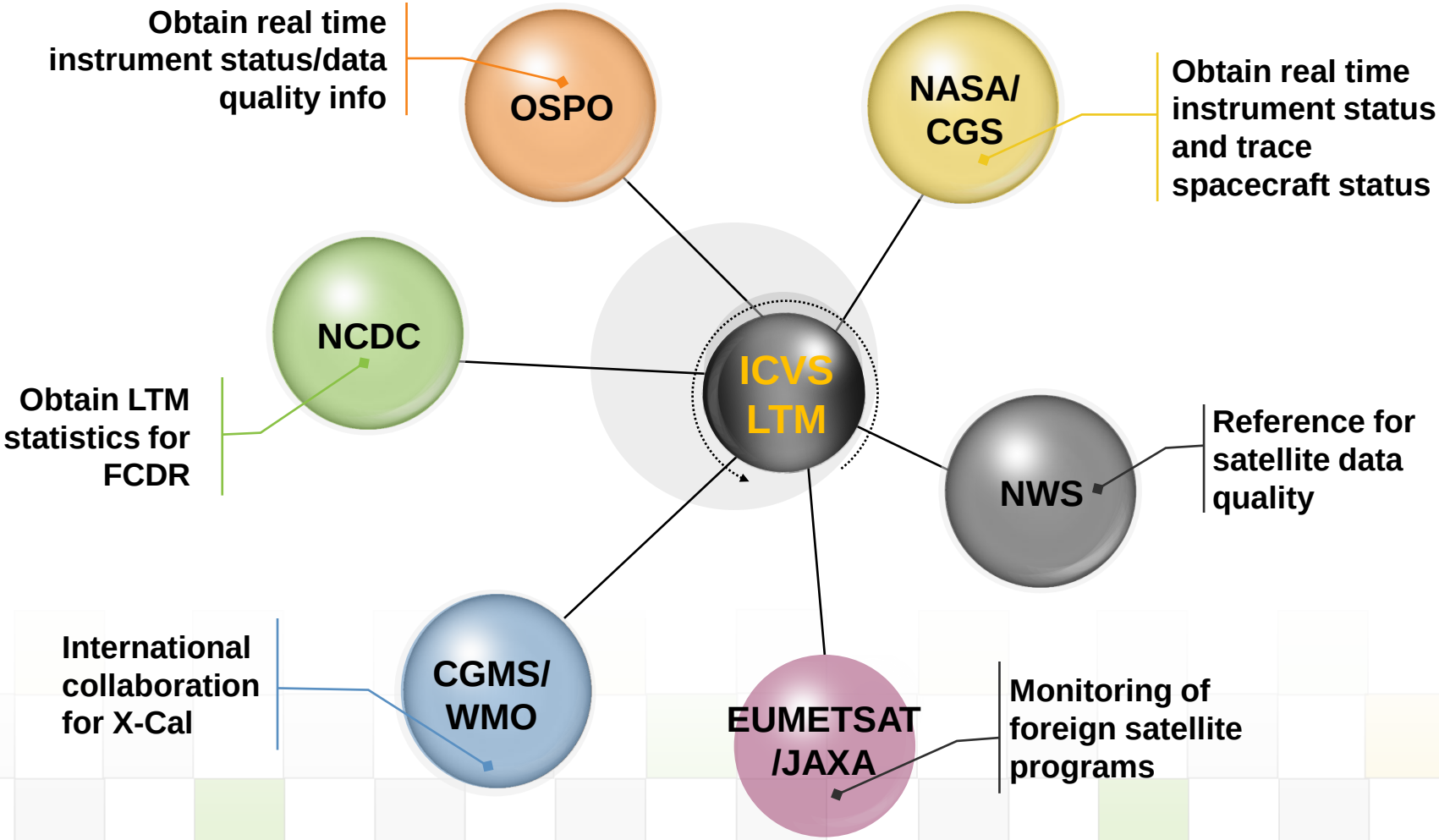
1. Provide real-time satellite status, instrument performance, and data quality monitoring for operational missions

2. Provide long-term satellite and instrument stability/performance and data quality monitoring for satellite climate change study

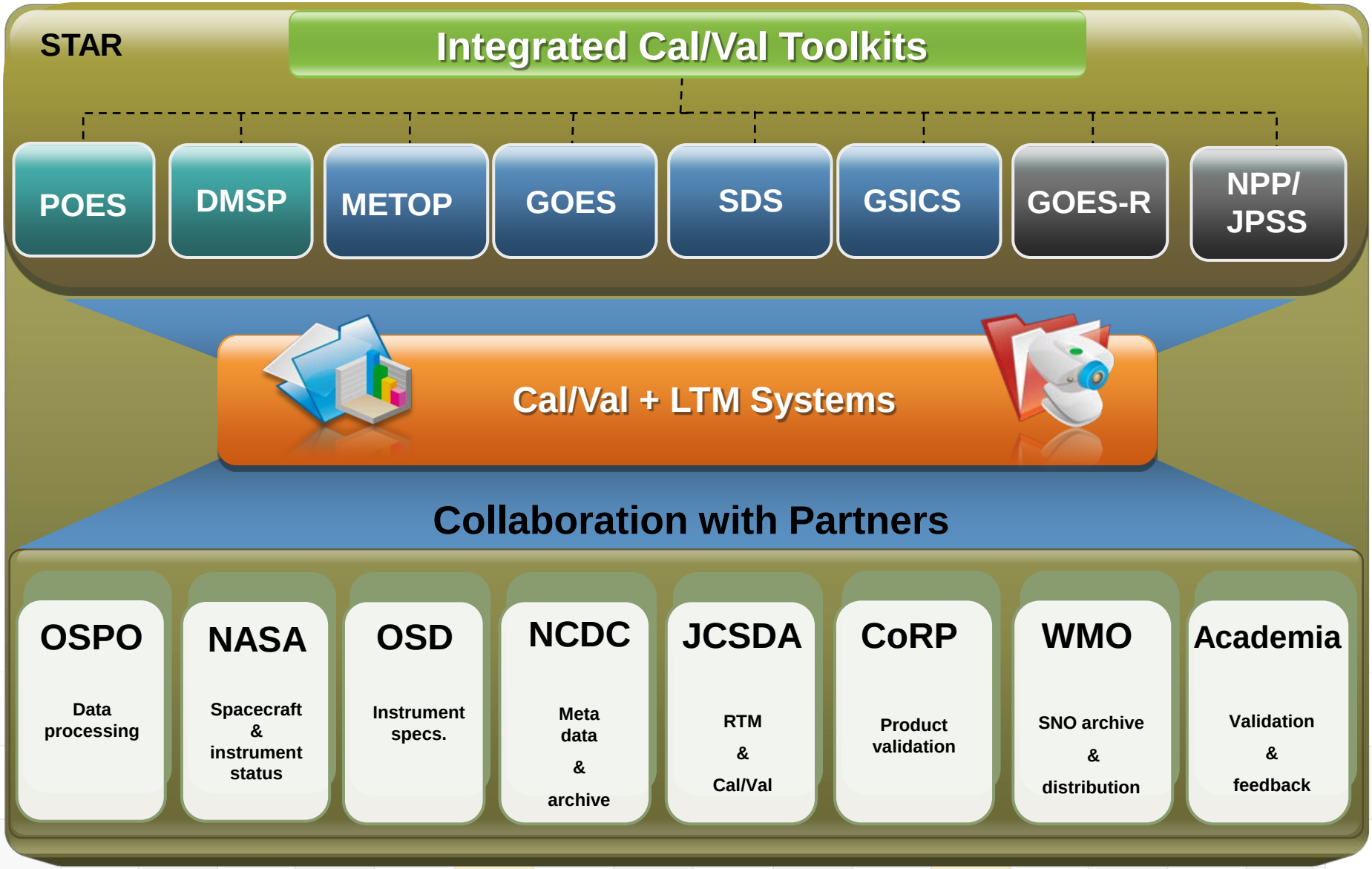
3. Provide the root-cause analysis for the instrument anomalies and the recommendation for risk mitigation

4. Generate and verify instrument calibration coefficients for NOAA operational ground processing systems

Primary Users



Concept of Operations



ICVS-LTM Overview

Common Ground System (CGS)

CLASS (TDR/SDR/ EDR/IP)

Flight Segment

ESPC (L1b, GVAR)

ICVS LTM System

- Data handling module
- Calibration parameter module
- Common data operator module
- Data and product analysis module

Correlative truth data

In-situ/Field Campaign

NWP Global Analysis

- ✓ **On-line near real time/long term products**
- ✓ **Instrument/Data Quality notifications**
- ✓ **Operational Cal/Val coefficients**
- ✓ **Status/performance statistic data**

ICVS-LTM System Components

Spacecraft

- NPP spacecraft
- JPSS spacecraft *

Instrument

- NPP ATMS/CrIS/VIIRS/OMPS
- NOAA-18/-19/MetOP-A AMSU-A/MHS/AVHRR/HIRS
- DMSP F-16/17/18 SSMIS
- GOES-11/12/13/14/15 Sounder
- AMSR2, MetOp-B, DMSP F19 *

Data Quality

- NPP ATMS/CrIS
- NOAA-18/-19/MetOP-A AMSU-A/MHS
- DMSP F-16/17/18 SSMIS
- AMSR2, MetOP-B, DMSP F19 *

* Available after launch

Suomi NPP Spacecraft Parameters

http://www.star.nesdis.noaa.gov/icvs

S/C CDH-RF Comm Telemetry
Command RX 1 Baseplate Temperature | Display

S/C Bus Critical Telemetry
PUMA Bus Voltage | Display

S/C Orbit State Telemetry
Beta Angle | Display

S/C PUMA Configuration Telemetry
PUMA 1 Payload Bus Current | Display

S/C Temperature Telemetry - ATMS
ATMS 10-Day All Index Summary | Display

S/C Temperature Telemetry - VIIRS
VIIRS 10-Day All Index Summary | Display

S/C Temperature Telemetry - CERES
CERES 10-Day All Index Summary | Display

S/C HRD Transmitter Telemetry
HRD Tx 1 RF Signal Strength, Derived | Display

S/C ADCS Housekeeping High Rate Telemetry
Star Tracker Maximum Residual | Display

S/C DSEP Instrument Power Control Telemetry
DSEP 1 ATMS Current | Display

S/C Temperature Telemetry
Temp. Telemetry TX 1 Baseplate | Display

S/C Temperature Telemetry - CrIS
CrIS 10-Day All Index Summary | Display

S/C Temperature Telemetry - OMPS
OMPS 10-Day All Index Summary | Display

100+ Parameters Provided in Real Time for NPP Spacecraft Telemetry Monitoring

Suomi NPP Spacecraft Parameters

- PUMA Bus Voltage
- PUMA Total Bus Current
- PUMA Battery 1 Voltage
- PUMA Battery 2 Voltage
- PUMA Battery 1 Pressure
- PUMA Battery 2 Pressure
- Wheel 1 Speed/Direction
- Wheel 2 Speed/Direction
- Wheel 3 Speed/Direction
- Wheel 4 Speed/Direction
- Gyro(TARA) 1 Motor Current
- Gyro(TARA) 2 Motor Current
- Gyro(TARA) 3 Motor Current
- Reaction Wheel 1 Motor Current
- Reaction Wheel 2 Motor Current
- Reaction Wheel 3 Motor Current
- Reaction Wheel 4 Motor Current
- System Pressure
- Propulsion Deck -Z Temperature
- Propulsion Tank Temperature (Gas Side)
- Control Frame Rate X
- Control Frame Rate Y
- Control Frame Rate Z

- Command RX 1 Baseplate Temperature
- Command RX 2 Baseplate Temperature
- Command Receiver 1 Strength
- Command Receiver 2 Strength
- Command Receiver 1 Loop Stress
- Command Receiver 2 Loop Stress

- Star Tracker Maximum Residual
- Total System Momentum 1
- Total System Momentum 2
- Total System Momentum 3

- DSEP 1 ATMS Current
- DSEP 1 CERES Current
- DSEP 1 CrIS Current
- DSEP 1 OMPS Current
- DSEP 1 VIIRS Current

- PUMA 1 Payload Bus Current
- PUMA 2 Payload Bus Current
- PUMA 1 Array Current
- PUMA 2 Array Current
- PUMA 1 Array Temperature 1
- PUMA 1 Array Temperature 2
- PUMA 2 Array Temperature 3
- PUMA Bus Voltage

- HRD Tx 1 RF Signal Strength, Derived
- HRD Tx 2 RF Signal Strength, Derived
- NB Tlm Tx 1 RF Signal Strength, Derived
- NB Tlm Tx 2 RF Signal Strength, Derived
- SMD Tx 1 RF Signal Strength, Derived
- SMD Tx 2 RF Signal Strength, Derived

- Temp. Telemetry Tx 1 Baseplate
- Temp. Telemetry Tx 2 Baseplate
- Temp. HRD Tx 1 Baseplate
- Temp. HRD Tx 2 Baseplate
- Temp. SMD Tx 1 Baseplate
- Temp. SMD Tx 2 Baseplate

Suomi NPP Spacecraft Parameters

- ATMS G-Band RX Shelf Temperature
- ATMS Scan Drive Mechanism Temperature
- ATMS Baseplate Temperature
- ATMS Calibration Target Bench Temperature
- ATMS V-Band RX Shelf Temperature
- ATMS Coldplate Operational Temperature (via DSEP ECC 1)
- ATMS Coldplate Operational Temperature (via DSEP ECC 2)
- ATMS Coldplate Operational Heater Deadband (via DSEP ECC 1)
- ATMS Coldplate Operational Heater Deadband (via DSEP ECC 2)
- ATMS Coldplate Operational Heater Operational Setpoint (via DSEP ECC 1)
- ATMS Coldplate Operational Heater Operational Setpoint (via DSEP ECC 2)

- CERES Detector Survival Temperature, Primary
- CERES ICA Survival Temperature, Primary
- CERES PCA Survival Temperature, Primary
- CERES Interface Temperature

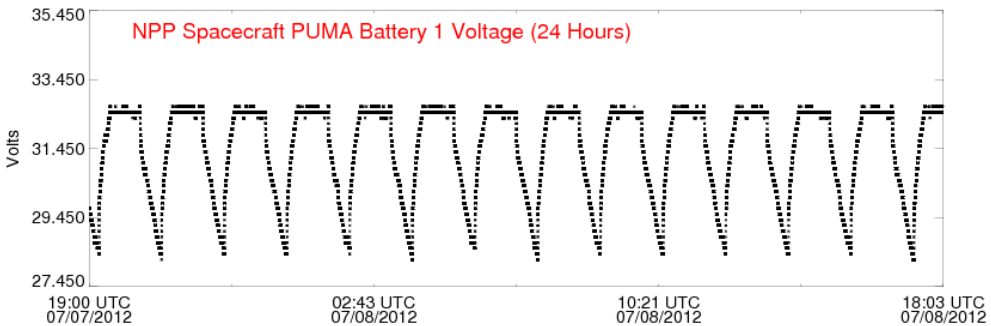
- OMPS Sensor I/F 1 Temperature
- OMPS Sensor I/F 2 Temperature
- OMPS Total Column Thermistor Temperature
- OMPS Nadir Profiler Thermistor Temperature
- OMPS Limb Thermistor Temperature

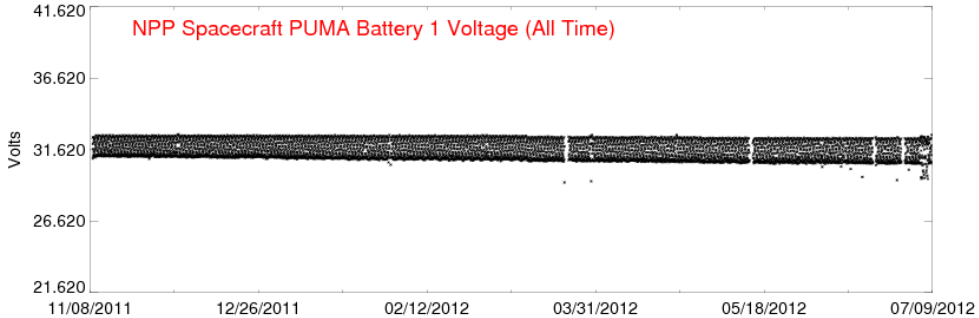
- VIIRS Sensor I/F 1 Temperature
- VIIRS Sensor I/F 2 Temperature
- VIIRS Telescope Moter Survival Heater Temperature
- VIIRS Aft Optics Housing Temperature
- VIIRS EM Coldplate Temperature
- VIIRS EM Nadir Panel Temperature
- VIIRS Coldplate Temperature (via DSEP ECC 1)
- VIIRS Coldplate Temperature (via DSEP ECC 2)
- VIIRS Electronics Coldplate Heater Deadband (via DSEP ECC 1)
- VIIRS Electronics Coldplate Heater Deadband (via DSEP ECC 2)
- VIIRS Electronics Coldplate Heater Operational Setpoint (via DSEP ECC 1)
- VIIRS Electronics Coldplate Heater Operational Setpoint (via DSEP ECC 2)

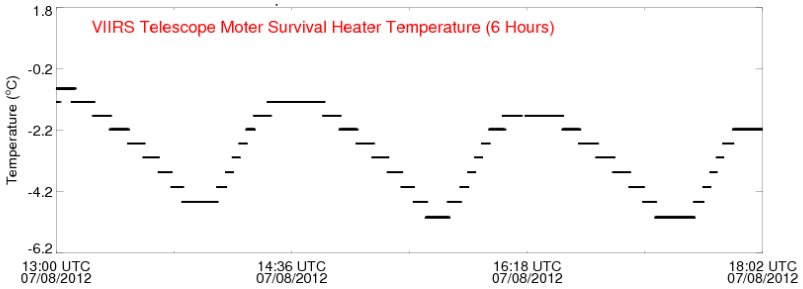
- CrIS Sensor I/F 1 Temperature
- CrIS Sensor I/F 2 Temperature
- CrIS Structure Near Survival Heater Temperature
- CrIS PCE Temperature
- CrIS Interferometer Electronics Temperature
- CrIS SSM Temperature

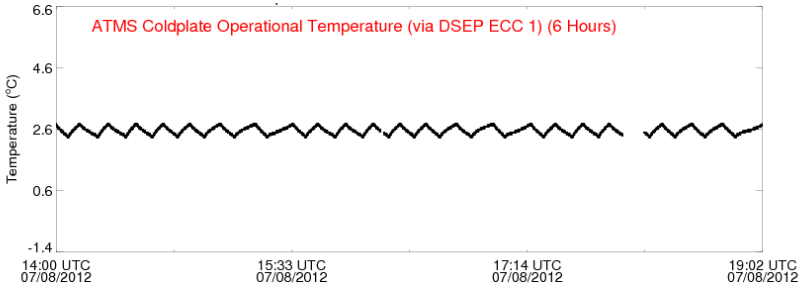
Spacecraft Monitoring Example

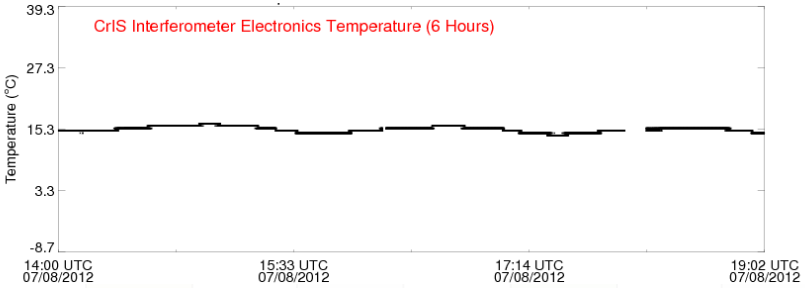
- Instrument temperatures obtained from S/C telemetry (right)
- S/C PUMA Battery 1 Voltage real time variation during the last 24 hours and LTM trending since launch (below)

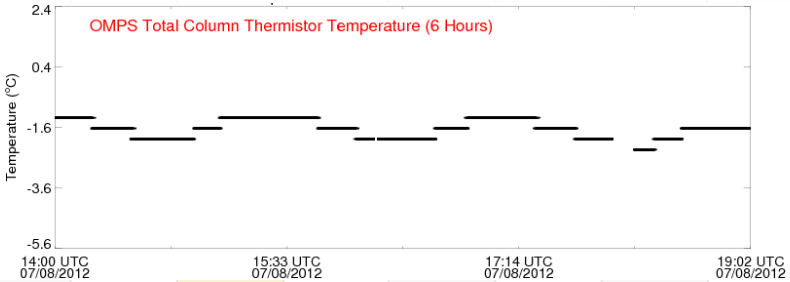




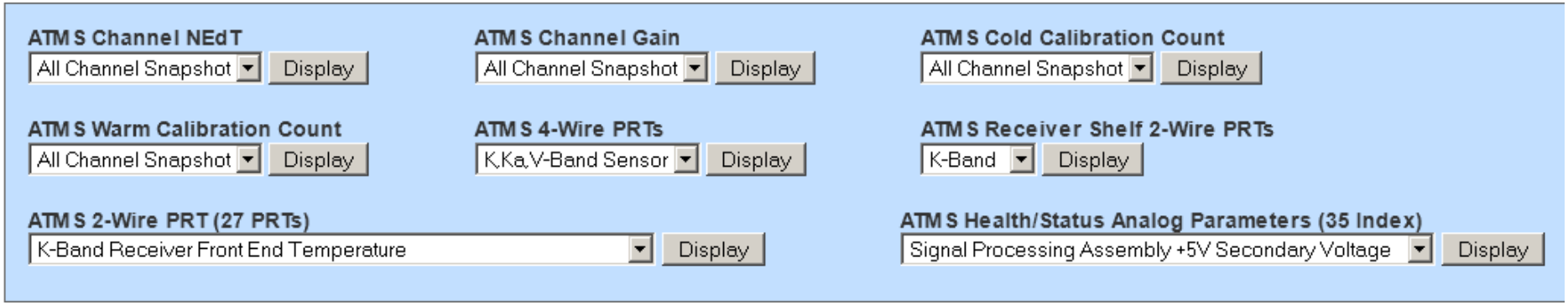






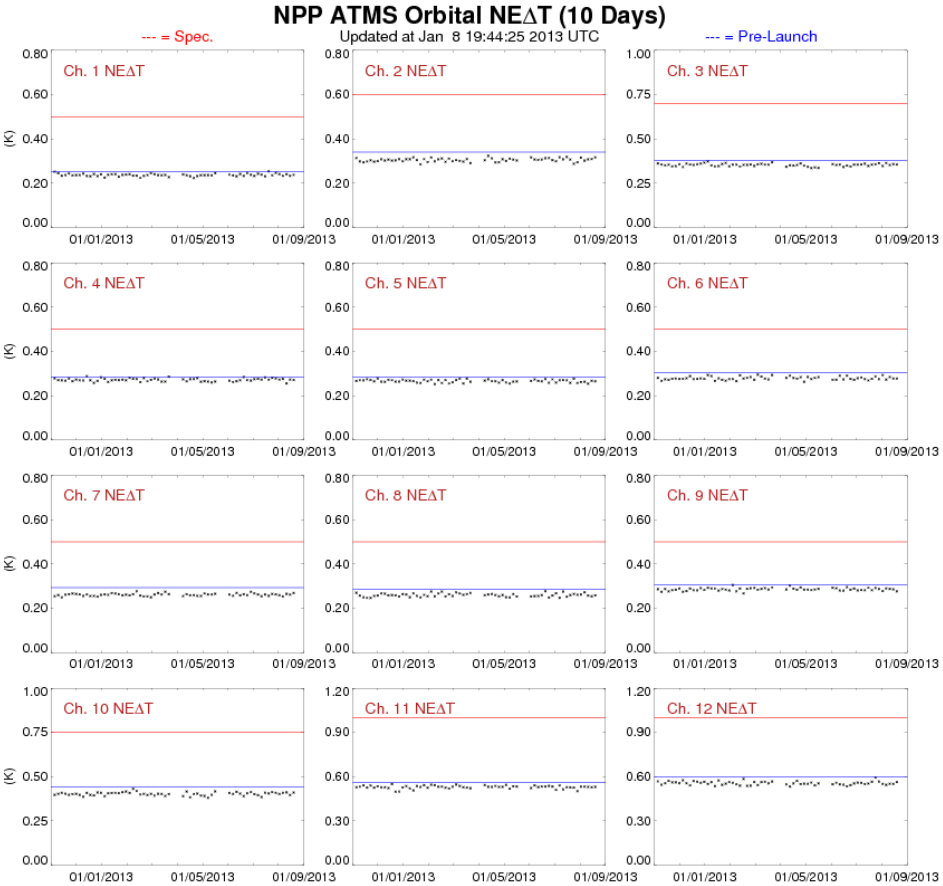


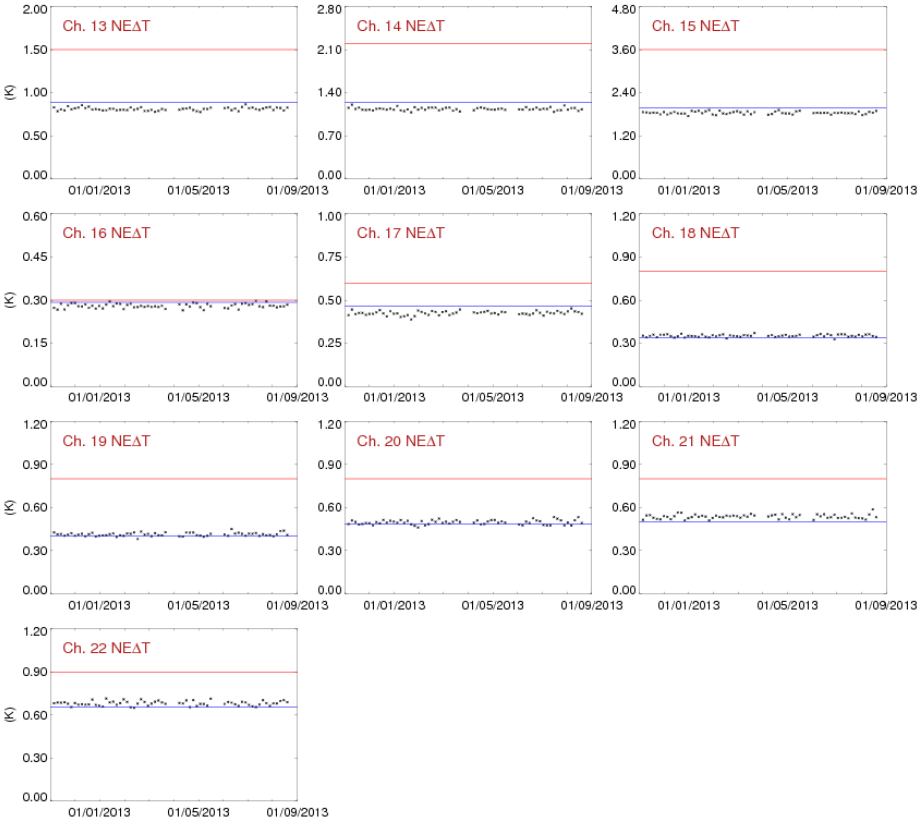
Suomi NPP ATMS Parameters



Parameters	Descriptions	Dimensions	Usage
Channel NE∆T	Noise equivalent differential temperature	22 channels	sensitivity trending
Warm Count	Blackbody warm target count	4 readings/channel * 22 channels	Onboard calibration target trending
Space view Count	Space view cold target count	4 readings/channel * 22 channels	Onboard calibration target trending
Channel Gain	Calibration gains for each channel	22 channels	Calibration trending
4-Wire PRT Temperature	Blackbody platinum resistance thermometer (PRT) temperature	2 bands	Stability trending
2-Wire telemetry temperatures	Receiver shelf temperature, Scan drive mechanism temperature, IF module temperature, etc.	31 temps	Instrument health status
Instrument telemetry	Scan drive power supply voltage, Receiver voltage, etc.	35 parameters	Instrument health status

Suomi NPP ATMS Parameters - RDR

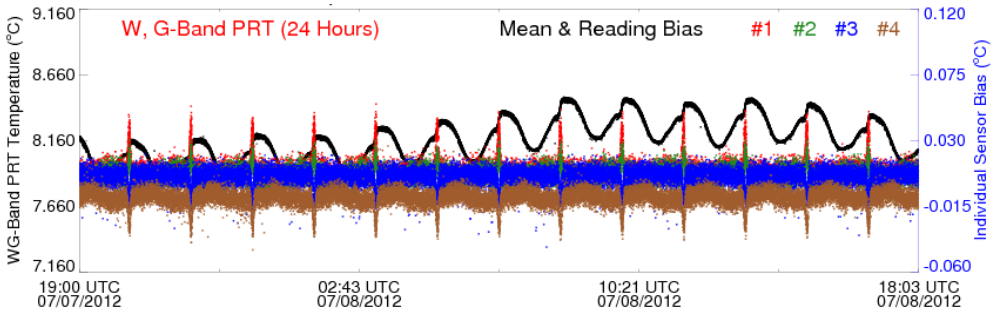


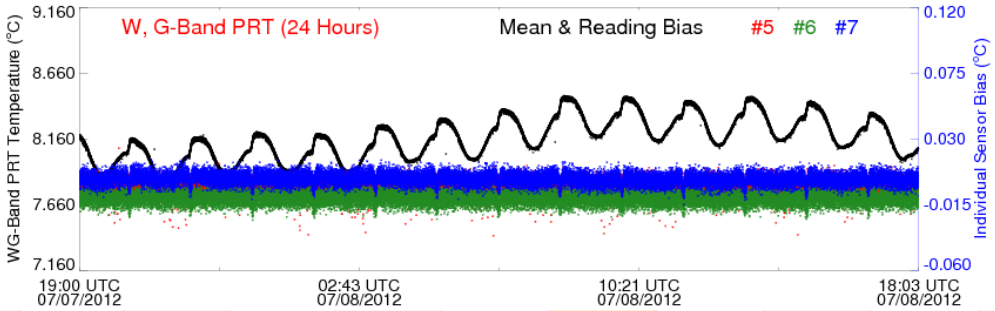


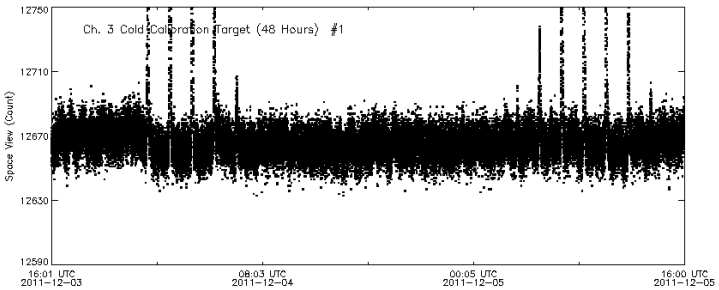
Suomi NPP ATMS Parameters - RDR

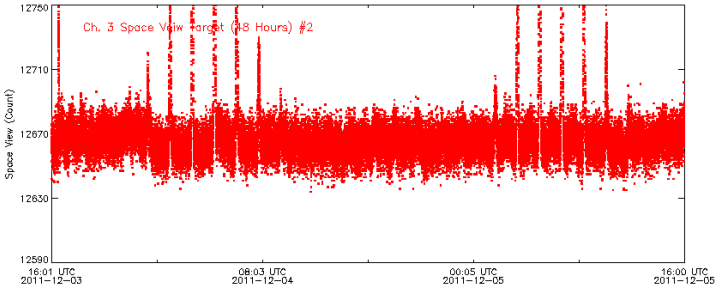
- **Lunar intrusion effects on ATMS space view readings and channels are different (right)**

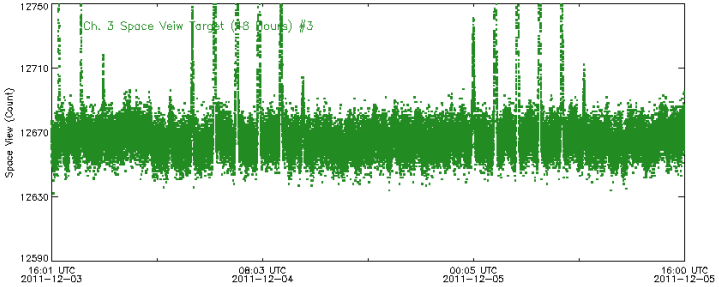
- **ATMS 4-Wire PRTs anomalies are observed in individual readings of all bands (below)**

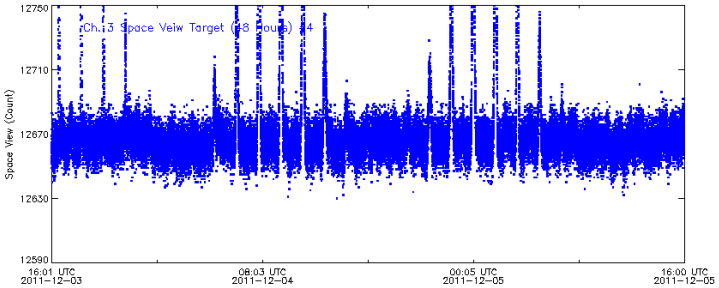




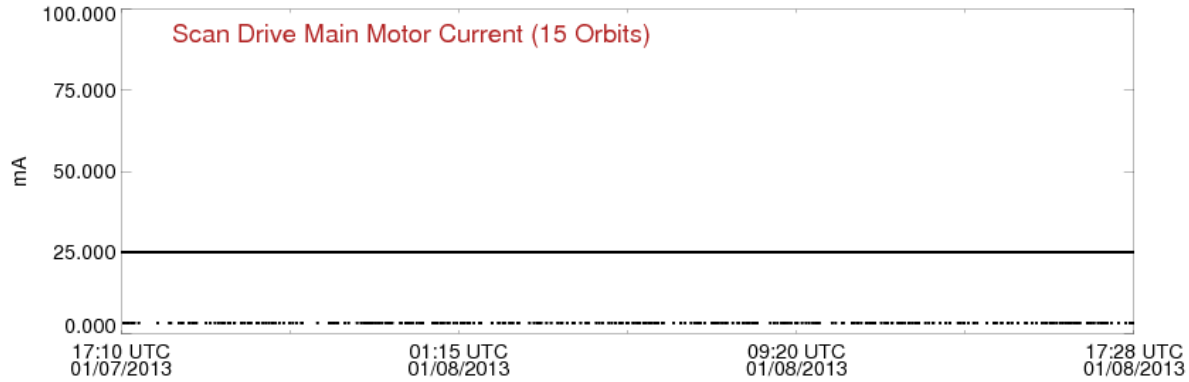


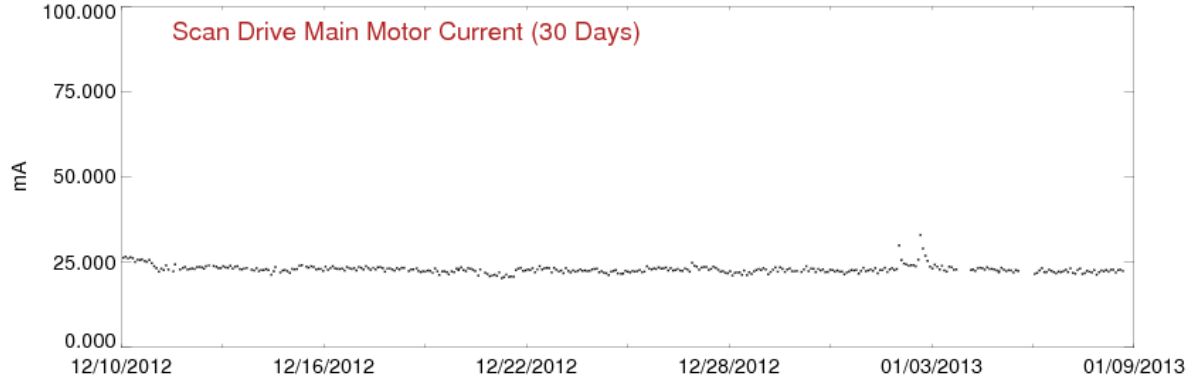


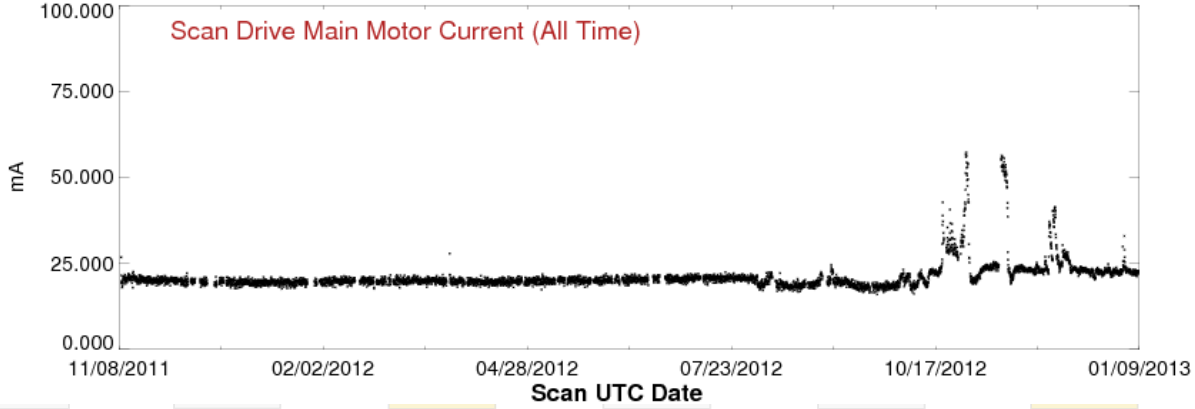




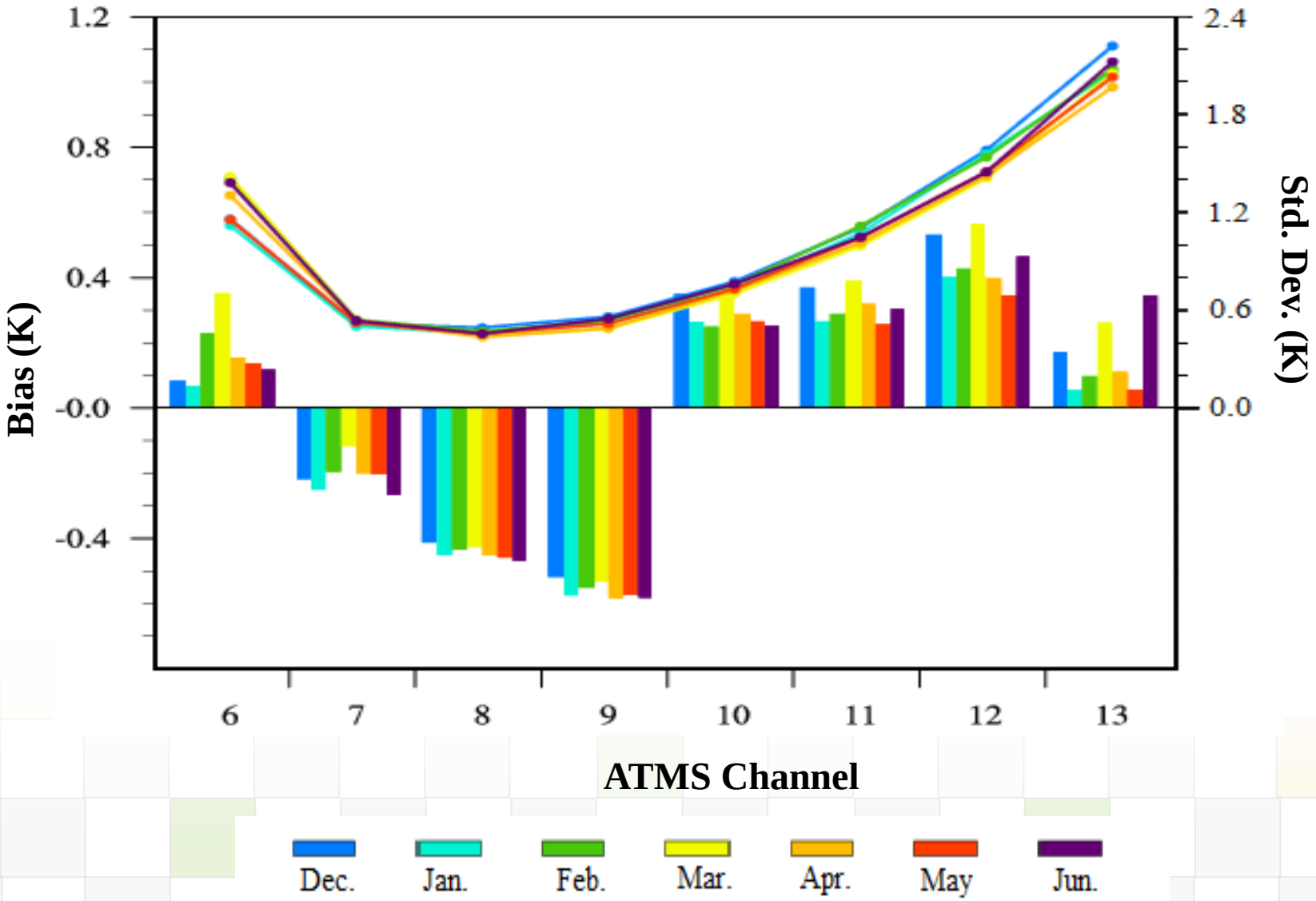
Suomi NPP ATMS Parameters - RDR



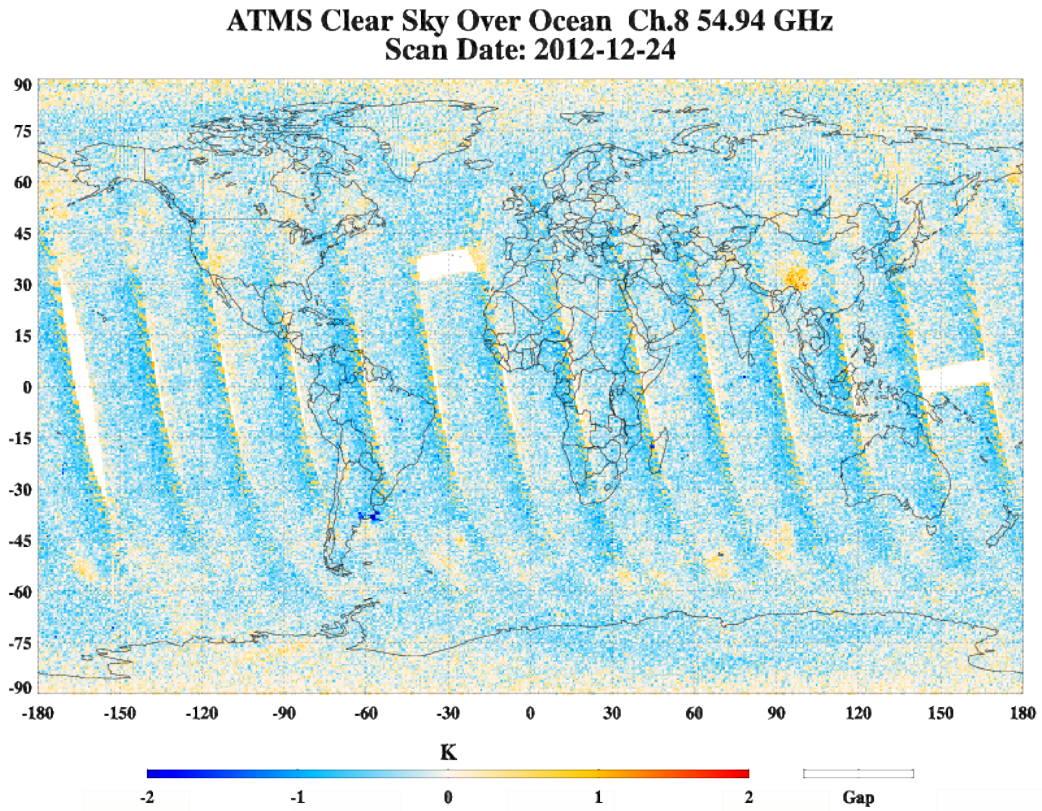


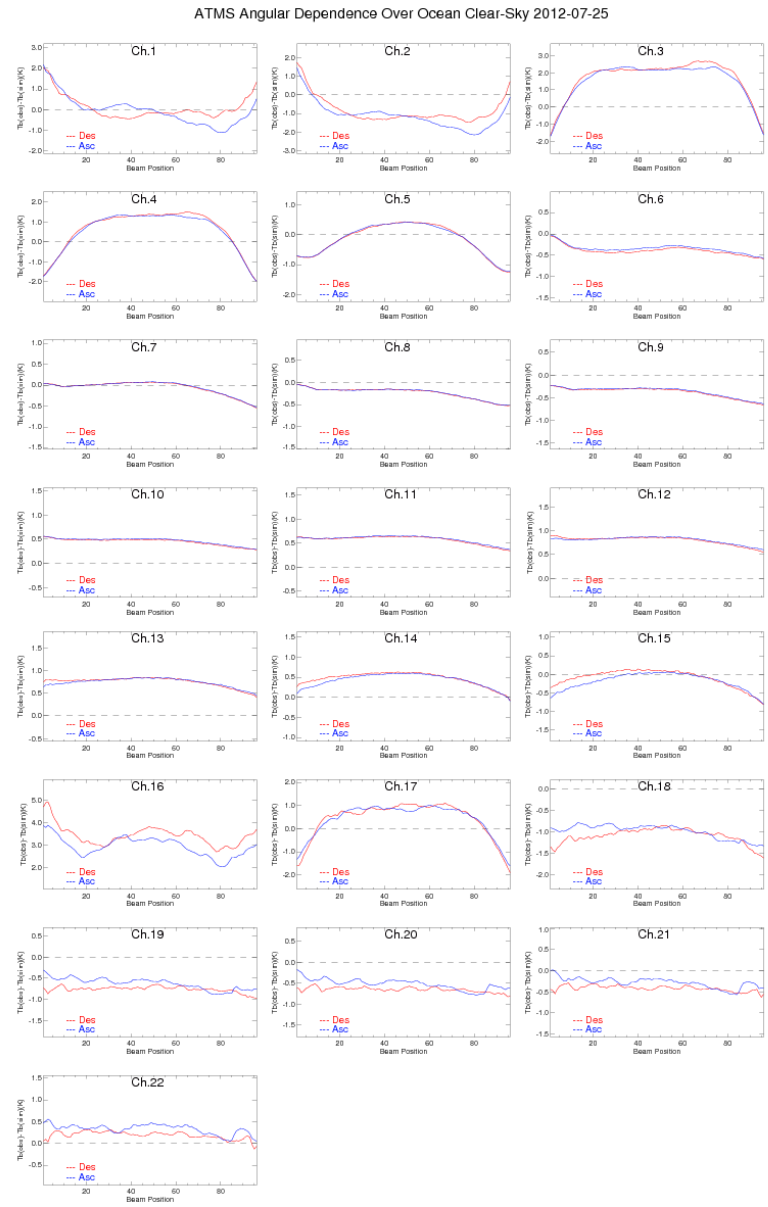


Suomi NPP ATMS Parameters - TDR



Suomi NPP ATMS Parameters - TDR





Upper: ATMS Global Bias Distribution

Right: ATMS SDR Scan Angle Dependent Bias

Suomi NPP VIIRS Parameters

VIIRS Global True Color Image
Global True Color Image | Display

VIIRS Health and Status
FT Controller ADC Ref 5V | Display

VIIRS Solar Diffuser (SD) Count (by Detector)
Band I1 | Display

VIIRS Solar Diffuser (SD) Count NEΔN
Band I1 | Display

VIIRS Blackbody Count NEΔN
Band I1 | Display

VIIRS Space View Count NEΔN
Band I1 | Display

VIIRS F Factors/H Parameters
F Factor (VNIR Bands) HG/HamA | Display

VIIRS Solar Diffuser (SD) Count (by Band)
Band I1 | Display

VIIRS SD Stability Monitor (SDSM) Count
Band M1 | Display

VIIRS Blackbody Count
Band I1 | Display

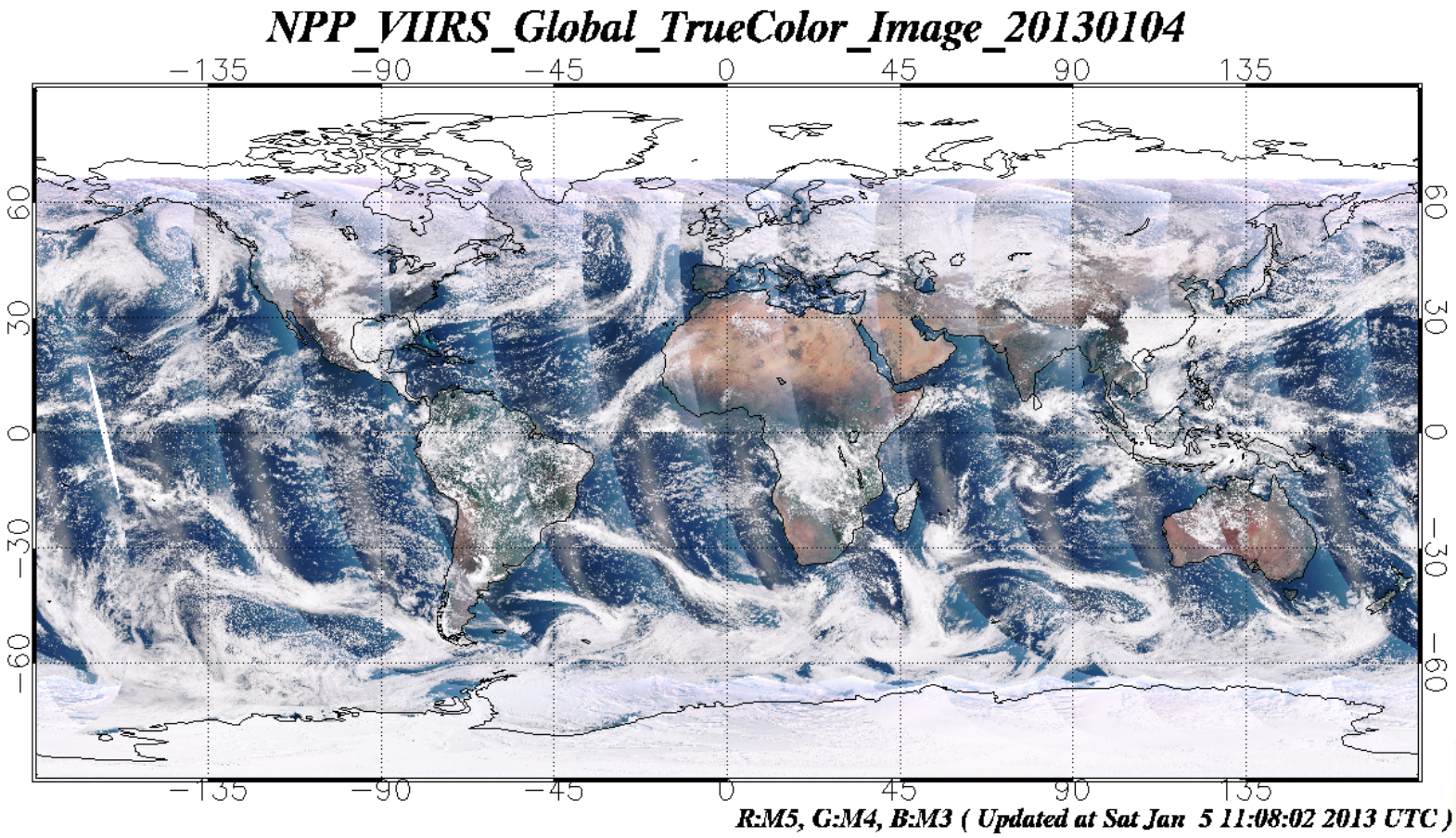
VIIRS Space View Count
Band I1 | Display

VIIRS Instrument Temperature
Blackbody Temperature | Display

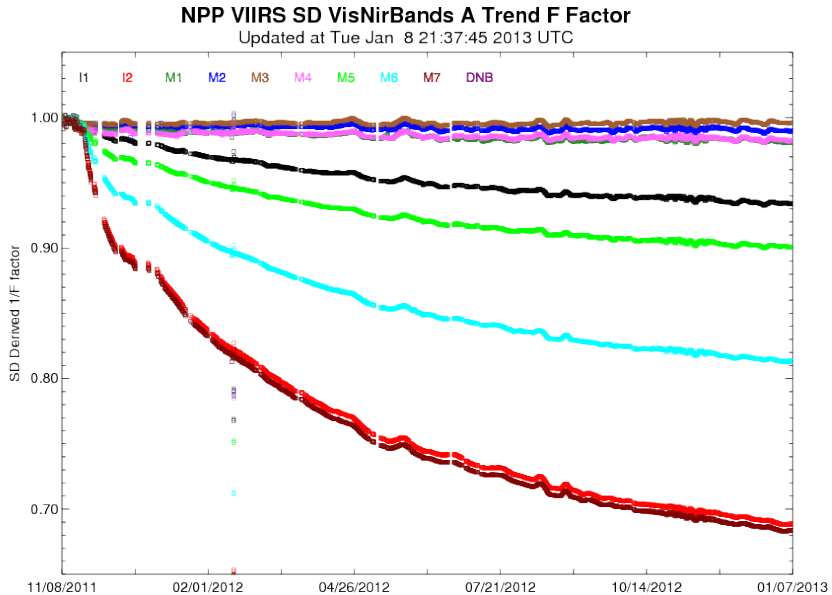
Suomi NPP VIIRS Parameters

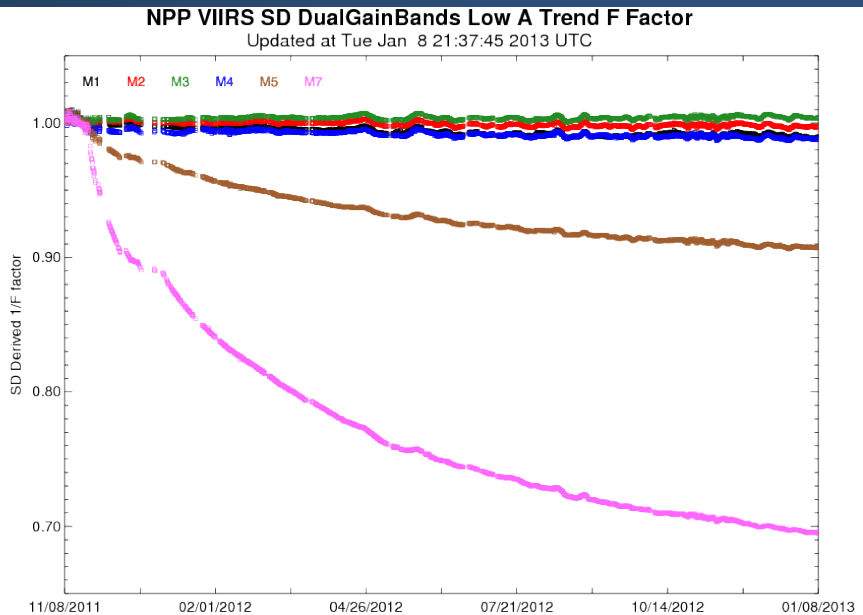
Parameters	Descriptions	Dimensions	Usage
Telemetry temperatures	BB, RTA, cavity, HAM, FPA, cooler, Mainframe, Circuit Card Assembly	21 temps	Instrument Healthy status
SD_Counts	VIIRS observation DN of Solar diffuser for band I1~I3, M1~M11, DNB over band average	14 bands	Degradation trending
SD NEΔN	Noise NEΔN for SD signal of solar bands	14 bands	SNR trending
SD_Counts by detectors	VIIRS observation DN of Solar diffuser I1~I3, M1~M11, DNB over detector average	14bands *32d	degradation for Detector uniform
SDSM signal	SDSM signal of SD and Sun in every orbit	8 bands	SD trending
SV_Counts	VIIRS observation Space view DN for 22 bands	22bands	Background signal trending
SV NEΔN	Dark Noise NEΔN for Space view signal	22bands	Dark noise signal
BB_Counts	VIIRS observation Blackbody DN for 22 bands	22 bands	IR gain derivation
BB NEΔN	Noise NEΔN for black body signal	22bands	IR NEDT derivation
F factors and H factors	Degradation of Solar bands based on SD signal and SDSM	14 bands	Solar bands degradation
IR NEΔT	Noise equivalent temperature for IR bands M4, M5, M12-M16	7 IR bands	IR bands noise
IR Calibration Gain	Calibration gains for IR bands M4, M5, M12-M16	7 IR bands	IR bands calibration trending

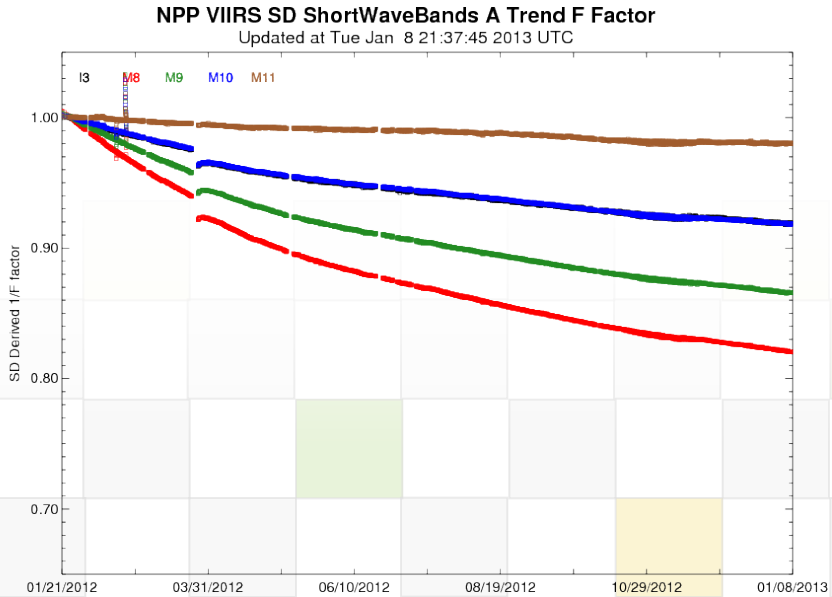
Suomi NPP VIIRS Global Image

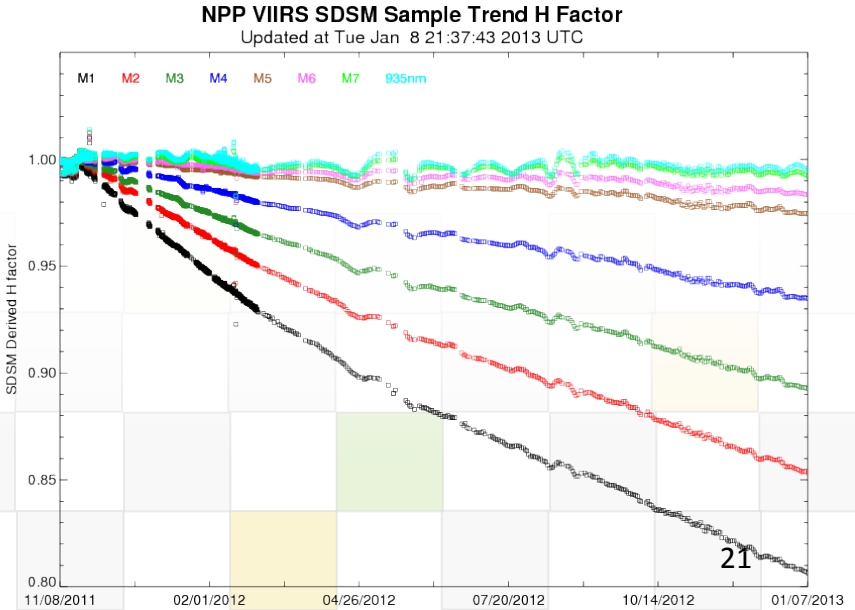


Suomi NPP VIIRS OBC Parameters









Suomi NPP CrIS Parameters

Telemetry Parameters

Name	Description
RDR_TLM_ICT_PRTTemp	ICT PRT temperature
RDR_TLM_OMA_Temp	OMA structure temperature
RDR_TLM_StageCooler_Temp	Stage 1/2/3/4 cooler temperature
RDR_TLM_Other_Temp	BS/SB/Telescope Temperature
RDR_Laser_Diode	Laser diode current & temperature
RDR_Servo_Error	SSM Cross/In-track servo error over 30 FORs

Housekeeping Parameters

Name	Description
SSMelectronicsboardTemp	SSM electronics board Temperature
ServoMotorwindingTemp	Cr- & In-Track Motorwinding Temperature
PorchswingVelocity	Porchswing Velocity
MotorCurrent	Porchswing/DA-X/DA-Y Motor Current
DA_XY_Tilt_Err	DA-X & DA-Y Tilt Error

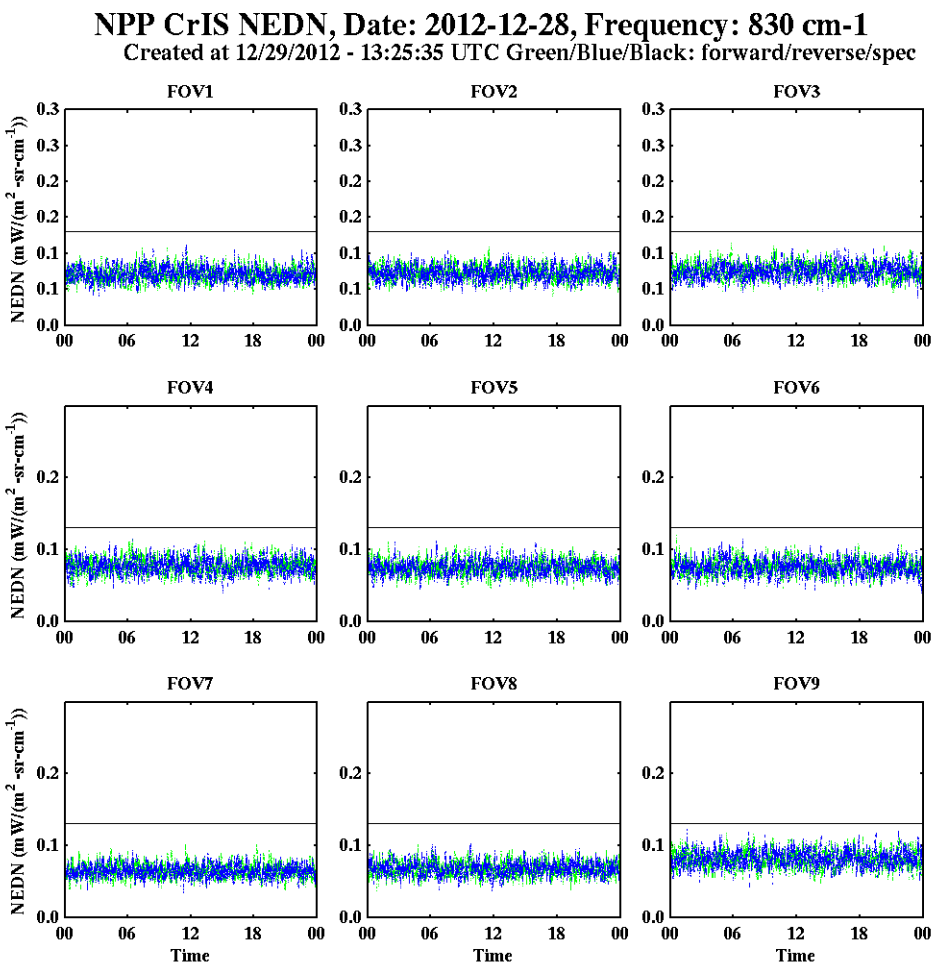
Instrumental Responses

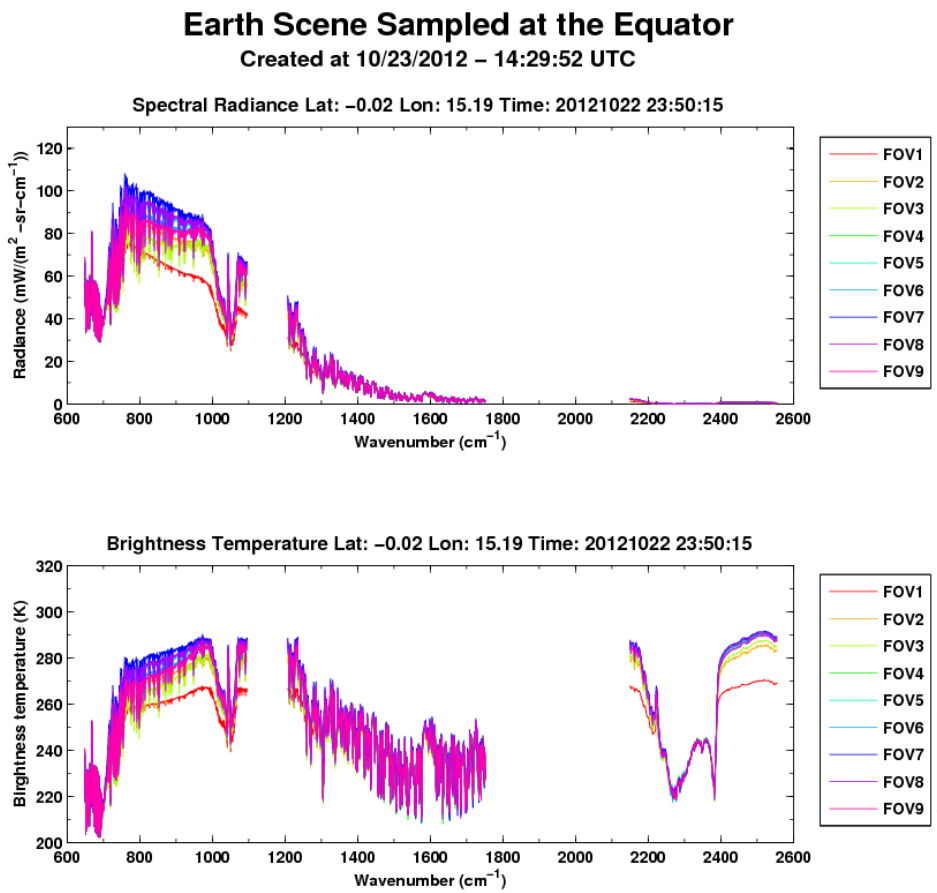
Name	Description
SSMelectronicsboardTemp	SSM electronics board Temperature
ServoMotorwindingTemp	Cr- & In-Track Motorwinding Temperature
PorchswingVelocity	Porchswing Velocity
MotorCurrent	Porchswing/DA-X/DA-Y Motor Current
DA_XY_Tilt_Err	DA-X & DA-Y Tilt Error

Suomi NPP CrIS Parameters

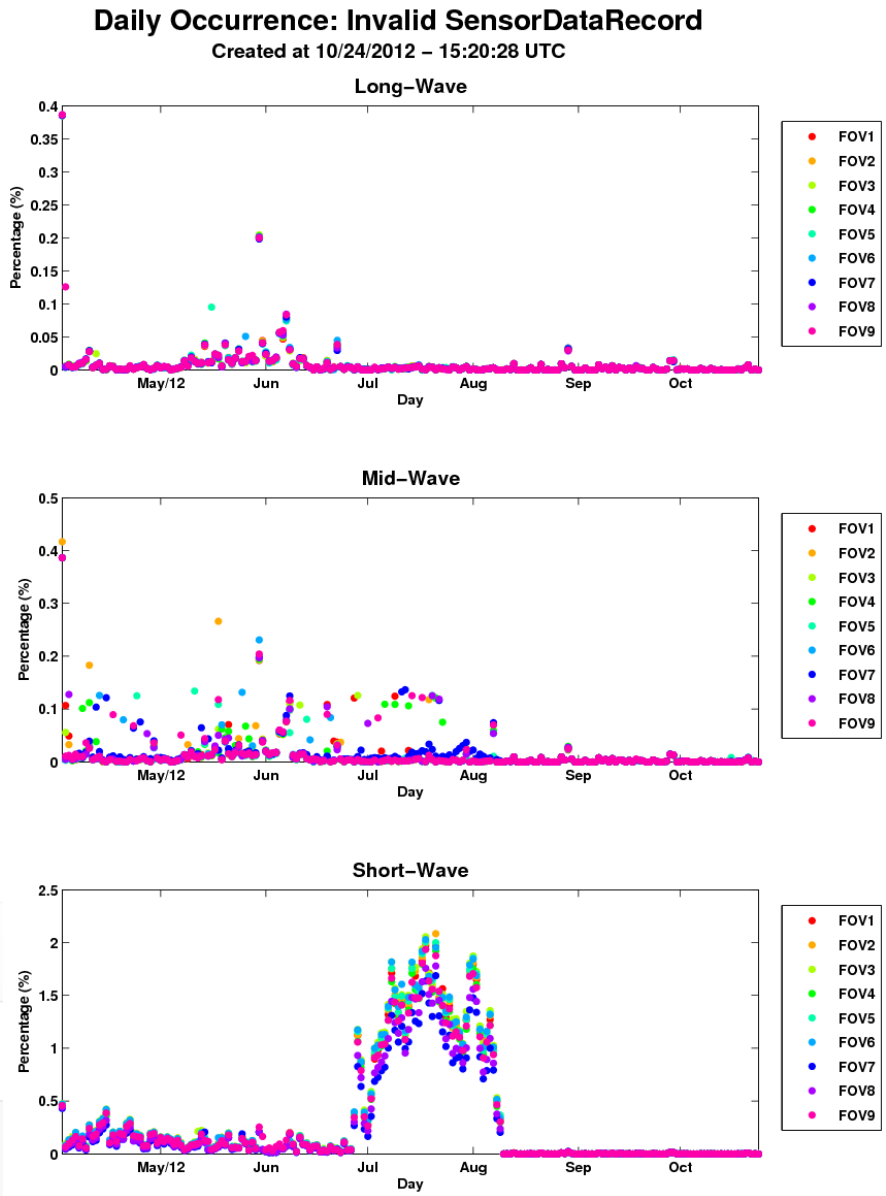
Name	Description
npp_cris_window_map	11 µm (900 cm^{-1}) BT map
npp_cris_H2O_map	6.7 µm (1500 cm^{-1}) BT map
npp_cris_window2_map	4.0 µm (2500 cm^{-1}) BT map
npp_cris_O3_map	9.7 µm (1030 cm^{-1}) BT map
npp_cris_SDR_Quality_map	SDR overall QF map
npp_cris_SDR_Quality	SDR overall QF time series over 9 field of views (FOV)
npp_cris_SDR_MAX_SD_imgy	Max std. dev. of imaginary NEDN per scan
npp_cris_SDR_AVG_NEDN	Average spectral NEdN of the day
npp_cris_SDR_MAX_NEDN	Maximal spectral NEdN of the day
npp_cris_SDR_AVG_imgy	Average spectral imaginary part of the day
npp_cris_SDR_MAX_imgy	Maximal spectral maginary part of the day
npp_cris_sdr_Invalid_Radiometric_Calibration	Radiometric Cal. Invalidity flag over 9 FOVs
npp_cris_sdr_Invalid_Spectral_Calibration	Spectral Cal. Invalidity flag over 9 FOVs
npp_cris_sdr_FCE_Correction_Failed	FCE Correction Failed flag over 9 FOVs
npp_cris_sdr_FCE_Detection	FCE Detection flag over 9 FOVs
npp_cris_sdr_Invalid_Geolocation	Geolocation Invalidity flag over 9 FOVs
npp_cris_sdr_Invalid_RDR	RDR Invalidity flag over 9 FOVs
npp_cris_sdr_Bit_Trim_Failed	Bit Trim Failed flag over 9 FOVs
SDR_Laser_Wavelength	3 laser wavelength parameters
SDR_NumberOfValidPRTTemps	# of valid PRT temp count
Scan_Level_QF1	6 Scan-level QFs
SDR_DS_Symmetry	Asymmetry in DS IGMs
SDR_ICT_Temp_Stab_Cons	ICT temp stability & consistency
SDR_DS_WindowSize	DS WindowSize
SDR_ICT_WindowSize	ICT WindowSize
SDR_DS_SpectralStability	DS Spectral Stability
SDR_ICT_SpectralStability	ICT Spectral Stability
SDR_ImpulseNoise_Count	Impulse Noise over 9 FOVs
SDR_SDRFringe_Count	SDR Fringe over 9 FOVs
SDR_ES_ZPDFringe_Count	ES ZPD Fringe over 9 FOVs
SDR_ES_ZPDMagnitude_Count	ES ZPD Magnitude over 9 FOVs
npp_cris_sdr_Day_Night	Day/Night flag over 9 FOVs
SDR_Lunar_Intrusion_QF2	Lunar Intrusion flag
npp_cris_SDR_Spectrum_NP	Spectral Rad/BT at North Pole
npp_cris_SDR_Spectrum_EQ	Spectral Rad/BT at Equator
npp_cris_SDR_Spectrum_SP	Spectral Rad/BT at South Pole
npp_cris_imgy900_map	11 µm (900 cm^{-1}) imgy. rad. map
npp_cris_imgy2500_map	4 µm (2500 cm^{-1}) imgy. rad. map

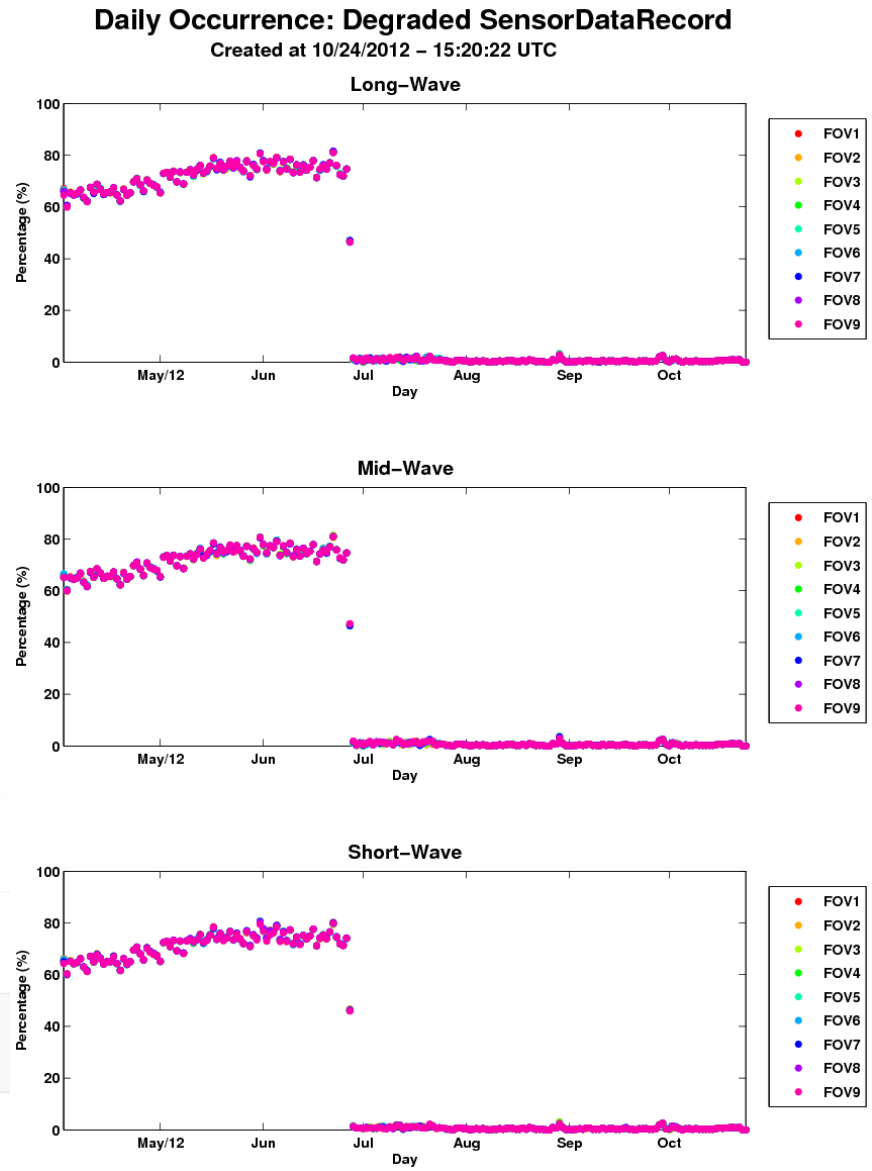
Suomi NPP CrIS Parameters



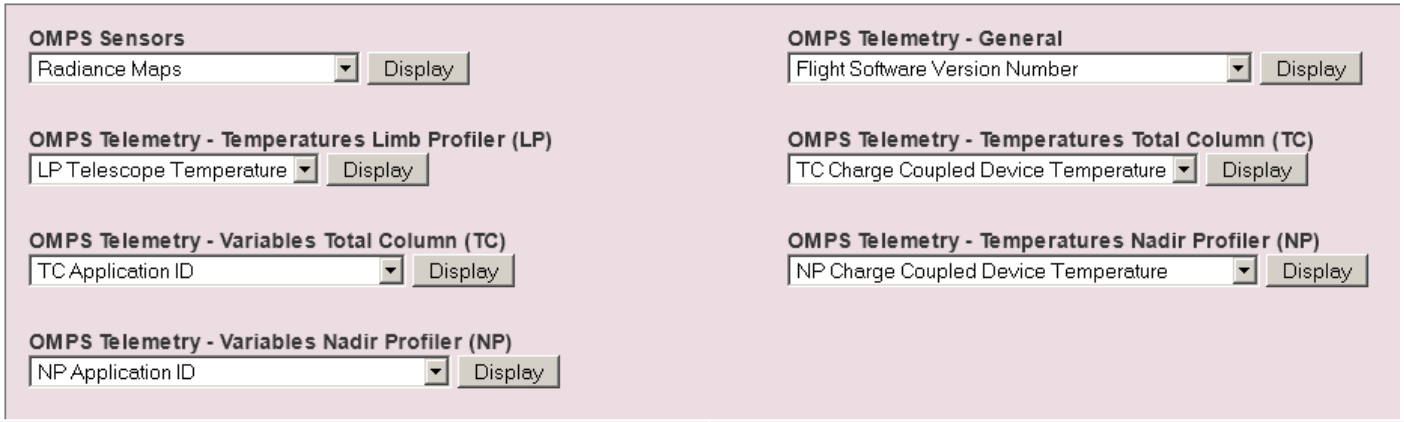


Suomi NPP CrIS Parameters



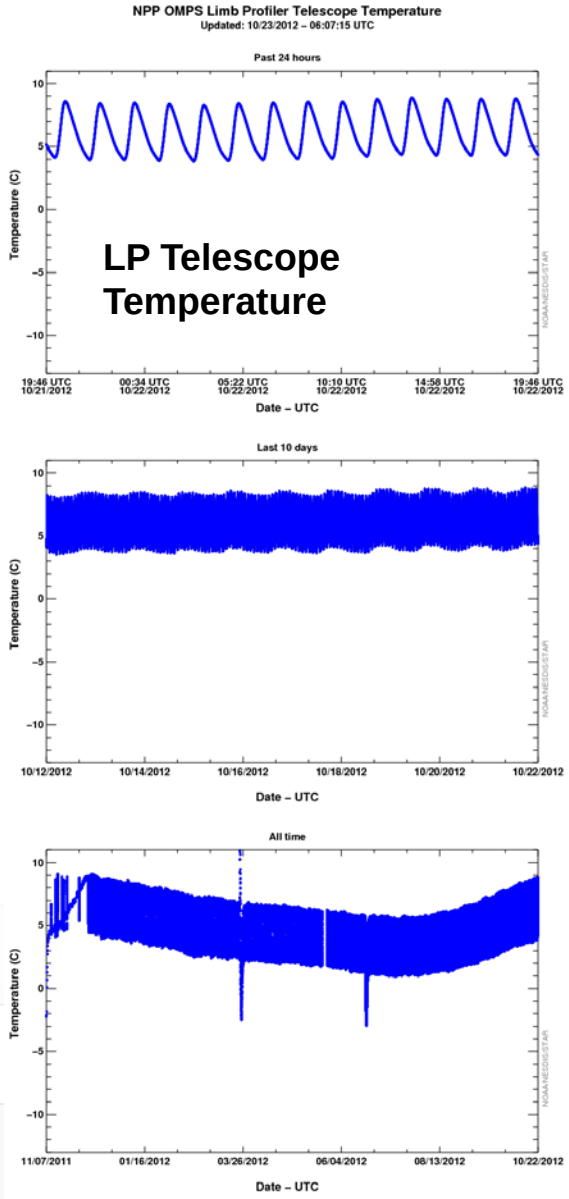


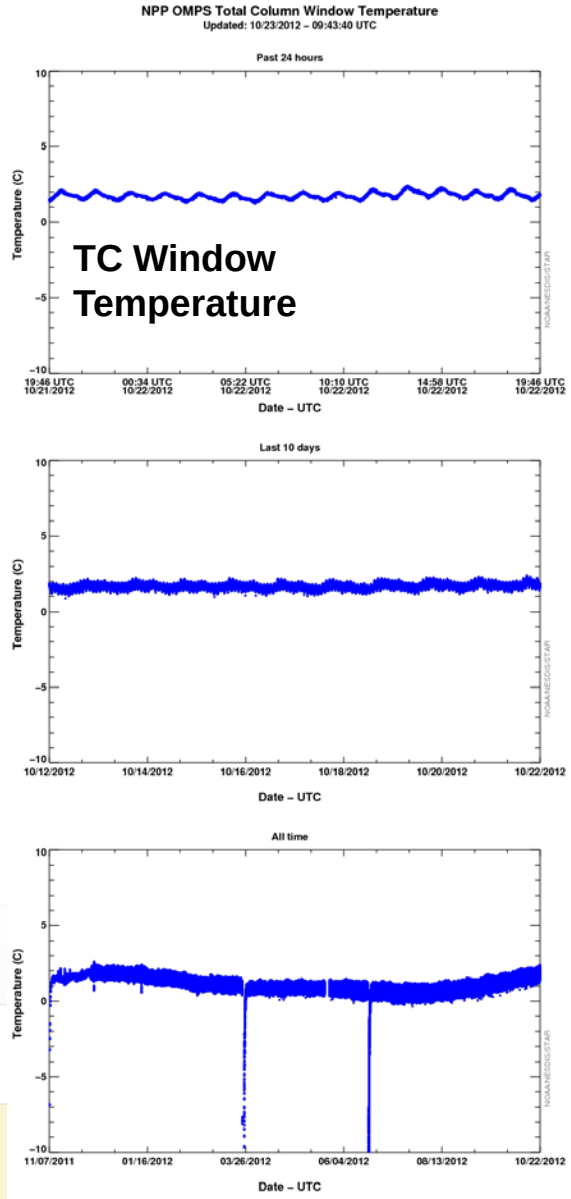
Suomi NPP OMPS Parameters

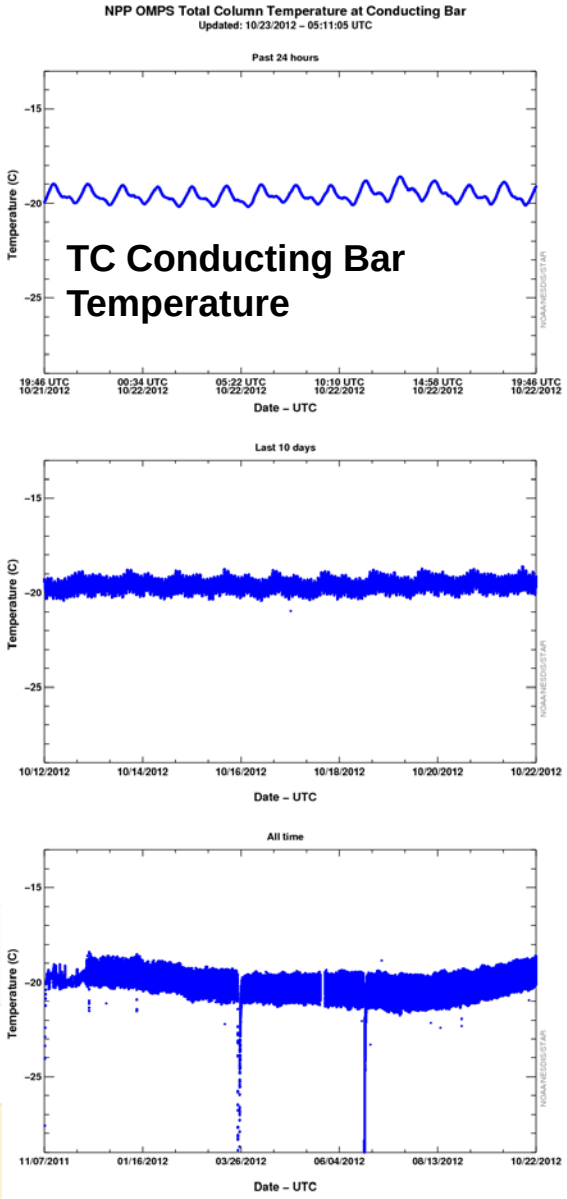


Parameters	Purpose
Instrument Status • Four temperatures for TC • Eight temperatures for NP • Examples: CCD, Window, Conduction Bar, Housing, Telescope, …	Monitor variation of instrument status Watch for health and safety issues Assist anomaly investigation
Instrument Performance • Specified requirements • Examples: Linearity, Dark Count, Hot Pixels, Solar Cal	Monitor variations in instrument performance Verify compliance with specifications Assist anomaly investigation
Operation Status • 12 for TC • 15 for NP • Examples: LUT versions, ID, …	Monitor operation and processing status Assist anomaly investigation
Product Quality • Self-consistency • Inter-comparison	Evaluate product quality in relation to other monitoring

Suomi NPP OMPS Parameters







NOAA/METOP/DMSP Parameters

	AMSU-A	MHS	HIRS	AVHRR	SSMIS
Noise Equivalent Temperature Difference (NEΔT)	15 Channels	5 Channels	20 Channels (NEΔN)	3 IR Channels (NEΔT) 3 VIS Channel (SNR)	N/A
Gain	15 Channels	5 Channels	20 Channels	3 IR Channels	24 Channels
Warm Load Calibration Count	15 Channels	5 Channels	20 Channels	3 IR Channels	24 Channels
Cold Space Calibration Count	15 Channels	5 Channels	20 Channels	5 Channels	24 Channels
Warm Load PRT Temperature	3 per Unit (A1-1/A1-2/A2)	5 Readings	4 Warm 1 Cold	4 Readings	3 Readings
Temperature Sensor Telemetry	8 per Unit (A1-1/A1-2/A2)	11	12	12	28
Orbital Status/Statistics	QC/Calib. Flag	QC/Calib. Flag	QC/Calib. Flag	QC/Calib. Flag	N/A
Data Quality Analysis	15 Channels	5 Channels	N/A	N/A	24 Channels

LTM System Notification

- Notify through e-mails
- Provide instrument status
- Provide data availability
- Provide data quality

From ESPCOperations <espcoperations@noaa.gov>
Subject **Product Outage/Anomaly Update #1 Metop-A GDS FRAC Data delayed, Issued: July 06, 2012, 1607 UTC** 7/6/2012 12:16 P
To _NESDIS OSDPD ESPC OUTAGE Notification <ESPC.Notification@noaa.gov>

Update1: The DS-3 between Darmstadt and Suitland has been experiencing problems starting at 1030z, which is when the issues started with the GDS passes. During this time, ESPC missed the following three (3) orbits B2964546, B2964646 and B2964647.The NOC is currently in the process of reshipping ESPC the missed orbits. The NOC opened Incident ticket; INC000001352140 for this issue and since, AT&T has opened ticket number 270602196 to track this problem. ESPC is currently awaiting a status report from AT&T on this issue.

Topic: Metop-A GDS FRAC Data delayed.

Date/Time Issued: July 06, 2012, 1607 UTC

Product(s) or Data Impacted:

A-DCS/2
AMSU-A
ASCAT
AVHRR
GRAS
GOME
HIRS
IASI
MHS
S&R
SEM

Date/Time of Initial Impact: July 06, 2012, 0946 UTC

Date/Time of Expected End: Unknown

Length of Outage: Unknown

Details/Specifics of Change: Metop-A GDS FRAC data is delayed. Problem is being investigated.

Contact Information for Further Information: ESPC Operations at ESPCOperations@noaa.gov at 301-817-3880

Web Site(s) for applicable information: N/A

Update1: The DS-3 between Darmstadt and Suitland has been experiencing problems starting at 1030z, which is when the issues started with the GDS passes. During this time, ESPC missed the following three (3) orbits B2964546, B2964646 and B2964647.The NOC is currently in the process of reshipping ESPC the missed orbits. The NOC opened Incident ticket; INC000001352140 for this issue and since, AT&T has opened ticket number 270602196 to track this problem. ESPC is currently awaiting a status report from AT&T on this issue.

This message was sent from ESPC.Notification@noaa.gov. You have been sent this and other notifications

From Ninghai Sun <nsun@orbit082L.orbit2.nesdis.noaa.gov>
Subject **ICVS warning message (2012-07-08 04:28:08 UTC)** 12:28 AM
To Ninghai Sun

```
NOAA-19 AMSU-A Channel 8
NSS.AMAX.NP.D12189.S2346.E0137.B1759495    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.736
NSS.AMAX.NP.D12189.S2204.E2352.B1759394    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.738
NSS.AMAX.NP.D12189.S2021.E2209.B1759293    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.743
NSS.AMAX.NP.D12189.S1832.E2027.B1759092    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.738
NSS.AMAX.NP.D12189.S1652.E1837.B1758991    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.718
NSS.AMAX.NP.D12189.S1526.E1648.B1758989    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.677
NSS.AMAX.NP.D12189.S1346.E1532.B1758889    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.711
NSS.AMAX.NP.D12189.S1205.E1352.B1758788    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.659
NSS.AMAX.NP.D12189.S1024.E1211.B1758687    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.663
NSS.AMAX.NP.D12189.S0849.E1030.B1758586    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.686
NSS.AMAX.NP.D12189.S0706.E0854.B1758485    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.701
NSS.AMAX.NP.D12189.S0519.E0712.B1758384    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.719
NSS.AMAX.NP.D12189.S0330.E0525.B1758283    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.696
NSS.AMAX.NP.D12189.S0142.E0335.B1758182    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.689

NOAA-19 AMSU-A Channel 7
NSS.AMAX.NP.D12189.S2346.E0137.B1759495    NEdT within specification .
NSS.AMAX.NP.D12189.S2204.E2352.B1759394    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.253
NSS.AMAX.NP.D12189.S2021.E2209.B1759293    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.255
NSS.AMAX.NP.D12189.S1832.E2027.B1759092    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.266
NSS.AMAX.NP.D12189.S1652.E1837.B1758991    NEdT within specification .
NSS.AMAX.NP.D12189.S1526.E1648.B1758989    NEdT within specification .
NSS.AMAX.NP.D12189.S1346.E1532.B1758889    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.253
NSS.AMAX.NP.D12189.S1205.E1352.B1758788    NEdT within specification .
NSS.AMAX.NP.D12189.S1024.E1211.B1758687    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.250
NSS.AMAX.NP.D12189.S0849.E1030.B1758586    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.254
NSS.AMAX.NP.D12189.S0706.E0854.B1758485    NEdT within specification .
NSS.AMAX.NP.D12189.S0519.E0712.B1758384    NEdT within specification .
NSS.AMAX.NP.D12189.S0330.E0525.B1758283    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.252
NSS.AMAX.NP.D12189.S0142.E0335.B1758182    NEdT out of specification !!!! Spec. = 0.2500
Current =   0.252

NOAA-19 MHS Channel 3
NSS.MHSX.NP.D12189.S2346.E0137.B1759495    NEdT out of specification !!!! Spec. = 1.0000
Current = 3.0732
```

Path Forward

- Add more spacecraft status monitoring to support NASA flight segment
- Add more instrument status and performance monitoring for Cal/Val teams
- Improve instrument status /quality anomaly notification function
- Improve user experience of current website for easy access and understanding with historical daily status figure and data provided
- Integrate latest instrument trending analysis of each SDR group into ICVS
- Improve the bias monitoring capability including more detailed analysis
- Prepare ICVS/LTM for J1 and J2 missions
- Provide periodical instrument performance analysis report to JPSS program and CGMS

Thank You!