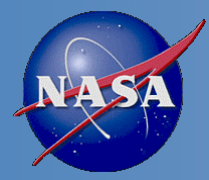


JPSS DPA Program Planning Meeting OMPS SDR Team

September 18, 2012

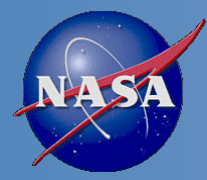




Outline



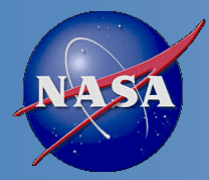
- Team Membership
- FY-12 Accomplishments
- Scientific Advancements
- Issues, Challenges, Setbacks
- Changes in Strategy due to funding constraints
- FY-13 Schedule and Milestones
- Path Forward (FY-13 thru FY-17)
- Summary



Team Members' Roles & Responsibilities



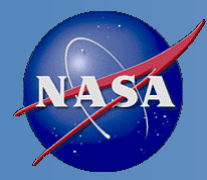
Name	Organization	Funding Agency	Task
X. Wu	NOAA/NESDIS/STAR	NOAA STAR	SDR Team Lead
L. Flynn	NOAA/NESDIS/STAR	NOAA STAR	EDR Team Lead
G. Jaross	SSAI	JPSS Program	Technical Lead/senior scientist
S. Janz	NASA/GSFC	JPSS Program	Instrumentation
M. Caponi	Aerospace	JPSS Program	Algorithm manager
C. Pan	UMD	JPSS Program	SDR Team lead support/calval
R. Buss	RTN/O&S	JPSS Program	Data quality
T. Beck	NOAA/NESDIS/STAR	NOAA STAR	Calval
R.mundakkara, M. Haken	SSAI	JPSS Program	Calval
N. Baker, M. Denning, T. Kashita, W. Thomas	DPA/DPE	JPSS Program	DPA/DPE
B. Sen, M. Novicki, W. Li	NGAS	JPSS Program	Calval
S. Miller, W. Johnsen, J. Cram, W. Ibrahim, M. Montgomery-Seaman, P. Smit, D. Stuhmer, N. Anderson, D. Cumpton, N. Emmert	RTN/CGS	JPSS Program	Algorithm



FY-12 Accomplishments



- Management Support for JPSS
 - SOWs, OPSCON, Weekly and Monthly Reports.
 - Weekly OMPS SDR Team Meeting
- Technical Support for NPP OMPS
 - Launch and Activation, Early Orbit Checkout and Intensive Calval.
 - Independent verification of contractual compliance
 - Updates of sensor operations.
- Delivered Beta EV/GEO SDR Products and towards the provisional via
 - Established sensor initial settings and parameters and on-orbit calibration measurements.
 - Provided satellite Telemetry monitoring and trending.
 - Investigated and resolved data anomalies.
 - Deployed ADL and GADA tools for LUTS validation.
- Outreach to Community
 - AMS, IGARSS, and CALCON.

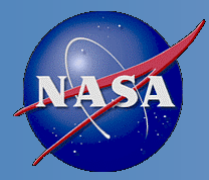


Cal/Val Support Activity



- Evaluation of entire sensor chain dependencies (SDRs, GEO, IPs and EDRs) with nominal and non-nominal conditions with major build releases (Mx5, Mx6) and interim builds (Mx6.A, Mx6.B) to ensure data quality
- Extensive analysis of quality flag and FILL value behavior with nominal and non-nominal conditions including:
 - Spacecraft Maneuvers
 - Eclipse, Lunar contamination
 - Sun Glint
 - SSA
 - Removal of packets (e.g., missing band(s))
 - Failed detectors
 - Packet modifications
 - LUT/PCT modification to trigger out-of-bound conditions (e.g., exclusions, out of range)
 - GTM Imagery

Courtesy Raytheon



FY12 Accomplishments: DRs

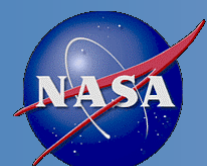


Closed DRs

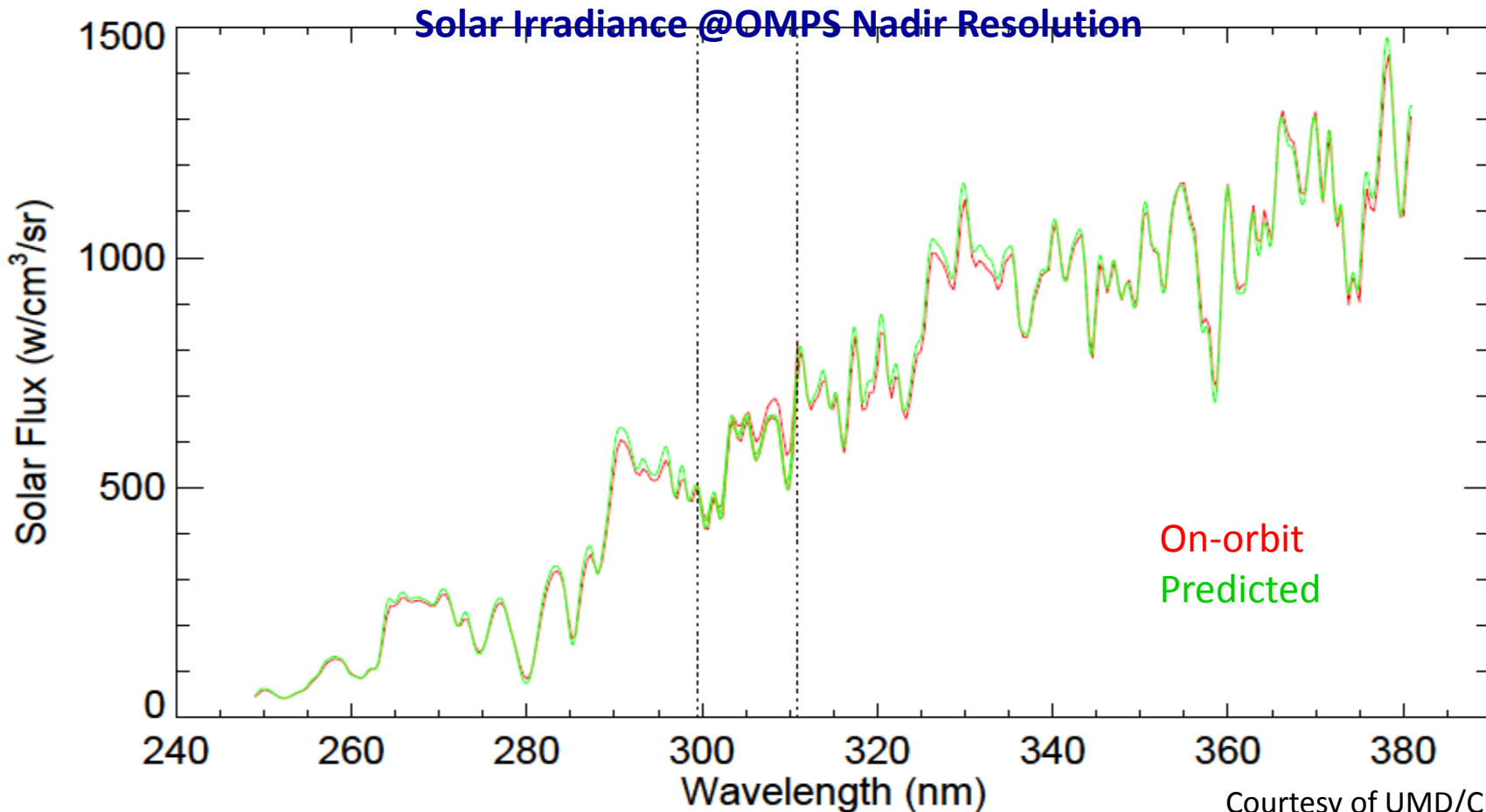
Open DRs

There is a total of 34 of which 18 are closed and the rest have been open and assigned.

DR #	Short Description
4879	NP and TC Darks need to be updated
4861	OMPS Effectivity time table update FT
4823	NP straylight straylight needs to be corrected.
4818	Smears in error - Smears show negative and unexpected values
4800	CalSDR generation of Darks inconsistent with EV SDR
4799	Inconsistent structure between OAD and EV SDR
4797	NP solar day 1 need to be updated with on orbit results.
4792	OMPS wavelength and cf-earth update . Needed every 29th days
4757	OMPS wavelength and cf-earth update . Needed every 29th days
4751	Unable to access NP Aps
4750	Dark tables updated from Aps to GND-Pis
4749	OMPS darks have negative values
4725	CDFCB has incorrect GND-PI wavelength
4722	OMPS wavelength and cf-earth update
4694	CDFCB VolVIII had incorrect dark dimensions
4693	CalSDR stratgy study
4676	Radiance error associated with aggregation
4673	Correction for different linearit slope Tup for CCD2
4672	Linearity correction update for xml file
4671	OMPS Data quality threshold tables non existend for SDR
4650	OMPS wavelength and cf-earth update . Needed every 29th days
4627	Quantization introduced by linearity correction error - Cal SDR
4617	wavelength and cf-earth update . Needed every 29th days updates
4616	TC Solar flux update for day 1
4615	Transient filter issue
4564	Assign beta maturity to OMPS SDR
4562	Solar flux in TC SDR is missing and products are fill
4559	OMPS wavelength and cf-earth update . Needed every 29th days
4536	Sample table update to include extra pixel to monitor straylight
4516	NewGND-Pis Wavelength and cf-earth need to be updated every 29 days



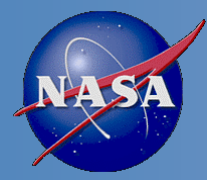
On-orbit Observed Solar Flux



Observed solar irradiance is within an average of 2% of predicted synthetic solar spectra:

- NM is on average $\pm 4\%$ with small scale variations
- NP is less than 2% on average with several percent variations

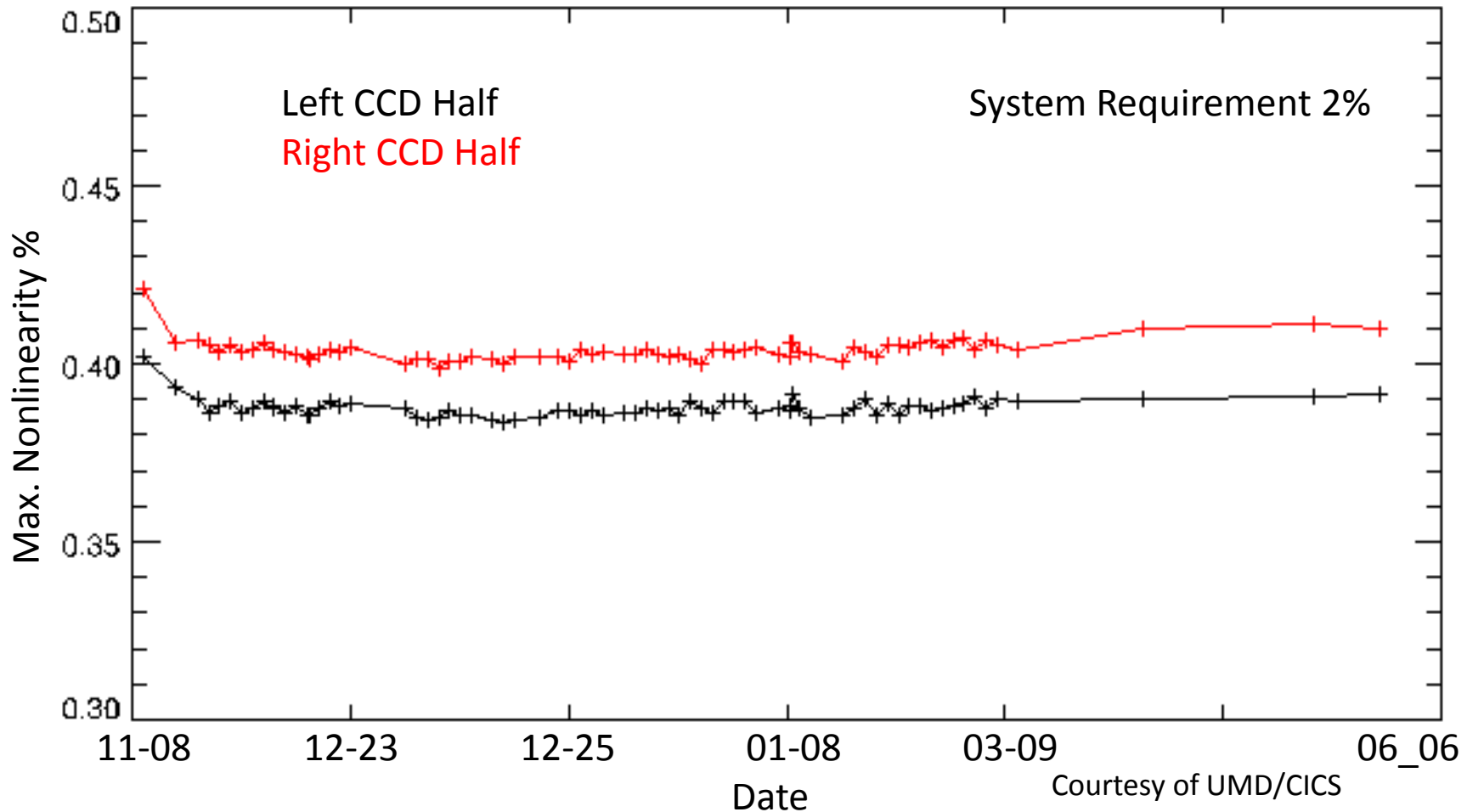




On-orbit Linearity Performance

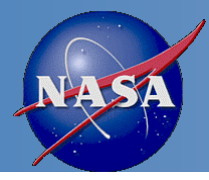


Max. Nonlinearity %

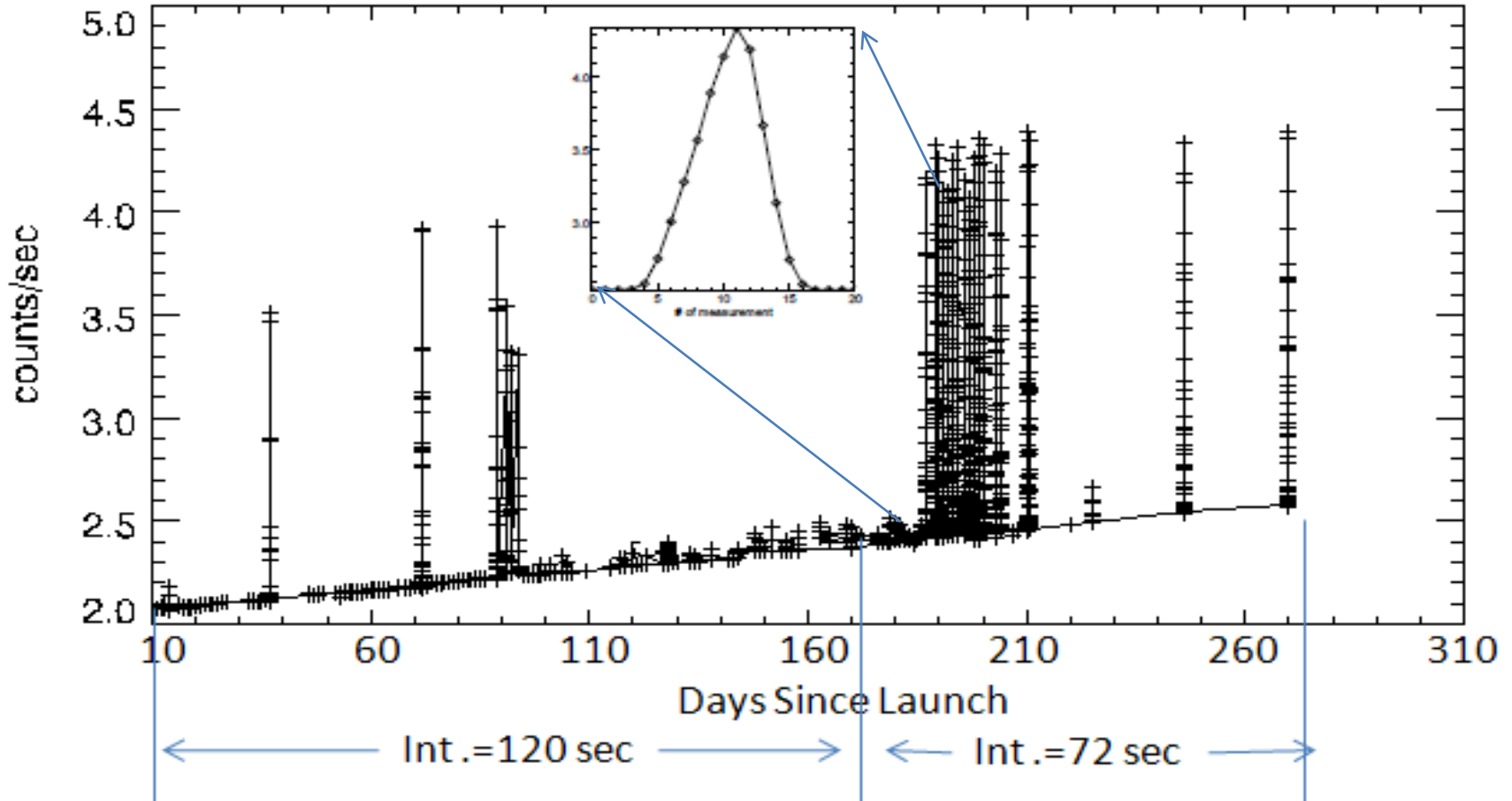
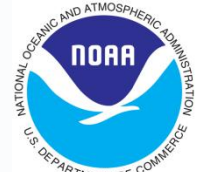


Measurement GMT changed 3 times: Nov. 08 – Mar. 09; May 29 – June 06; July 4-current
OMPS shows an exception linearity stability

Courtesy of UMD/CICS

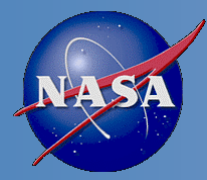


On-orbit Dark Current Performance



Dark measurement is established by optimizing various diagnostic dark cal. activities

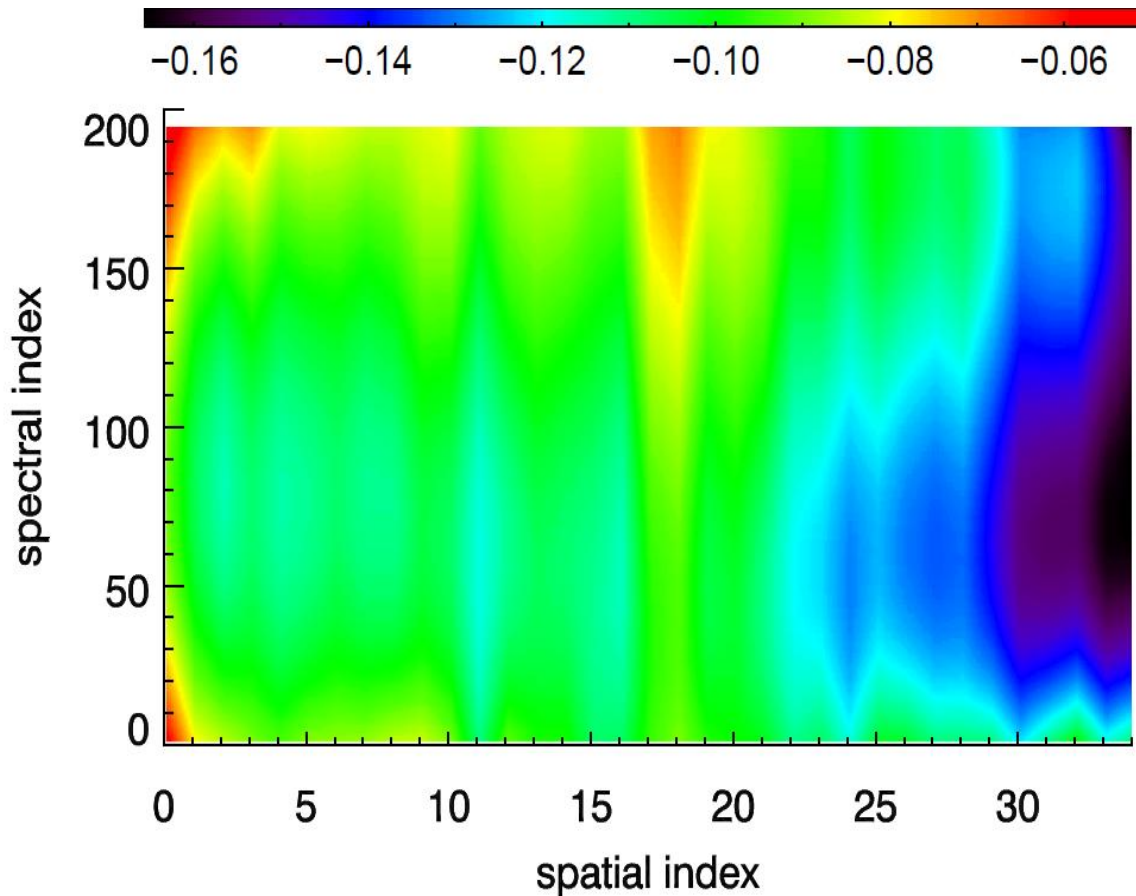
Courtesy of UMD/CICS



Wavelength Shifts from Ground to Orbit

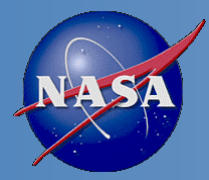


Ozone Channel Wavelength Shift

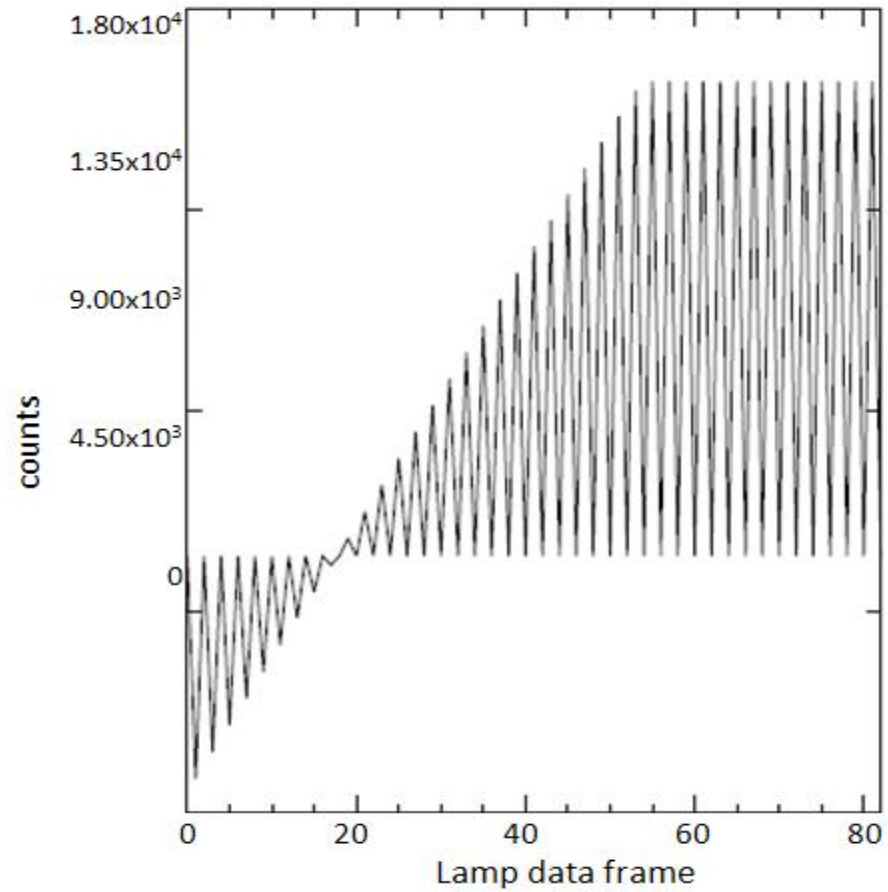
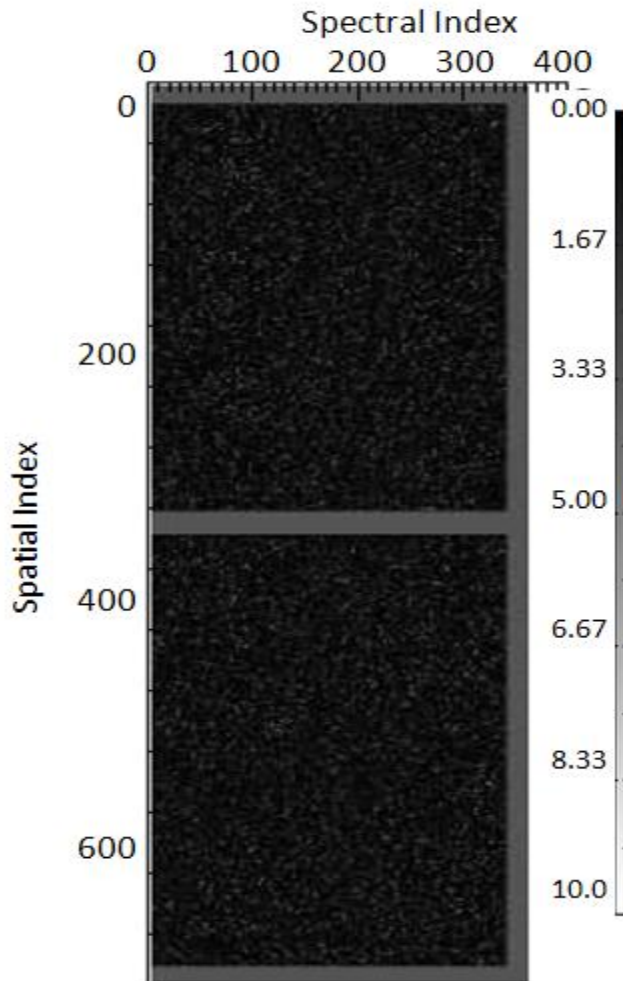


Wavelength (nm)	averaged_shift (nm)
253.092	-0.058
272.835	-0.092
283.021	-0.114
288.140	-0.092
291.989	-0.086
297.992	-0.094
301.862	-0.109
306.171	-0.136
312.838	-0.114
317.855	-0.117
330.795	-0.118
339.967	-0.115
380.024	-0.093

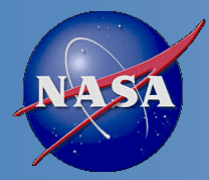
- Wavelength changed less than 0.16 nm from ground to orbit. Courtesy of UMD/CICS



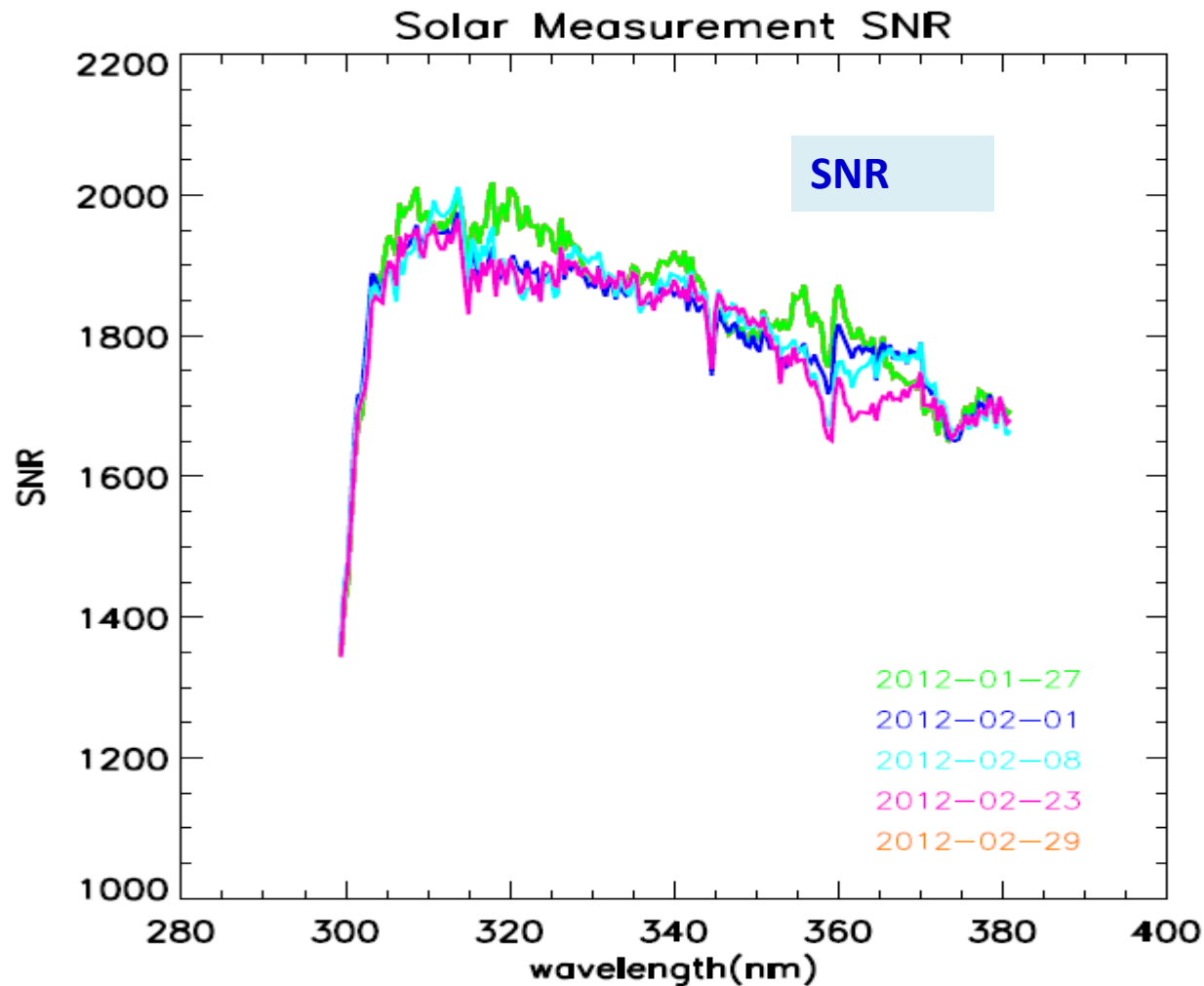
Dark and Lamp Data Verification Results



Courtesy of UMD/CICS

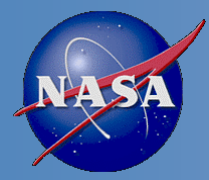


Sensor SNR Verification

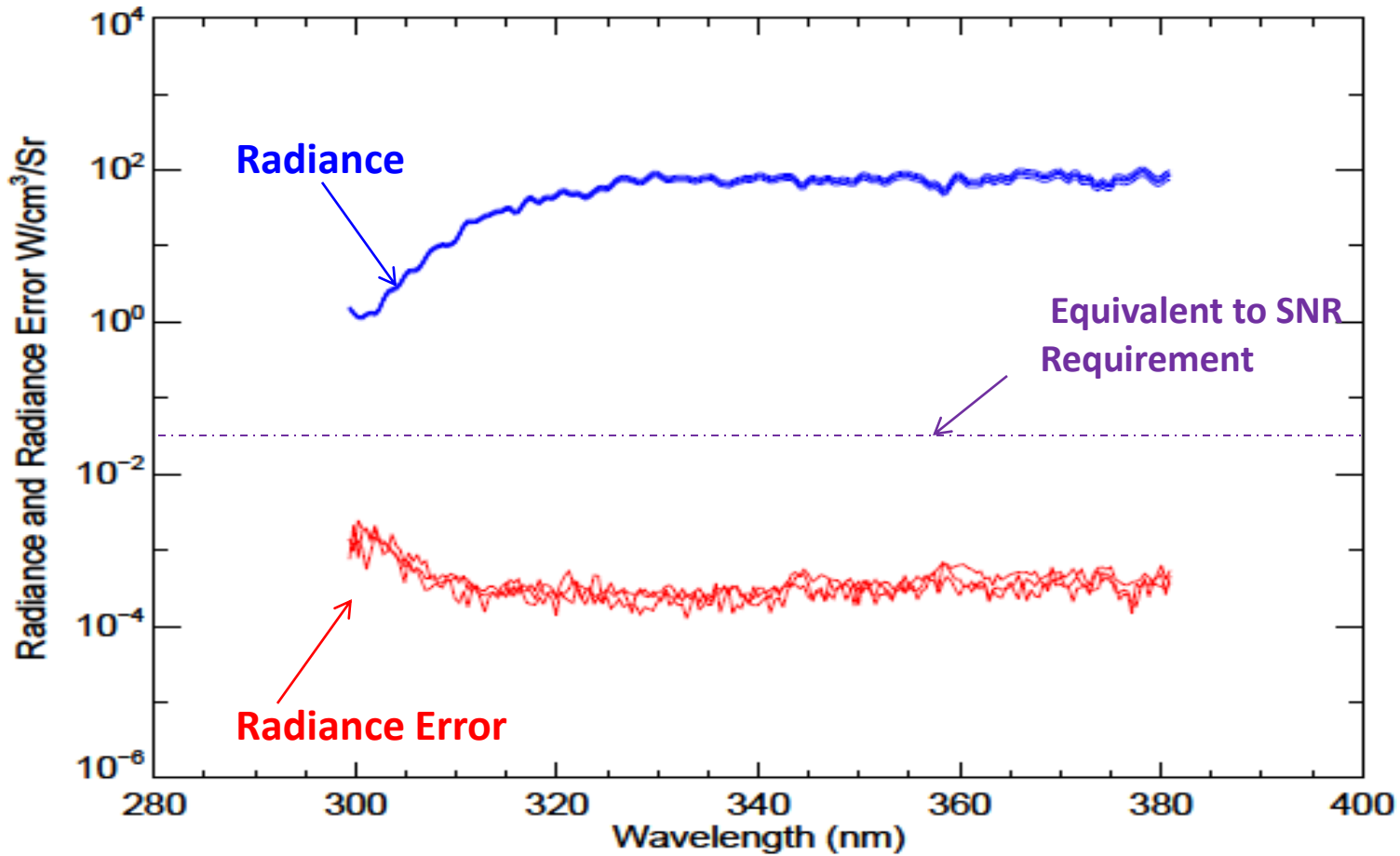


Courtesy of UMD/CICS

Solar measurement SNR meets the system requirement of 1000



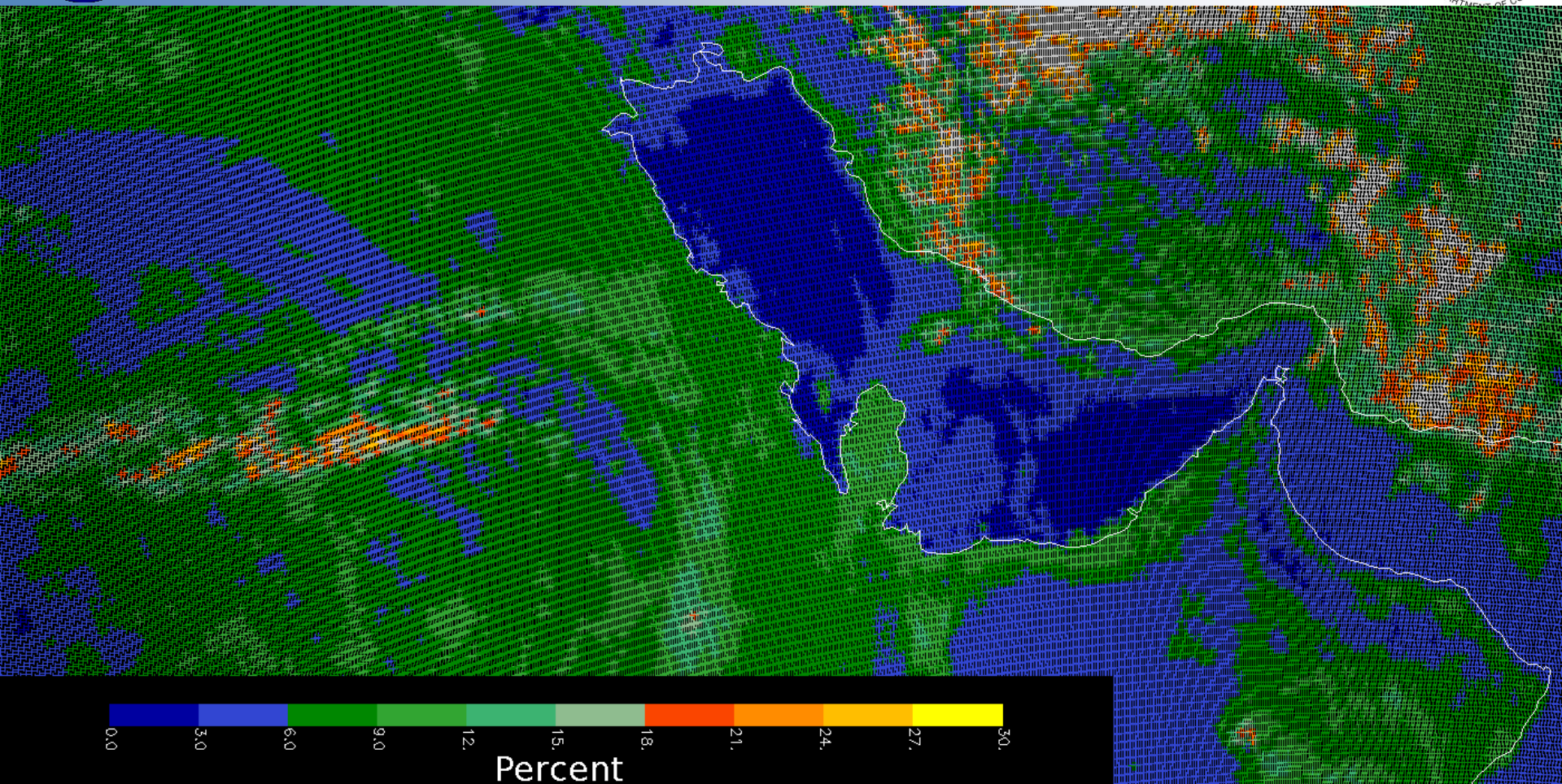
EV Data Verification Results



Courtesy of UMD/CICS



OMPS Geolocation



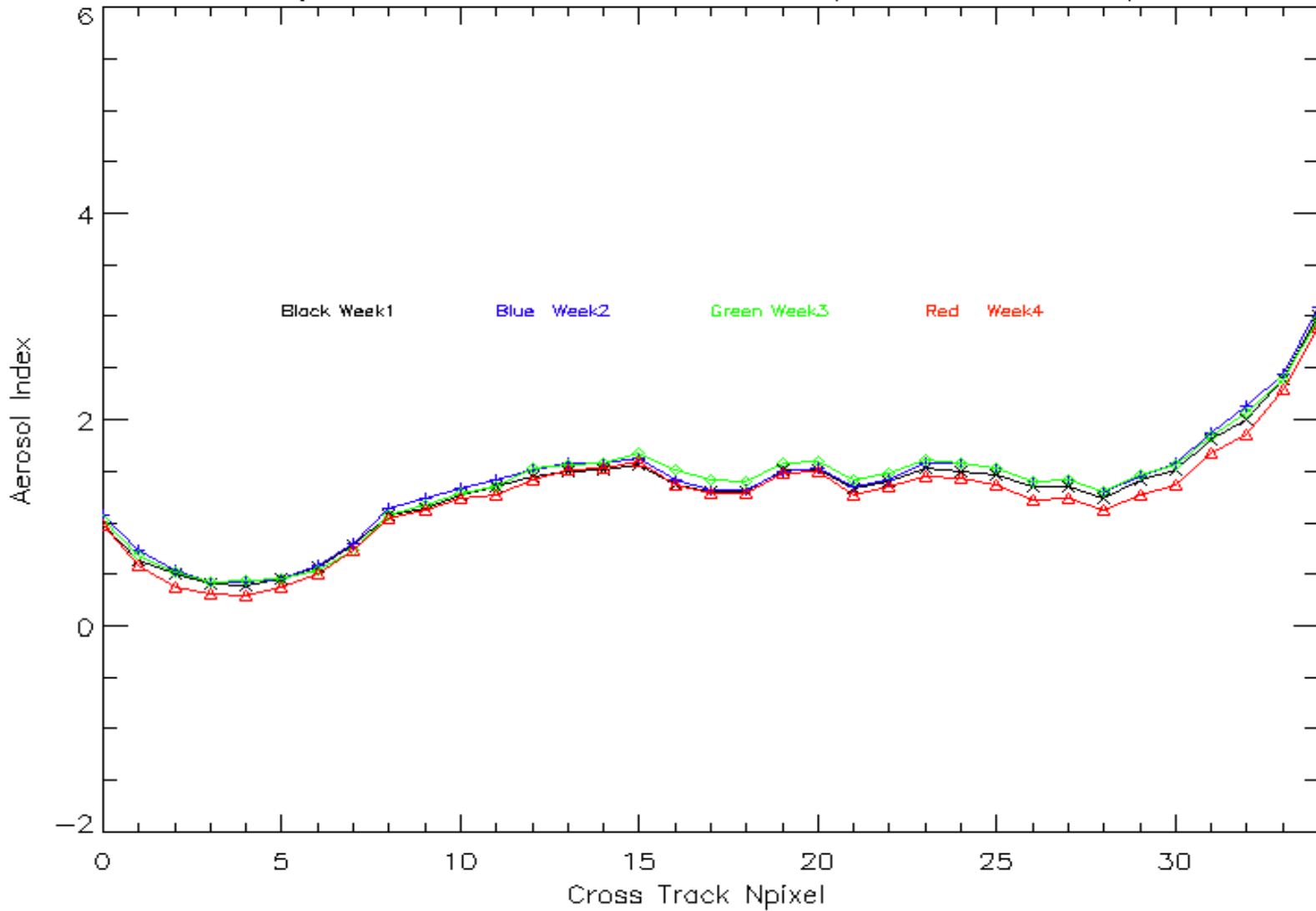
This image shows the effective reflectivity for the 380-nm Channel for part of an orbit of small Field-of-View (5 KM X 10 KM at Nadir) made by the OMPS Nadir Mapper in a special diagnostic mode. The Qatar peninsula sticking into the Persian Gulf in the middle of the picture lies along the nadir view of the orbital track and gives a preliminary assurance of the geolocation at better the 5 KM.

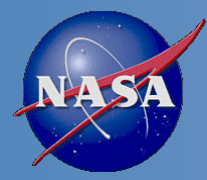


Stable OMPS Products



OMPS 4 Weekly Mean V8 Aerosol Index for 6/2012 20S-20N/100W-180W





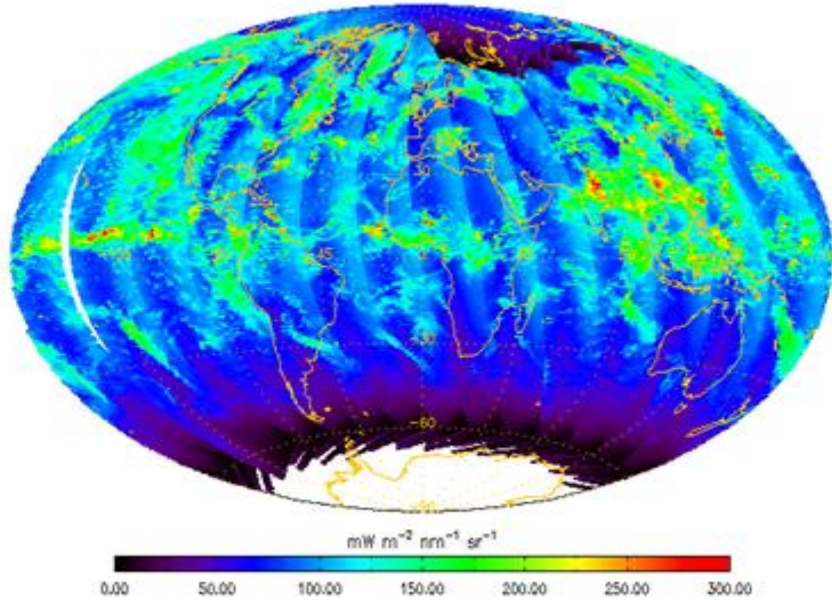
Scientific Advancements



- Dark calibration has been evaluated via. SAA and hot pixels impact
 - SAA impact is not negligible for short wavelength channels.
 - Hot pixels cause a constant increase in the dark signal – in stead of weekly calibration, daily calibration will be on schedule.
- On-orbit calibration sequences have been modified to meet system requirement.
 - Newly established dark calibration captures and removes transients.
 - Solar calibration now is with multiple orbits measurements, solar observation accuracy is improved by several percent.
- Flexibility in sensor EV observation allows the sensor to achieve an attainable level of products
 - Additional sampling of smear pixels will improve EV radiance calibration.
 - Smaller spatial IFOV allows the sensor to provide higher resolution products.

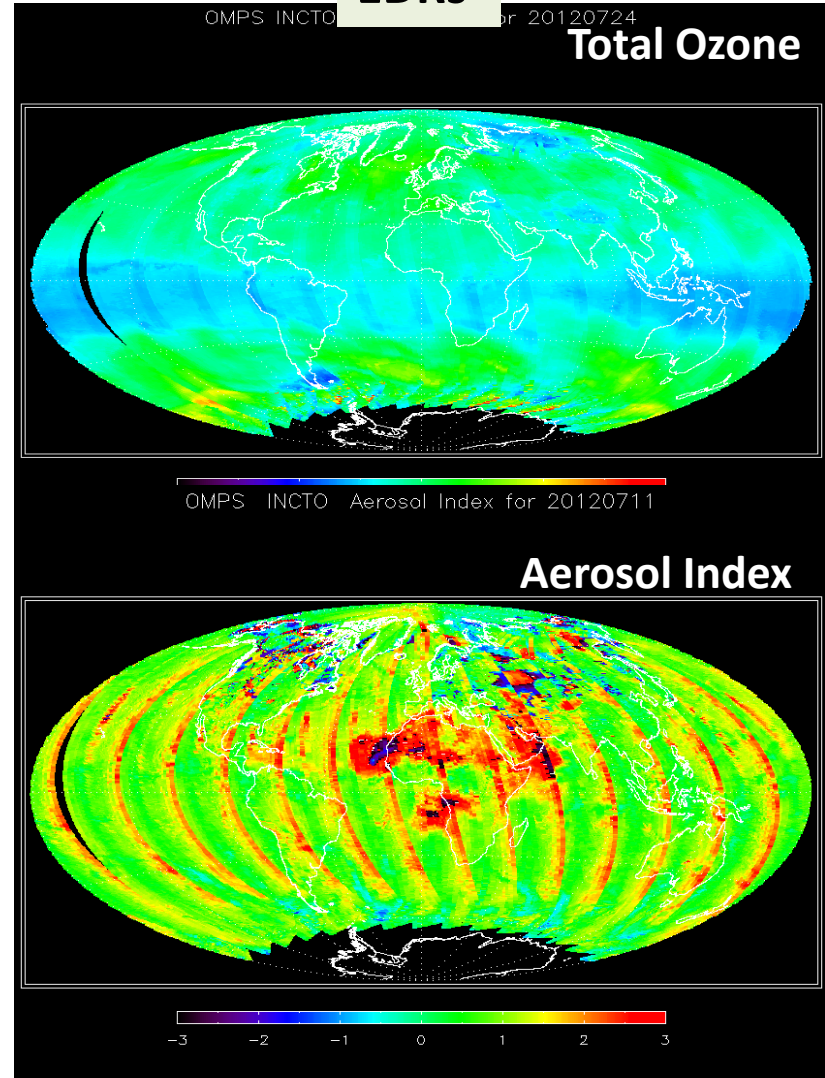
Science SDRs

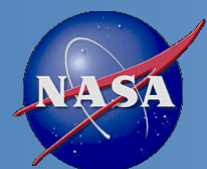
NM Radiance. July 24, 2012



Courtesy of UMD/CICS

EDRs

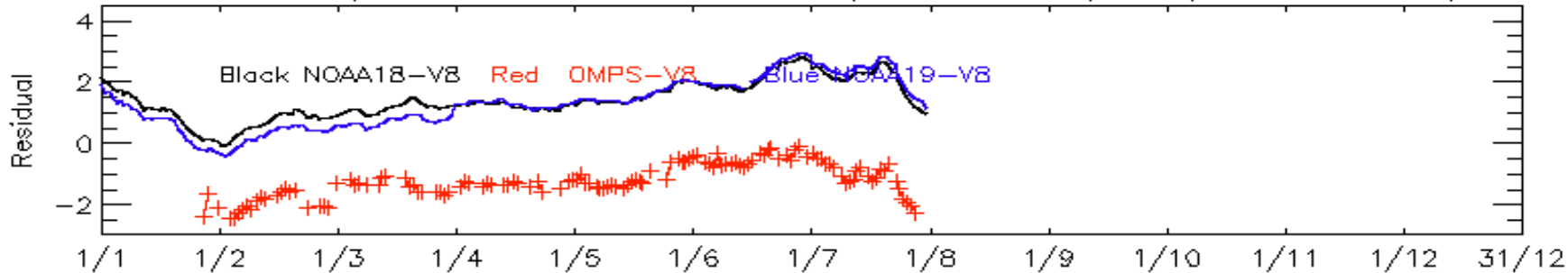




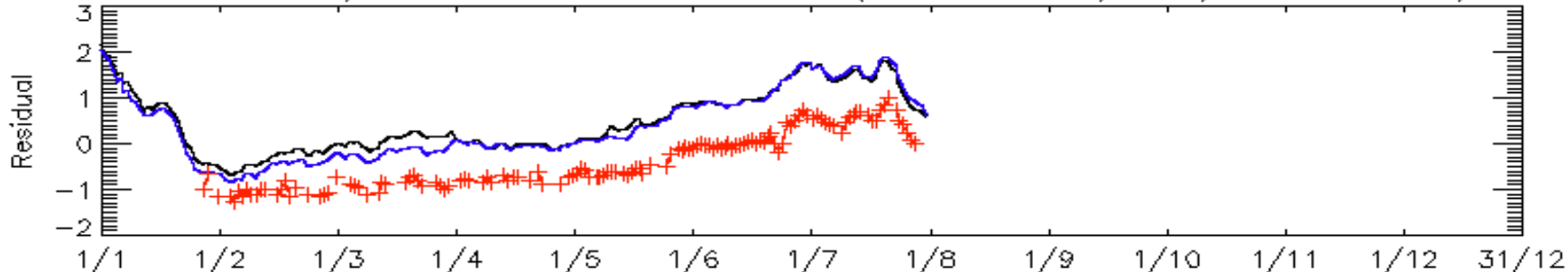
Daily Zonal Mean Residual



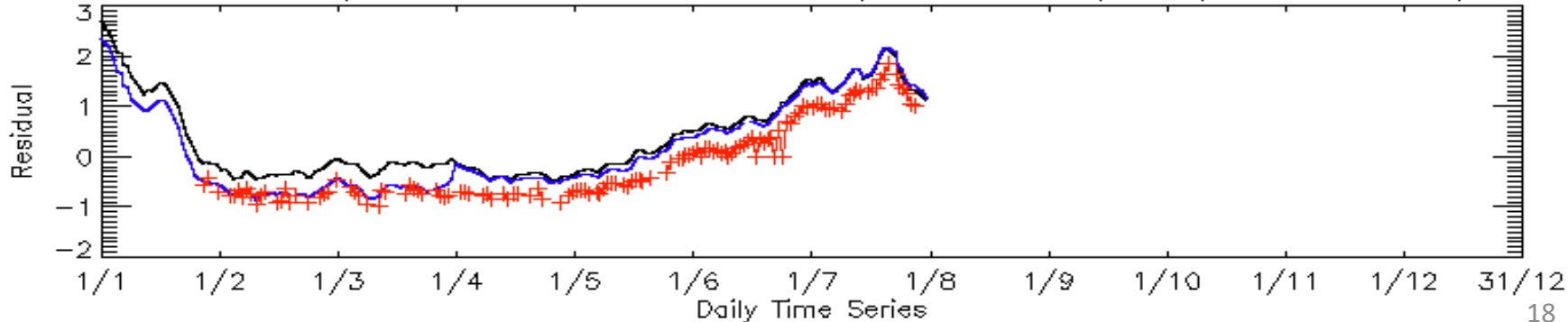
N18N19 OMPS Daily Zonal Mean Initial Residual(Cha1@252nm) 1-7/2012 20S20N/-90W0

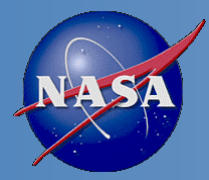


N18N19 OMPS Daily Zonal Mean Initial Residual (Cha2@274nm) 1-7/2012 20S20N/-90W0



N18N19 OMPS Daily Zonal Mean Initial Residual (Cha3@283nm) 1-7/2012 20S20N/-90W0

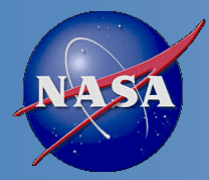




Issues, Challenges, Setbacks



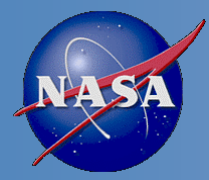
- Calibration SDR
 - Status: Disabled at IDPS. Provided by PEATE
 - Reliability: Complete data at regular interval in stable format
 - Sustainability: Status quo was not meant for the mission life
- Impacts
 - Incomplete calibration databases at STAR
 - Difficult for cal/val work
 - Uncertain future
 - Many DR's are dependent on the CAL SDR Strategy



Changes in Strategy (due to funding constraints)



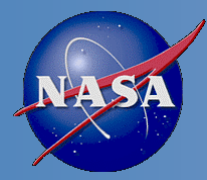
- Not to change, but rather to complete the CAL SDR strategy
- One option is to permanently disable IDPS CAL SDR and rely on external supply of CAL SDR
- Another is to resume and revise the automatic generation of CAL SDR at IDPS, with human-in-the-loop to decide when to update
- Both options have variants of who, how, ...



FY13 STAR Tasks



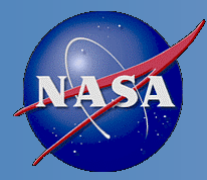
Task	Task Description
1	OMPS SDR Team Management and Coordination
2	Update OMPS SDR Algorithm Theoretical Basis Algorithm Document (ATBD)
3	Transition Calibration Support to STAR (<i>subject to CAL SDR Strategy</i>)
4	OMPS Instrument Calibration (details to follow)
5	OMPS SDR Validation (monitoring, comparison, EDR)
6	J1 Calibration



FY-13 Milestones



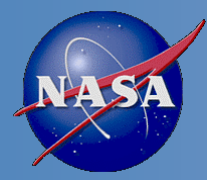
Task #	Priority	Task Description
824	1	OMPS SDR Wavelength Calibration
825	1	OMPS Cross-check NP & NM Solar Irradiances
825.1	1	OMPS Cross-check NP & NM EV Radiances
817	1	OMPS SDR Flat Field Database Verification
829.2	3	OMPS Earth No Linearity Check
829.3	3	OMPS Earth No Flat-Field Gain Check
1248	3	OMPS Nadir Solar Irradiances Compared to SORCE Data
1421	1	OMPS Bias Check – Earth
832	3	OMPS Attitude Check - Equatorial Ozone
827	3	OMPS NP Solar Magnesium II Index
819.2	3	OMPS Working Diffuser Fine Features
822	3	OMPS Solar Diffuser Characterization
833	2	OMPS Make SDR Maps
840	1	OMPS Earth SDR Radiometric Noise Analysis
841	3	OMPS Smear/Scene Motion
835.1	1	OMPS Geo-location Verification with VIIRS Radiances
835	1	OMPS Geo-location Verification with Glacial Coasts
839	4	OMPS Earth Fraunhofer Wavelength Registration
844.1	3	OMPS NP Empirical Characterization of Earth Stray Light



FY-13 Schedule



- Mar. 2013: Complete update of OMPS SDR ATBD for provisional products.
- June 2013: Release initially validated and calibrated EV SDRs.
 - All calibration tables are expected to be applied to the IDPS EV SDRs by May, 2013.
- Aug. 2013: Establish sensor on-orbit performance monitoring (LTM) in accordance with the finalized operation and routine calval activities.
 - Routinize operation and calval measurements to provide stable cal. SDRs by June, 2013.
- Sept. 2013: Release initially validated and calibrated cal. SDRs.
- Dec. 2013: Evaluate the established calibration through inter-comparisons.
- Mar. 2014: Complete transition of cal. SDR generation from NASA to NOAA/STAR with fully operated Human-In-The-Loop processing (*subject to CAL SDR Strategy*).

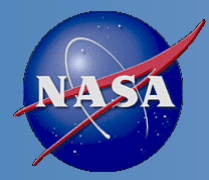


Path Forward (FY-13 thru FY-15)

(assume "FY13" runs from April 1, 2013 to March 31, 2014)



- Evaluate Product Maturity
 - OMPS SDR needs validation in FY13 and further validation in FY14-17 to characterize, for example, seasonal variation (if any) and maintain long term stability sensor attainable levels.
- Provide Calibration Support for OMPS Operation
 - Transition cal. SDR processing to NOAA in FY13 (*subject to CAL SDR Strategy*)
 - Provide technical support for NPP OMPS on-orbit calval
 - Provide continues cal. SDR products to the NPP/JPSS users
- Provide Technical Support for J1
 - Support to apply lessons learned from NPP OMPS
 - Improve J1 IDPS SDR data processing algorithms
 - Add critical fields in the J1 SDR products
- Implement Technical Improvements:
 - Update IDPS EV SDR processing algorithm with a flexibility to suite changes in EV observation and calibration



Summary



- OMPS SDR team contributed to the JPSS overall success
 - EOC and ICV
 - Independent verification and instrument calibration
 - Improved calibration procedure
 - Worked with EDR team, NPP/JPSS users, and broader community
 - Participated in and contributed to all post-launch activities.
- Transitions present challenges:
 - FY13: transition product maturity to Provisional
 - FY14: transition calibration SDRs to NOAA (*subject to CAL SDR Strategy*)
 - FY15 and beyond: transition from NPP to J1
- Will continue to support for NPP and J1 calval