



NOAA Satellite Cal/Val Progress Update

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NOAA/NESDIS/STAR

40th CEOS Working Group on Calibration and Validation Plenary
(WGCV-40)
Canberra, Australia, March 14-18, 2016

Outline

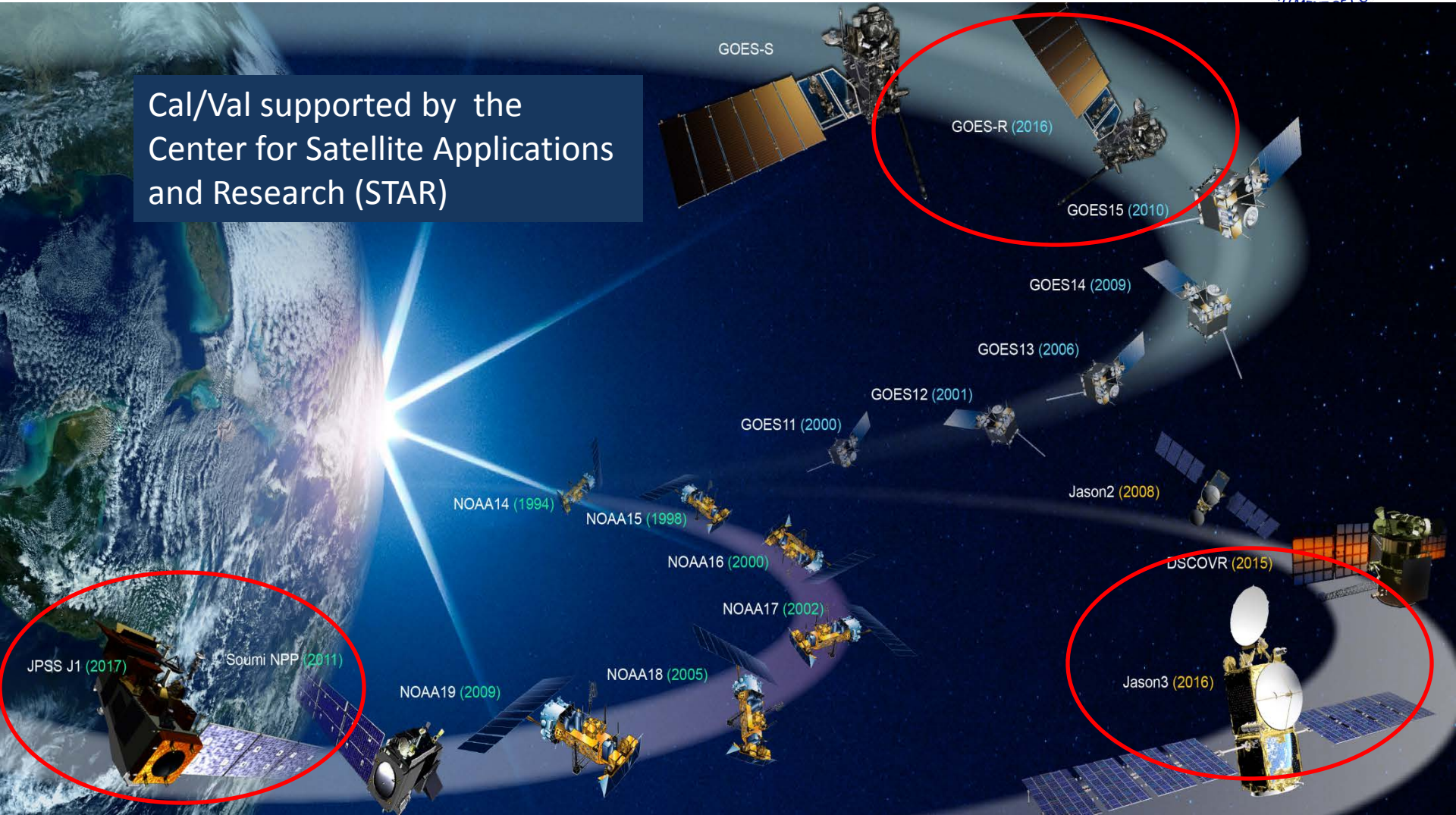


- Suomi-NPP/JPSS Program Update
 - » Suomi-NPP VIIRS post-launch characterization and Cal/Val activities
 - » J1 VIIRS Prelaunch Calibration and Launch Preparation
- GOES-R Program Update
 - Himawari/AHI vs. CrIS intercomparisons
 - Field Campaign Preparation
- Jason 3 (Launched Jan. 17, 2016) radiometer stability monitoring
- GSICS collaboration

NOAA Satellite Missions



Cal/Val supported by the Center for Satellite Applications and Research (STAR)



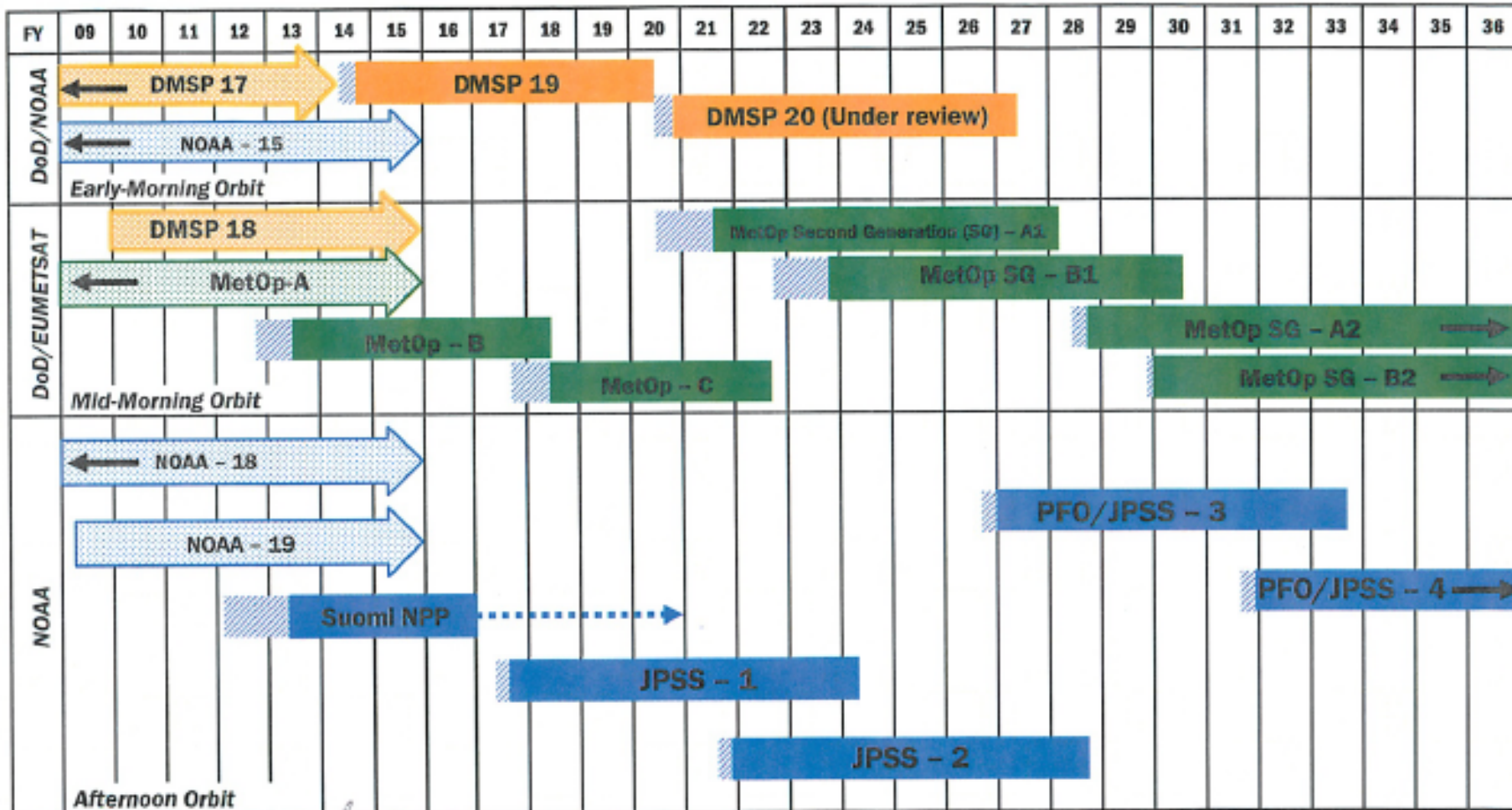


NOAA & Partner Polar Weather Satellite Programs

Continuity of Weather Observations



As of April 2015



Approved: *Mark S. Puse*
 Assistant Administrator for Satellite and Information Services

Note: Extended operations are reflected through the current FY, based on current operating health.

DMSP: Defense Meteorological Satellite Program
 JPSS: Joint Polar Satellite System Program
 Suomi NPP: Suomi National Polar-orbiting Partnership

Note: DoD and EUMETSAT data provided for reference only

- Post Launch Test
- Operational based on design life
- Secondary
- Operational beyond FY 2036
- Extended mission life
- Launched before Oct 2008

Integrated cal/val longterm monitoring



STAR ICVS Integrated Calibration / Validation System Long-Term Monitoring
Monitoring and characterizing satellite instrument performance for weather, climate and environmental applications

» STAR ICVS Home

» Instrument Performance Monitoring

- Suomi NPP
 - Spacecraft
 - ATMS
 - CrIS
 - CrIS FSR
 - VIIRS >>**
 - OMPS Nadir Mapper
 - OMPS Nadir Profiler
 - OMPS Limb Profiler
- MetOp-B
 - AMSU-A
 - MHS
 - AVHRR
 - HIRS
- NOAA-19
 - AMSU-A
 - MHS
 - AVHRR
 - HIRS
- MetOp-A
 - AMSU-A
 - MHS
 - AVHRR
 - HIRS
- NOAA-18
 - AMSU-A
 - MHS
 - AVHRR
 - HIRS
- NOAA-15
 - AMSU-A
 - AVHRR
- GOES
 - GOES-13 Sounder
 - GOES-13 Imager
 - GOES-15 Sounder
 - GOES-15 Imager

Browse: NPP VIIRS
4 Mar 2016 - 09:11 ET / 14:11 UTC

Animate Selected Product Animate All Products Finder

Select a parameter: **VIIRS Global Image** Select a Date: 03-02-2016

VIIRS Global Image Global True Color Image

Suomi NPP VIIRS Global True Color Image 2016-03-02

R:M5, G:M4, B:M3 03/03/2016-16:07 UTC

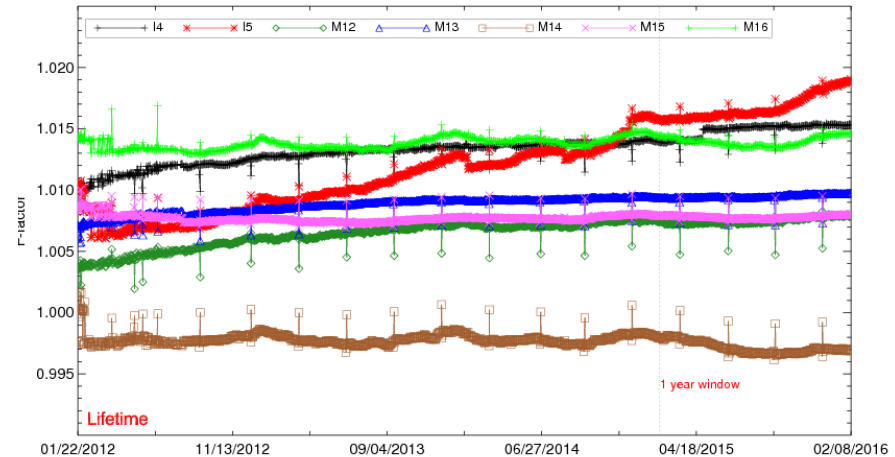
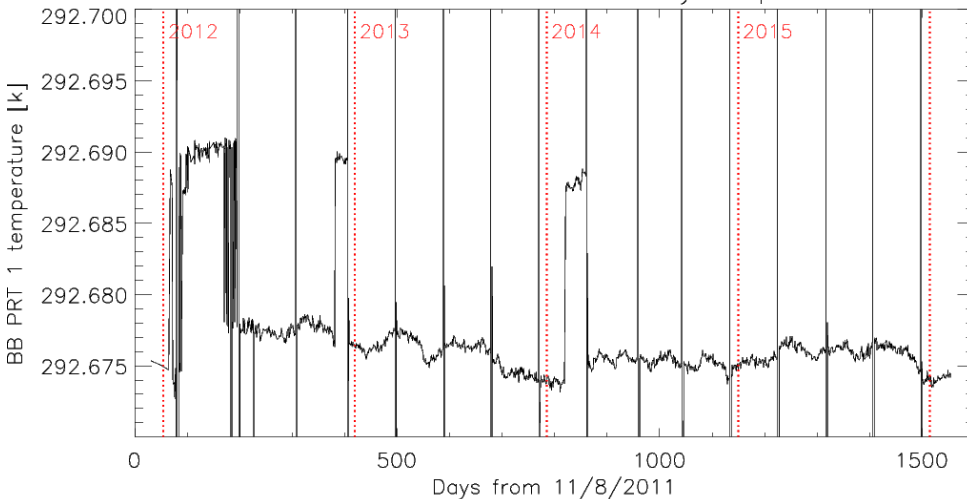
All instrument parameters are monitored since launch

S-NPP VIIRS Thermal Emissive Bands (TEB)

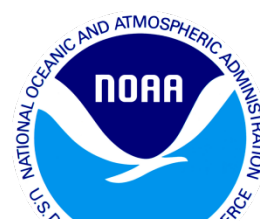


- TEB Calibration has been performing well.
- The source of TEB calibration is on-board blackbody (BB), which showed an excellent thermal stability within 4 mK since launch (excluding configuration changes).
- Corresponding F-factors are also very stable over 4+ years.
 - » Mostly with in 0.5%

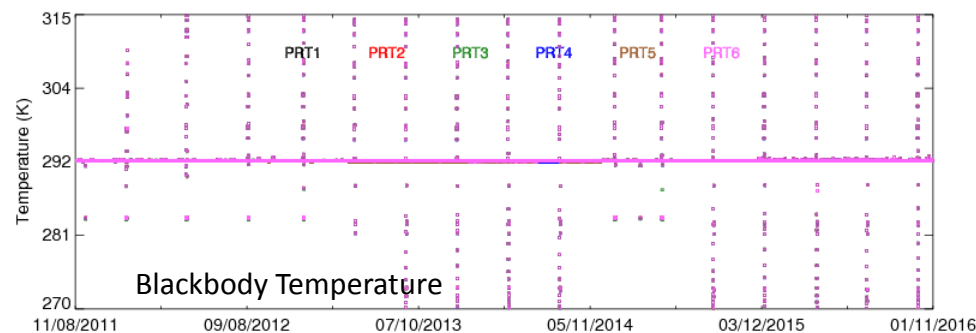
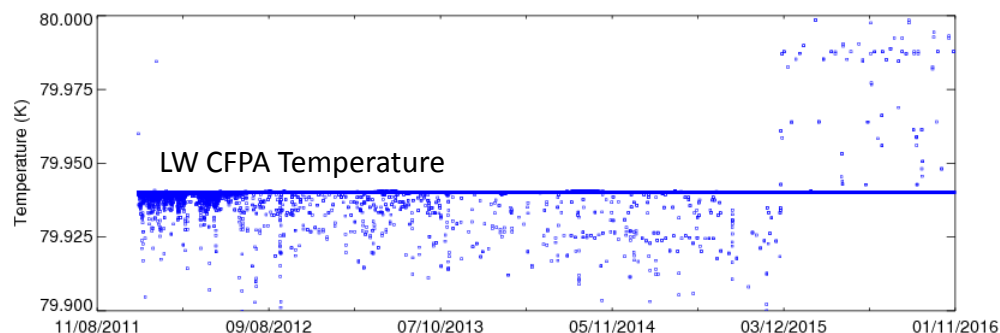
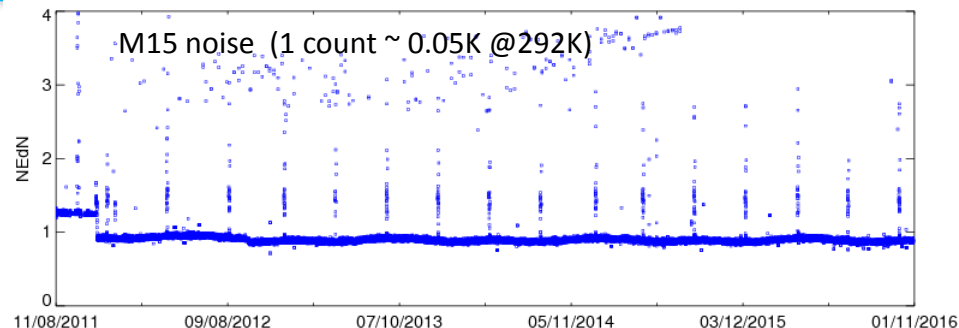
S-NPP VIIRS on-board blackbody temperature



S-NPP VIIRS Thermal Emissive Band (TEB) (continued)

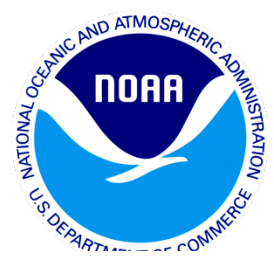


- TEB band noise remains low, has not changed significantly since launch, according to ICVS monitoring;
- Cold focal plane array temperature is very stable;
- Blackbody temperature is maintained as $\sim 292.6\text{K}$, with a max $\sim 0.04\text{k}$ orbital variation for two thermistors;
- Quarterly warm up cool down (WUCD) of the blackbody to characterize nonlinearity changes;
- WUCD has a small impact on SST during such events.

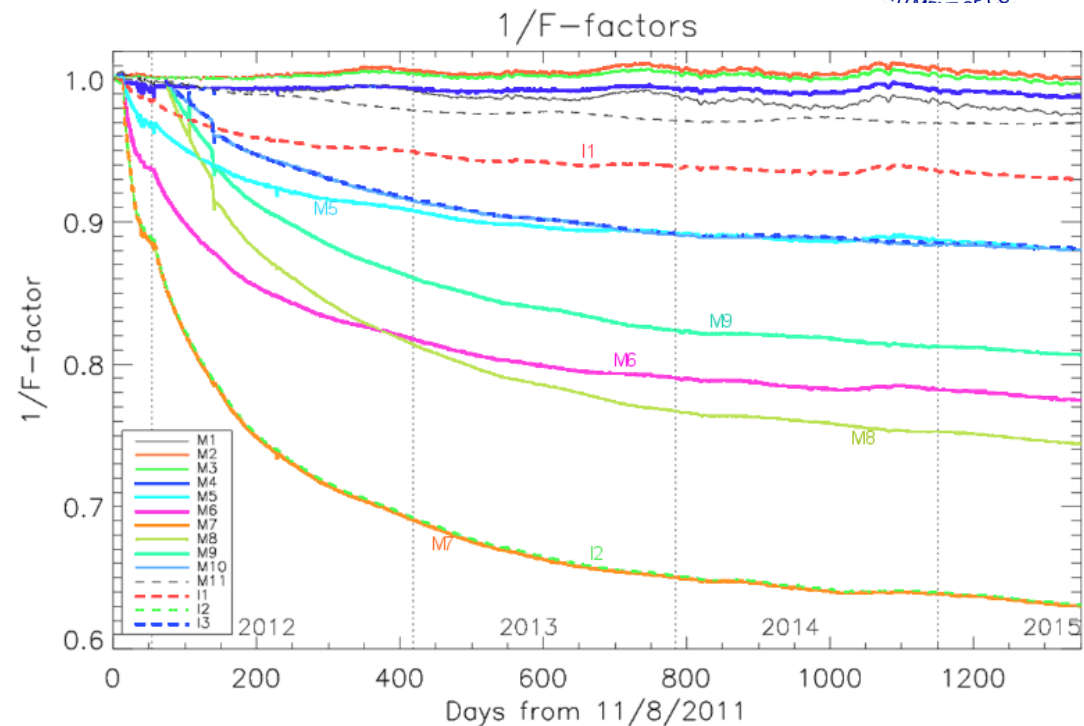


S-NPP VIIRS Reflective Solar Band (RSB) performance

-Rotating Telescope Assembly (RTA) mirror degradation

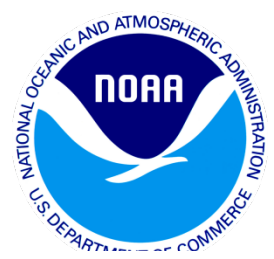


- Rotating Telescope Assembly (RTA) mirror degradation was a major postlaunch anomaly, due to prelaunch contamination;
- Band M7 has the largest degradation (~35%) since launch; while degradation at shorter wavelength is much smaller;
- The degradation has leveled off since mid 2013;
- The VIIRS SDR team actively maintains the calibration to compensate for the degradation;
- Impact on users are only limited to early orbits during beta maturity which would require reprocessing.

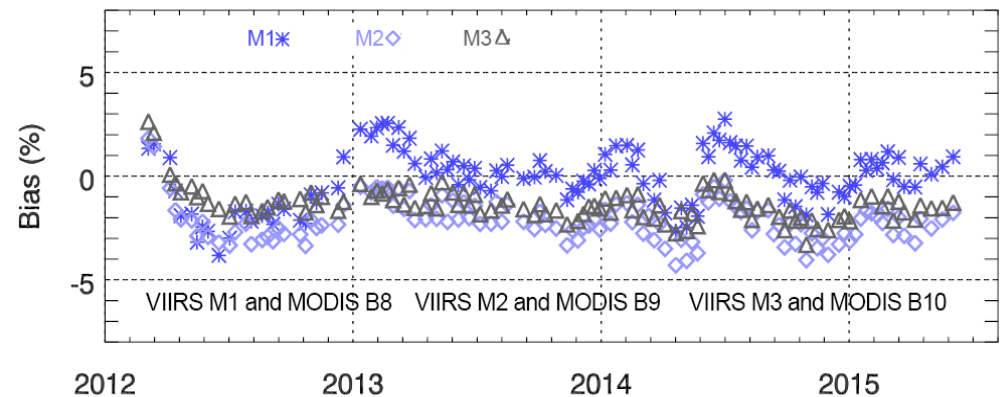
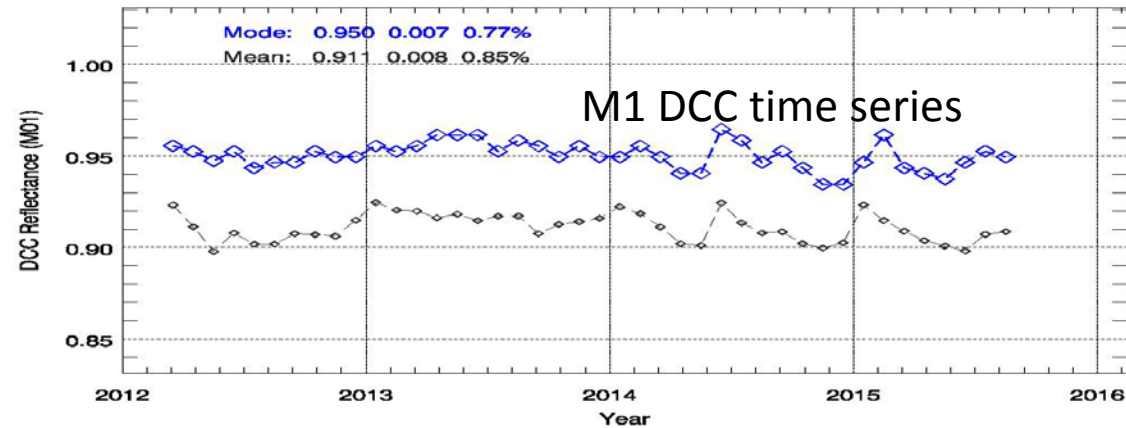


1/F factor is indicative of the instrument gain which shows the degradation due to RTA mirror reflectivity change

S-NPP VIIRS Calibration Stability and Accuracy

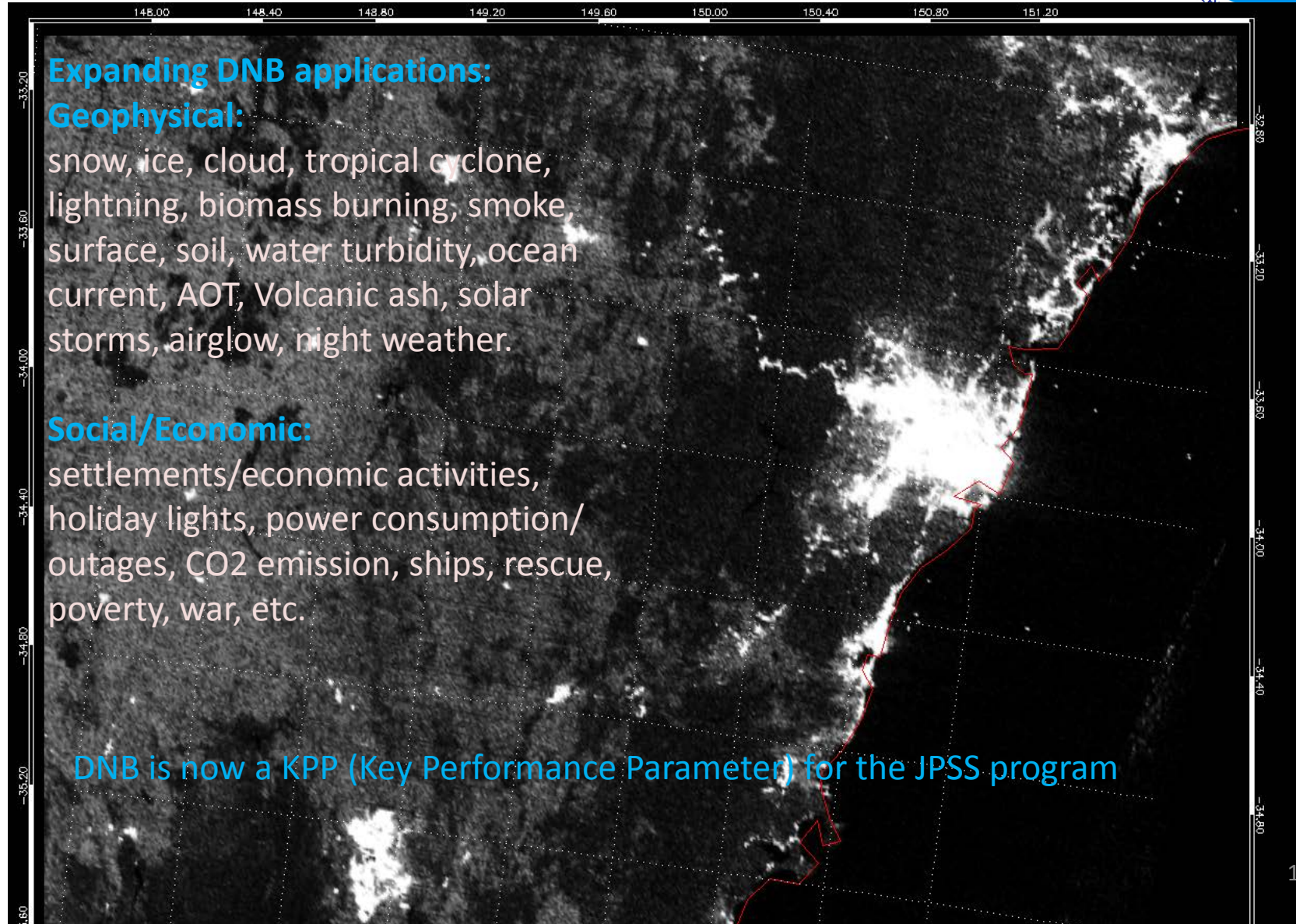
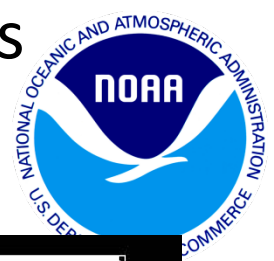


- VIIRS calibration is closely monitored at 30+ cal/val sites worldwide;
- Time series shows the calibration is very stable, and accurate (better than the +/-2% spec)
- Comprehensive calibration & monitoring include monthly maneuvers such as lunar cal, as well as DNB offset and gain transfer (VROP702)



VIIRS accurate compared to MODIS

Excellent SNPP VIIRS DNB performance leads to expanding applications



Expanding DNB applications:

Geophysical:

snow, ice, cloud, tropical cyclone, lightning, biomass burning, smoke, surface, soil, water turbidity, ocean current, AOT, Volcanic ash, solar storms, airglow, night weather.

Social/Economic:

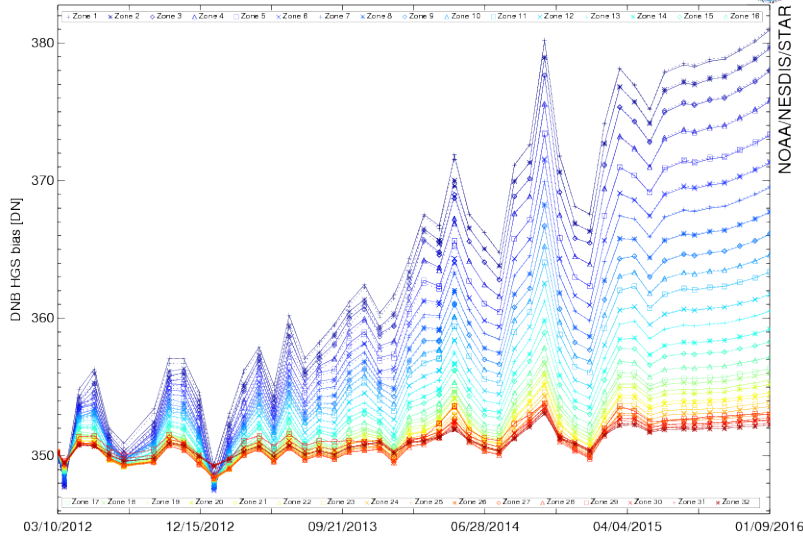
settlements/economic activities, holiday lights, power consumption/outages, CO2 emission, ships, rescue, poverty, war, etc.

DNB is now a KPP (Key Performance Parameter) for the JPSS program

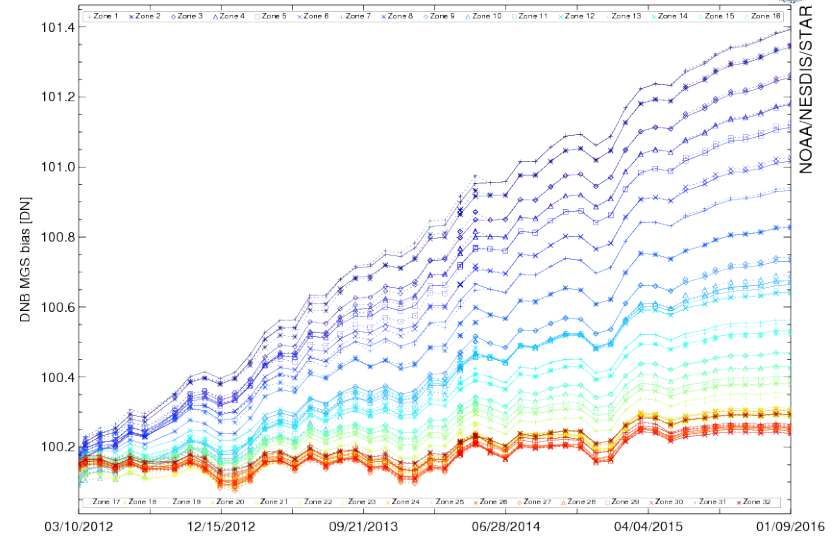
S-NPP VIIRS DNB Offset changes



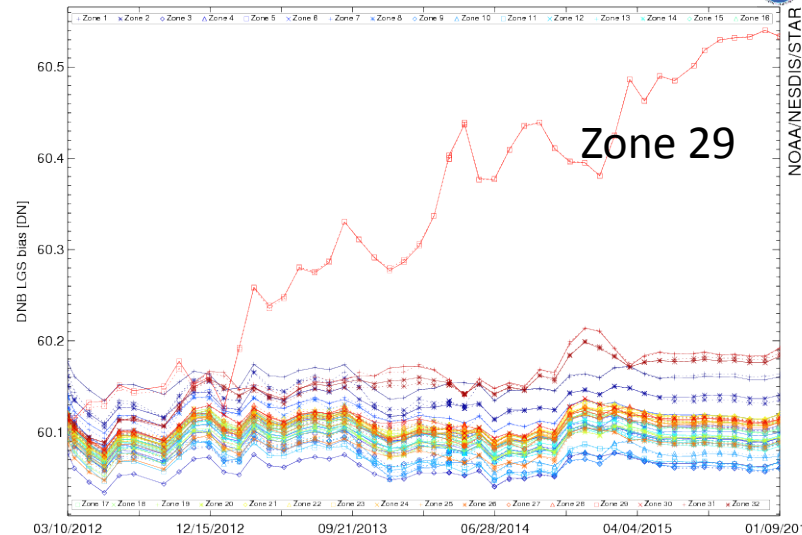
Operational DNB HGS DNO [Det. & Zone Averaged]
02/09/2016-13:04:46 UTC



Operational DNB MGS DNO [Det. & Zone Averaged]
02/09/2016-13:04:46 UTC



Operational DNB LGS DNO [Det. & Zone Averaged]
02/09/2016-13:04:46 UTC

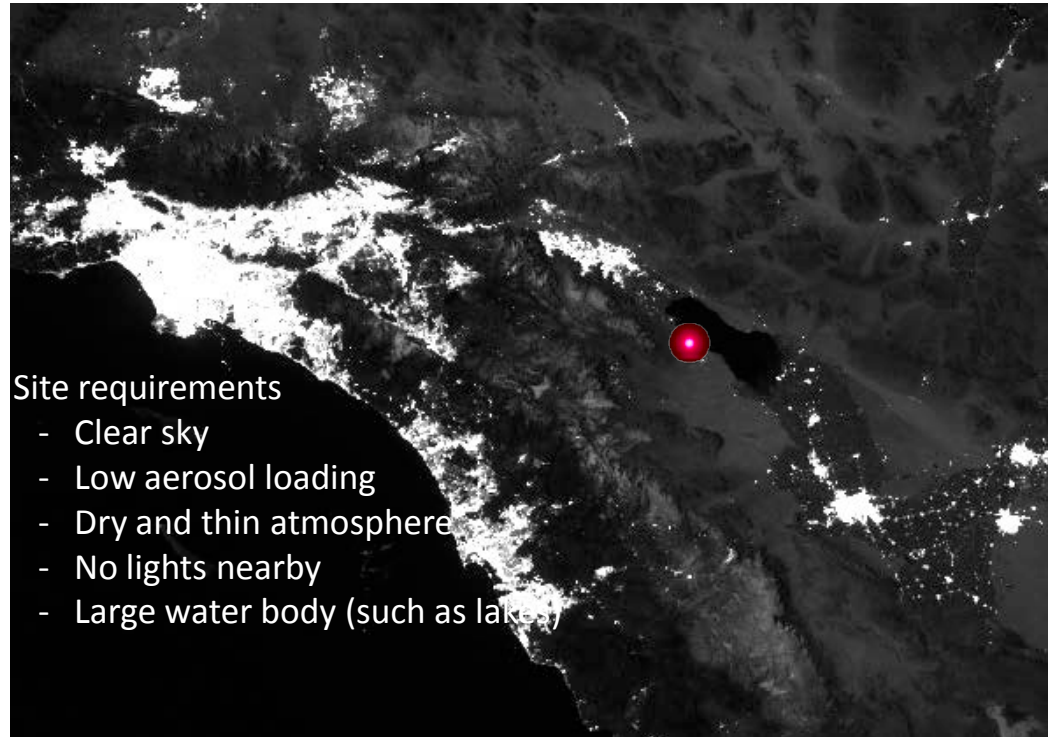


Offset (DNO) increase
greatest towards Agg.
zone 1, due to dark
current increases

Active Night Light Sources for DNB Calibration



- Investigating vicarious validation sites suitable for DNB (at low radiances):
 - » Analysis of nightlight point sources (from bridges, fishing vessels, cities) showed the potential to validate DNB calibration (Cao & Bai, *Remote Sens* 2014)
 - » Emphasizes the need and feasibility of developing active light source references
- SBIR project in progress to develop active nightlight for VIIRS DNB validation, working closely with NIST and NASA scientists
- Potential collaboration with RADCALNET



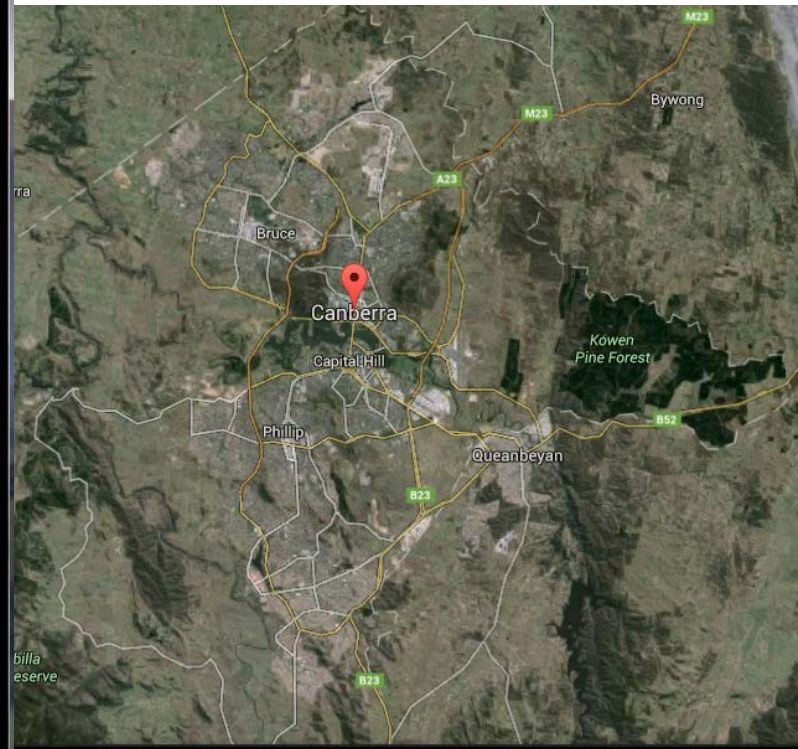
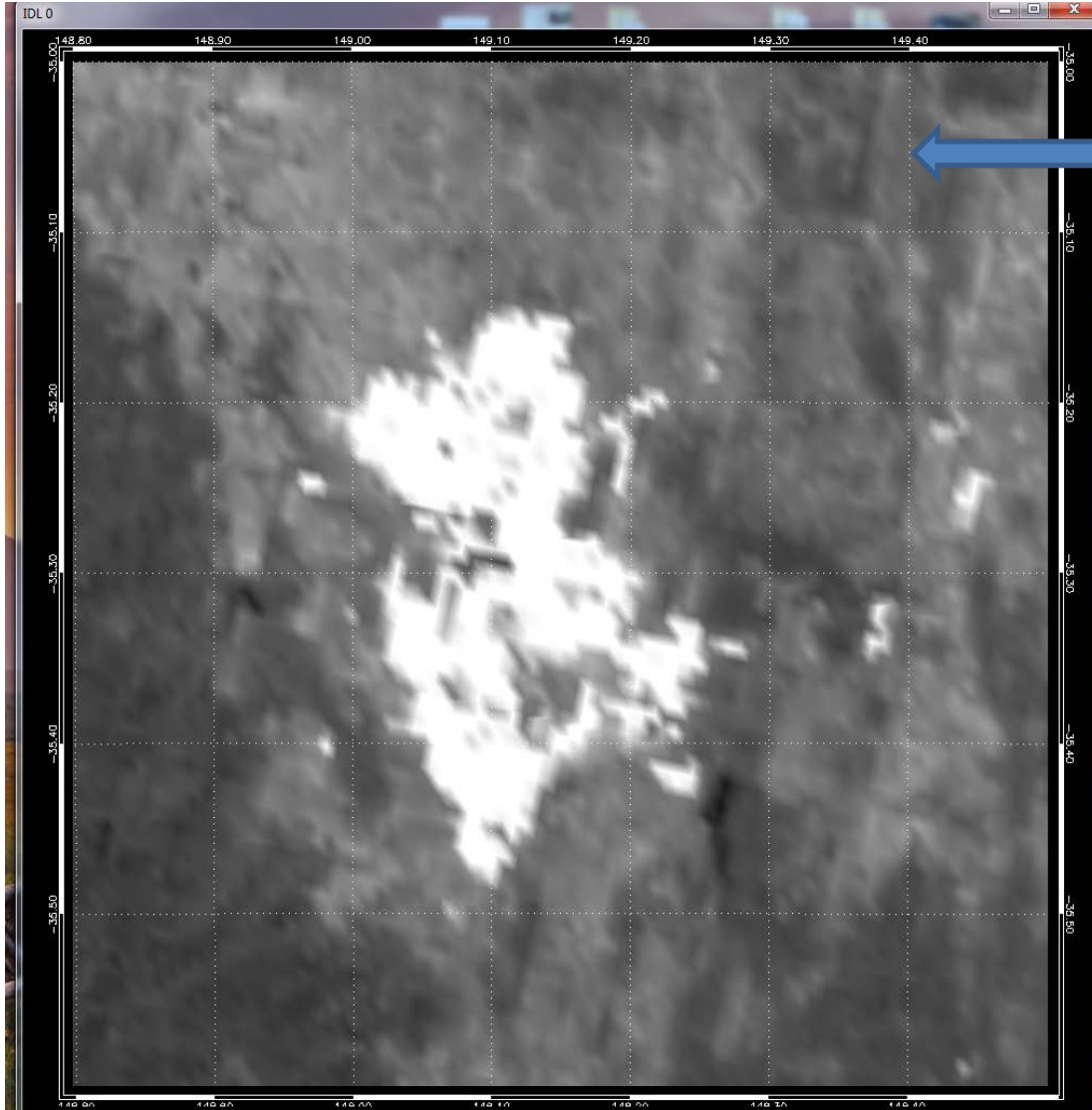
Site requirements

- Clear sky
- Low aerosol loading
- Dry and thin atmosphere
- No lights nearby
- Large water body (such as lakes)

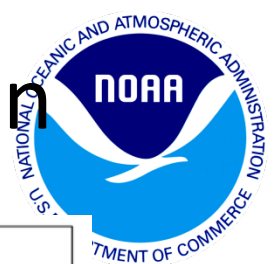
VIIRS DNB Nighttime Observation of Canberra



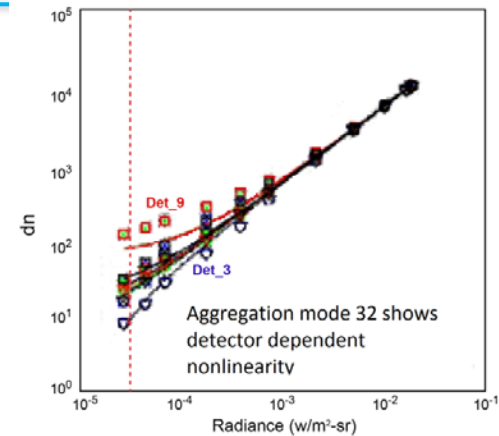
February 22, 2016, Full Moon



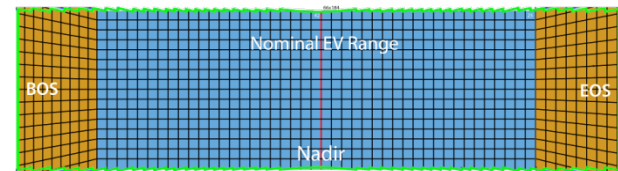
J1 VIIRS DNB non-linearity Mitigation



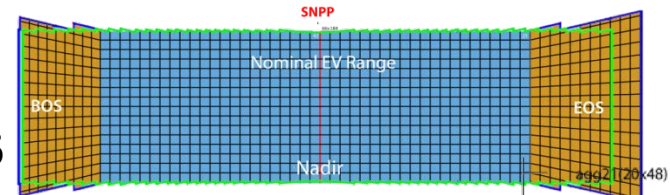
- J1 VIIRS DNB has high nonlinearity in radiometric response especially at edge of scan based on prelaunch tests, which is different from the behavior of the SNPP VIIRS
- Two options have been proposed by the J1 data working group:
 - » **Op21 (Baseline)**
Extend AggMode 21 up to 32
 - » **Op21/26**
Extend AggMode 21 up to 25
Extend AggMode 26 up to 32



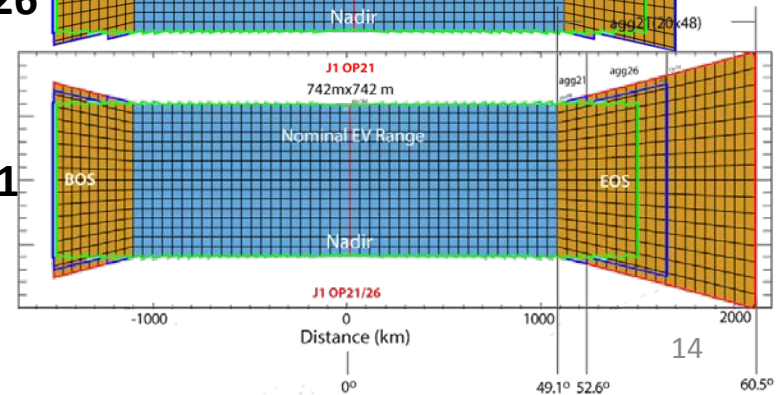
SNPP



**J1
Op21/26**



J1 Op21



Reprocessing of SNPP SDR data

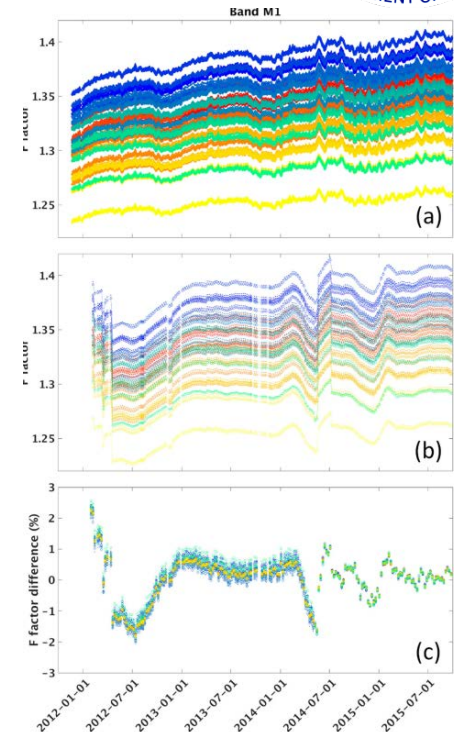


- **SNPP VIIRS SDRs will be reprocessed at NOAA using:**

- » Latest RSB radiometric calibration coefficients generated by RSBAutoCal
- » Improved DNB LUTs
 - Stray light LUTs with solar vector error corr.
 - New RSR and LGS LUTs between launch and mid-2013
- » Improved TEB LUTs
- » Latest geolocation LUTs
- » Latest SDR algorithms

- » Reprocessing is planned to start in 2017

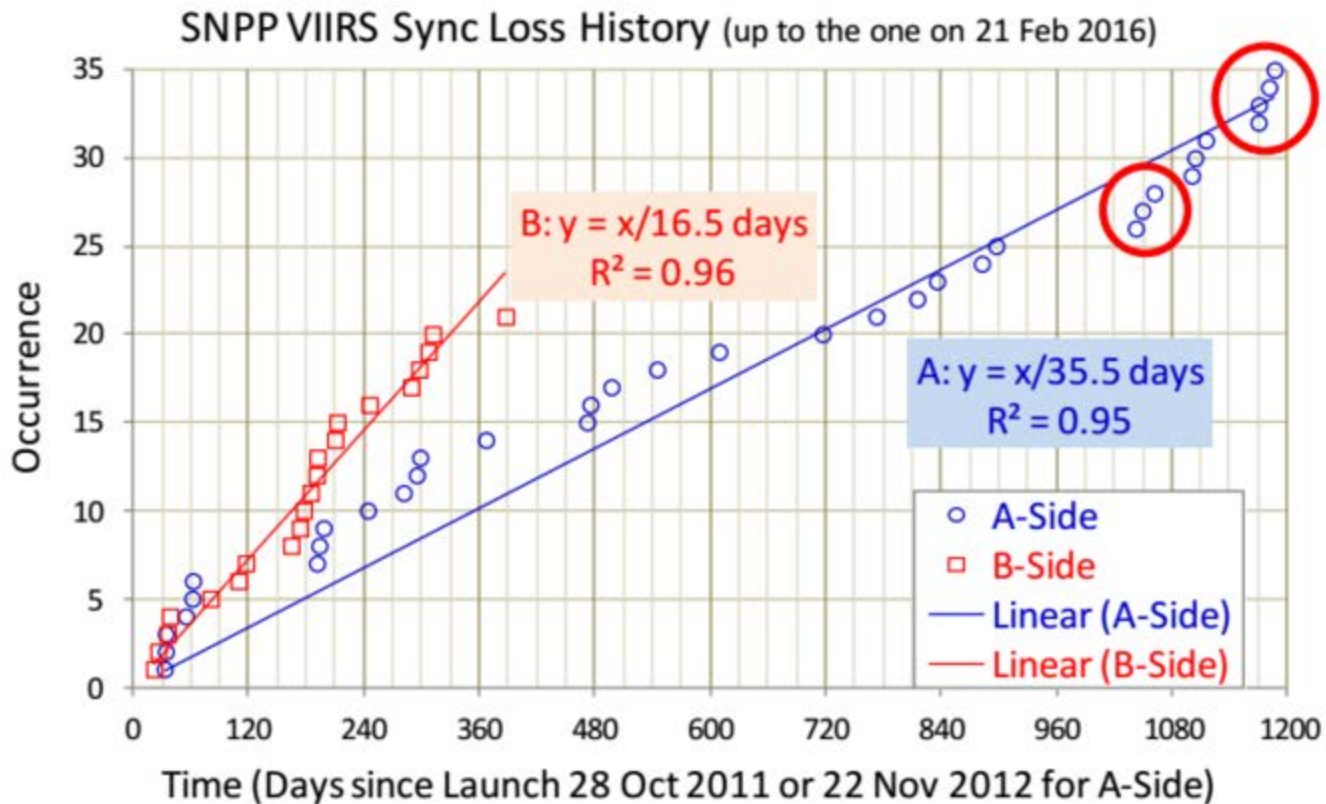
- » Reprocessing validation capabilities are being developed at NOAA STAR



M1 F-factors: (1) generated by RSBAutoCal; (2) NOAA operational; (3) differences

Blanski and Cao, RS, 2015

S-NPP VIIRS Issue: SNPP VIIRS RTA/HAM Sync Loss



Courtesy of G. Lin, VCST

Special issue of [Remote Sensing](#) (Guest Editor: Dr. Changyong Cao) “VIIRS Cal/Val and Applications” 27 papers already published online (http://www.mdpi.com/journal/remotesensing/special_issues/VIIRS?view=default)



Article: Preliminary Inter-Comparison between AHI, VIIRS and MODIS Clear-Sky Ocean Radiances for Accurate SST Retrievals
Remote Sens. 2016, 8(3), 203; doi:10.3390/rs8030203

Review: VIIRS Reflective Solar Bands Calibration Progress and Its Impact on Ocean Color Products
Remote Sens. 2016, 8(3), 194; doi:10.3390/rs8030194

Article: Radiometric Inter-Calibration between Himawari-8 AHI and S-NPP VIIRS for the Solar Reflective Bands
Remote Sens. 2016, 8(3), 165; doi:10.3390/rs8030165

Article: Evaluation of VIIRS and MODIS Thermal Emissive Band Calibration Stability Using Ground Target
Remote Sens. 2016, 8(2), 158; doi:10.3390/rs8020158

Article: The Potential of Autonomous Ship-Borne Hyperspectral Radiometers for the Validation of Ocean Color Radiometry Data
Remote Sens. 2016, 8(2), 150; doi:10.3390/rs8020150

Article: Assessing the Effects of Suomi NPP VIIRS M15/M16 Detector Radiometric Stability and Relative Spectral Response Variation on Striping
Remote Sens. 2016, 8(2), 145; doi:10.3390/rs8020145

Article: JPSS-1 VIIRS Pre-Launch Response Versus Scan Angle Testing and Performance
Remote Sens. 2016, 8(2), 141; doi:10.3390/rs8020141

Article: An Overview of the Joint Polar Satellite System (JPSS) Science Data Product Calibration and Validation
Remote Sens. 2016, 8(2), 139; doi:10.3390/rs8020139

Article: Suomi NPP VIIRS Day/Night Band Stray Light Characterization and Correction Using Calibration View Data
Remote Sens. 2016, 8(2), 138; doi:10.3390/rs8020138

Review: Comparison of the Calibration Algorithms and SI Traceability of MODIS, VIIRS, GOES, and GOES-R ABI Sensors
Remote Sens. 2016, 8(2), 126; doi:10.3390/rs8020126

Article: Assessment of S-NPP VIIRS On-Orbit Radiometric Calibration and Performance
Remote Sens. 2016, 8(2), 84; doi:10.3390/rs8020084

Letter: An Investigation of a Novel Cross-Calibration Method of FY-3C/VIRR against NPP/VIIRS in the Dunhuang Test Site
Remote Sens. 2016, 8(1), 77; doi:10.3390/rs8010077

Article: Fast and Accurate Collocation of the Visible Infrared Imaging Radiometer Suite Measurements with Cross-Track Infrared Sounder
Remote Sens. 2016, 8(1), 74; doi:10.3390/rs8010074

Article: Improved VIIRS and MODIS SST Imagery
Remote Sens. 2016, 8(1), 79; doi:10.3390/rs8010079

Article: Inter-Comparison of S-NPP VIIRS and Aqua MODIS Thermal Emissive Bands Using Hyperspectral Infrared Sounder Measurements as a Transfer Reference
Remote Sens. 2016, 8(1), 72; doi:10.3390/rs8010072

Article: Pre-Launch Radiometric Characterization of JPSS-1 VIIRS Thermal Emissive Bands
Remote Sens. 2016, 8(1), 47; doi:10.3390/rs8010047

Article: JPSS-1 VIIRS Radiometric Characterization and Calibration Based on Pre-Launch Testing
Remote Sens. 2016, 8(1), 41; doi:10.3390/rs8010041

Article: Spectral Cross-Calibration of VIIRS Enhanced Vegetation Index with MODIS: A Case Study Using Year-Long Global Data
Remote Sens. 2016, 8(1), 34; doi:10.3390/rs8010034

Article: Monitoring the NOAA Operational VIIRS RSB and DNB Calibration Stability Using Monthly and Semi-Monthly Deep Convective Clouds Time Series
Remote Sens. 2016, 8(1), 32; doi:10.3390/rs8010032

Article: Improved Band-to-Band Registration Characterization for VIIRS Reflective Solar Bands Based on Lunar Observations
Remote Sens. 2016, 8(1), 27; doi:10.3390/rs8010027

Article: Radiometric Stability Monitoring of the Suomi NPP Visible Infrared Imaging Radiometer Suite (VIIRS) Reflective Solar Bands Using the Moon
Remote Sens. 2016, 8(1), 15; doi:10.3390/rs8010015

Article: Comparison between the Suomi-NPP Day-Night Band and DMSP-OLS for Correlating Socio-Economic Variables at the Provincial Level in China
Remote Sens. 2016, 8(1), 17; doi:10.3390/rs8010017

Article: User Validation of VIIRS Satellite Imagery
Remote Sens. 2016, 8(1), 11; doi:10.3390/rs8010011

Article: Validation of S-NPP VIIRS Sea Surface Temperature Retrieved from NAVO
Remote Sens. 2015, 7(12), 17234-17245; doi:10.3390/rs71215881

Article: Validation of the Suomi NPP VIIRS Ice Surface Temperature Environmental Data Record
Remote Sens. 2015, 7(12), 17258-17271; doi:10.3390/rs71215880

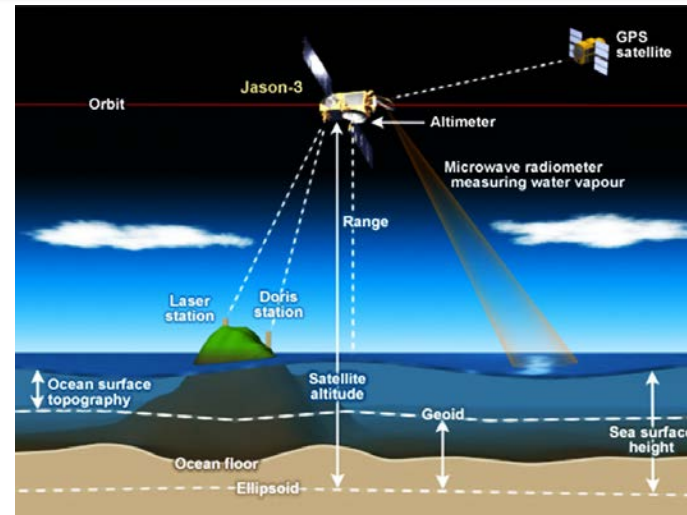
Article: Suomi NPP VIIRS Reflective Solar Bands Operational Calibration Reprocessing
Remote Sens. 2015, 7(12), 16131-16149; doi:10.3390/rs71215823

Article: Quality Assessment of S-NPP VIIRS Land Surface Temperature Product
Remote Sens. 2015, 7(9), 12215-12241; doi:10.3390/rs70912215

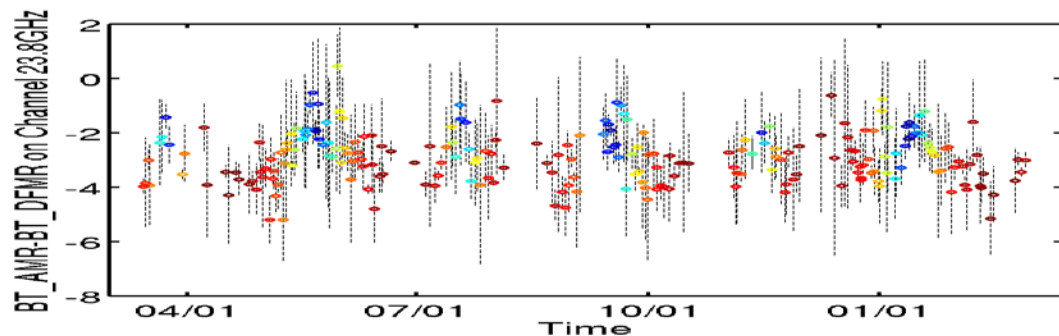
Jason 3 Radiometer Calibration Support



- Jason 3 AMR radiometer will be intercompared with Jason 2 and other instruments to ensure stability;
- Pitch maneuver will also be performed to improve the calibration on the cold end;
- Cal/Val methodologies have been developed based on Jason 2, SARAL, and other missions;
- We will support the Radiometer calibration, working closely with the altimetry team.



Courtesy of Laury Miller, Satellite Altimetry Laboratory, STAR/SOCD



Brightness temperature difference between Jason2/AMR and SARAL/AltiKa/DFMR for the 23.8G Hz common channel. Color represents meridian distance from equator (or latitude without sign). No clear trend in both difference and ratio time series is observed.

GOES-R/ABI: Himawari/AHI and IASI/CrIS/AIRS Intercomparison



Meteorological Satellite Center (MSC) of JMA

Home Calibration Products Operations Supports

Current position: Home > GSICS Himawari-8/AHI Calibration Monitoring > Himawari-8 IR Inter-calibration with AIRS/IASI/CrIS

GSICS Infrared Inter-calibration

GSICS Global Space-based Infrared Calibration System

Back

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GSICS Infrared Inter-calibration

GSICS Global Space-based Infrared Calibration System

Back

Himawari-8/AHI IR Inter-calibration with AIRS, IASI-A/B and CrIS

Himawari-8/AHI IR Inter-calibration with AIRS, IASI-A/B and CrIS

AHI Infrared Bands

- Band07 (3.9 μm)
- Band08 (6.2 μm)
- Band09 (6.9 μm)
- Band10 (7.3 μm)
- Band11 (8.6 μm)
- Band12 (9.6 μm)
- Band13 (10.4 μm)
- Band14 (11.2 μm)
- Band15 (12.4 μm)
- Band16 (13.3 μm)

LEO Data

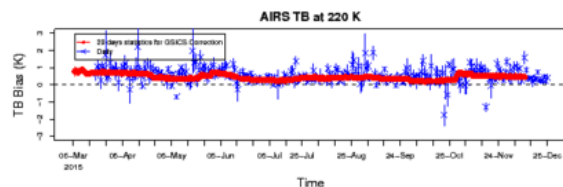
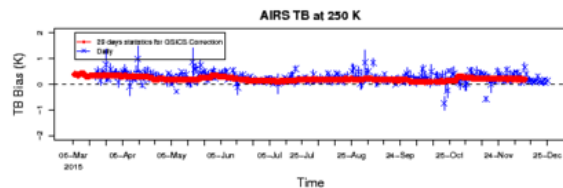
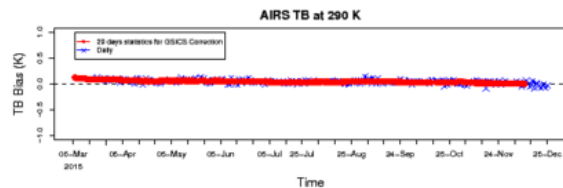
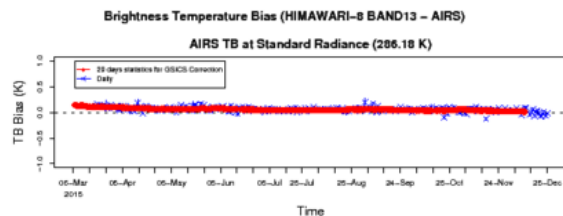
- AIRS (all)
- IASI-A (all)
- IASI-B (all)
- CrIS (all)
- AIRS (asc, 1:30pm)
- AIRS (des, 1:30am)
- IASI-A (des, 9:30am)
- IASI-A (asc, 9:30pm)
- IASI-B (des, 9:30am)
- IASI-B (asc, 9:30pm)
- CrIS (asc, 1:30pm)
- CrIS (des, 1:30am)

Time Series

- TB difference
- Regression coef.

Statistics for GSICS Correction

- Scatter plot
- (Month Day Year) ▲
- Sep 11, 2015
- Sep 12, 2015
- Sep 13, 2015
- Sep 14, 2015
- Sep 15, 2015



AHI Infrared Bands

- Band07 (3.9 μm)
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LEO Data

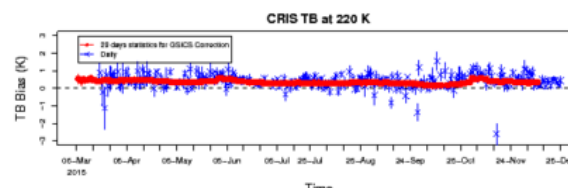
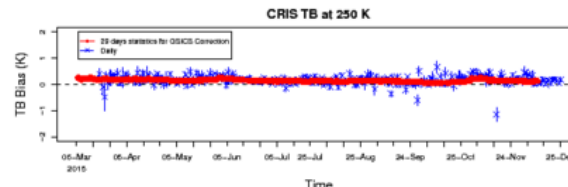
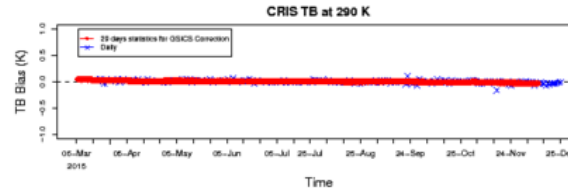
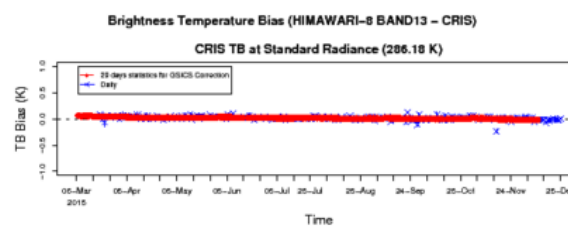
- AIRS (all)
- IASI-A (all)
- IASI-B (all)
- CrIS (all)
- AIRS (asc, 1:30pm)
- AIRS (des, 1:30am)
- IASI-A (des, 9:30am)
- IASI-A (asc, 9:30pm)
- IASI-B (des, 9:30am)
- IASI-B (asc, 9:30pm)
- CrIS (asc, 1:30pm)
- CrIS (des, 1:30am)

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Courtesy of JMA

GOES-R Field Campaign Overview



The purpose of the GOES-R field campaign is to support post-launch validation of L1b & L2+ products:

Advanced Baseline Imager (ABI) & Geostationary Lighting Mapper (GLM):

- Planning ~6 week field campaign (~100 flight hours) with the high-altitude NASA ER-2 platform coordinated with ground based and near surface observations over several Earth targets
- » April – June 2017



ER-2



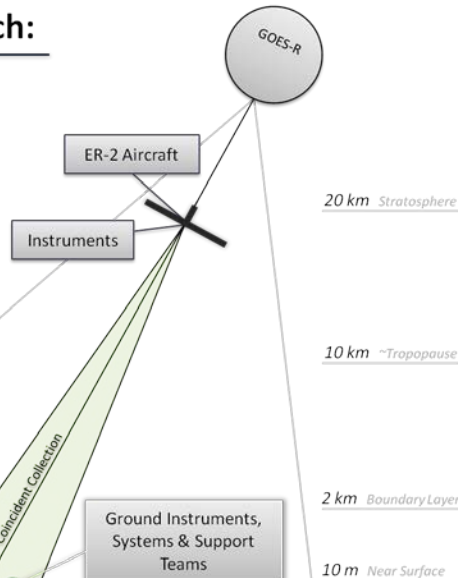
ABI Field Campaign Approach:

Primary Objective: provide validation of ABI L1b spectral radiance observations to validate SI traceability

Secondary objective: provide surface and atmospheric geo-physical measurements to support L1b & L2+ product validation

Targets of Interest:

- Desert
- Open Ocean
- Land/Vegetation
- Clouds



GLM Field Campaign Approach:

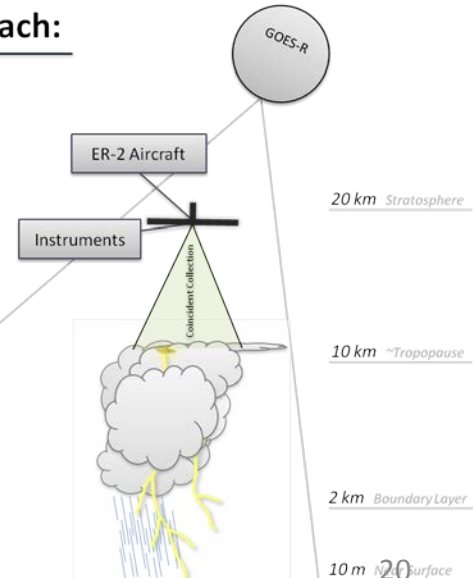
Primary Objective: provide validation of GLM flash detection efficiency day through night over land at well characterized total lightning super sites: Northern AL, Lubbock TX, Norman OK, KSC FL, and Wallops/DC area

Secondary Objective: provide validation of GLM flash detection efficiency day through night at other land locations and over ocean

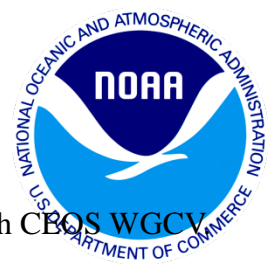
Tertiary Objective: provide validation of GLM flash location & time stamp accuracy, and GLM image navigation and registration (INR) accuracy

Targets of Interest:

- Storms



GSICS - CEOS Interaction



Background

- The initial concept of GSICS was brought forward by people involved in calibration activities with some links with CEOS WGCV.
- Important interaction on the QA4EO in (2009-2010). Resulted in GPPA (inherited from QA4EO).
- *WGCV Chair in the GSICS Executive Panel, and the GSICS EP Chair in WGCV. Lots of overlap among group members.*

Interaction in 2014

- In Feb 17-21, 2014 , 37th CEOS WGCV-36 held in **Frascati**, Italy. GSICS members Jerome Lafeuille (GSICS EP Member) and Tim Hewison invited to the meeting.
- In Sept – Oct 2014 NOAA hosted, 38 th CEOS , Mitch Goldberg (GSICS EP Member) , Lawrence E Flynn (Director GCC) and Manik Bali (Deputy Director GCC) presented GSICS , GSICS Coordination Center activities and GSICS Procedure for Product Acceptance (GPPA).

Outcome of 38th CEOS Meeting at NOAA

Meeting resulted in following action items on GSICS

- MWSG Chair to have a communication with GSICS on how WGCV can offer support on best practices.
- WGCV Secretariat to send out the list of potential GSICS-WGCV Cooperation items outlined by GSICS to each subgroup chair
- WGCV (Completed) Subgroup Chairs to identify and prioritize specific activity areas for interaction with GSICS.
- Mitch Goldberg suggested to WGCV to establish surface reference sites, and help with procedures for best practices.

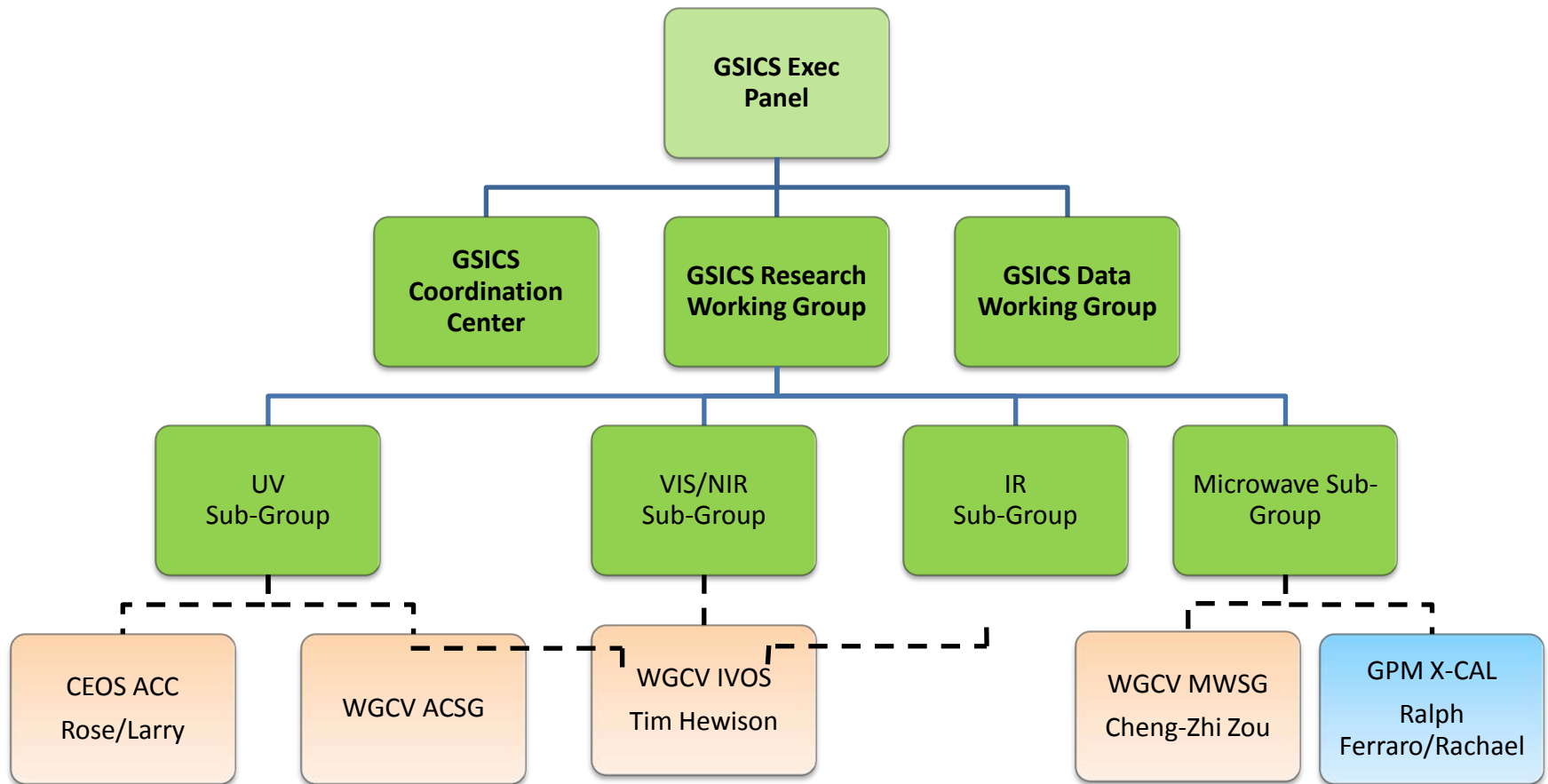


Challenges in GSICS



- Multiple GSICS References
 - » Merging or Single
 - » Handling Transitions
 - » Traceability
 - » CLARREO/TRUTHS
 - » The Moon
 - » The Sun
- New Instruments in GSICS
 - New Channels (GEO NIR UV MW)
 - Sounders
 - Hyperspectral
 - High-Resolution
- New Sub-Groups

GRWG CEOS Collaboration



Close interaction with CEOS needed at subgroup level to meet challenges.

Areas include : SAR calibration, Solar spectrum for calibration, lunar inter-calibration etc

GCC – GSICS Quarterly Newsletter

GSICS Quarterly Newsletter Features

- New format since Fall 2013.
- Since Winter 2014, the Newsletter has a doi.
- Accepts articles on topics related to calibration (Pre and Post launch).
- New Landing page on the GCC website.
- Rate and Comment section: readers and authors can interact.
- Articles are reviewed by subject matter experts



This Issue: Lunar Calibration

In This Issue

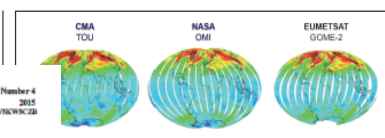
Articles
 Moon as a Calibration Source
 by Tom Stone
 Absolute Calibration of Lunar Spectral Irradiance
 by Glenn Oeser
 Lunar Calibration of MODIS/VIIRS Solar Bands
 by Barthelme Volkmann, Alexander Wagner, Tom Hewison and Tom Stone
 Planetary Orbital Lunar Observations (POLO) - Historic Study of the Moon
 by Sophie Leckie
 On the Phase-Angle Dependence of the Moon Calibration Results
 by Sophie Leckie, Alexander Wagner, Tom Stone, Laurent Colot, Alexander Wagner, and Tom Hewison
 Calibration of the Sun: SPV/VIIRS Day-Night Band using Moon Light
 by Yi Zhou, Changyong Cao, and Zhou Cheng
 Angular Variation of GOES Imager Area Meter Visible Radiance
 by Fengping Yu, Jingping Wu, Jun Stone, and Gordon Lindt-Hart

News in This Quarter
 A Note from the Executive Panel Chair by Mark Ball
 Semi-Annual Meeting of the NOAA/ES/OS Calibration Project Oversight Panel (COPOP) by Jingping Wu, NOAA
 2013 Field Campaign of Radiometric Calibration for FY Sensors Held at CRDS Danchang Site by Tom Stone, NOAA
 Improved Accessibility to EUMETSAT GOES Products
 by Tom Hewison, EUMETSAT
 FY-12 Satellite Readiness Launches by Tom Stone, NOAA
 EUMETSAT Begins Providing Alternative Calibration Coefficients for Imagers (ISERV) by Tom Hewison, EUMETSAT

ANNOUNCEMENTS
 Mark Ball Takes Over as Deputy Director of OS/CS Coordination Center
 OS/CS Forms UV Working Group
 Upcoming OS/CS-related Meetings
 OS/CS-related Publications
 Special Thanks to Fengping Yu and George Oering



This Issue: Special Issue on Ultraviolet



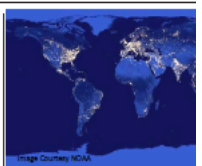
This Issue:

In This Issue

Articles
 The Conundrum of Ω Traceability at λ_{sun} for the VIIRS Day/Night Band
 by Changyong Cao, NOAA
 SWPP VIIRS Thermal Emission Bands On-Orbit Performance
 by Benjamin Ehrenweik and Jack Wang, NOAA
 Update on the International Calibration of NOAA VIIRS CO₂ Channels for Climate Studies
 by Zhou Cheng, Changyong Cao and Shi Zhang, NOAA
 CLARIFIED: Climate Change Observations and Calibration Objectives
 by C. Lubert, S.A. Miesch, R.F. Strick and the CLARIFIED Science Team, NOAA
 Inter-comparison of OS/CS Full Resolution Radiances with ASD
 by Jun Wang, Jingping, Yong Chen, Yu Ju and Naichuan Wang and David Tomasko, NOAA
 The status of long term data processing in NSIC
 by Jun Liu, Peng, Qid, Zhaogang Zheng and Hu Yu, CMA

News in This Quarter
 Outcomes of the Joint OS/CS-OS/NOG Lunar Calibration Workshop
 by Alexander Wagner, EUMETSAT

Announcements
 OS/CS Users' Workshop to be held 25-26 September, 2015, in Toulouse, France
 by Tom Hewison, EUMETSAT
 Annual OS/CS-OS/NOG meeting to be held 21-26 March, 2015, in New Delhi, India
 by Mark Ball, NOAA
 OS/CS-Related Publications



Images above show Earth Night Lights as viewed by CNR1 (Image Courtesy NOAA)

The Conundrum of L_{min} for the VIIRS D₁

by Changyong Cao, NOAA
 It is commonly accepted that an including those from satellites, is traceable, which is defined as the result whereby the result can be documented unbroken chain of c to the measurement uncertainty¹ onboard calibration, the pre-launch would be the irradiance sources used and maintained at the metrology institute. After the satellite is launched into orbit, the reference becomes the solar irradiance which has been extensively studied with well known uncertainties. After taking into account all the uncertainties in the error budget analysis, it is concluded that the VIIRS onboard solar diffuser calibration can achieve a calibration with $\pm 2\%$ (1-sigma) uncertainty.
 In the case of the VIIRS Day/Night Band (DNB), the nominal value for the solar diffuser in-band radiance is on the order of $1.000\ 000\ \text{mW}\cdot\text{cm}^{-2}\cdot\text{sr}^{-1}$ (at $\lambda = 660\ \text{nm}$), or $0.001\ \text{W}\cdot\text{m}^{-2}\cdot\text{sr}^{-1}$ which is in the low gain stage (LGS). However, at night, the radiances are



In This Issue

Articles
 Post-launch Calibration of Himawari-8/AHI
 by Arata Okuyama and Masaya Takahashi, JMA
 Improved FY-2D SVSRR onboard IR calibration model using GSICS inter-calibrated radiances
 by Yong Zhang, Zhipu Rong and Xiaoping Hu, NIO/CMA
 Fast Radiative Transfer Model for hyperspectral Meteosat data simulation
 by G. Ota, V. Pavlov (Observer Branch of Russian Academy of Sciences, A. Kozlov, A. Rublev, A. Litvinov (Radiation), A. Pajonik, Ya. Vokladov, Yu. Timofeyev (Joint Petersburg State University)

Post-launch calibration of Himawari-8/AHI

by Arata Okuyama and Masaya Takahashi, JMA
 The next-generation geostationary meteorological satellite of the Japan Meteorological Agency (JMA), Himawari-8, started operations on 7 July 2015. Himawari-8 features the new Advanced Himawari Imager (AHI), whose observation capability is better than that of its predecessor MTSAT-series satellites. The hardware configuration of the AHI is similar to that of the Advanced Baseline Imager (ABI) planned for the GOES-R satellite (Schmit et al., 2005 and Schmit, 2008).

The AHI carries 16 observation bands covering visible, near- and short-wave infrared and thermal infrared spectra. The AHI produces full-disk imagery every 10 minutes, and rapid scanning at 2.5-minute intervals is also conducted. The AHI can observe specific regions every 30 seconds for landmark analysis. By utilizing this function, the AHI can receive the moon imagery twenty times in the 10 minutes observing cycle, which is expected to support more precise calibration and validation. This study reports on the current data quality, especially concerning the radiometric calibration for the AHI. This report is based on data from the commissioning period.

There is room for data quality improvement in the future. For calibration of observation data, AHI has a blackbody as an internal calibration target and a solar diffuser as a solar calibration target. Using these targets, calibration coefficients, slope and offset, are derived to enable conversion of raw data counts from detector samples into radiances.

An infrared on-orbit calibration approach developed under the GSICS project involves the use of hyperspectral infrared sounders such as the Infrared Atmospheric Sounding Interferometer (IASI) on board EUMETSAT's Metop

Updates to the calibration of the visible channel of the SDCP BTU data in the production of the Heeres RSCOP cloud products
 by Anand K. Bhandari and Kenneth R. Knapp, NOAA

Highlights of 2015 Annual OS/CS Users Workshop
 by Mark Ball and Lawrence E. Flynn, NOAA

GSICS-related highlights of the 2015 EUMETSAT Meteorological Satellite Conference
 by Tom Hewison, EUMETSAT

Joint OS/CS GRWG-IVSIS and OS/CS WGVV-CISG Meeting
 by Lawrence E. Flynn, NOAA

The Annual GRWG-IVSIS Meeting to be held from February 23 to March 4, 2016 in Tsukuba, Japan
 by Akioyuki Takahashi (JMA) and Masaya Takahashi (JMA)

SPE Asia Pacific Remote Sensing Symposium 2016 to be held in New Delhi, India, 4-7 April, 2016
 by Ashwini Kulkarni (ISRO), Sat Akharam Kulkarni (ISRO) and Toshiyuki Kimura (JAXA)

GSICS-Related Publications

Special Thanks to Alexander Jankov
 OS/CS-Related Publications

differences between instruments are clearly understood. Measurements widely separated in time and space can be compared if they

the measurement of Top of Atmosphere (TOA) Total Solar Irradiance (TSI) provides an example of this work. The Earth Radiation Budget (ERB)

Summary



- VIIRS on Suomi NPP has been performing well;
 - » The RTA mirror degradation has leveled off
- Scientists continue to explore the new capabilities of the DNB;
- J1 VIIRS is not identical to Suomi NPP VIIRS
 - » Several issues on SNPP are resolved for J1
RTA mirror degradation, SEU, and Sync loss
 - » Several waivers are being mitigated
DNB & SWIR nonlinearity, polarization sensitivity, etc
 - » Additional validation capabilities are being developed, especially for DNB
- Other initiatives:
 - reprocessing, J1 launch preparation, VIIRS special issue ...
- S-NPP VIIRS RSB, TEB, and DNB performance factors are monitored in near real-time.
 - » NOAA National Calibration Center (NCC) site at <http://ncc.nesdis.noaa.gov/VIIRS/index.php>
 - » NOAA Integrated Cal/Val System (ICVS) site at http://www.star.nesdis.noaa.gov/icvs/status_NPP_VIIRS.php