PROVISIONAL MATURITY SCIENCE REVIEW FOR NOAA-20 VIIRS SDR

VIIRS SDR Team

With contributions from NOAA STAR, NASA/VCST, The Aerospace Corp., and U. of Wisconsin

Outline

- Algorithm Cal/Val Team Members
- Product Requirements
- Evaluation of algorithm performance to specification requirements
  - Evaluation of the effect of required algorithm inputs
  - Quality flag analysis/validation
  - Error Budget
- User Feedback
- Downstream Product Feedback
- Documentations (Science Maturity Check List)
- Conclusion
- Path Forward

NOAA-20 VIIRS SDR Cal/Val Team (1 slide)

PI	Organization	Team Members	Roles and Responsibilities
C. Cao	STAR		Team lead, calibration/validation, SDR science, coordination, oversight
S. Blonski/W. Wang	STAR/ERT	J. Choi, Y. Gu, B. Zhang, A. Wald	Flight & operations interface; maneuver support; VIIRS SDR cal/val (prelaunch studies; software code changes and ADL tests; postlaunch analysis, monitoring and LUT update; operations support; anomaly resolution); postlaunch cal/val tasks.
X. Shao$_{(1/2)}$	UMD/CICS	S. Uprety, Y.Bai, and students	DNB operational calibration, straylight correction, geolocation validation, intercomparisons, solar/lunar calibration; image analysis& quality assurance; postlaunch cal/val tasks.
I. Guch	Aerospace	G. Moy, E. Haas, S. Farrar, F. Sun, and many others	Postlaunch cal/val tasks; independent analysis.
J. Xiong	NASA/VCST	G. Lin, N. Lei, J. McIntire, others	Flight support, geolocation, postlaunch cal/val tasks; independent analysis,
C. Moeller	U. Wisconsin	C. Moeller, J. Li	VIIRS RSR, CrIS comparison, DCC calibration
JPSS	JPSS	R. Marley, C. Rossiter B. Guenther	Collaboration

VIIRS SDR Product Requirements from JPSS L1RD

Attribute	Threshold	Objective
Center Wavelength	412 to 12,013 nm	412 to 12,013 nm
Bandpass	15 to 1,900 nm	15 to 1,900 nm
Max. Polarization Sensitivity	2.5 to 3.0 %	2.5 to 3.0 %
Accuracy @ Ltyp	0.4 to 30 %	0.4 to 30 %
SNR @ Ltyp or NEdT @ 270 K	6 to 416 or 0.07 to 2.5 K	6 to 416 or 0.07 to 2.5 K
FOV @ Nadir	0.4 to 0.8 km	0.4 to 0.8 km
FOV @ Edge-of-Scan	0.8 to 1.6 km	0.8 to 1.6 km
Ltyp or Ttyp	0.12 to 155 $W \cdot m^{-2} \cdot sr^{-1} \cdot mm^{-1}$ or 210 to 380 K	0.12 to 155 $W \cdot m^{-2} \cdot sr^{-1} \cdot mm^{-1}$ or 210 to 380 K
Dynamic Range	0.12 to 702 $W \cdot m^{-2} \cdot sr^{-1} \cdot mm^{-1}$ or 190 to 634 K	0.12 to 702 $W \cdot m^{-2} \cdot sr^{-1} \cdot mm^{-1}$ or 190 to 634 K
See L1RD for details		

KPP: For latitudes greater than 60N in the Alaskan region:
VIIRS Imagery EDR at 0.64 um (I1), 1.61 um (I3), 3.74 um (I4), 11.45 um (I5), 8.55 um (M14), 10.763 um (M15), 12.03 um (M16), and Near Constant Contrast EDR

NOAA-20 VIIRS SNR/NEDT Performance (Jan. 2018)

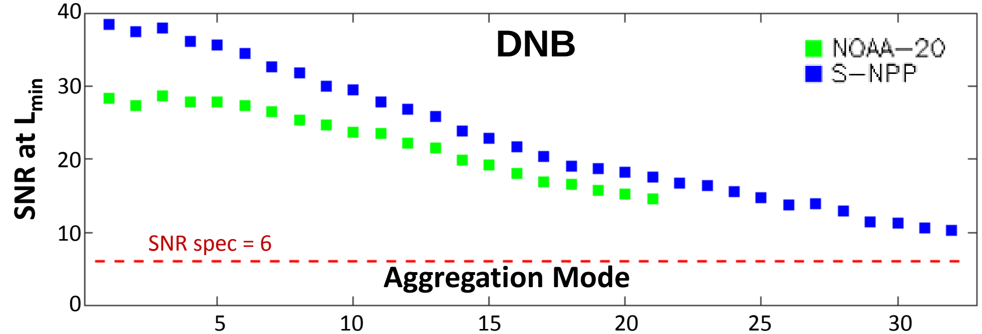
Band	L_typ	SNR Spec	NOAA-20 (on-orbit)	S-NPP (on-orbit)
M1 LG	155	316	1102	1045
M1 HG	44.9	352	631	588
M2 LG	146	409	998	1010
M2 HG	40	380	564	572
M3 LG	123	414	1061	988
M3 HG	32	416	693	628
M4 LG	90	315	848	856
M4 HG	21	362	549	534
M5 LG	68	360	774	631
M5 HG	10	242	385	336
M6	9.6	199	417	368
M7 LG	33.4	340	715	631
M7 HG	6.4	215	532	457
M8	5.4	74	321	221
M9	6	83	297	227
M10	7.3	342	673	586
M11	1	90	199	22*
I1	22	119	225	214
I2	25	150	286	264
I3	7.3	6	180	149

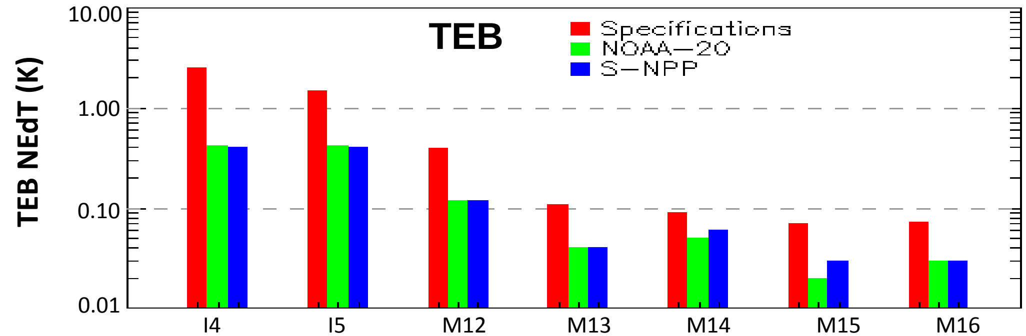
Band	T_typ	NEDT Spec	NOAA-20 (on-orbit)	S-NPP (on-orbit)
M12	270	0.396	0.12	0.12
M13	300	0.107	0.04	0.04
M14	270	0.091	0.05	0.06
M15	300	0.07	0.02	0.03
M16	300	0.072	0.03	0.03
I4	270	2.5	0.42	0.4
I5	210	1.5	0.42	0.4

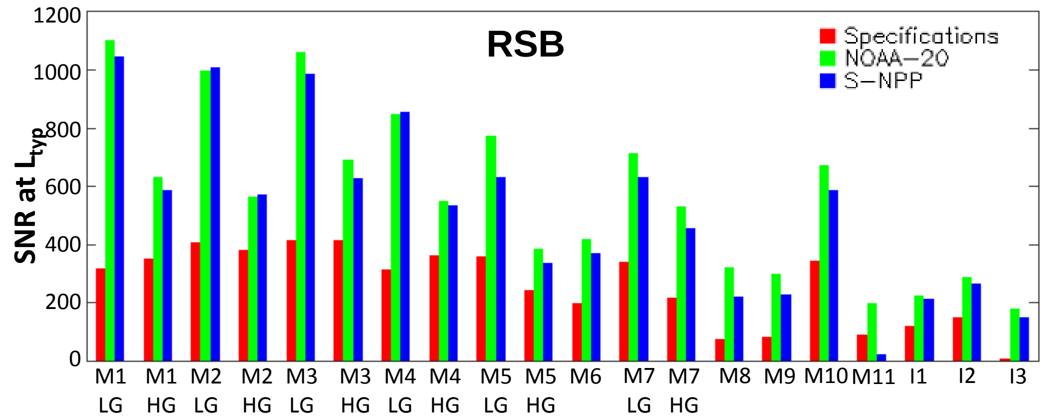
Band	L_min	SNR Spec	NOAA-20 (on-orbit)	S-NPP (on-orbit)
DNB**	3	6	>10	>10

* For S-NPP M11, L_{typ} = 0.12 W/m^2-sr-µm

** On-orbit SNR of DNB at L_{min} was evaluated by using the DNB OBC-BB data



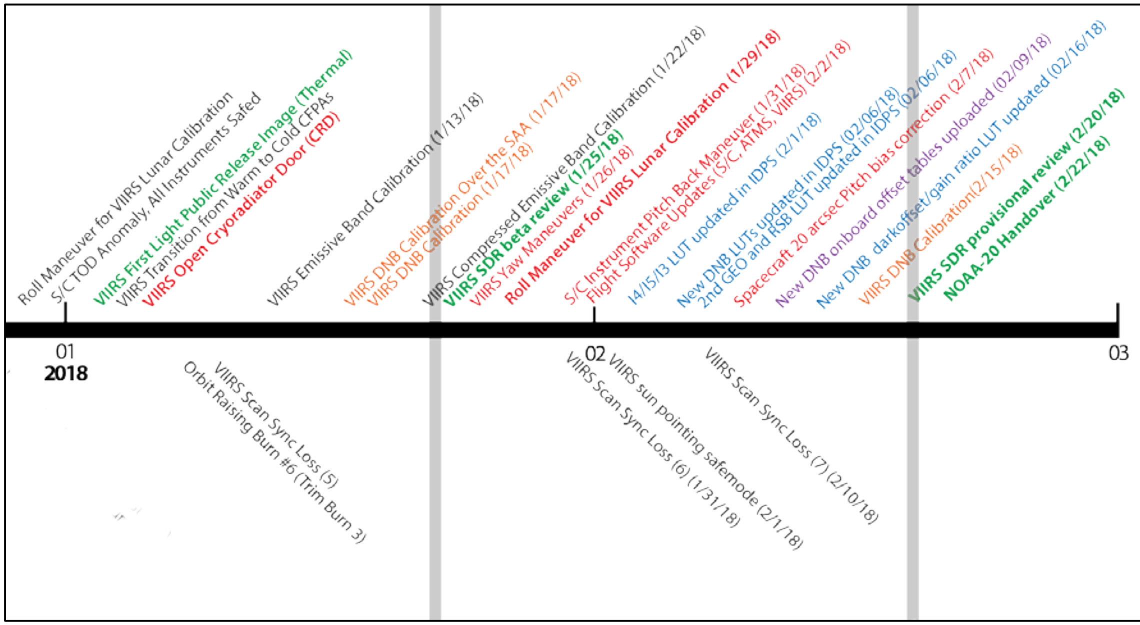




All channel noise performance meet specification, comparable to SNPP (I3 bad detector excluded)

Findings/Issues from Beta Review

- I-3 band has a noisy low response detector which is causing striping. This is somewhat expected prelaunch but it is not as good as predicted. Additional cal/val work may improve the performance but not dramatically. The detector maybe considered in-operable.
- Initial geolocation error can be up to a few kilometers depending on the scan angle. An updated on-orbit mounting matrix was delivered and went in the operations on January 5, 2018 which significantly reduced the geolocation errors down to within one pixel level.
- An unexpected intense straylight is found in the extended view portion of the DNB. Developing straylight correction will be challenging, although this new feature may allow us to better trace the source of straylights.
- Occasional sync loss between the RTA and HAM, which persisted for Suomi NPP VIIRS and was supposed to have been fixed for NOAA-20, still exists
- I4/I5 were not producing images consistently due to lower than expected instrument component temperatures.

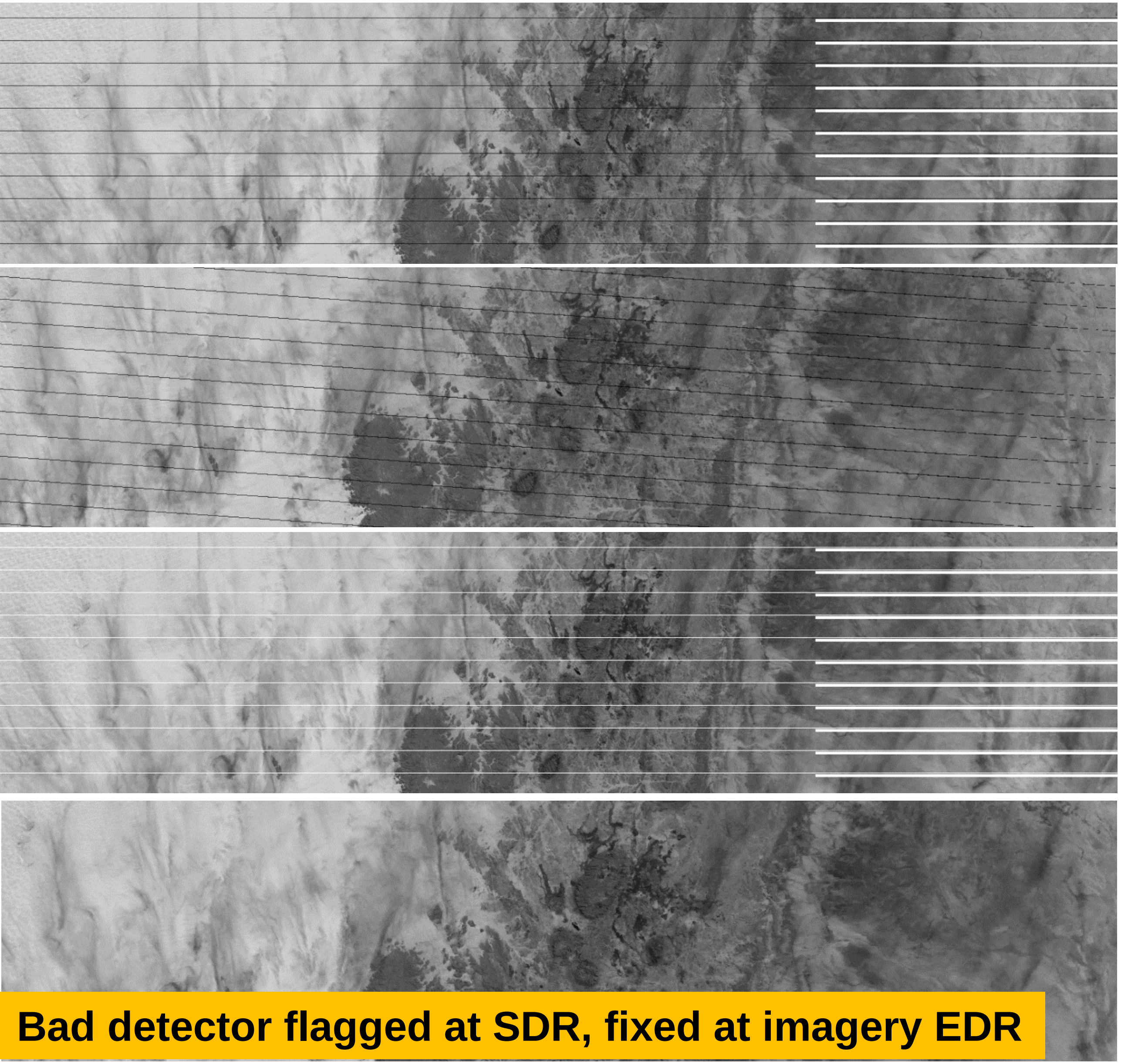


Improvements since Beta Review

- Four SDR LUTs updated on February 1, 2018 (starting with the 15:38 UTC granule)
  - Enabled uninterrupted production of VIIRS SDR for **bands I4 and I5**
  - Flagged **I3 detector #29** as inoperable to replace its measurements with fill values
- Eight SDR LUTs updated on February 6, 2018 (starting with the 14:15 UTC granule)
  - Improved **DNB image quality and radiometric calibration** (e.g., reduced striping)
  - Corrected **DNB stray light artifacts** that occur near the terminators
  - Improved radiometric calibration for the **SWIR bands (I3 and M8 to M11)**
  - Further reduced **geolocation uncertainty to below 200 m** and removed scan-angle dependence of geolocation errors
- Four **DNB onboard tables uploaded to the NOAA-20 spacecraft** on February 9, 2018
  - Derived from the VIIRS data collected during the pitch maneuver to avoid contamination from the airglow
  - Two corresponding, updated DNB LUTs submitted for deployment in IDPS February 16, 2018

All “fixable” issues identified during the Beta review are fixed with the 16 LUT updates, although further improvements are needed towards validated maturity

NOAA-20 VIIRS I-3 Bad Detector Mitigation



Bad detector flagged at SDR, fixed at imagery EDR

Inoperable detector (#29) in band I3:

- **IDPS SDR** before the QA LUT update: det. #29 not flagged

Bow-Tie Deletion

- **IDPS Imagery EDR** before the QA LUT update

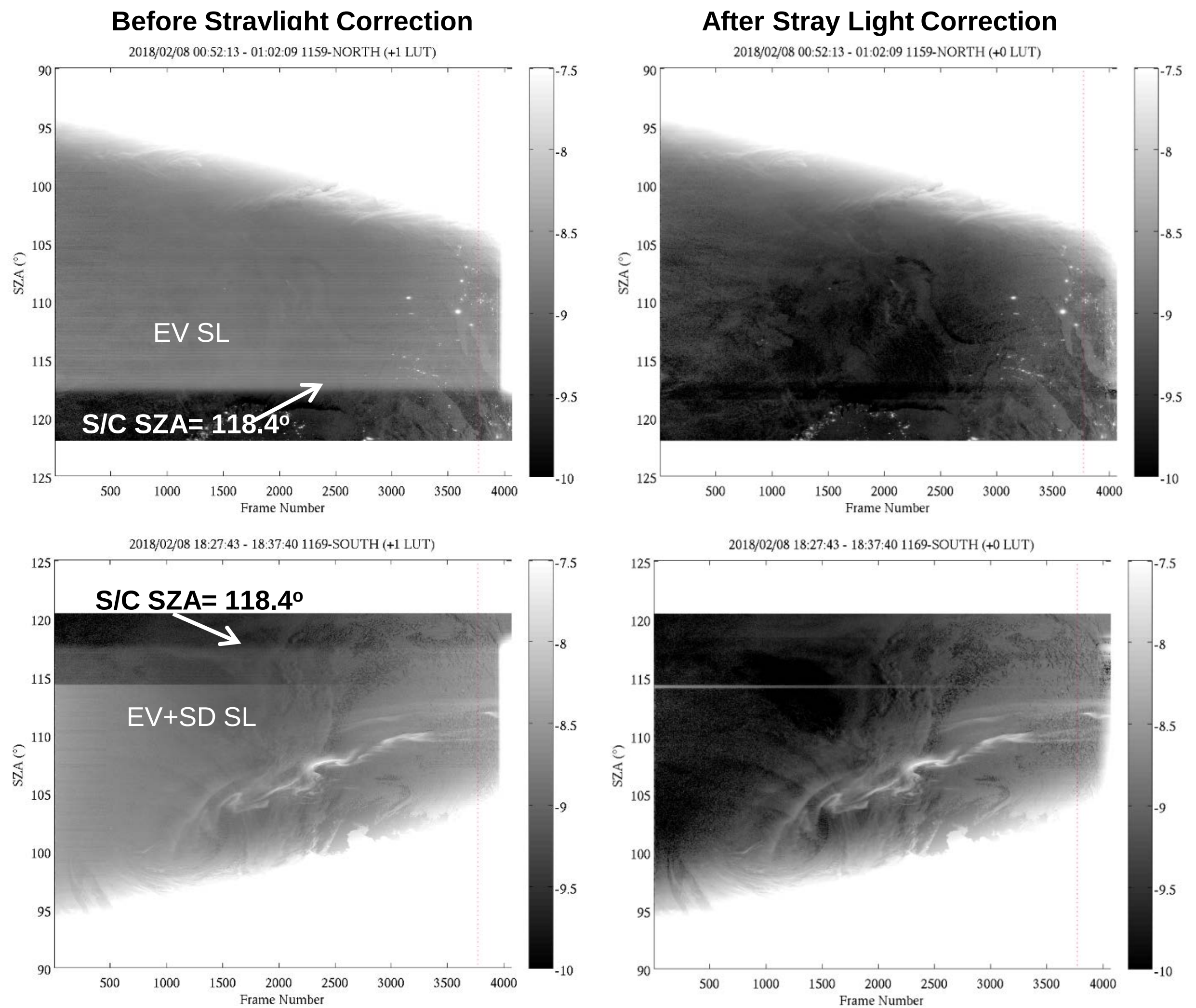
- **ADL SDR** with the updated QA LUT: det. #29 flagged (data replaced with fill values)

- **ADL Imagery EDR** after the QA LUT update: missing data replaced during re-projection

VIIRS granule acquired on 2018-01-07 at 12:24 UTC

NOAA-20 VIIRS DNB Stray Light

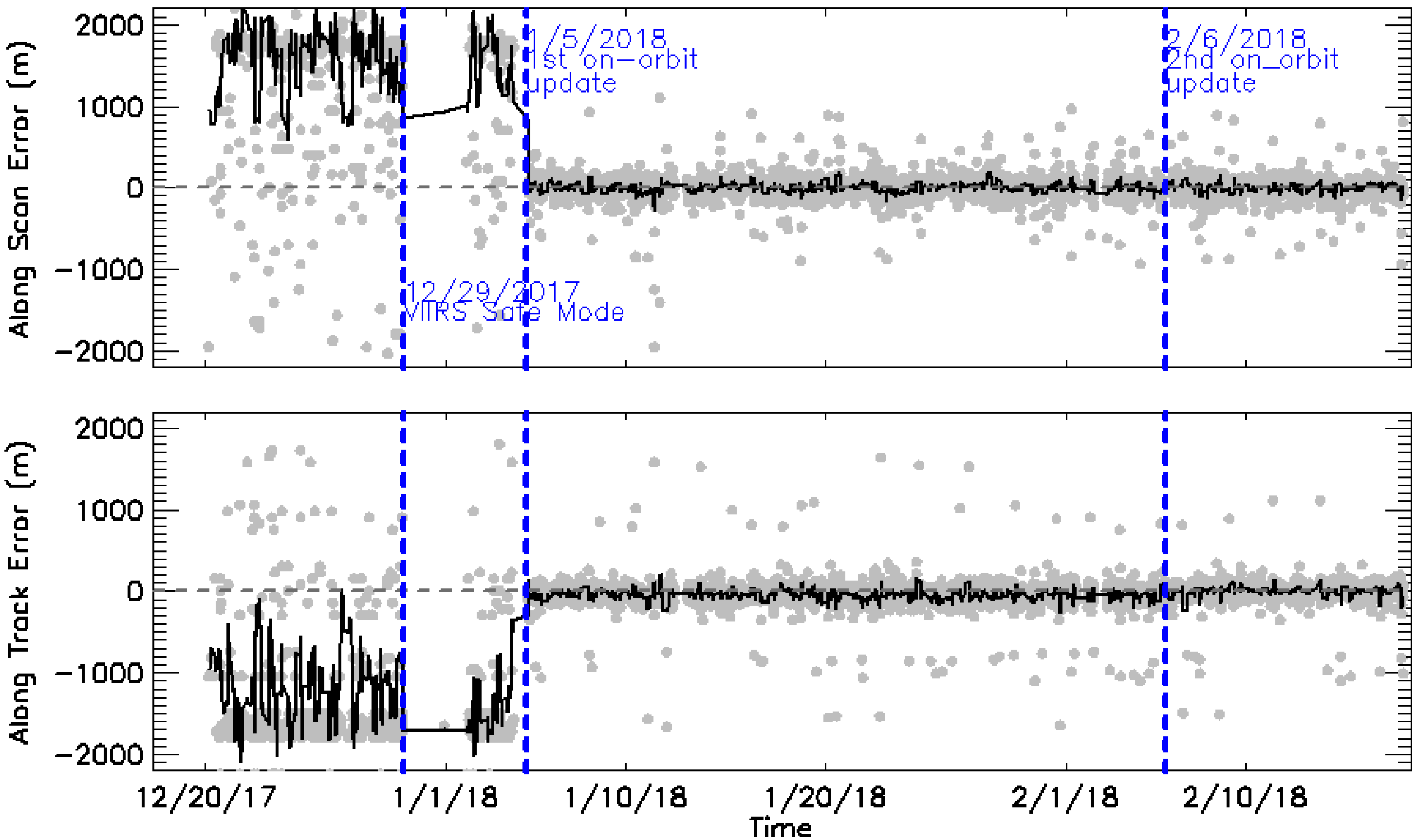
- Overall stray light pattern is similar to SNPP DNB with additional strong stray light (as large as ~10^{-7} W/cm^2-sr) in the extended zone
- Modified the NOAA/STAR DNB stray light correction code to extend the correction into the extended zone
- First stray light correction LUT was developed using new moon data around Jan. 17, 2018 and in operation at IDPS since Feb. 6, 2018 (Orbit #1139) . Routine monthly stray light correction LUT will be prepared over the 12-month period.



Initial straylight correction implemented, further refinements needed month by month

Significant Improvement in Geolocation Accuracy

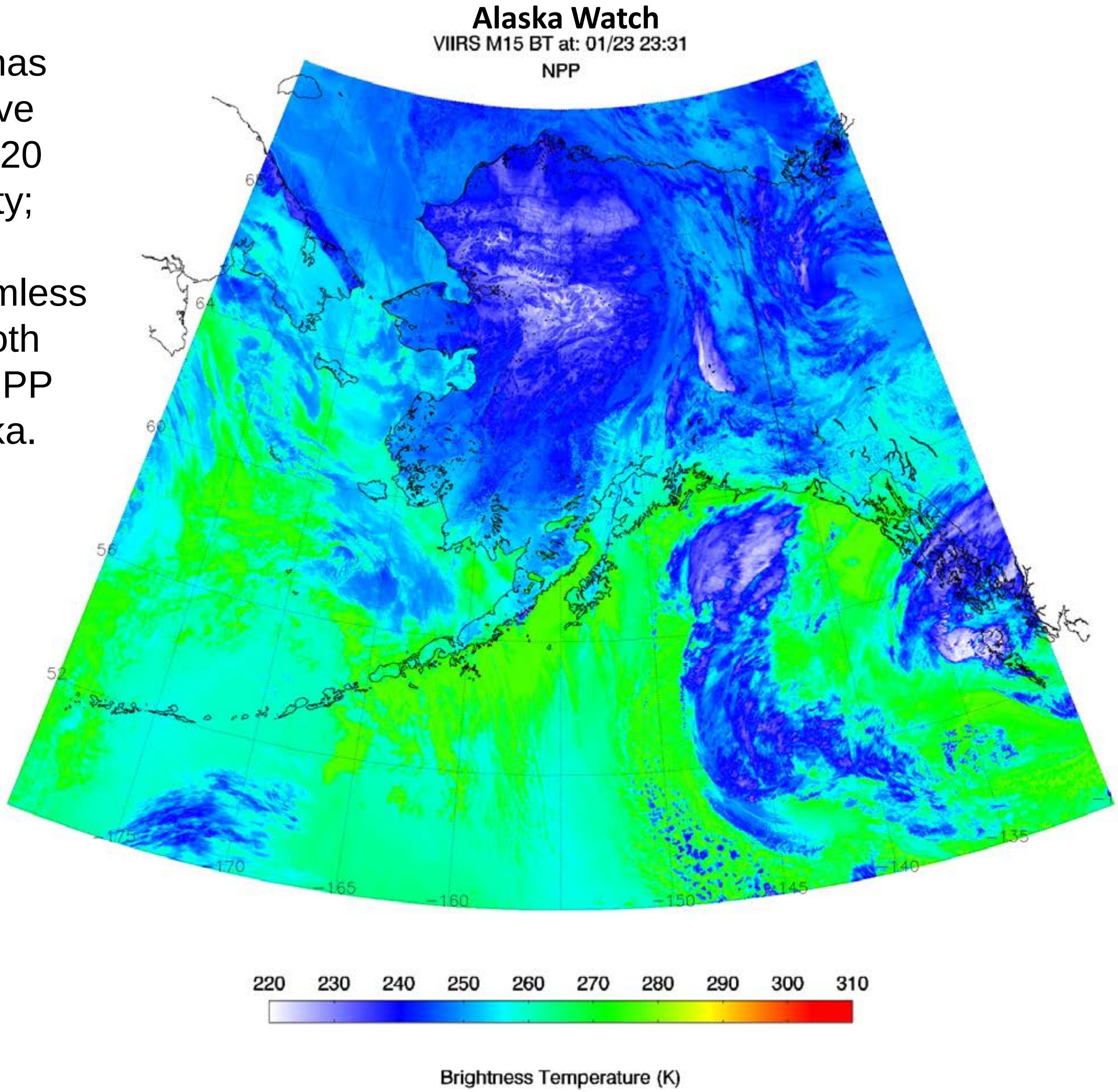
Geolocation errors for the I-bands and the M-bands were greatly reduced by the update of the instrument mounting matrix in the three GEO LUTs:



Geolocation errors for DNB were additionally reduced by the update of the detector position parameters in the DNB GEO LUT

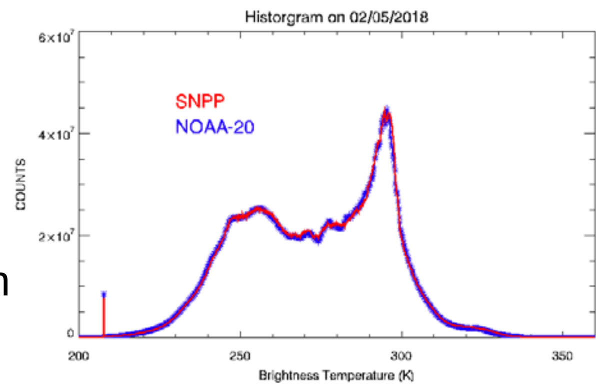
NOAA-20 Image Quality Assessment

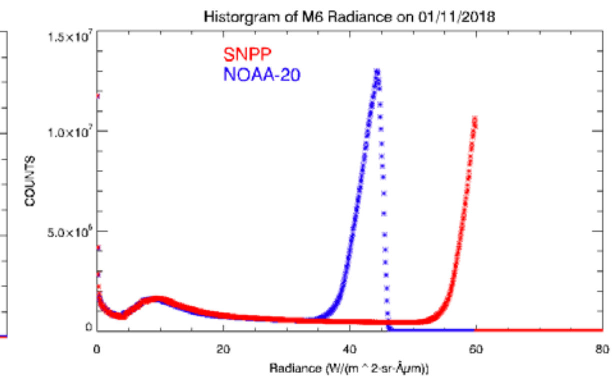
- VIIRS SDR team has performed extensive analysis of NOAA-20 VIIRS image quality;
- Figure shows seamless animation using both NOAA-20 and S-NPP M15 data for Alaska.

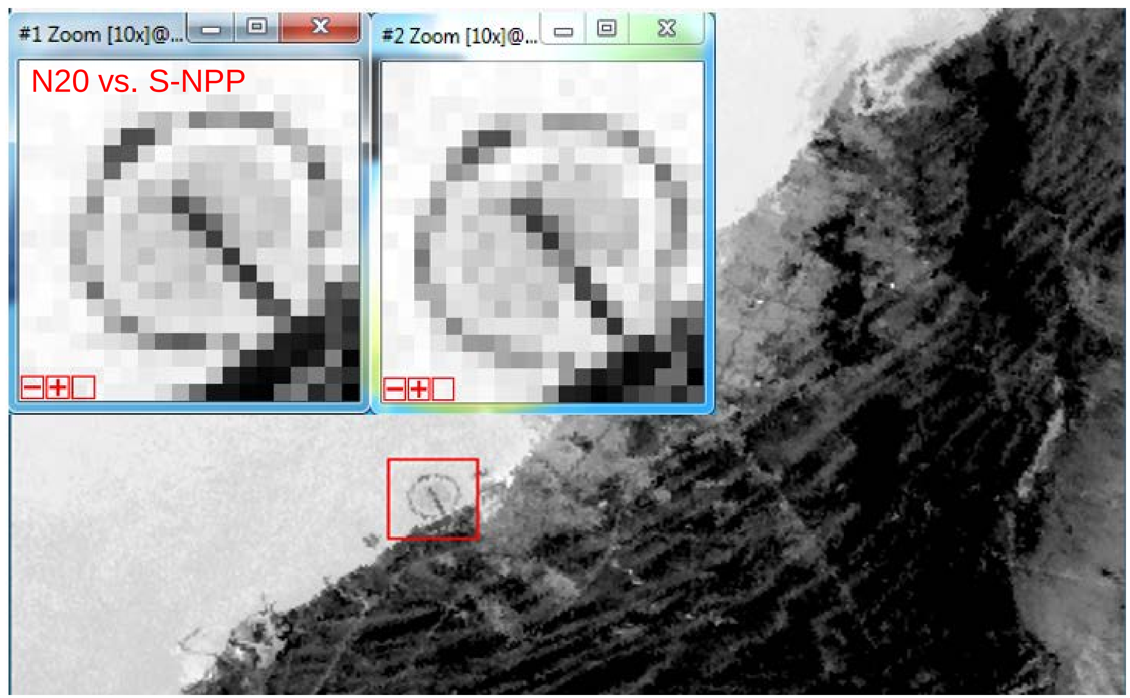


Radiometric and Image Quality Evaluation

- VIIRS channels on NOAA-20 are compared to those of Suomi NPP to characterize radiometric performance with a number of methods;
- The PDF (Probability Distribution Function) method uses one day of global data to generate histograms of occurrences at different radiometric levels;
- Top figures shows excellent agreement for I-4, while M6 saturates at much lower radiances on NOAA-20, which will require further study and mitigation;
- Bottom figure shows image quality of TEB I-4 over Dubai area, with high spatial resolution comparable to that of S-NPP.



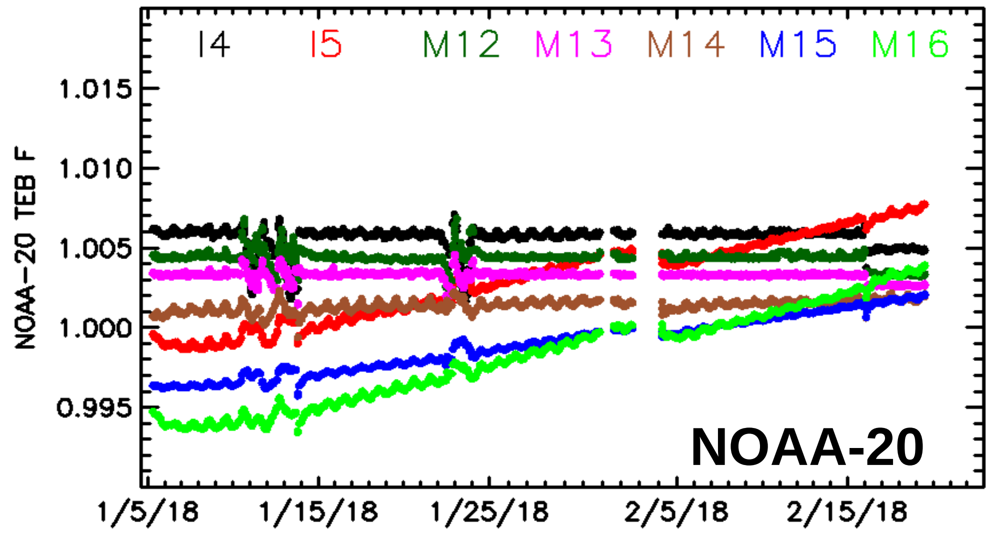


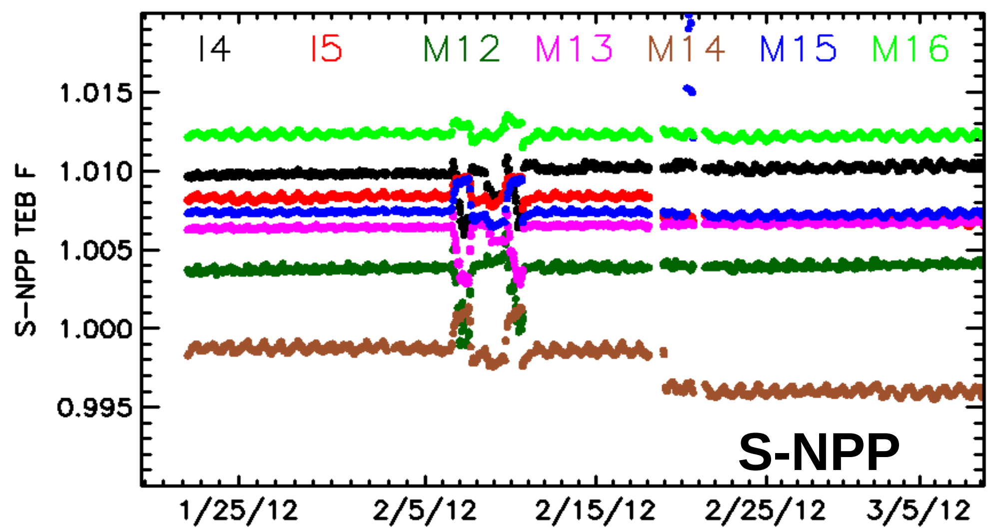


I-4 Sample Image over Dubai area

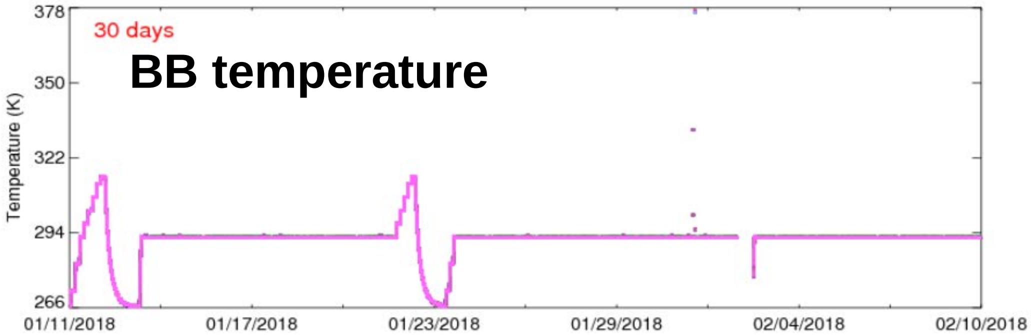
NOAA-20 VIIRS LWIR Responsivity Degradation

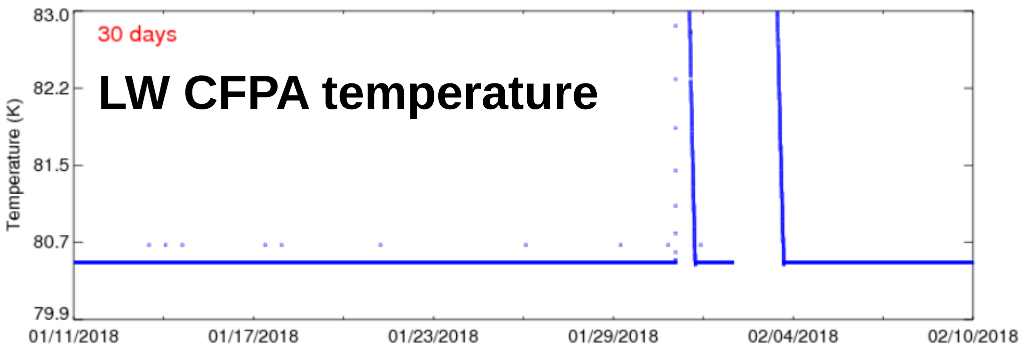
- I4, M12-M14 F-factors are generally stable
- But larger than expected responsivity degradations were observed in LWIR bands I5, M15-M16
  - I5: ~0.14%/week
  - M15: ~0.09%/week
  - M16: ~0.15%/week
  - Detector dependent
  - Require further monitoring and analysis
- S-NPP: no obvious degradation during similar period
  - Except for the F-factor changes in I5 after the Feb 18, 2012 petulant mode

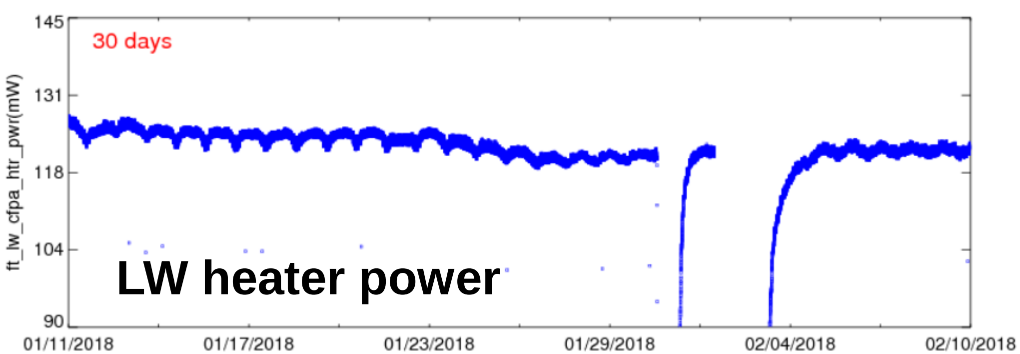




NOAA-20 TEB Performance



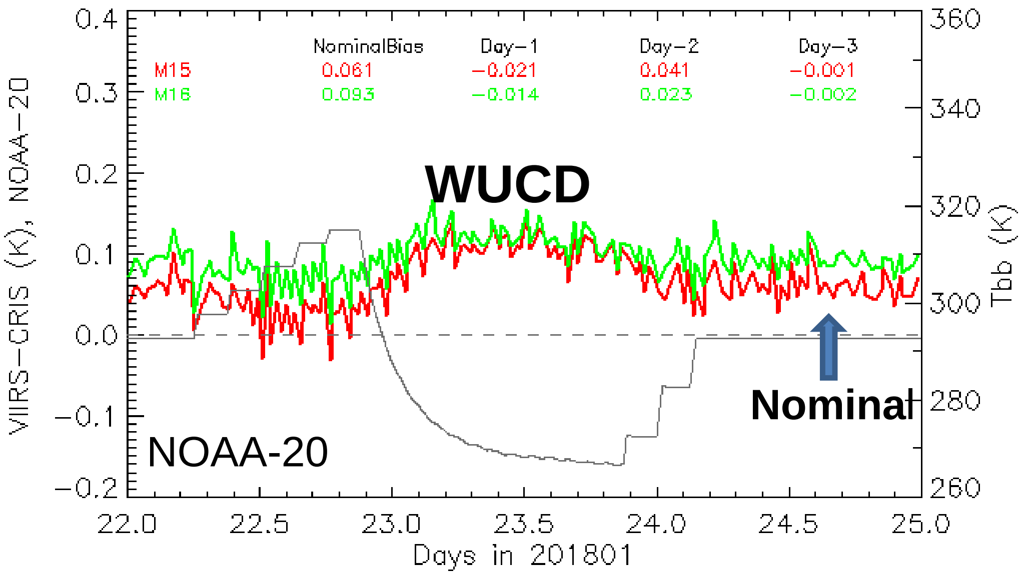


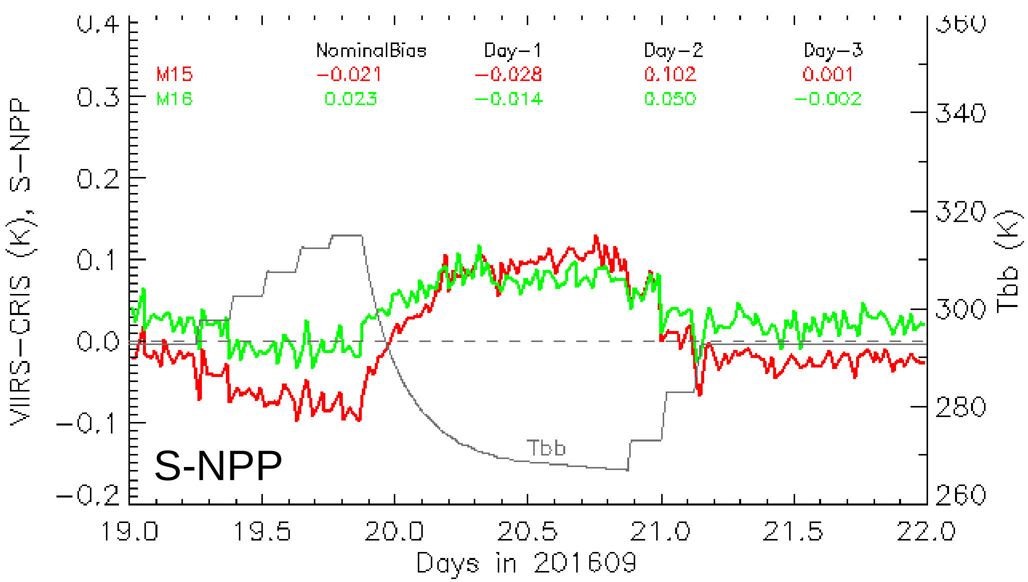


- Blackbody temperatures are stable during nominal operations (uniformity: 30 mK), similar to S-NPP
- Cold focal plane temperatures are also stable and similar to S-NPP
- LW heater power: ~ 120 mW, better than expected

TEB Comparison with CrIS

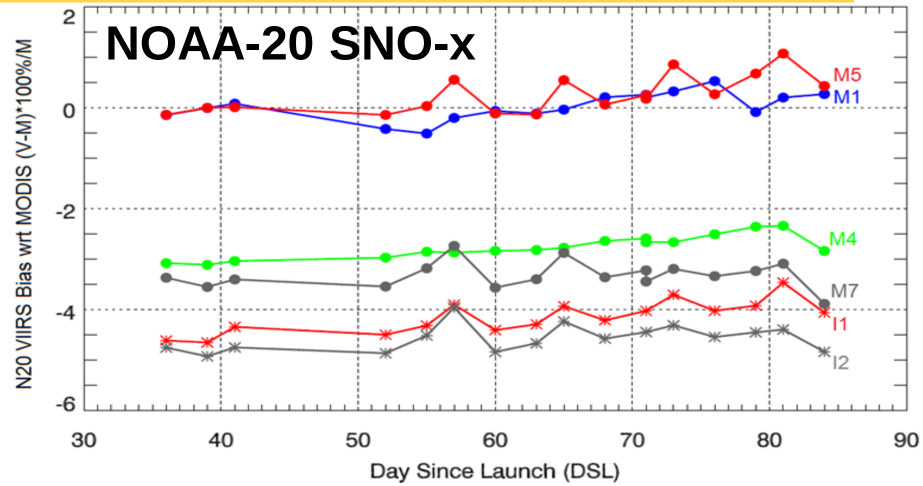
- VIIRS TEB and CrIS show good agreements in bands M13, M15-M16, and I5 during nominal operations (on the order of 0.1 K)
- NOAA-20 SST bands WUCD biases are smaller than S-NPP
- NOAA-20 VIIRS-CrIS M15 shows similar scene temperature dependent biases as S-NPP, But cold bias is slightly larger, will be further studied

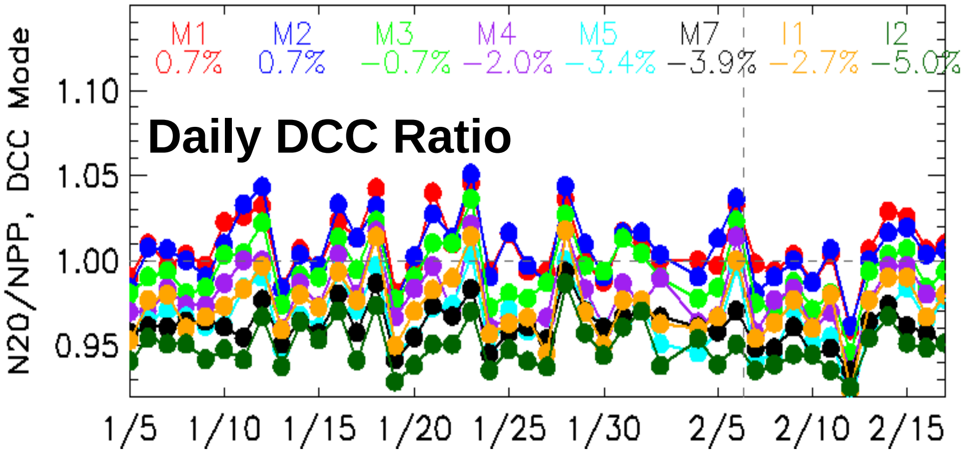




NOAA-20 VIIRS RSB VIS/NIR Comparison with S-NPP

- **NOAA-20 and S-NPP VIIRS RSBs radiometric consistency were characterized using:**
  1. Double differencing with MODIS Aqua over SNOs
  2. Daily Deep Convective Clouds (DCC) reflectance ratio
- **M1-M3 are generally consistent**
- **M5&M7 are ~3% lower than S-NPP, but consistent with Cloud and Aerosol EDR teams' suggestions that S-NPP M5&M7 radiances are too high by ~3%**

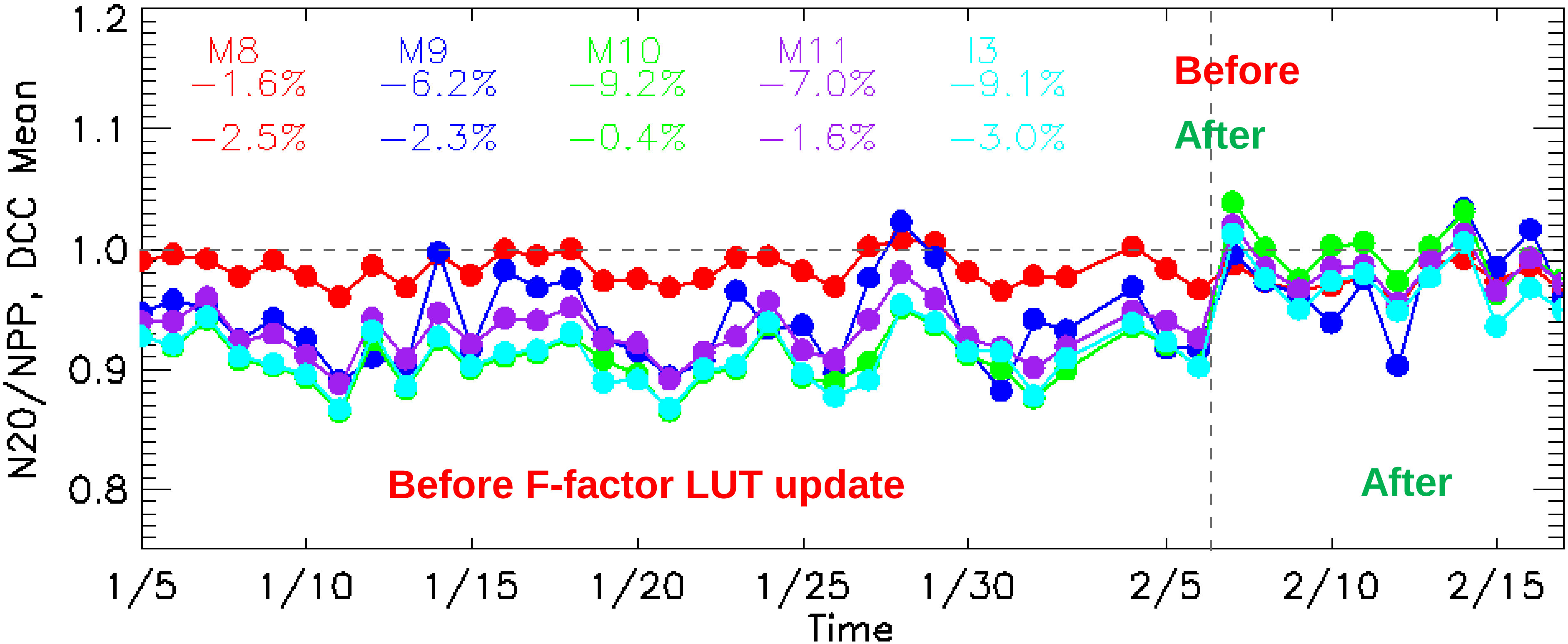




N20-NPP (%)	M1	M2	M3	M4	M5	M7	I1	I2
X-SNO	1.3			-2.2	-3.2	-4.1	-2.1	-5.1
Daily DCC	0.7	0.7	-0.7	-2.0	-3.4	-3.9	-2.7	-5.0

NOAA-20 RSB SWIR bands comparison to S-NPP

- After on-orbit F-factor LUT update (on Feb 6, 2018), differences between NOAA-20 and S-NPP radiances in M9-M11 were significantly reduced (from up to 9 % → 3% or less)



Error Budget (1 slide)

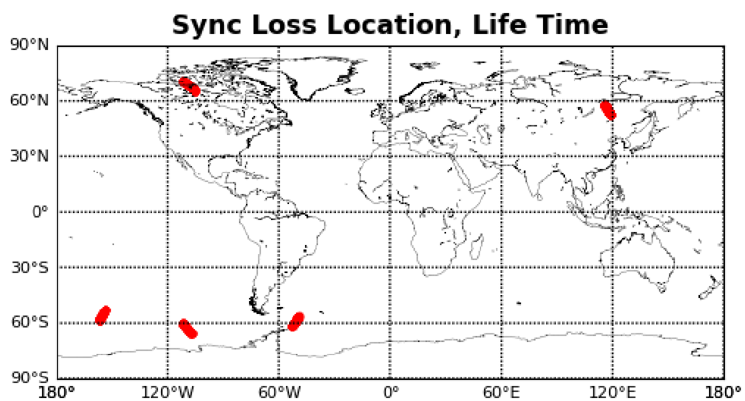
Compare analysis/validation results against requirements, present as a table. Error budget limitations should be explained. Describe prospects for overcoming error budget limitations with future improvement of the algorithm, test data, and error analysis methodology.

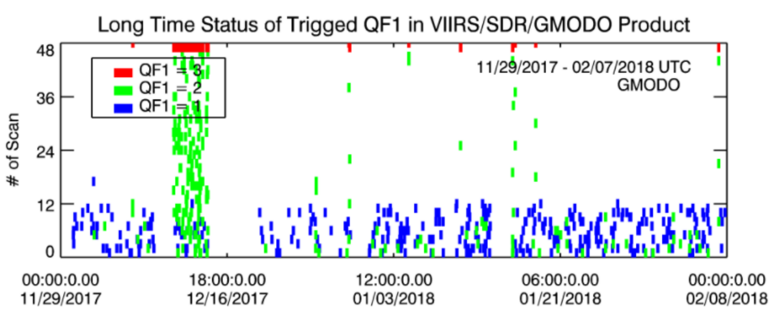
Attribute Analyzed	L1RD Threshold	Pre-Launch Performance	On-orbit Performance	Meet Requirement?	Additional Comments
RSB Bias	2%	2%	Most bands within 2% compared to SNPP VIIRS	Exceptions: M5 and M7 (I2)	A known issue based on previous study on SNPP VIIRS. Requires further cal/val
TEB Bias	0.1K @ OBCBB	0.1K	<0.1K compared to CrIS during nominal operations	Yes.	Bias up to 0.1K observed. May require operationalization of the WUCD correction algorithm
DNB Bias	5-10% (LGS) 10-30% (MGS) 30-100% (HGS)	4.4-6.5% (LGS) 7.6-9.0% (MGS) 10.5-54.2%(HGS)	5% compared to SNPP DNB (LGS)	Yes.	HGS/MGS require further assessment

Note: DNB L1RD threshold and prelaunch performance are for aggregation modes 1-21 and given at 3 gain stages, at 0.5 *Lmax and low radiance for LGS, at high and low radiance levels for MGS and HGS.

Quality flag analysis/validation (ICVS)

- Major VIIRS SDR and its Geolocation Quality Flags are monitored on ICVS for NOAA-20.
  - SDR QF1 at pixel level
  - SDR QF2 at scan level
  - Geolocation QF1
  - The QF for all M, I and DNB bands are monitored
  - Other QFs are currently underway.
- The ICVS monitoring result showed NOAA-20 are generally stable and comparable to SNPP
- However, similar to S-NPP, RTA/HAM sync loss anomalies and some geolocation outliers were observed





Items	S-NPP	NOAA-20
HAM/RTA Sync Loss Events	12/16/2017, 17:17:51-17:19:24 12/20/2017, 12:24:16-12:25:45. 01/04/2018, 06:48:37-06:50:10	12/01/2017, 04:44:43-04:46:23 12/06/2017, 03:49:27-03:51:07 12/13/2017, 19:07:17-19:08:57 12/13/2017, 21:52:17-21:53:52 01/07/2018, 18:39:43-18:41:22 01/31/2018, 10:53:35-10:55:13 02/10/2018, 21:20:22-21:22:00
Geolocation TLE Outliers	12/05/2017(30), 12/08/2017(7), 12/19/2017(41), 01/11/2018 (22), 01/16/2018 (28)	12/06/2017(4), 12/09/2017(356) , 12/10/2017(346) , 12/11/2017(247) , 12/12/2017(111), 12/13/2017(162), 12/14/2017(25), 01/05/2018 (4), 01/10/2018 (27) , 01/16/2018(25) , 01/18/2018(5), 02/07/2018(5)

Waivers and Status

J1 Waivers	Description	Status
DNB Non-linearity	High nonlinearity in radiometric response especially at edge of scan	Verified, prelaunch code change works correctly for Op21
DNB Stray Light	When VIIRS itself is sunlit and DNB is viewing night side of the earth	1st DNB stray light correction LUT has been developed and deployed in IDPS. Requires monthly update of LUT for one full year cycle.
Crosstalk	Dominated by static electrical crosstalk	No impact based on study by VCST team
Dynamic Range	M5LG, **M8**, M9, M10, M11, I1, **I3**, and I4 saturation; DNB	M6 is out of spec which requires mitigation; further study on other bands
Polarization Sensitivity	Linear polarization sensitivity (M1-M4)	To be studied after provisional review
SWIR non-linearity and uncertainty	SWIR M-bands at low radiance	To be studied after provisional review
Emissive band radiometric calibration	RRU: M12, M13(HG), & M14 RRCU: M12 & I5	To be studied after provisional review
Spatial Resolution-DFOV	Smaller DFOV due to normal sensor-to sensor build variability	Minimal impact
Spatial Resolution -MTF	M1-M7/M13	Minimal impact
Near Field Response (NFR)	M7, M13, M16A; I3	Minimal impact
Relative Spectral Response (RSR)	Mainly in several SWIR&LWIR bandpass/center wavelength	Minimal impact
Band-to-Band Registration (BBR)	Dominated by in-track registration; I-bands	Minimal impact

User and Downstream Product Feedback

Name	Organization	Application	User Feedback - User readiness dates for ingest of data and bringing data to operations
Andy Heidinger	STAR/UW	Cloud Mask	Stay tuned for next few talks
Menghua Wang	STAR	Ocean Color	
Alex Ignantov	STAR	SST	
Ivan Cisiszar	STAR	Fire	
Don Hillger	STAR/CIRA	Imagery	Imagery session
Eric Steven	Alaska/GINA	Operational user	Imagery session

Documentations (Check List, 1 slide)

Science Maturity Check List	Yes ?
ReadMe for Data Product Users	Yes
Algorithm Theoretical Basis Document (ATBD)	Yes
Algorithm Calibration/Validation Plan	Yes
(External/Internal) Users Manual	Needs update on DNB
System Maintenance Manual (for ESPC products)	OAD available
Peer Reviewed Publications (Demonstrates algorithm is independently reviewed)	Yes (SNPP) Coming (NOAA-20)
Regular Validation Reports (at least. annually) (Demonstrates long-term performance of the algorithm)	At annual meetings

Conclusion (1 slide)

- Cal/Val results summary:
  SDR algorithm performance is similar to S-NPP VIIRS
  - NOAA-20 VIIRS DNB unique **aggregation mode 21** works well as implemented;
  - Operational algorithm is performing well with updated LUTs;
  - Continued **fast track LUT** update provided by STAR is necessary to ensure SDR data quality;
  - Issues addressed
    - DNB aggregation mode change
    - I-3 bad detector flagged
    - LUT updates (instrument temperature related, geolocation, radiometric accuracy, DNB, etc)
    - A 20-arcsec pitch bias of the N20 spacecraft was removed (timing adjustment not planned)
- Caveats
  - Saturation in M6 and other bands
  - SDSM uncertainty which may affect stability of RSB calibration
  - Radiometric biases in some bands (M5, M7, M9)
  - Geolocation error due to 0.1s timing was corrected using alternative method (pitch error)
  - I5, M15, M16 LWIR degradation requires close monitoring
- Team recommends VIIRS SDR provisional maturity (after LWIR diagnoses completed)

Path Forward (slide 1)

Planned improvements and future Cal/Val activities / milestones

1. Continued monthly Lunar calibration

   Algorithm correction for TEB during lunar intrusion.

2. Continued DNB straylight LUT development:
   - Require monthly update of DNB straylight correction LUT;
   - 1st LUT already delivered, 11 LUTs (month by month) will be developed during the first year on orbit
3. Saturation and "Roll-over" in band M6 (and other bands) below the required maximum radiance level resulting in large number of pixels with incorrect measurements above the level of 30-35 radiance units (Lmax = 41 r.u.): ADR created. Mitigation: study impacts to users and options to correct after provisional maturity.
4. SDSM uncertainty reduction
   - Mitigation and path forward: 1) extensive calibration/validation with vicarious sources, Lunar, Deep Convective Clouds.; 2) Consider additional yaw maneuvers
5. LWIR monitoring

   WUCD

   - Re-evaluate WUCD reduction
   - WUCD algorithm implementation in operations
6. I-3 bad detector correction at SDR algorithm level requires further impact study, working with users.

Path Forward (slide 2)

7. Continued vicarious monitoring using DCC, cal/val sites, and geolocation
8. Reprocess three months of missing data on Gravite
9. Possible field campaign: VIIRS DNB SI traceable calibration in collaboration with SDSU and USGS calibration center. Leverage light source developed under NOAA SBIR; Buy in from NASA GSFC (Miguel Roman); Other field campaigns?
10. Large (on the order of 10%) difference between prelaunch and on-orbit radiometric calibration of reflective solar bands: updated F factors to mitigate but root cause unknown. Recommendations to flight: investigate uncertainties of prelaunch calibration
11. RTA/HAM sync losses: Recommendation to flight: Closely monitor progression; Recommendation to flight: investigate root cause and fix for future models;
12. Other issues and path forward (to be studied towards calibrated/validation maturity)
    - Polarization on-orbit characterization and impact studies
    - SWIR band nonlinearity study
    - Uncorrected, residual non-uniformity of the RSB radiometric response, especially between HAM sides (creates low-magnitude striping in imagery): root cause requires further study
    - Differences in RSB radiometric calibration between low-gain and high-gain: to be further investigated (may be causing anomalies in observed gain transitions)
    - Difference in radiometric response of band I5 sub-samples: may add noise and/or striping (needs to be investigated)
    - Continuing F factor changes for some thermal emissive bands; additional changes during WUCD tests

VIIRS Science Team will continue providing operational cal/val support;

Backup slides

JPSS Data Products Maturity Definition

JPSS/GOES-R Data Product Validation Maturity Stages – COMMON DEFINITIONS (Nominal Mission)

1. Beta

- Product is minimally validated, and may still contain significant identified and unidentified errors.
- Information/data from validation efforts can be used to make initial qualitative or very limited quantitative assessments regarding product fitness-for-purpose.
- Documentation of product performance and identified product performance anomalies, including recommended remediation strategies, exists.

2. Provisional

- Product performance has been demonstrated through analysis of a large, but still limited (i.e., not necessarily globally or seasonally representative) number of independent measurements obtained from selected locations, time periods, or field campaign efforts.
- Product analyses are sufficient for qualitative, and limited quantitative, determination of product fitness-for-purpose.
- Documentation of product performance, testing involving product fixes, identified product performance anomalies, including recommended remediation strategies, exists.
- Product is recommended for potential operational use (user decision) and in scientific publications after consulting product status documents.

3. Validated

- Product performance has been demonstrated over a large and wide range of representative conditions (i.e., global, seasonal).
- Comprehensive documentation of product performance exists that includes all known product anomalies and their recommended remediation strategies for a full range of retrieval conditions and severity level.
- Product analyses are sufficient for full qualitative and quantitative determination of product fitness-for-purpose.
- Product is ready for operational use based on documented validation findings and user feedback.
- Product validation, quality assurance, and algorithm stewardship continue through the lifetime of the instrument.

Provisional Maturity Review - Entry Criteria

- Product Requirements
- Pre-launch Performance Matrix/Waivers
- Provisional Maturity Performance Validation
  - On-orbit instrument performance assessment
    - Identify all of the instrument and product characteristics you have verified/validated as individual bullets
    - Identify pre-launch concerns/waivers, mitigation and evaluation attempts with on-orbit data
- Users/EDRs feedback
- Risks, Actions, Mitigations
  - Potential issues, concerns
- Path forward to Validated Maturity
- Summary

Provisional Maturity Review - Exit Criteria

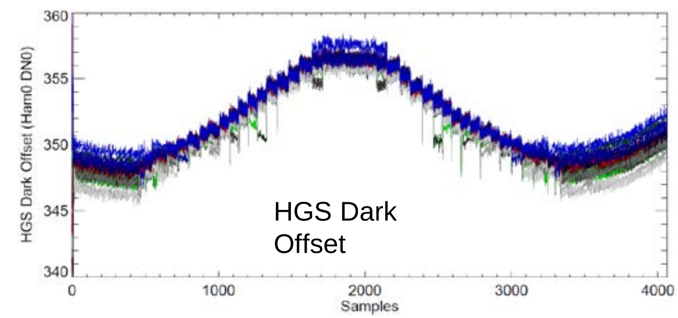
- Provisional Maturity Performance is well characterized and meets/exceeds the requirements:
  - On-orbit instrument performance assessment
    - Provide summary for each identified instrument and product characteristic you have validated/verified as part of the entry criteria
    - Provide summary of pre-launch concerns/waivers mitigations/evaluation and address whether any of them are still a concern that raises any risk.
- Updated Provisional Maturity Slide Package addressing review committee's comments for:
  - Cal/Val Plan and Schedules
  - Product Requirements
  - Provisional Maturity Performance
  - Risks, Actions, Mitigations
  - Path forward to Validated Maturity

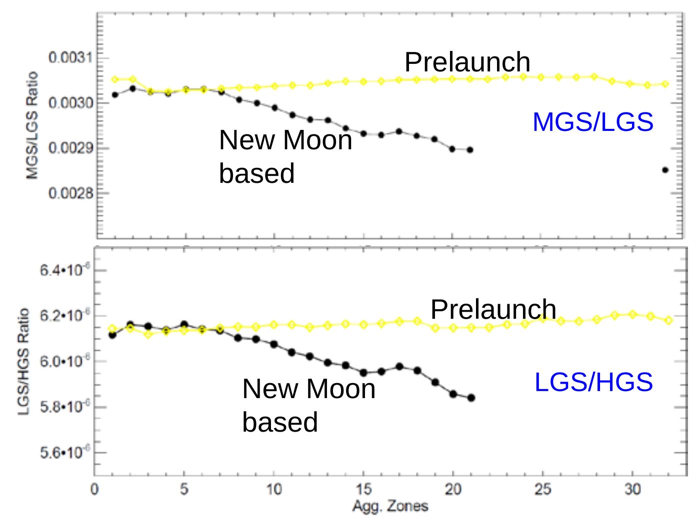
SDR Algorithm Performance Summary Highlights

- **Operational SDR algorithm performance**
  - Operational algorithm works well overall, except two separate LUT updates became essential for SDR production (one emergency update for RSB; the other for TEB I-band) due to lower than expected instrument temperature;
  - VIIRS DNB aggregation mode 21 algorithm change works well as implemented and delivered by STAR (NOAA-20 unique feature);
  - Geolocation accuracy significantly improved after mounting matrix update on 2/5/18;
  - I-3 bad detector mitigated with fill values which allowed correction for imagery EDR.
- **Remaining issues that have operational significance**
  - **Fast track LUT update for RSB:** due to larger than expected SDSM uncertainties, offline analysis (instead of RSBautocal) will be used near term;
  - **DNB straylight correction LUT**: monthly update of the LUT is needed. The LUTs are being developed at STAR;
  - **Timing issue**: 0.1-second difference between spacecraft attitude and ephemeris times will be resolved soon, which will impact all instrument geolocation and requires LUT updates;
  - **Algorithm updates** may be needed in the future:
    - WUCD correction (has been tested offline)
    - M6 saturation (requires additional studies)
  - **Sync loss** between RTA and HAM not resolved for NOAA-20.
- **Future PLTs needed:**
  - Possible additional yaw maneuver to reduce SDSM uncertainties;
  - Reduce WUCD events to once per year from quarterly;
  - Monthly lunar maneuver and DNB dark offset collect.

1st DNB LUT Update in IDPS using Monthly Cal. Data over Pacific Ocean

- Successfully generated VIIRS DNB dark offset and gain ratio LUTs based on measurements during new moon (01/17/2018).
- 1st update in operational IDPS SDR product happened on Feb 06, 2018.
- New moon based LUTs significantly improves the DNB image quality.





DNB Offset Tables using Pitch Maneuver based Deep Space View Data

- Pitch Maneuver based Deepa Space data collected on January 31, 2018.
- 4 Onboard Offset tables extracted for HGA, HGB, MGS and LGS.
  - To be uploaded into the instrument soon.
- 3 Dark Offset tables extracted for HGS, MGS and LGS are free of airglow.
  - To be updated into IDPS.
- After onboard offset is uploaded, the dark offset values for HGS is set to prelaunch target values ± <0.5 DN.