VALIDATED MATURITY REVIEW MATERIAL

NOAA-20 OMPS SDR Report

STAR OMPS SDR Team

With contributions from NOAA STAR ICVS Team, OMPS EDR Team and NASA OMPS Instrument Group

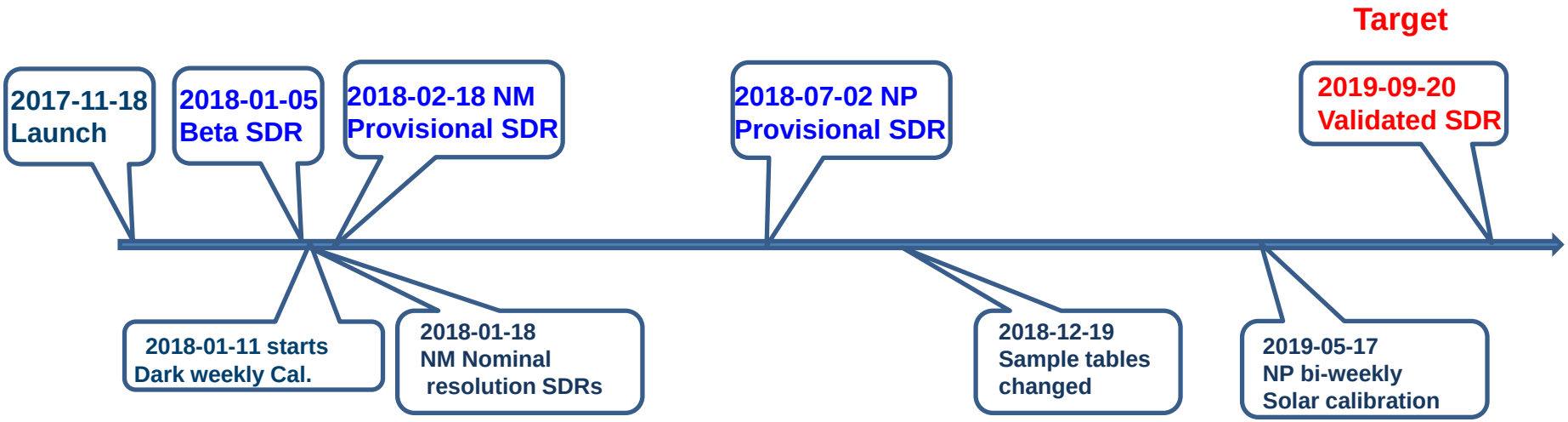
Outline

- Algorithm Cal/Val Team Members
- Product Requirements
- Achievement Highlights since Provisional Review
  - Evaluation of SDR calibration parameters in meeting specifications and requirements
  - SDR data quality validations
  - Issues, Actions and Mitigations
- Downstream Product Feedback (separate presentation by Larry)
- Documentations (Science Maturity Check List)
- Summary and Conclusions
- Path Forward

OMPS SDR Team

Team Member	Organization	Primary Roles
Banghua Yan	NOAA/STAR	Instrument scientist. Budget and coordination; instrument and product cal/val science, performance monitoring, SDR algorithm, SDR operation
Trevor Beck	NOAA/STAR	SDR algorithm and code development
Chunhui Pan	NOAA/STAR	NOAA Technical Lead; OMPS SDR cal/val science, LUTs derivation, TVAC data analysis; SDR algorithm.
Xiaozhen Xiong	NOAA/SSAI	OMPS SDR forward model. ADL offline test and LUTs delivery
Eve-Marie Devaliere	ProTech/GST?	Maintaining weekly dark auto run and delivery

Operational SDR Milestones



NP SDR Requirements

Requirement: L1RDS-2541

Budget Term	Requirement/Allocation
Wavelength range	250-310
Horizontal cell size	≤ 50 km @ nadir
Horizontal coverage	≥2800 km
SNR radiance@50x50km^2	varies with wavelength λ
Irradiance uncertainty	< 7%
wavelength λ calibration	<0.01 nm
intra-orbital wavelength variation	<0.01 nm
OOB/OOF Stray Light	< 2%
Radiance uncertainty	< 8%
λ-indpendent albedo calibration	<2%
Geolocation Error	≤ 5 km

Wavelength nm	SNR
250 - 273.6	7
273.6 - 283.1	20
283.1 -287.7	40
287.7-292	52
292-310	80

NM SDR Requirements

Requirement: L1RDS-2293

Budget Term	Requirement/Allocation
Wavelength range	300-380
Horizontal cell size	≤ 50 km @ nadir
Horizontal coverage	≥2800 km
SNR radiance @50x17km^2	≥590
Irradiance uncertainty	< 7%
λ-registration	<0.01 nm
intra-orbital wavelength variation	<0.01 nm
OOB/OOF Stray Light	< 2% (305 – 380 nm)
Radiance uncertainty	< 8%
λ-indpendent albedo calibration	<2%
Geolocation Error	≤ 5 km

Achievement Highlights Since Provisional Review

- Major Accomplishments
  - Completed SDR calibration and validation towards validated maturity
    - New NM and NP sample tables are used for better FOV alignment between two sensors
    - All the nine related LUTs were updated in cooperation with the new sample tables
    - Started bi-weekly routine calibration of NP solar & wavelength
    - Completed additional improvement to respond for EDR team feedback
      - NP wavelength updates, as well as NP wavelength related LUTs modification
    - Discovered and fixed 8 DRs and 3 PCR anomalies
  - Well validated OMPS SDR data quality using the following methods
    - Radiative transfer model simulation for albedo accuracy assessment
    - NOAA-20 and SNPP OMPS NM inter-sensor (SNO) bias analysis using GOME-2 as a transfer (ICVS team contribution)
    - Ray-matching-based spectral inter-comparison methodology for OMPS
    - NOAA and NASA SDR data comparison (ICVS and SDR team joint contribution)
  - Established long term monitoring capability of sensor and product performance via ICVS (ICVS team contribution)

Pre-launch Major Concerns/Waivers Mitigations/Evaluation

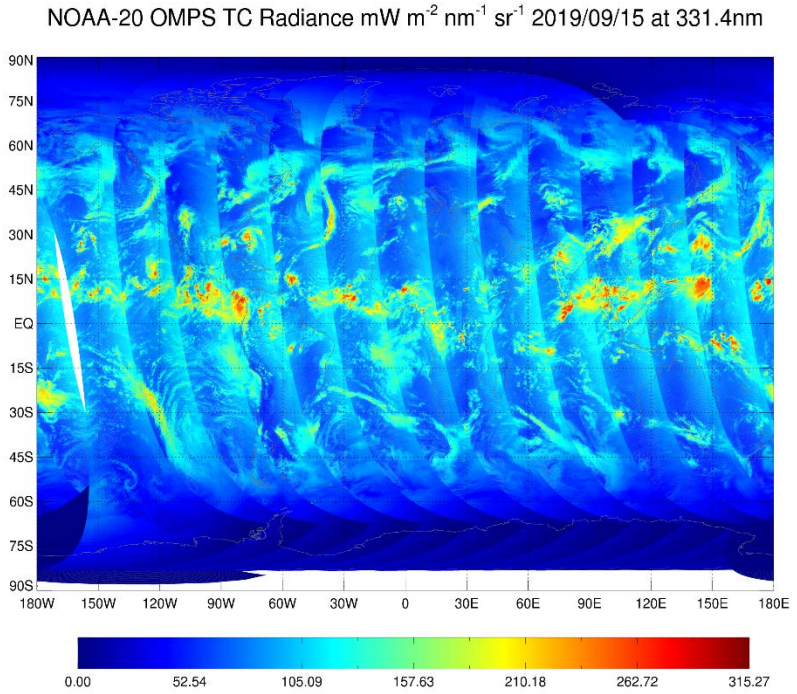
- Waiver 21742-W-215 Nadir Profiler Short Wavelength Throughput Loss

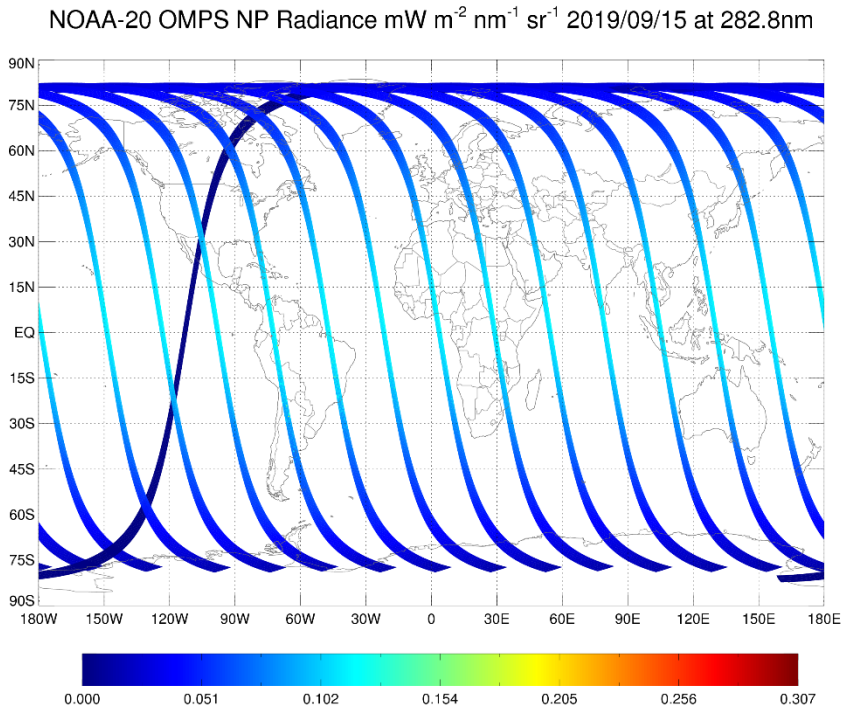
- Waiver against O_PRD-11308 for Nadir Profiler to allow albedo accuracy to be increased from 0.5% to 3% for wavelengths between 250 and 260 nm

  - No evidence of noticeable short wavelength throughput loss. The up to date sensor degradation is approximately less than 1%. We keep monitoring the drift. No concern at this stage

  - New foreign object debris (FOD) was found right after N20 launch in linearity calibration. (the FOD was at approximately [520,85] in reduced CCD frame coordinates, at ~315 nm channel and affects 312.5 nm and/or 317.5 nm). No impact of the FOD on OMPS calibration data as well as Earth view data

OMPS Produces SDRs in Required Dynamic Range

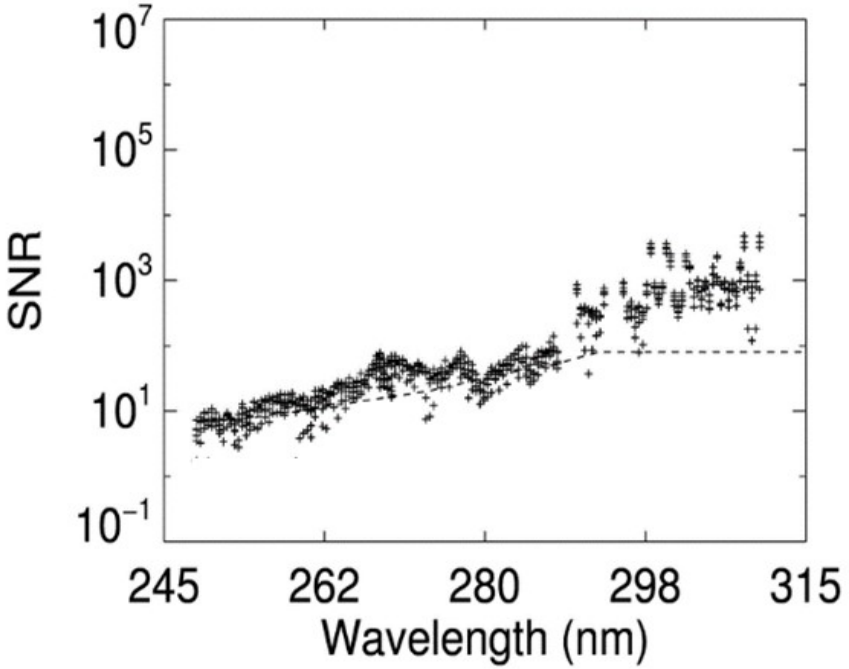




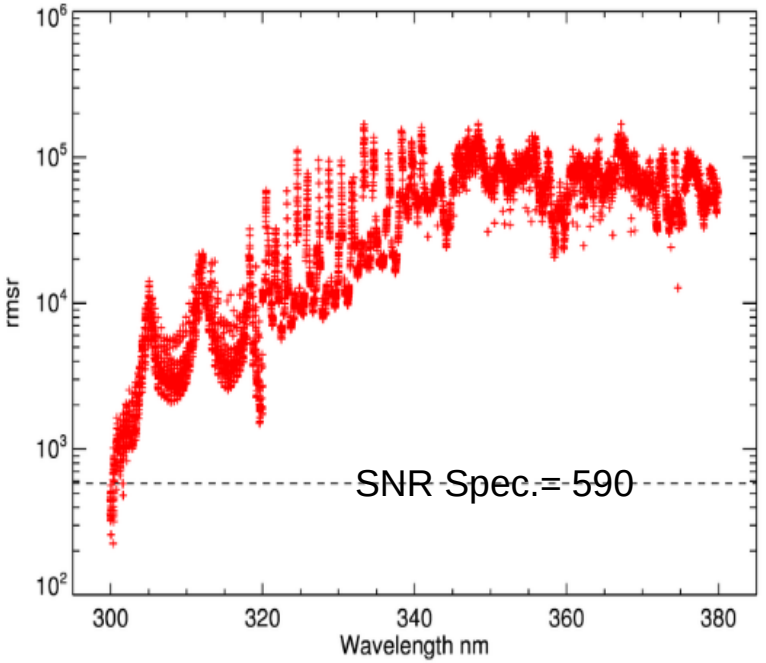
NP radiance and irradiance cover 250 – 310 nm at 50 km x 50 km footprint cross 250 km swath
NM radiance and irradiance cover 300 – 300 nm at 50 km x 17 km footprint cross 2800 km swath

Earth View SNR Meets Requirement

NP 50 km x 50 km



NM 50 km x 17 km



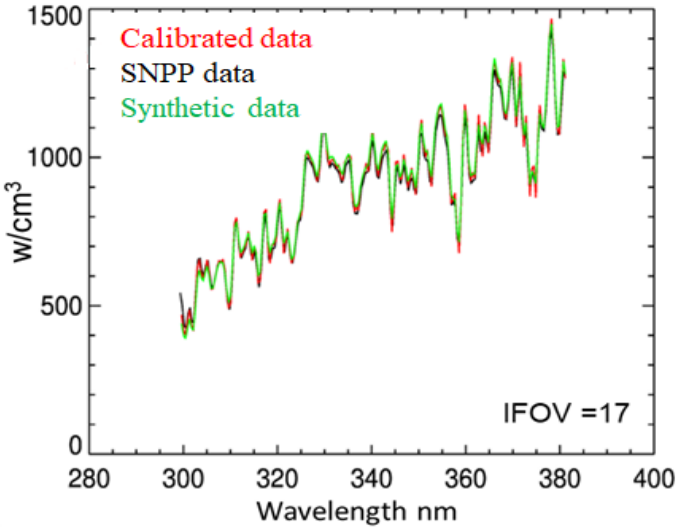
SNR from Earth view meets requirement on average

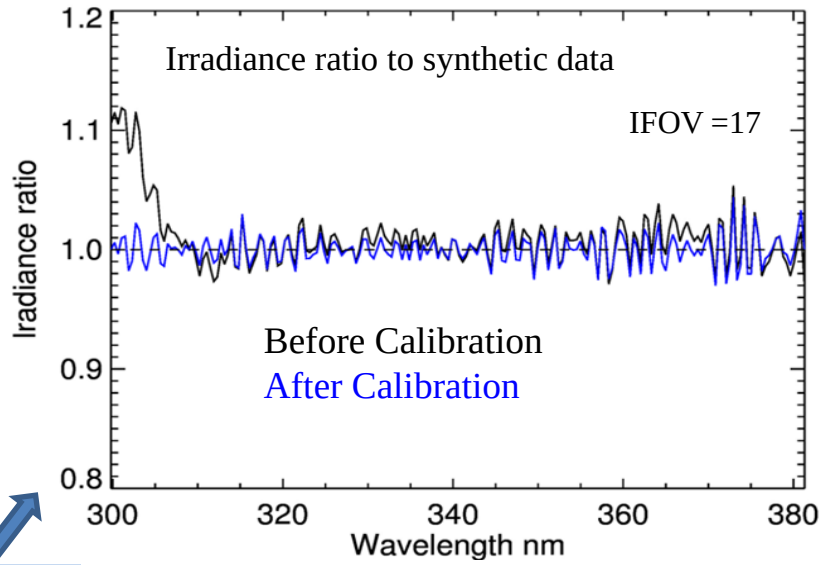
NM short individual wavelength where noise comes from stray light signal.

NP short wavelengths were influenced by high energy transient particles.

NM Day-1 Solar Calibration

NM Solar Flux Comparison

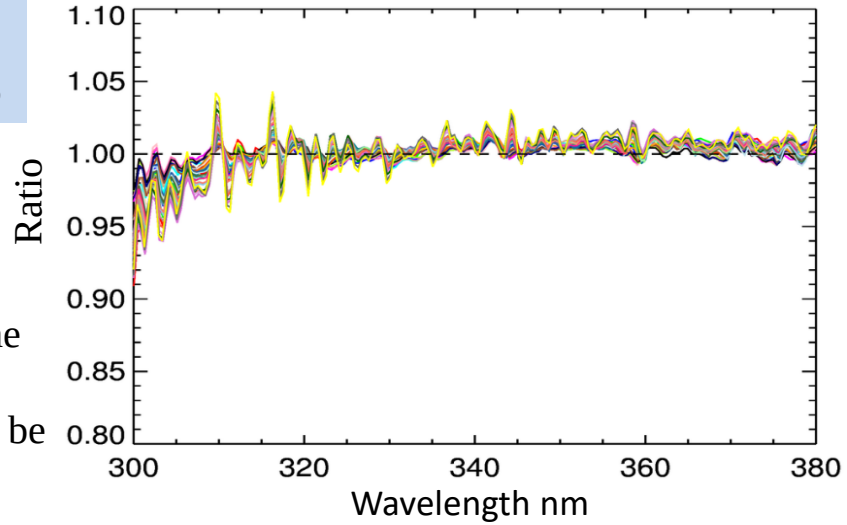




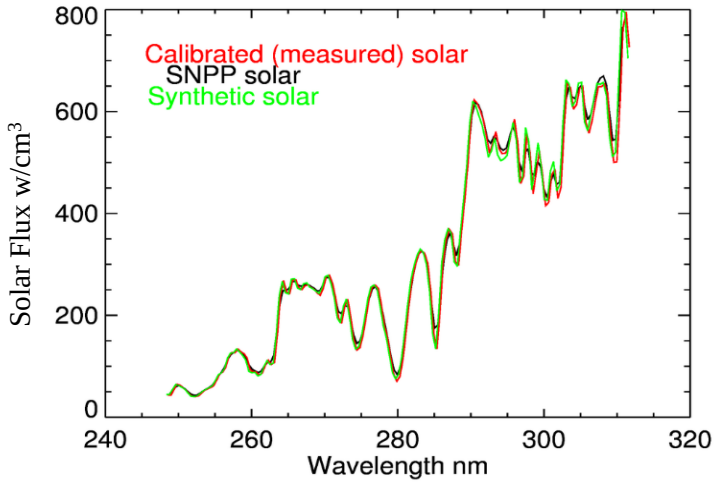
Ratio of calibrated day-1 solar flux to synthetic solar shows an average < 2% uncertainty for most of the channels. Calibrated irradiance meet requirement of <7%

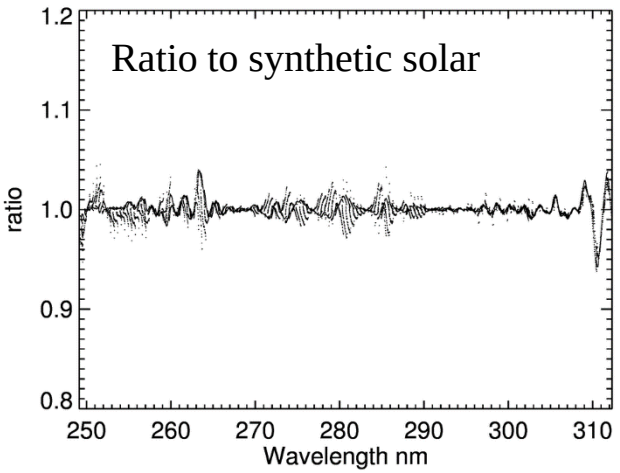
Consistency check with SNPP irradiance

- Less than 2% difference for most of the channels, indicating calibrated wavelengths, solar irradiance and irradiance coefficients are well calibrated for most of the wavelength.
- Noticeable discrepancy found in short wavelengths can be minimized.



NP Solar Day-1 Calibration

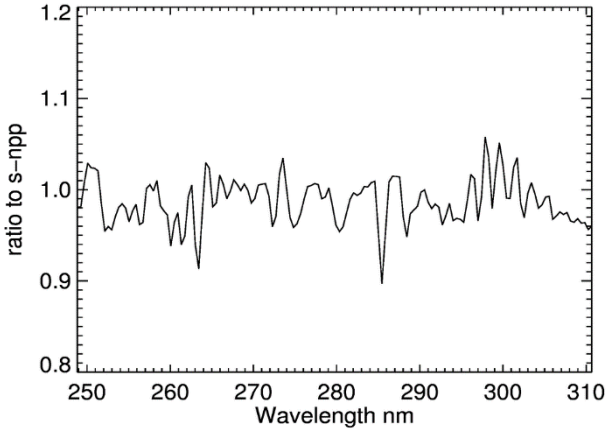




- Ratio of calibrated solar flux to synthetic solar indicates irradiance calibration uncertainty less than 1-2% for most of the channels. All channels meet requirement of <7%
- For most channels wavelengths calibration <0.01 nm

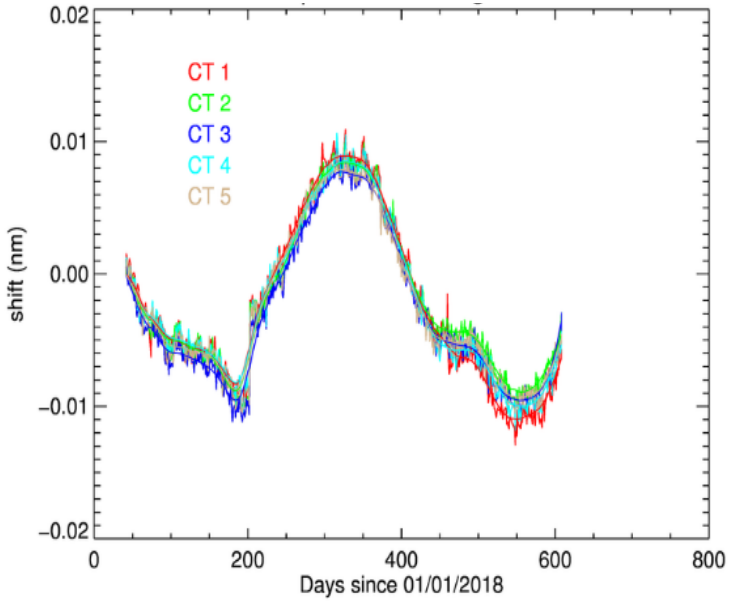
Consistency check with SNPP irradiance

- Slightly large deviation in a few wavelength channels can be minimized via a calibration update.

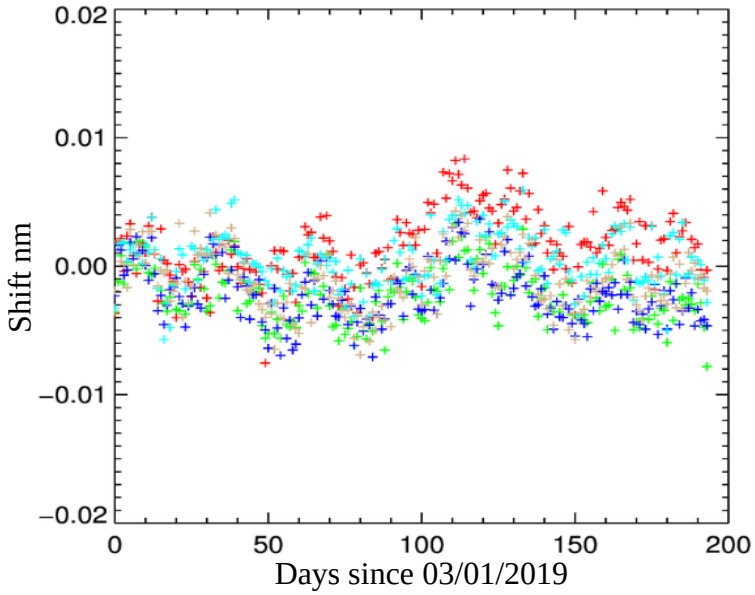


NP Annual Wavelength Calibration Meets Requirement

Wavelength Annual Pattern

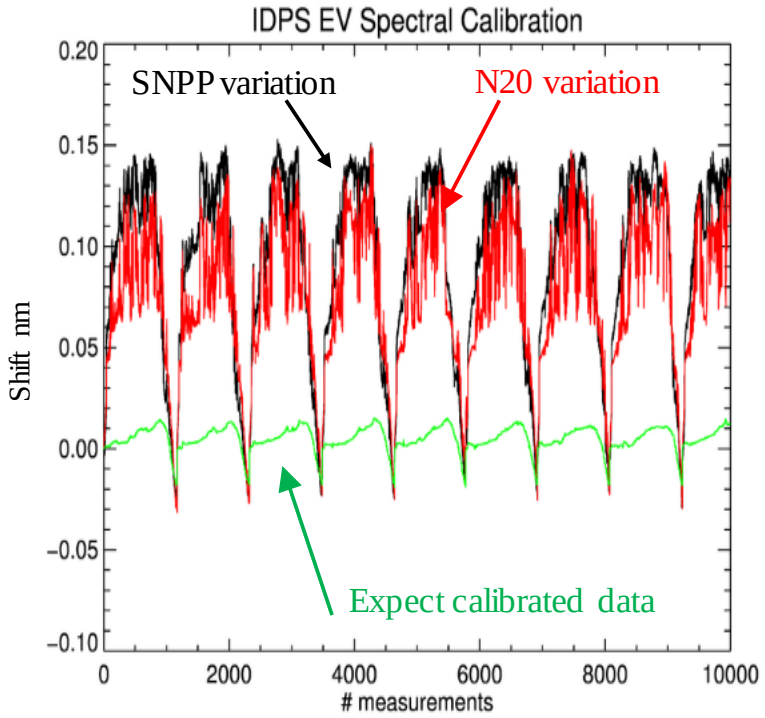


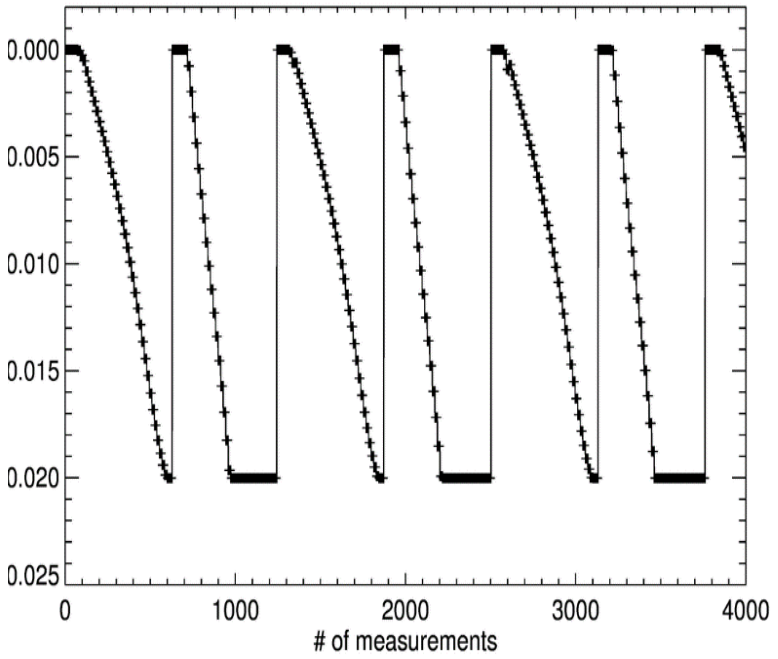
Calibration Error



Bi-weekly routine wavelength calibration meets 0.01 nm requirement

NM Intra-orbit Wavelength Variation Exceeds Requirement



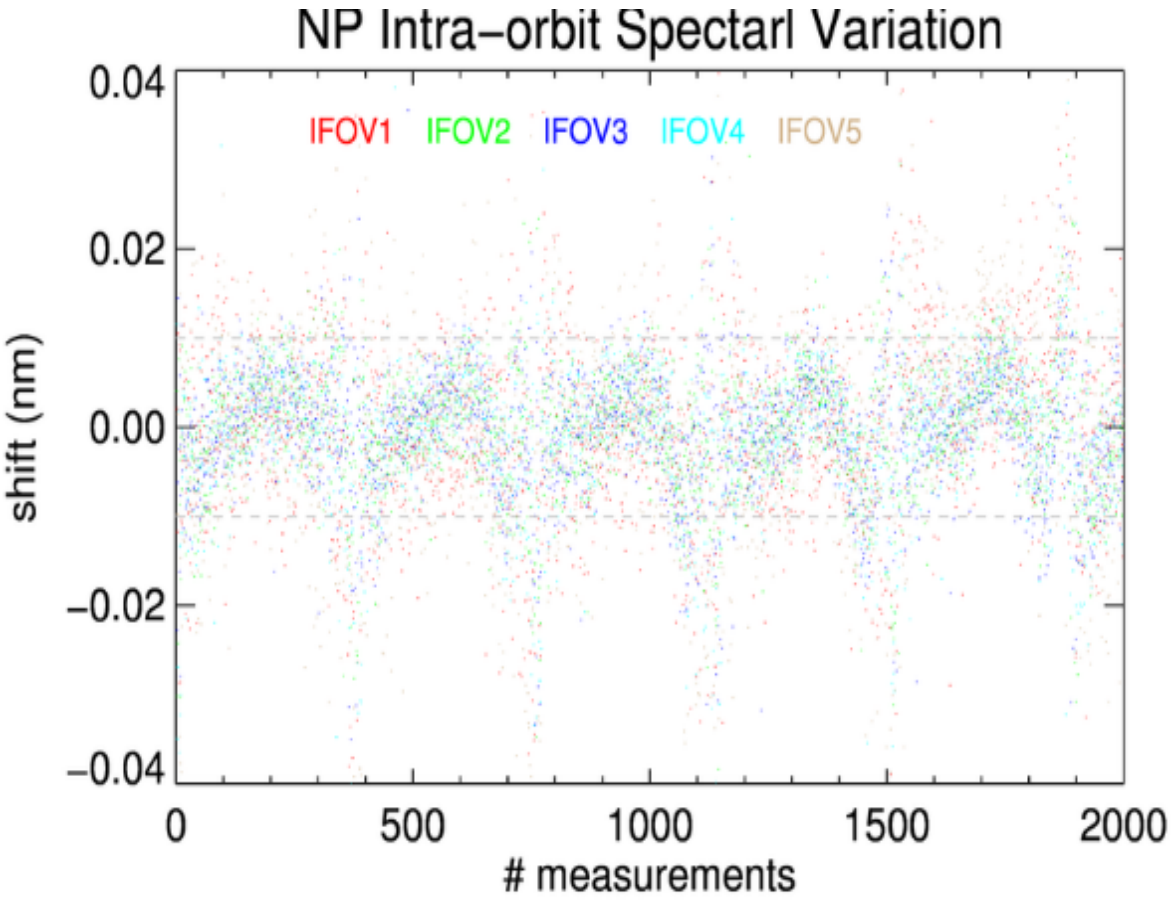


N20 has slightly small variation than S-NPP

After April, wavelength flag was accidently turned off, causing intra-orbit variation exceeds 0.01 nm requirement

DR9094 – Incorrect flag set in NOAA-20 OMPS-TC Wavelength table.
Will be fixed with DR9093/CCR19-4638 delivered to DPES 9/3/19.

NP Intra-orbit Wavelength Change Meets Requirement

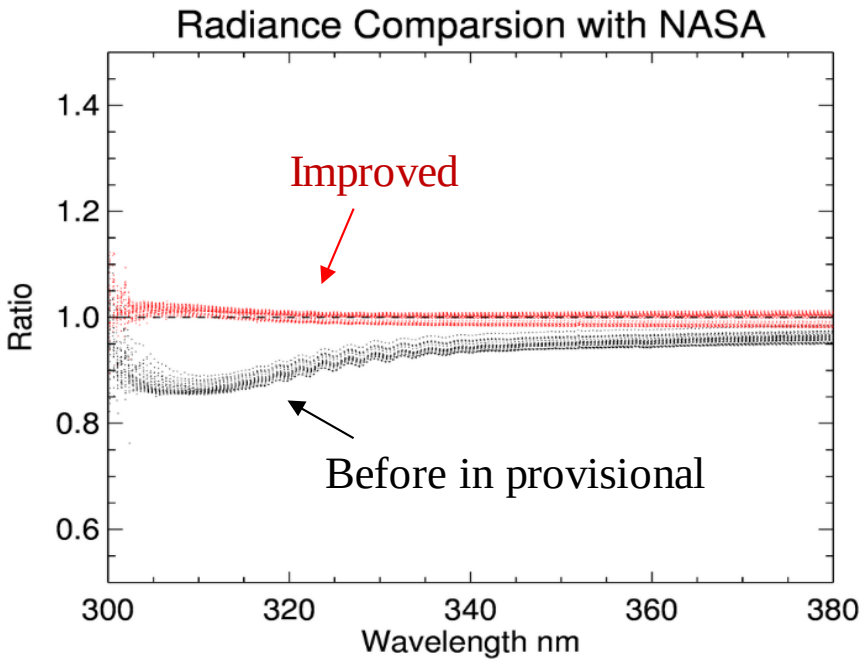


NP Intra-orbit Wavelength Variation < 0.01 nm in general

Note: some cases has larger than 0.01 nm shift at high latitude, which is not a concern from our S-NPP experience.

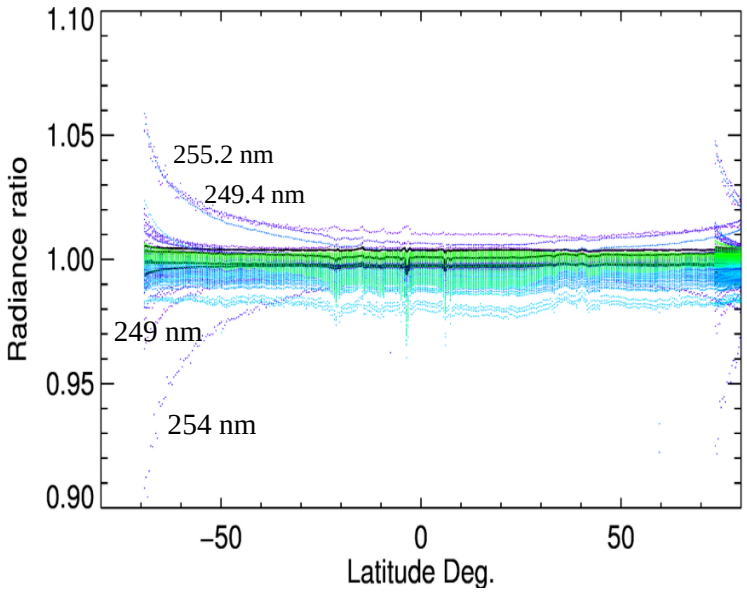
NM Stray Light Calibration Meets requirement

Use NASA'S data as reference



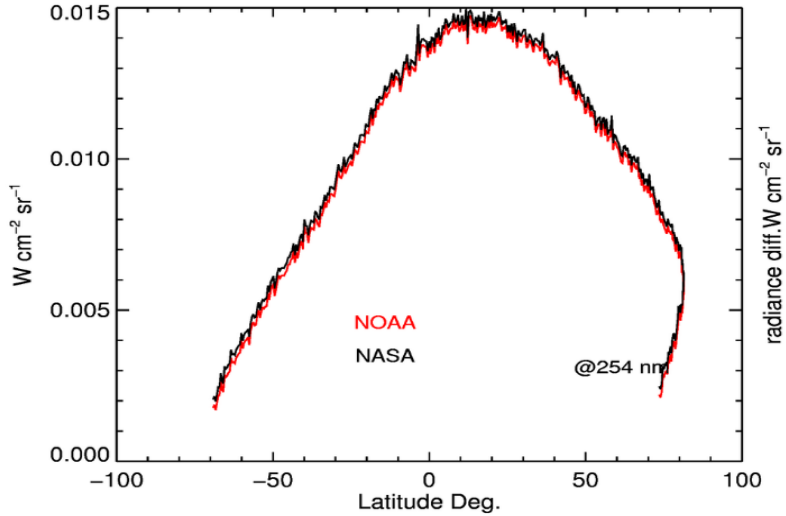
Use NASA data as reference, NM stray light calibration uncertainty in average < 2%

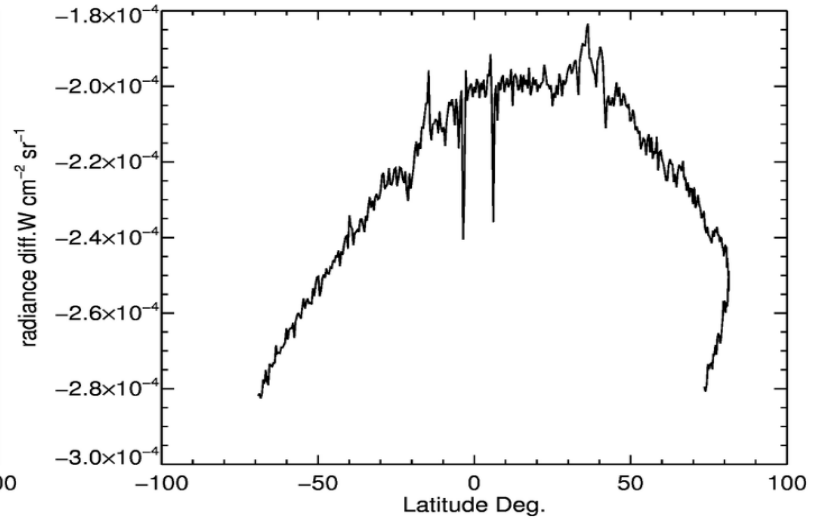
NP Stray Light Calibration Meets requirement



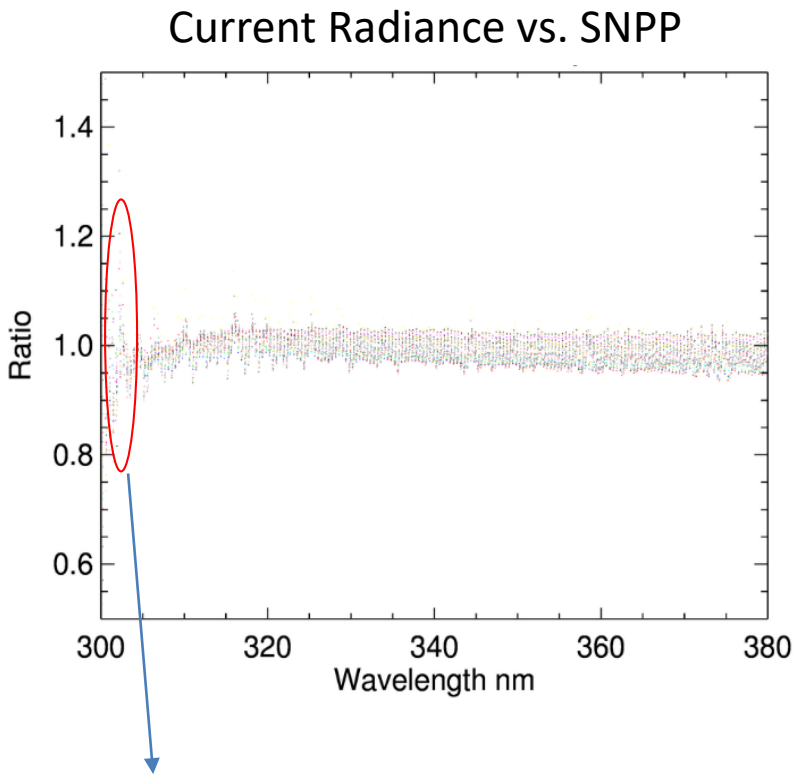
NM stray light calibration uncertainty in average < 2% when compared with NASA's data

Signal difference is small enough. Not a concern.





NM Radiance Calibration Meets Requirement

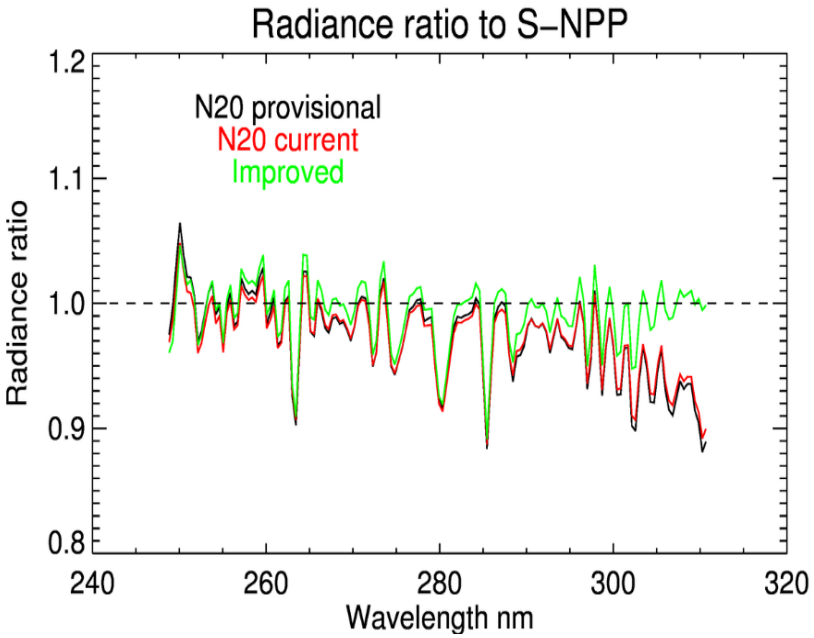


NM radiance uncertainty < 8% in general when compared with SNPP data

- 3.5 orbits data is used for comparison on a statistical level
- Data confidential level is 100%
- Data is col-located but ~52 minutes apart
- Radiance agrees well (≤ ±4%) in 305 -380 nm

Radiance discrepancy in short wavelengths <310 nm can be minimized with new radiance coefficients and/or updated stray light LUT.

NP Radiance Calibration Meets Requirement



- Spot check randomly picked 1 orbit data for comparison on a statistical level
- Data confidential level is 100%
- Data is col-located but ~52 minutes apart
- Radiance agrees well (green line) for most channels

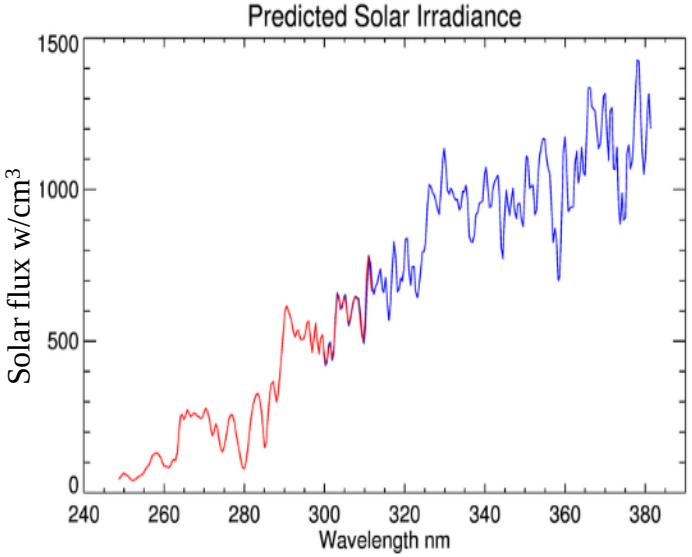
Use SNPP as reference, N20 NP radiance uncertainty in average < 8%

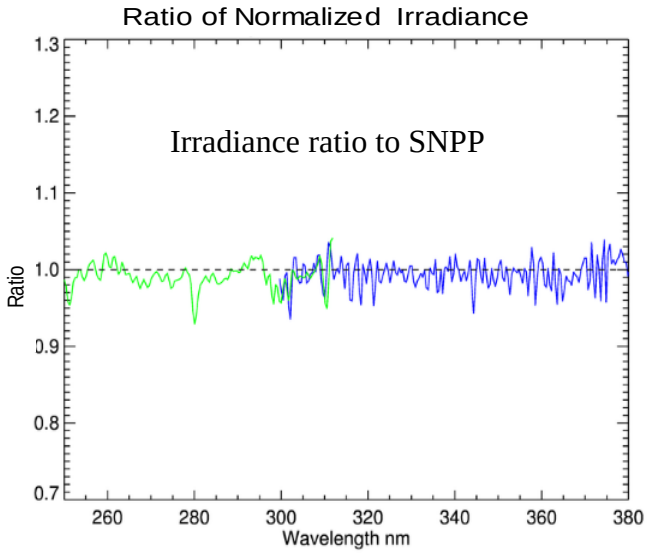
Radiance discrepancy in a few wavelengths will be improved via wavelength updates.

Additional Validation to Support EDR User's Needs (1/2)

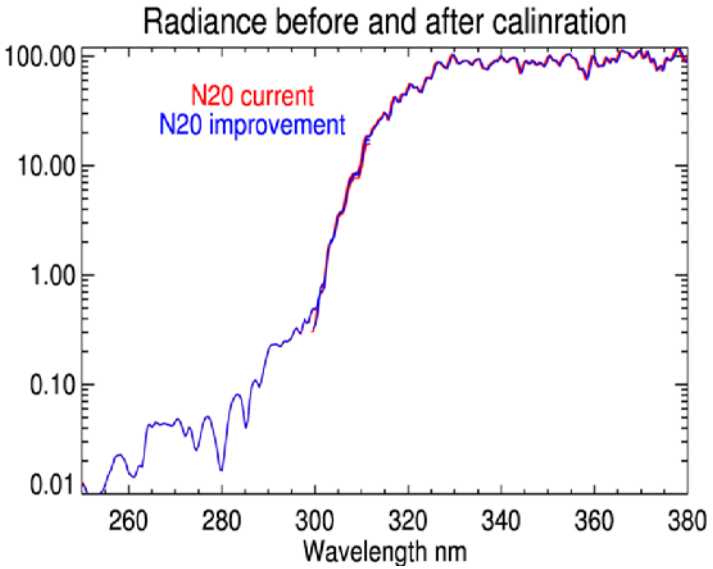
NM and NP are highly consistent in 300 -310 nm

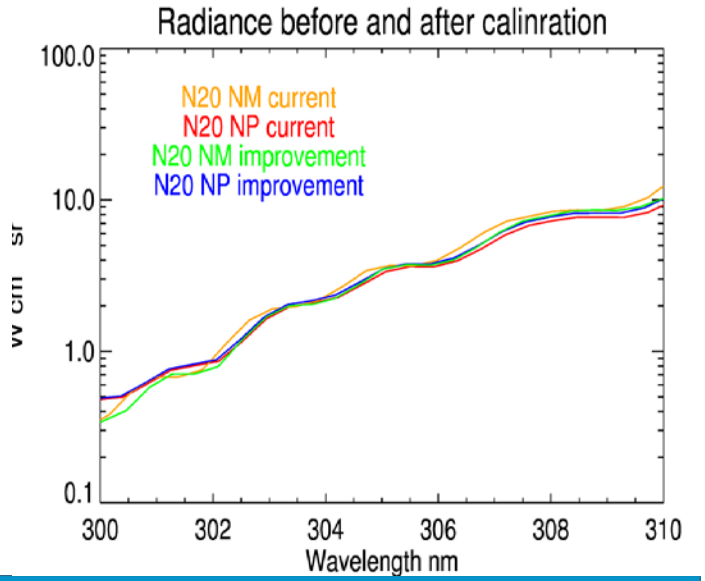
Irradiance consistency





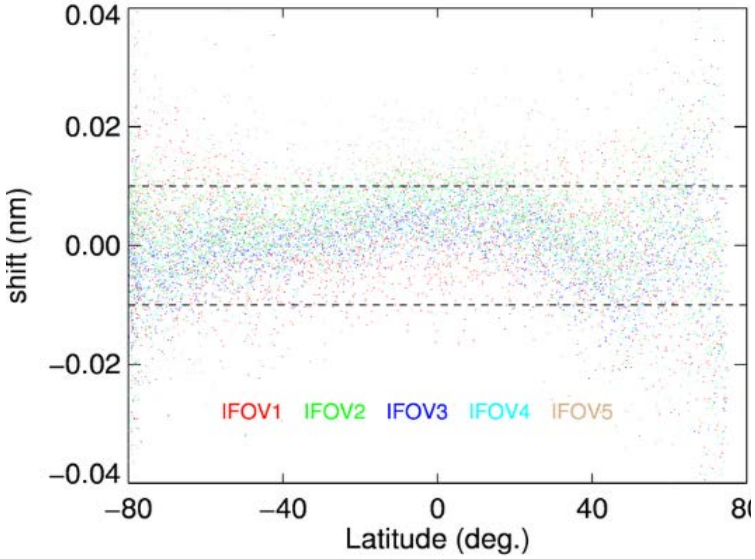
Radiance consistency



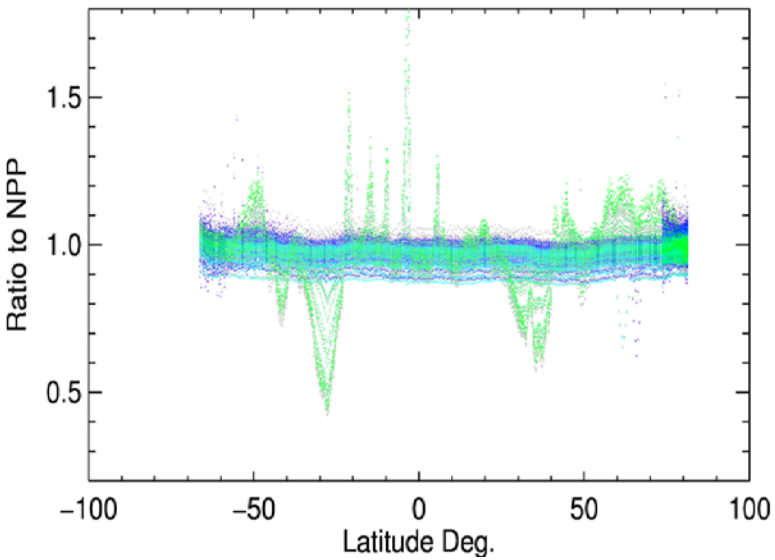


Additional Validation to Support EDR User's Needs (2/2)

Wavelength variation vs. Latitude
for all 5 macro-pixels



Radiance ratio to SNPP vs. Latitude
for all 151 channels



- 1 orbits data is used for comparison on a statistical level
- Data confidential level is 100%
- Data is col-located but ~52 minutes apart
- Few channels has large deviation caused by smear signals and noise

No significant variation in wavelength and EV radiance alone latitude

NOAA-20 OMPS SDR Data Quality Validation Methodologies

- Inter-sensor comparison between NOAA-20 and SNPP OMPS
  - Double difference based on SNO pairs (Northern hemisphere Polar regions) using GOME-2 as a transfer
  - Double difference using TOMRAD simulations as a transfer
  - Ray-matching method (preliminary analysis)
- Comparison between NOAA and NASA SDR data

Double Difference Between NOAA-20 and SNPP OMPS NM (SNO Pairs, GOME-2 as a Transfer)

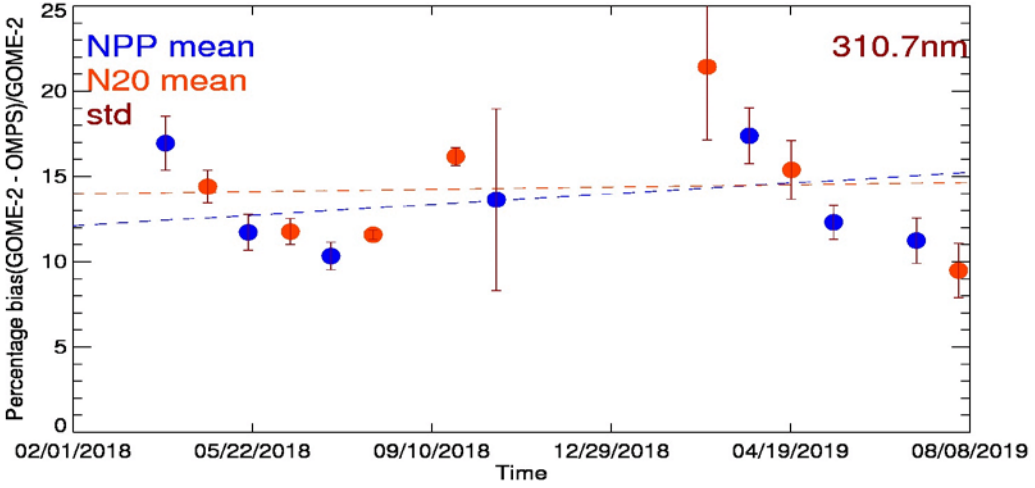
- Time series of SNO pairs for SNPP and GOME-2, NOAA-20 and GOME-2 (upper plot
  - Data sets: May 2018 to August 2019
  - Time (<120 seconds) and distance (<30 km) window
  - Each NM pixel together with all the 8 pixels (26 for N20) surrounding it forms a cluster with size of 150km x 160 km
  - SNO events: around 70° in Northern hemisphere regions
- Averaged SNO-based biases (%) between NOAA-20 and SNPP OMPS NM SDR reflectance
  - The absolute difference is within 2% for all bands

NOAA-20 NM reflectance agrees well with SNPP NM at N.P. high latitudes

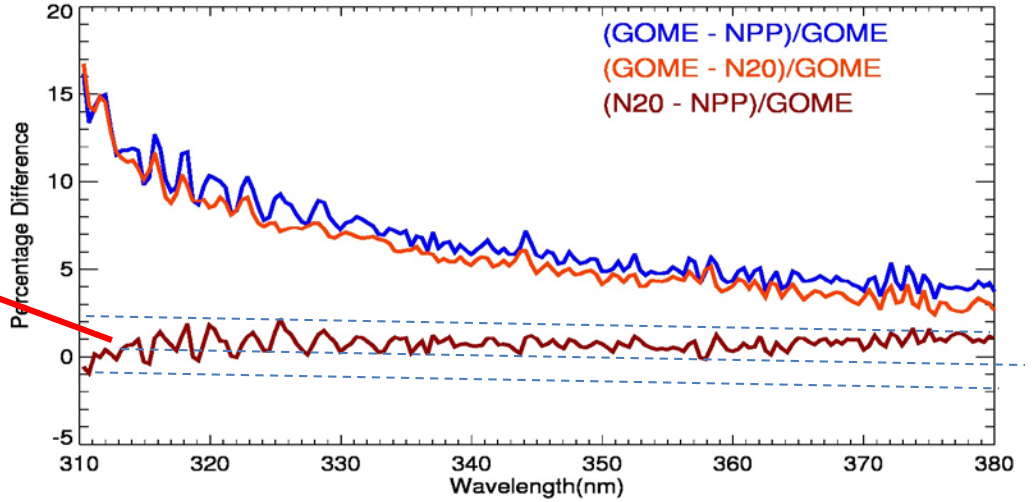
within ±2%

(Courtesy of ICVS Ding Liang)

(a) SNO Bias (%) Time Series at 11 Bands (animation)



(b) Averaged NOAA-20 and SNPP Bias (%) Spectrum

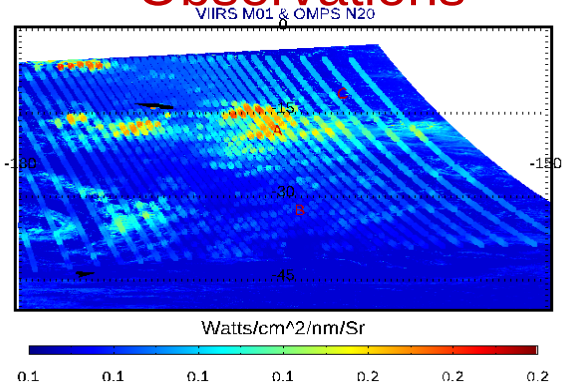


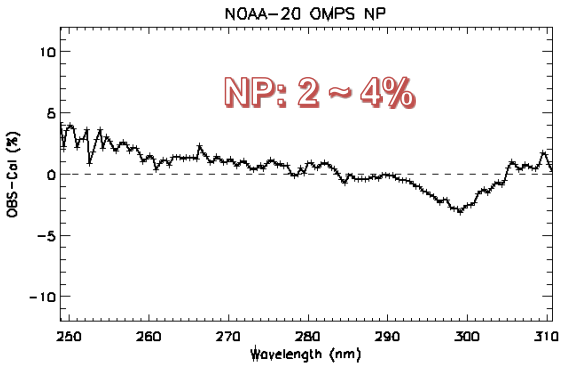
Double Difference Between NOAA-20 and SNPP OMPS NM (TOMRAD as a Transfer)

Method: DD = (NOAA-20 – RTM_{N20}) – (SNPP-RTM_{SNPP})

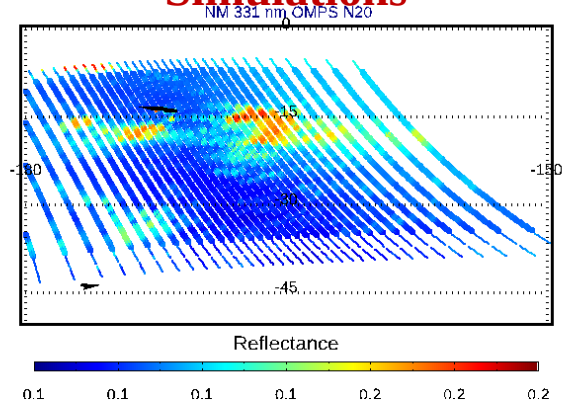
DD ~ NOAA-20 – SNPP + Δ_{simu_error}

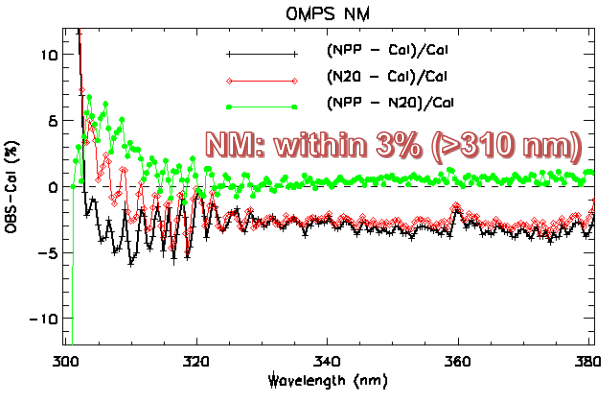
Observations





Simulations





▪**Simulations:**

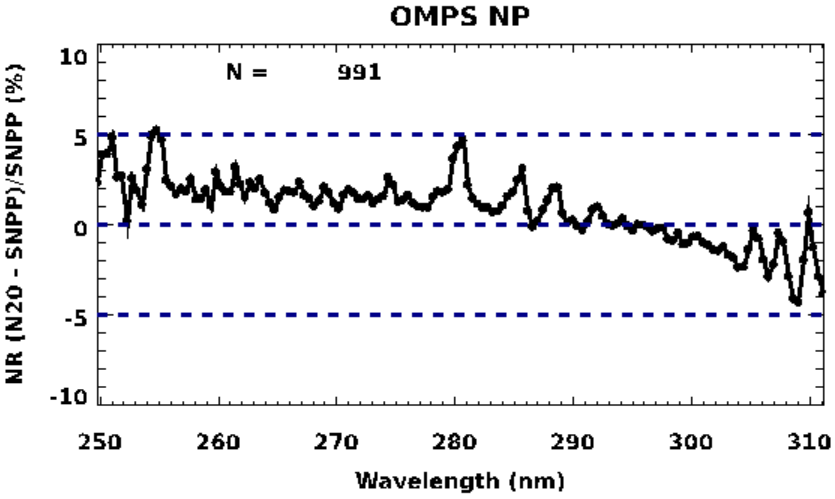
- **TOMRAD (v2.26), a model developed by NASA for UV simulations, is used for calculation at 0.1 A, then convoluted using pre-launched bandpass;**
- **Two different inputs of the total amounts of ozone data**
  - **NASA S-NPP L2 data (https://ozone.gsfc.nasa.gov/data/ozone) ;**
  - **TROPOMI L2 Products;**
  - **Temperature, SO_2 and NO_2 are from climatology;**
  - **Surface albedo at 331 nm is from NOAA EDR product but fixed in the whole spectral;**
  - **Solar is from Chance et al. (2010);**
- **One day data on April 25, 2019;**

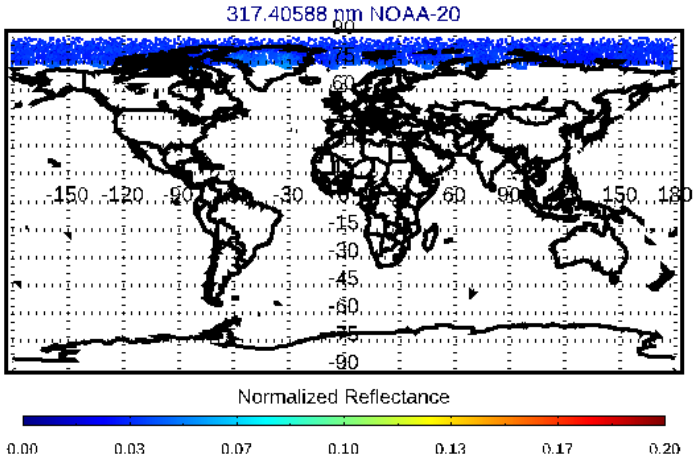
NOAA-20 NM data agree well with SNPP NM in particular at wavelengths higher than 310 nm

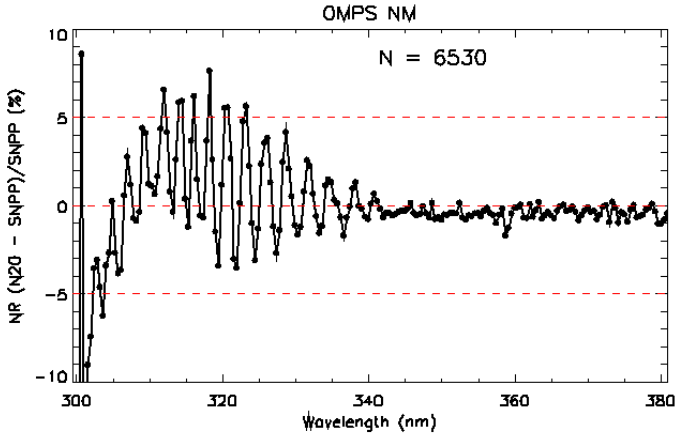
Note: Radiance discrepancy in short wavelengths <310 nm can be minimized with new radiance coefficients and/or updated stray light LUT.

NOAA-20 and SNPP SDR Inter-sensor Comparison (Ray Matching Method)

Spectral Inter-comparison Using Ray-Matching





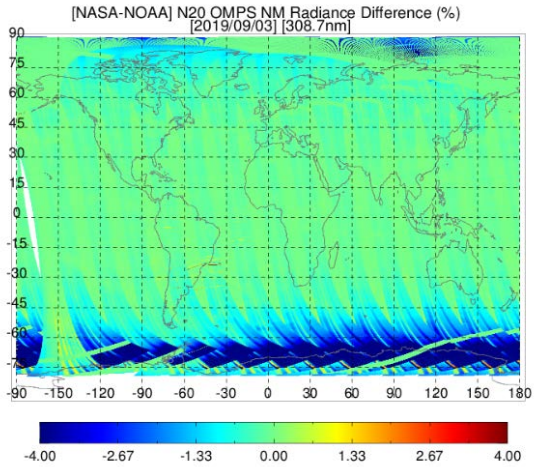


Data of August 1-30, 2019 is used for NP;
3 Days data (Aug.1-3, 2019) are used for NM;

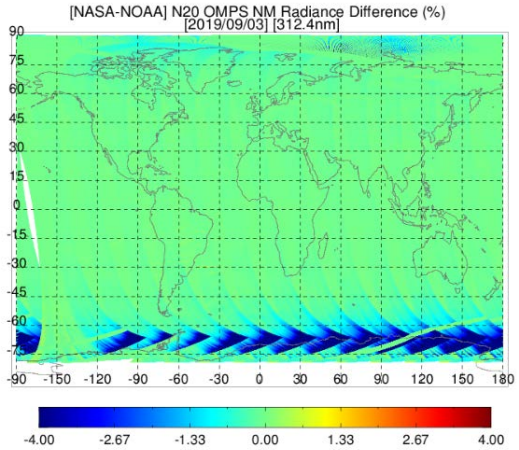
NOAA-20 OMPS (NM and NP) NR values agree well with SNPP data by differences up to ~ 5%

NOAA and NASA OMPS SDR Data Comparison

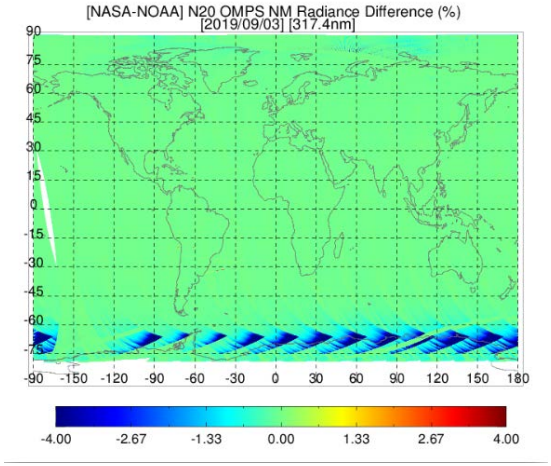
(a) 308.7 nm



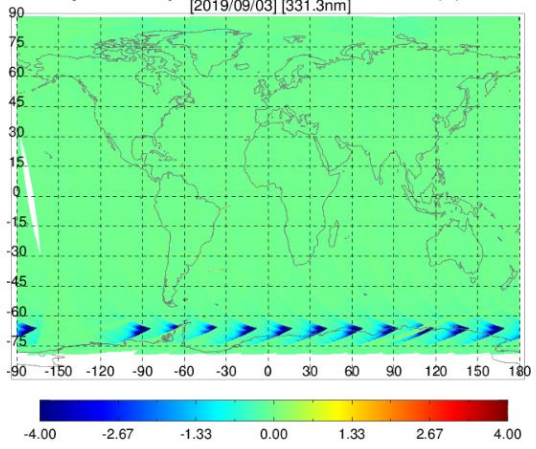
(b) 312.4 nm



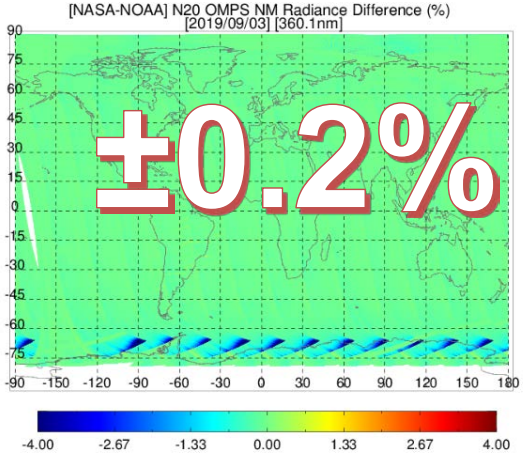
(c) 317.4 nm



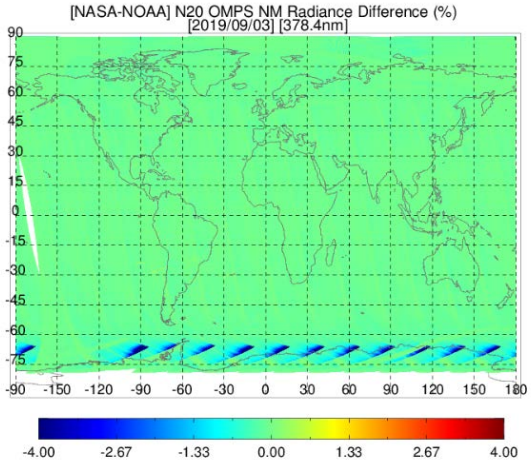
(d) 331.3 nm



(e) 360.1 nm



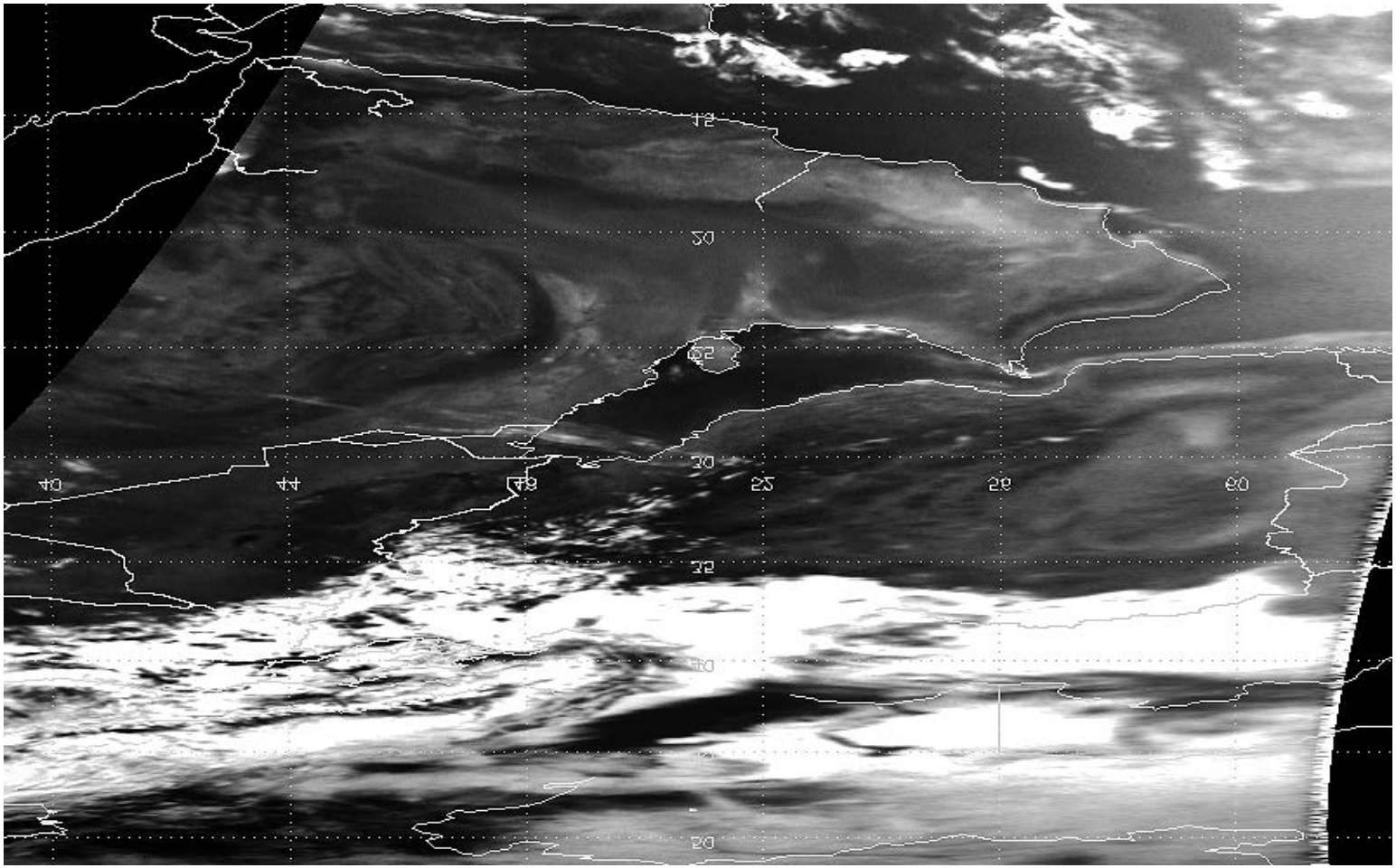
(f) 378.4 nm



NOAA data agree very well with NASA data except for some Antarctic regions where OMPS NM measurement values are very noisy

Courtesy of ICVS Ryan Stanfield and Ding Liang

Geo-location Validation against MODIS Results



Initial afford was taken to verify N20 NM geolocation in Persian Gulf region. Analysis is still under going.

Geo-location Validation against NASA Results

- Comparison of N20 OMPS w/r to S-NPP VIIRS RGB also indicates a small offset of < 5 km along track and < 3 km cross track (see within ellipses)
- OMPS reflectivity data from 15-55% overlaid on top of VIIRS image

Salar de Uyuni – 15 January 2018

Credit: NASA

DR/CCR Since Provisional Maturity

ADR	CCR	Title	Changes Made	Implementation Date
8616	n/a via PCR	16 scans per granule in some OMPS RDRs	PRO code updated to support optional cross granule functionality to handle 16 scan RDRs	Block 2.1 Mx3 (10/3/18)
8617	18-4137	OMPS NM/NP Mismatch for FOVs	Table updates to support macropixel compatibility between NOAA-20 OMPS NM & NP: OMPS-NP-CF-EARTH-GND-PI_j01 OMPS-NP-EV-SAMPLE-GND-PI_j01 OMPS-NP-MACROTABLE-GND-PI_j01 OMPS-NP-OSOL-LUT_j01 OMPS-NP-WAVELENGTH-GND-PI_j01 OMPS-TBL-VERS-GND-PI_j01 OMPS-TC-CF-EARTH-GND-PI_j01 OMPS-TC-EV-SAMPLE-GND-PI_j01 OMPS-TC-MACROTABLE-GND-PI_j01 OMPS-TC-WAVELENGTH-GND-PI_j01	12/19/2018
8684	18-4014	Update OMPS TC Quality Flags	Meaningful values set for OMPS TC QualityEarth flag	Block 2.1 Mx5 (3/25/19)
8685	18-4015	Update OMPS NP Quality Flags	Meaningful values set for OMPS NP QualityEarth flag	Block 2.1 Mx6 (7/25/19)
8709	18-4138	Transient Smear Correction	Removes transients from the smear signal	Block 2.1 Mx6 (7/25/19)
8730	18-4133	Unexpected Outliers in NP	NP-CALCONST-LUT and Flight non-linearity table updated to fix discretization error in onboard correction	12/4/2018
8784	via PCR	Missing Scans in NP	Ingest updated to produce all OMPS-NP RDRs with the correct number of scans	Block 2.1 Mx5 (3/25/19)
8816	19-4303	Update NOAA-20 OMPS Calibration Tables	Calibration updates for the following tables: OMPS-NP-OSOL-LUT_j01 OMPS-NP-STRAYLIGHT-LUT_j01 OMPS-NP-WAVELENGTH-GND-PI_j01 OMPS-TC-OSOL-LUT_j01 OMPS-TC-STRAYLIGHT-LUT_j01 OMPS-TC-WAVELENGTH-GND-PI_j01	4/11/2019
8817	n/a via PCR	Gaps between adjacent pixels in OMPS data	Fixes the geo corners latitude and longitude fields so that OMPS TC and NP pixels will line up	Block 2.1 Mx6 (7/25/19)
9093	19-4638	NOAA-20 OMPS TC & NP LUT updates for Validated Maturity	Additional calibration updates needed for: OMPS-NP-STRAYLIGHT_LUT_j01 OMPS-TC-STRAYLIGHT_LUT_j01 OMPS-TC-OSOL-LUT_j01 OMPS-TC-WAVELENGTH-GND-PI_j01	TBD: est. October 2019
9094	19-4638	Incorrect flag set in NOAA-20 OMPS-TC Wavelength table	Fixes incorrect flag set in OMPS-TC-WAVELENGTH-GND-PI	TBD: est. October 2019

NM SDR Performance Summary

Budget Term	Requirement/Allocation	Performance
Wavelength range	300-380	300-380
Horizontal cell size	≤ 50 km @ nadir	≤ 50 km @ nadir
Horizontal coverage	≥2800 km	≥2800 km
SNR radiance @50x17km^2	≥590	≥590
Irradiance uncertainty	< 7%	< 7%
λ-registration	≤0.01 nm	≤0.01 nm
intra-orbital wavelength variation	≤0.01 nm	<0.01 nm
OOB/OOF Stray Light	≤ 2% (305 – 380 nm)	≤ 2% (305 – 380 nm)
Radiance uncertainty	< 8%	< 8%
λ-indpendent albedo calibration	<2%	<2%
Geolocation Error	≤ 5 km	≤ 5 km@ nadir

- Performance evaluation uses offline ADL SDRs generated with most recent calibration LUTs
- Even radiance meets the requirement of 8%, but for albedo calibration improvement, radiance in short wavelengths <310 nm can be improved with new radiance coefficients and/or updated stray light LUT.

NP SDR Performance Summary

Budget Term	Requirement/Allocation	Performance
Wavelength range	250-310	250-310
Horizontal cell size	≤ 50 km @ nadir	≤ 50 km @ nadir
Horizontal coverage	≥2800 km	≥2800 km
SNR radiance@50x50km^2	varies with wavelength λ	meet
Irradiance uncertainty	< 7%	< 7%
wavelength λ calibration	<0.01 nm	<0.01 nm for most of wavelength channels
intra-orbital wavelength variation	<0.01 nm	<0.01 nm
OOB/OOF Stray Light	< 2%	< 2%
Radiance uncertainty	< 8%	< 8%
λ-indpendent albedo calibration	<2%	<2% for most of wavelength channels
Geolocation Error	≤ 5 km	≤ 5 km @ nadir

Performance evaluation uses offline ADL SDRs generated with most recent calibration LUTs
A few channels' wavelengths update will be made to provide better consistency with SNPP data.

User Feedback

- STAR OMPS EDR team: NOAA-20 OMPS SDR data are of good quality with a **request**: NP wavelength update to minimize ozone profiler latitude dependency (details are referred to Larry's user feedback presentation)
  - The wavelength update has been conducted by SDR team. The update table was sent to EDR team for evaluation.

Documentation

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

Check List - Validated Maturity

Validated Maturity End State	Assessment
Product performance has been demonstrated over a large and wide range of representative conditions (i.e., global, seasonal).	Performance has been demonstrated globally since launch with seasons.
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.	Caveats will be provided in the readme file for all major known anomalies and artifacts.
Product analyses are sufficient for full qualitative and quantitative determination of product fitness-for-purpose.	A variety of methods have been used to quantify the radiometric biases through quantitative analysis.
Product is ready for operational use based on documented validation findings and user feedback.	Yes. User feedbacks are very positive.
Product validation, quality assurance, and algorithm stewardship continue through the lifetime of the instrument	Yes. The OMPS SDR team will continue providing stewardship for mission life.

Recommendation: meet validated maturity

Risks/Issues, Actions and Mitigations

- **Risks/Issues/Challenges**
  - Relatively large geolocation error at the edge pixels
  - Prelaunch calibration accuracy is critical to post launch SDR performance and calibration

- **Actions and Mitigations**
  - Further improve geolocation accuracy at the edge pixels
  - Better collaboration with Ball and NASA teams

Summary and Conclusions

- NOAA-20 OMPS works well since activation
- NOAA- 20 OMPS SDR meets requirements in general
- NOAA-20 OMPS SDRs are in a family with SNPP OMPS SDRs
  - SNO-based inter-sensor biases at wavelength higher than 310 nm are mostly within 2%
  - RTM-simulation based inter-sensor biases are mostly within 3% at wavelength higher than 310 nm but are increased to 5% or above at lower wavelengths
- NOAA and NASA OMPS data are in general comparable
- Further investigation is needed for the following residuals
  - Geolocation error at edge pixels
  - Wavelength refinement from 300 to 310 nm as needed
- Long-term monitoring tool of ICVS for NRT monitoring OMPS instrument and product quality
- Documentation
  - 5 presentations have been presented at national and international conferences
  - ATBD and SDR User's Guide (to be provided)

Path Forward

Planned improvements and future Cal/Val activities / milestones

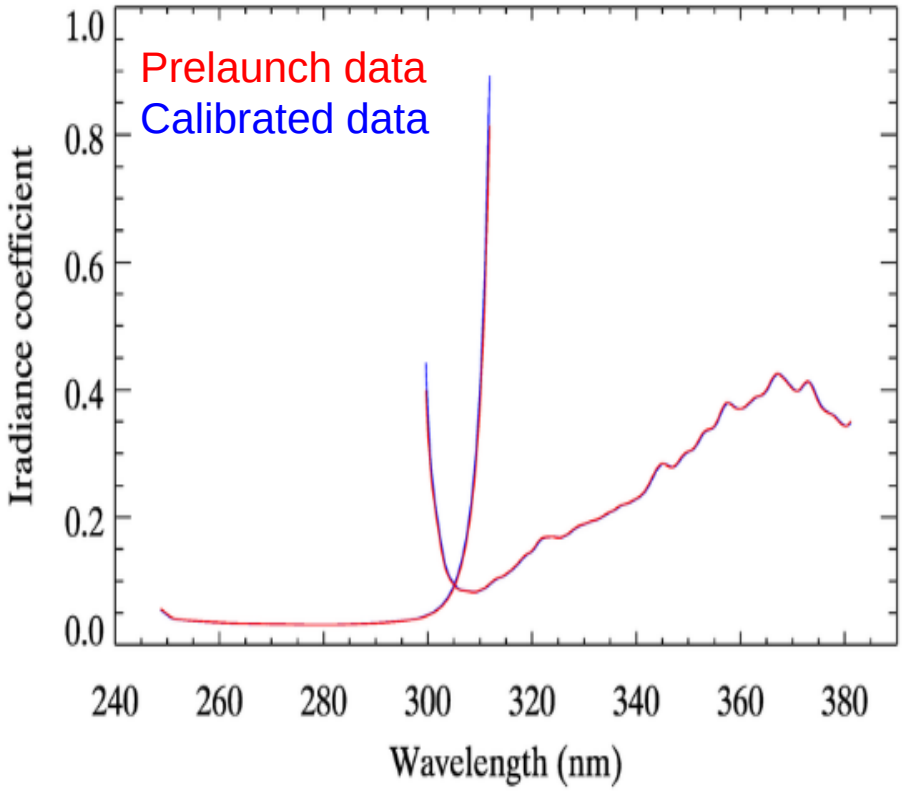
1. Refine N20 SDR calibration for particular wavelength channels
   - Update NP wavelength calibration as necessary
   - Update NM calibration for short wavelengths 300 -310 nm
2. Improve geolocation calibration methodology
   - More precisely quantify geolocation error at CCD edge pixels and mitigate errors as needed
   - Evaluate impact of geolocation error to the OMPS products (SDRs/EDRs)
3. Implement NM data to 17 km x 17 km medium resolution to meet EDR team's need
4. Update forward model to establish a robust validation methodology
5. Continue monitoring critical instrument parameters and SDR attributes via ICVS
6. J2 prelaunch calibration support
7. OMPS Science Team will continue providing operational cal/val support

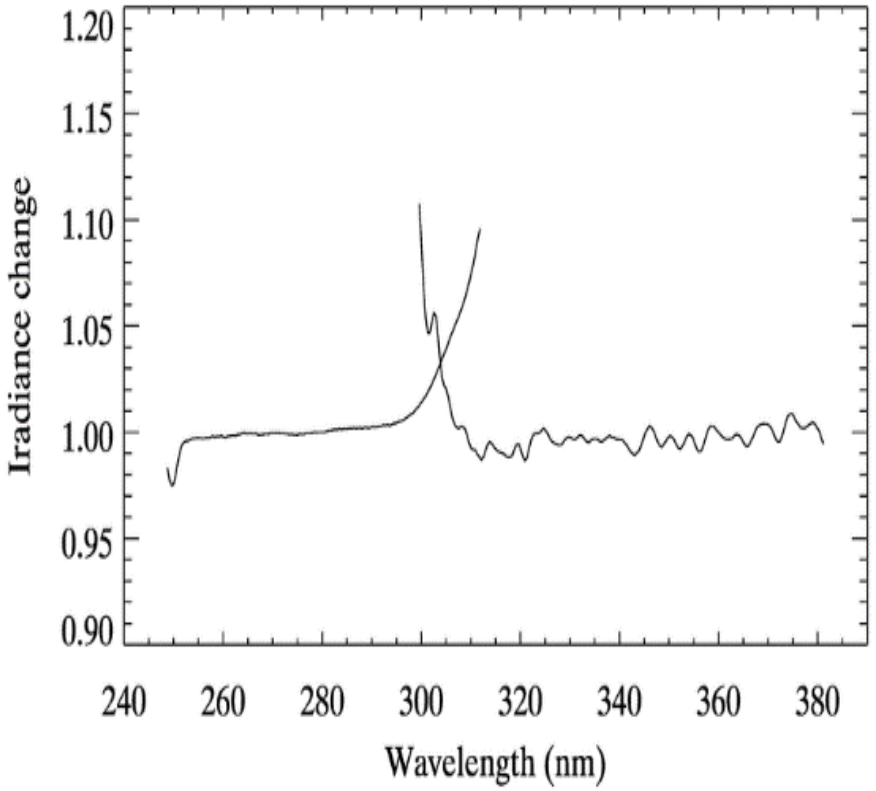
- Backup

SDR Calibration Data Source

- N20 Nadir Mapper (NM) Interface Data Processing Segment (IDPS) SDRs that provides 50 km cross-track x 17 km along track spatial resolution data.
- N20 NM in-house offline ADL SDRs, from which, NM SDR calibration and validation have been conducted.
- N20 Nadir Profiler (NP) IDPS SDRs that provides 50 km cross-track x 17 km along track spatial resolution data.
- N20 NP in-house offline ADL SDRs, from which, NM SDR calibration and validation have been conducted.
- S-NPP NM IDPS SDRs that provides 50 km cross-track x 50 km along track spatial resolution data.
- S-NPP NP IDPS SDRs that provides 50 km cross-track x 50 km along track spatial resolution data.
- N20 NM NASA L1B that provides ~12 x 50 km spatial resolution data.
- N20 NP NASA L1B that provides 50 x 50 km spatial resolution data.

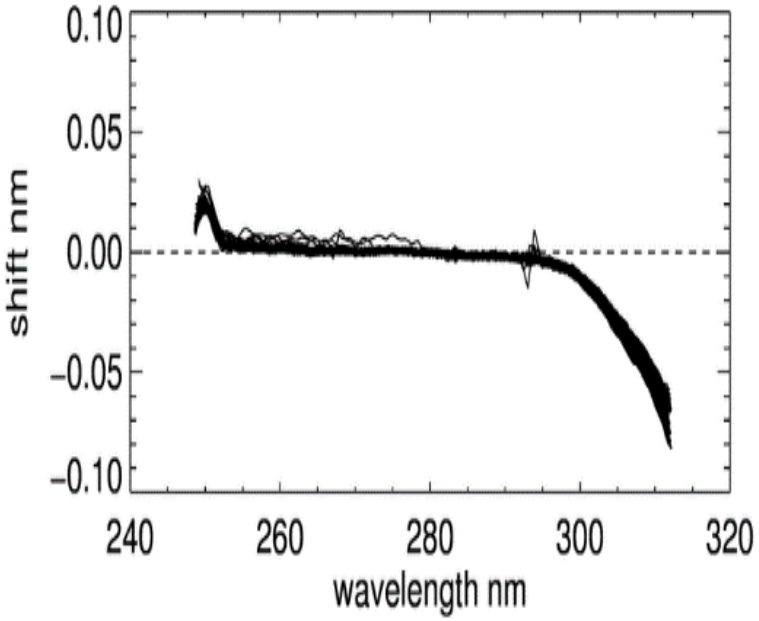
Improvement in Radiometric Calibration



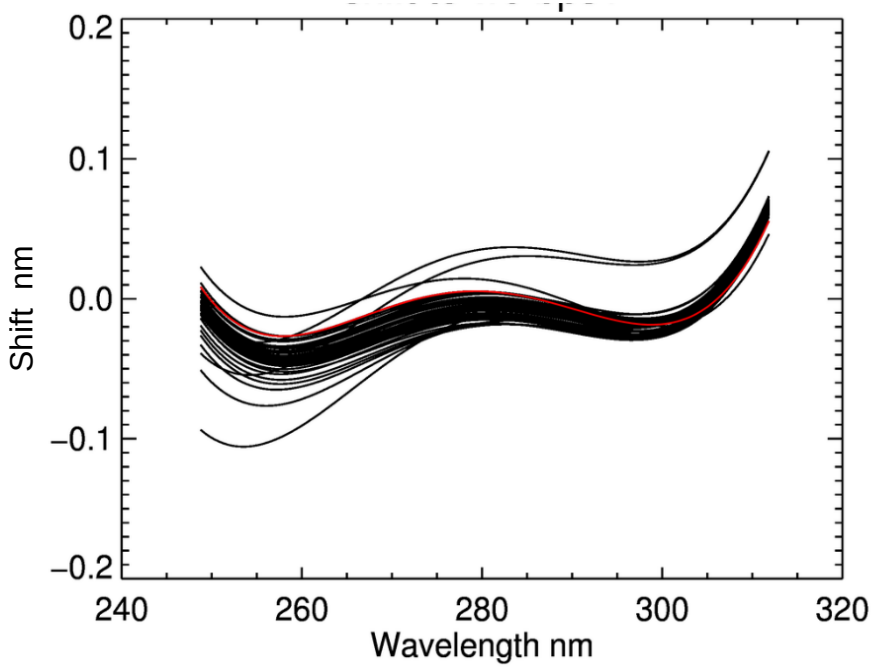


Updates of NP Solar Calibration

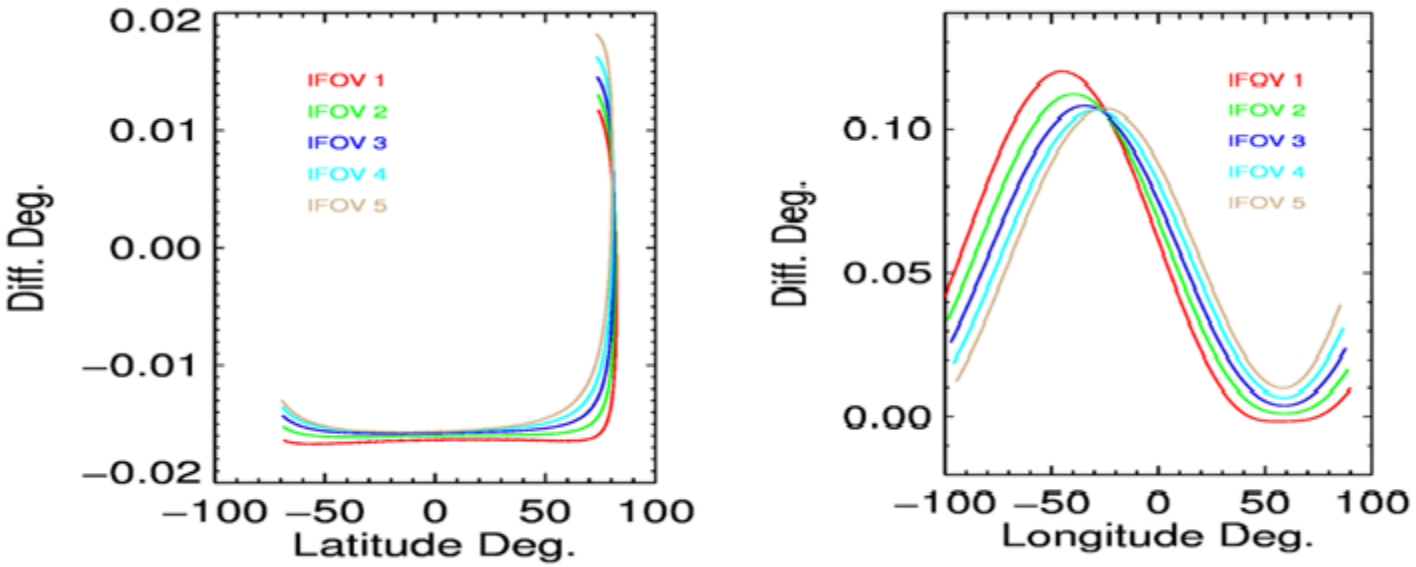
Consider sensitivity change



Consider sensitivity change as well as Non-zero bps center



NP Geolocation differs from NASA Data



Latitude matches well. Some discrepancy is found in longitude.

Two Pending Actions from the OMPS Review Board in Sept. 2019: Verification of the LUT implementation

Banghua Yan
On behalf of OMPS SDR Team
(Courtesy of Chunhui Pan and Trevor Beck)

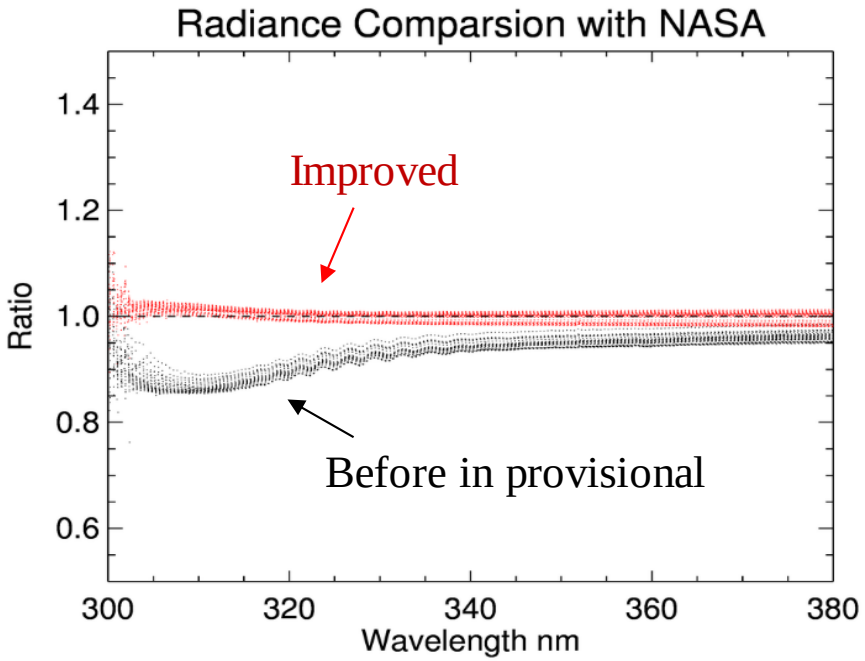
11/06/2019

Pending Action 1: Implement CCR 19 4638/DR9093

Details of the CCR: NOAA-20 OMPS TC & NP LUT updates

- Date of Delivery to DPES: 8/29/2019
- Following tables are updated:
  - OMPS-NP-STRAYLIGHT-LUT_j01
  - OMPS-TC-OSOL-LUT_j01
  - OMPS-TC-STRAYLIGHT-LUT_j01
  - OMPS-TC-WAVELENGTH-GND-PI_j01
- Following granules are used for the test run.
  - J01002466075741
  - J01002466076115
  - J01002466076489
  - J01002466076863
  - J01002466077237
- The implementation is verified in the following three slides.
- Conclusion: Impacts are confirmed as expected so the correction is well taken in the operational SDR data processing

NP Stray Light Correction: Comparison with/without Correction

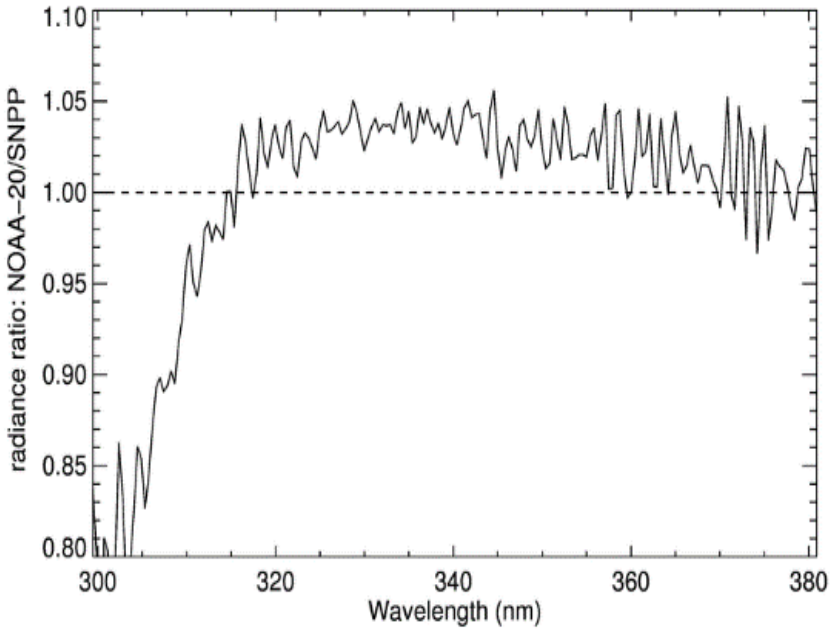


Use NASA'S data as reference

NM Stray Light Correction: Comparison with/without Correction

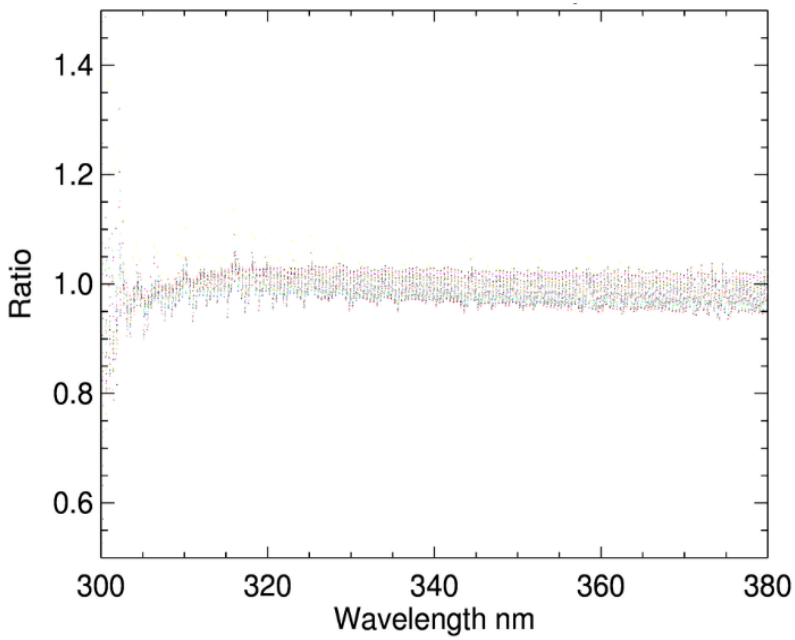
Compared with SNPP data

Before



After

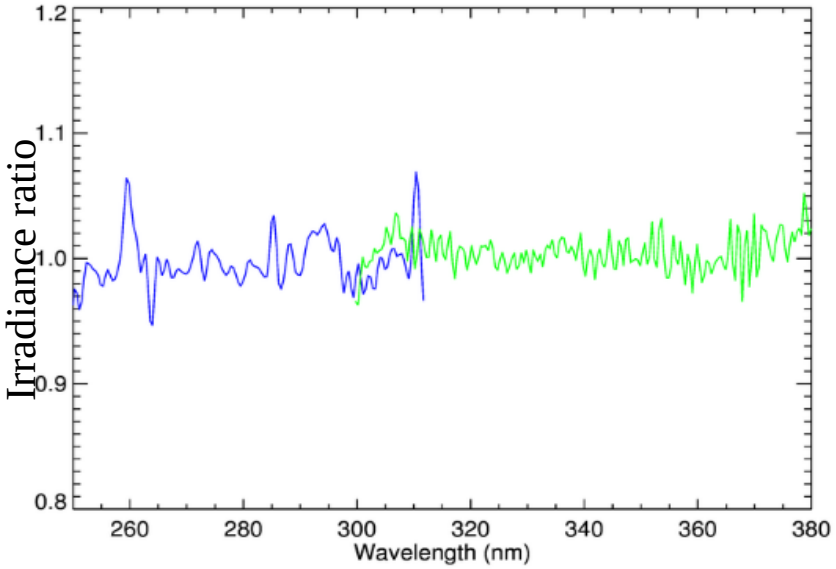
Current Radiance vs. SNPP



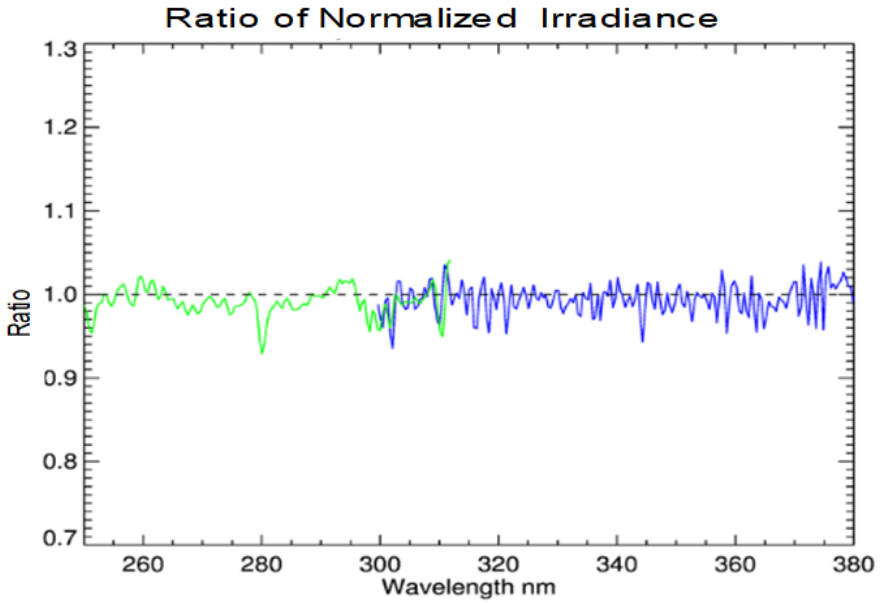
Solar Wavelength and Flux Calibration: Comparison with/without Correction

Compared with N20 synthetic data

Before



After



Pending Action 2: Implement CCR 19 4638/DR9094

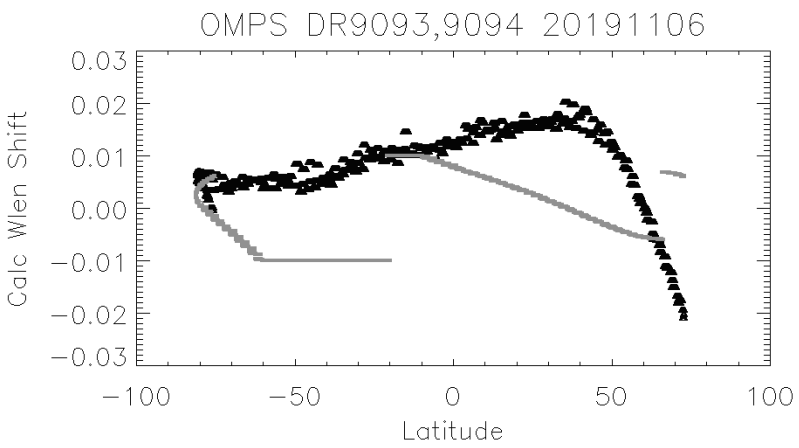
Details of the CCR: Fixes incorrect flag set in NOAA-20 OMPS-TC-WAVELENGTH-GND-PI

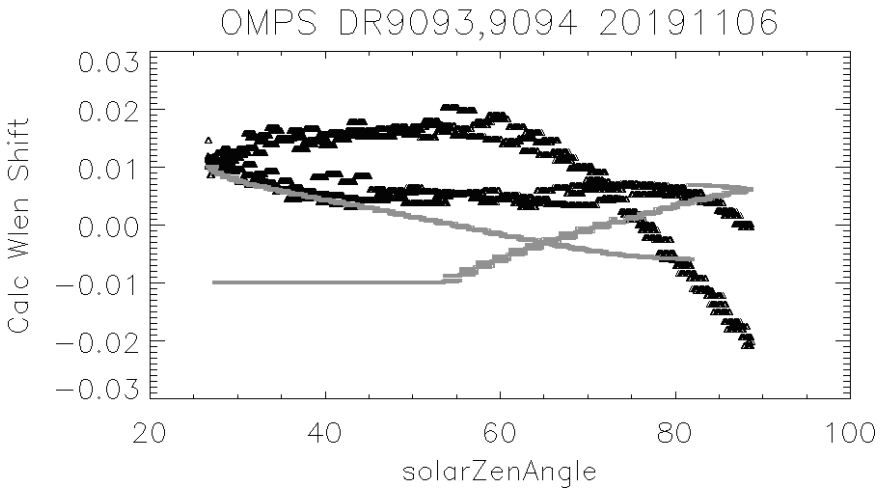
- Date of Delivery to DPES:
  - TTO in IDPS on Nov. 6 2019 at 15:36:58.4 UTC
- Background:
  - An incorrect Flag set was set in the OMPS-TC-WAVELENGTH-GND-PI table for NOAA-20 since 4/11/2019. The variable RSF_PW_LIMIT is used in the wavelength shift correction code. If it is positive the code follows the parameterized wavelength shift adjustment otherwise it follows the empirical fit. The parameterized fit was never finished and is not supposed to be used.
- SDR granule timestamps before and after the IDPS table load:
  - d20191106_t1537210_e1537584_b10191 Last granule before table updates
  - d20191106_t1537584_e1538358_b10191 First granule with new tables
- Impacts of the table implementation is addressed in the following 3 slides

- Conclusion: the correction is well taken in the operational SDR data processing

Correct behavior verified in IDPS for wavelength shift

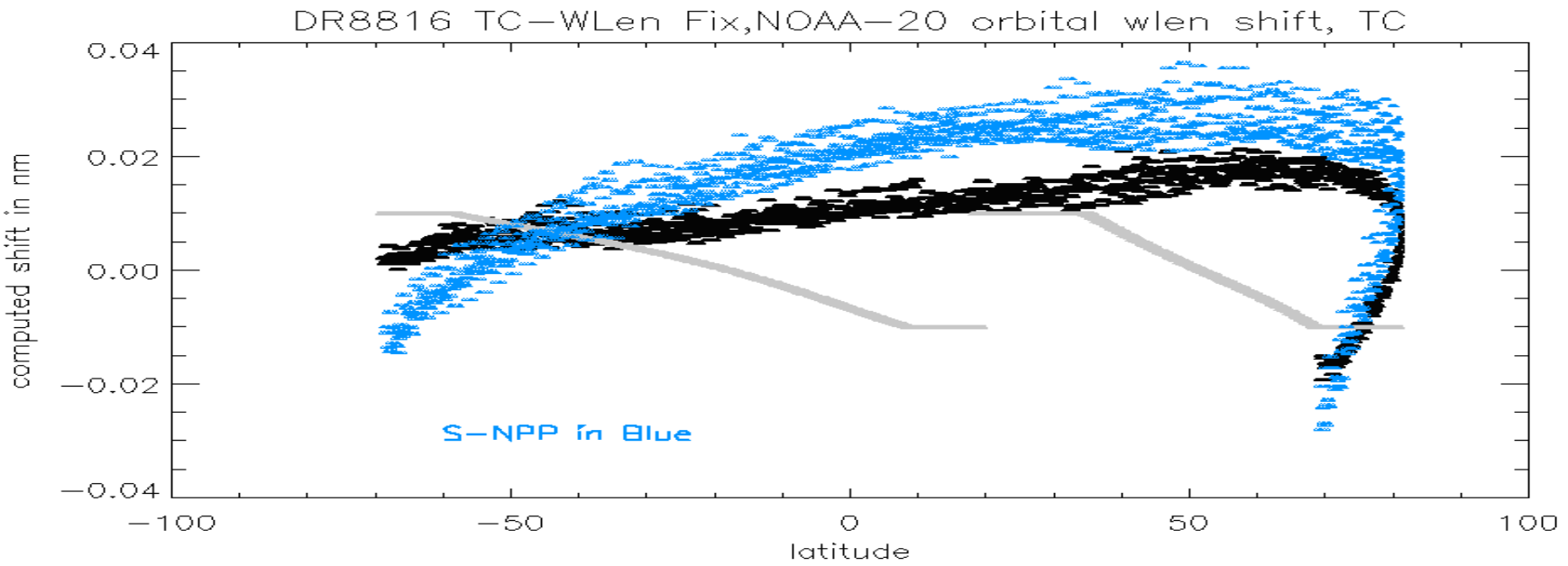
- IDPS SDR data checked to verify correct operation
- The larger black triangles are after the DR9093 TTO
- The thinner gray curve is the prior day's computed shifts.
- The image on the left is wavelength shift versus Latitude
- The image on the right is wavelength shift versus Solar Zenith Angle.





Comparison with S-NPP wavelength shift

The image below shows the final computed shift. S-NPP is in blue for comparison.
The corrected NOAA-20 for this day is plotted in black. In light gray is IDPS prior to DR9093 TTO.
Notice the jump in wavelength correction at around 10 degrees north latitude in the older IDPS. This discontinuity leads to noticeable discontinuity in Nvalue, the normalized radiance used by the EDR ozone algorithms, at a latitude of around 10 degrees north.



The bug-fix produces comparable NOAA-20 wavelength shift feature to SNPP OMPS

Nvalue differences are plotted. The 6 wavelengths shown are used in the Version 8 total and profile ozone algorithms. The plots are for nadir. The differences are due only to wavelength shift flag, both SDR datasets used identical tables except for the wavelength shift flag.