NOAA JPSS Monthly Program Office

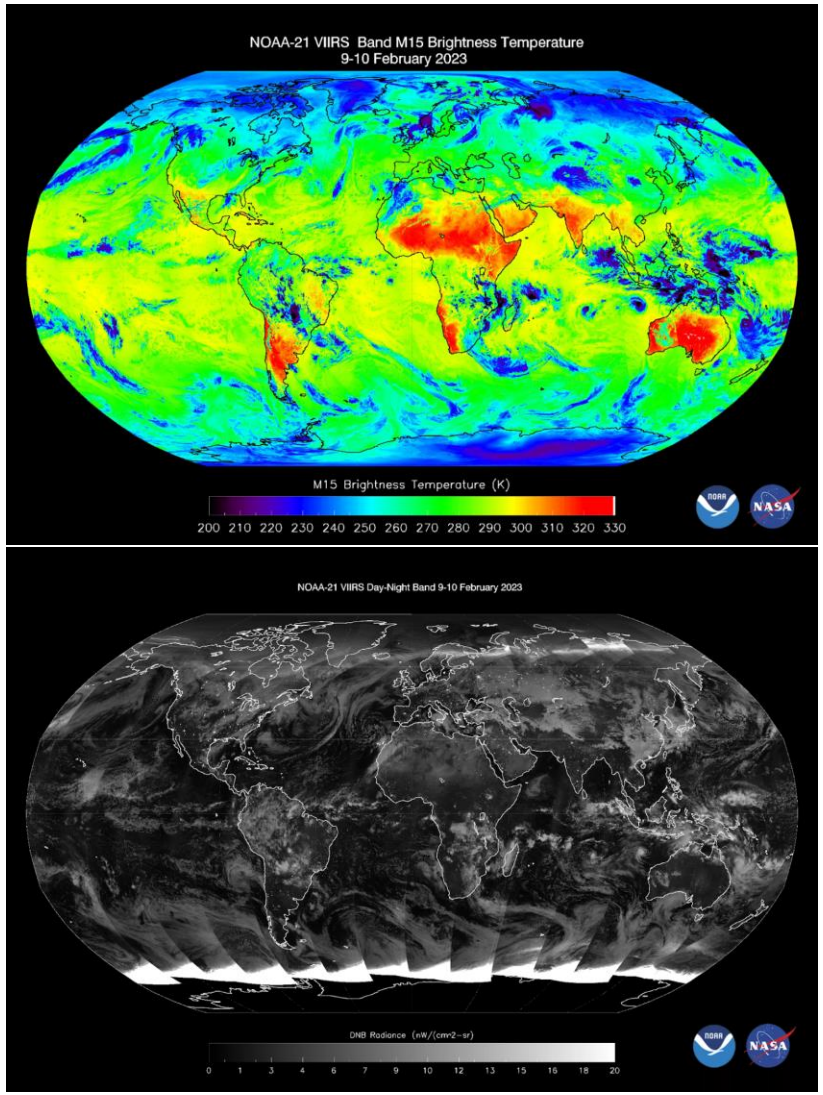
AMP/STAR FY23 TTA

Lihang Zhou, DPMS Deputy
Xingpin Liu, Algorithm Sustainment Lead
Ingrid Guch, Acting JPSS STAR Program Manager
Alisa Young, AMP Deputy for Science
& JPSS STAR Program Manager (on Detail)

March, 2023

Highlights from the Science Teams (February)

VIIRS thermal emissive band first light imagery



NOAA-21 VIIRS started collecting Earth science data from the DNB and thermal emissive bands on Feb. 9, 2023 after the cryocooler door opened to cool the cold focal plane to its operating temperatures. This comes after the Ka transmitter anomaly was resolved by switching to the redundant side (Ka side #2).
TEB data are essential for measuring sea surface temperature (SST) which is critical for mid/long-range weather forecasts, and for land surface temperatures, wildfire monitoring, and the detection of clouds. This first light global image below, shows cold clouds, snow and ice as blue, and warm surfaces such as deserts in red.

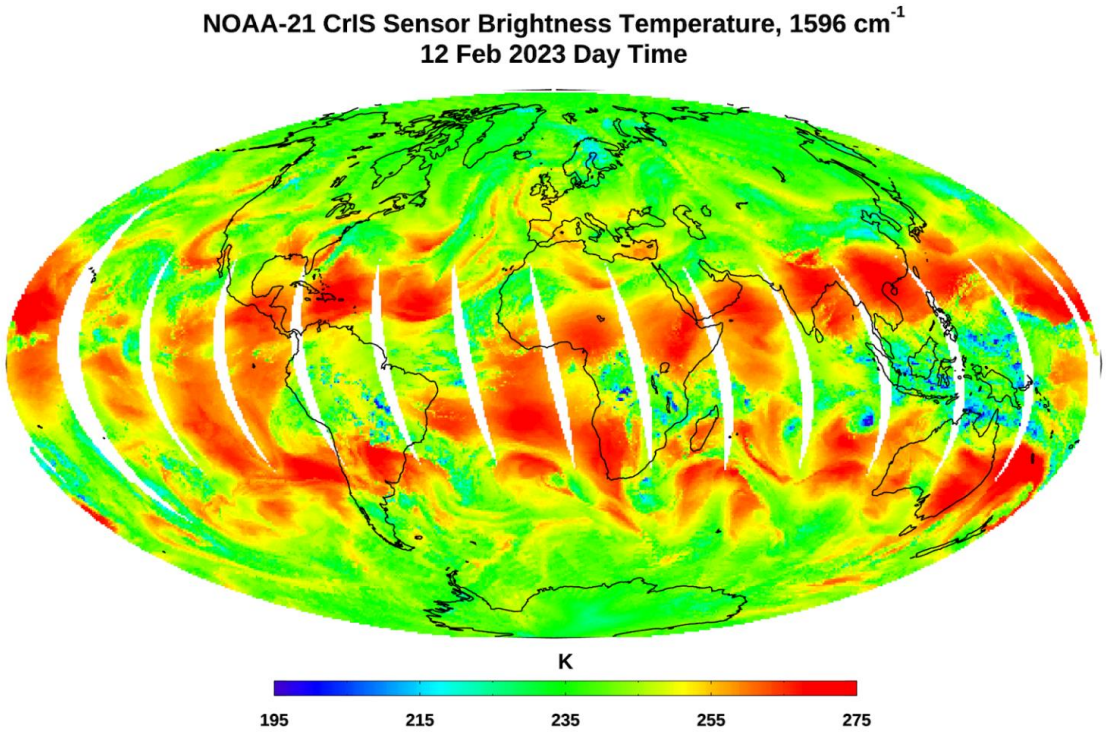
VIIRS on NOAA-21 also started acquiring data in its unique DNB on Feb. 9, 2023. The DNB measures low signals of reflected moonlight at night and is used for detecting nighttime clouds and fog. Artificial lights such as city lights, flares from natural gas wells, and shipping vessels can also be seen. DNB night light data have also been used for a wide range of social economic studies.

Figure. Global VIIRS Band M15 brightness temperature (top) and Day/Night Band radiance (bottom) from February 9-10.

Preliminary/non-operational data

Highlights from the Science Teams (February)

NOAA-21 CrIS first light imagery



On February 10, 2023, the NOAA-21 sent back its first CrIS science data. This milestone is part of a series of events, including instrument activation and intensive calibration and validation activities, that occur before the satellite is declared fully operational. The NOAA-21 CrIS observations will be assimilated at numerical weather prediction centers to improve weather forecast skills, while extending the data record of CrIS observations beyond a decade. The CrIS observations provide key information to retrieve greenhouse gases, land surface and cloud properties. When CrIS data is combined with ATMS, the fusion of these data is capable of profiling high quality atmospheric temperature and water vapor. This information has shown its potential for short-term forecasting of convective activity.

Figure. CrIS 1596 cm^{-1} brightness temperature from February 12, 2023.

Preliminary/non-operational data

Highlights from the Science Teams (February)

Beta maturity for NOAA-21 products

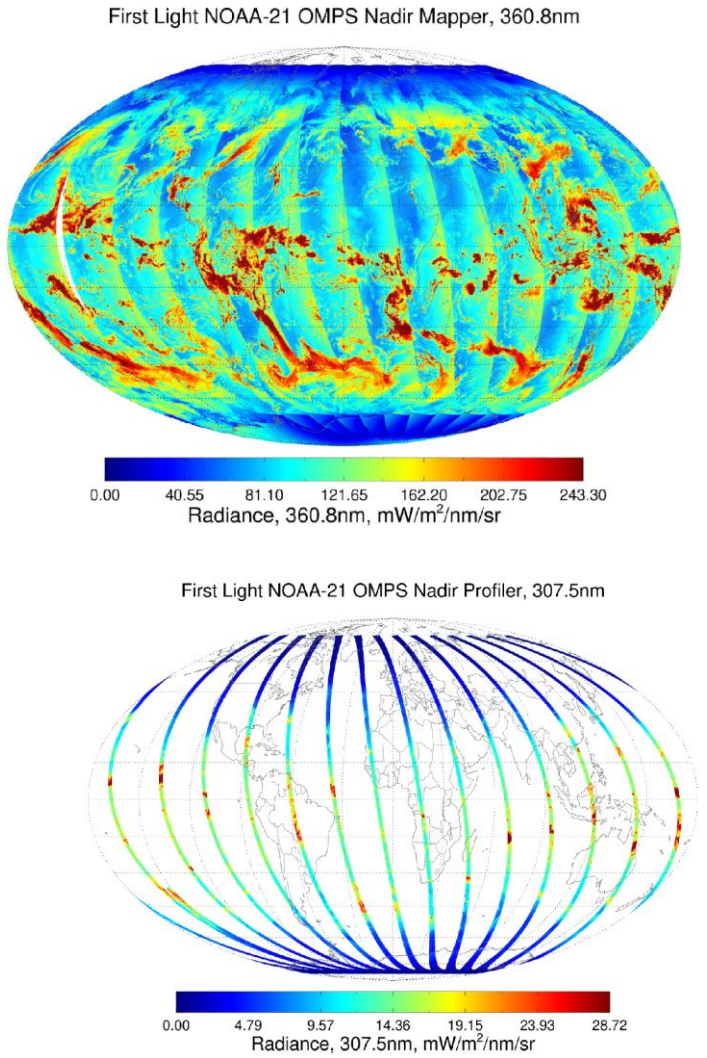
Sensor	Algorithm	Beta	Provision	Validated	ReadMe
ATMS	ATMS TDR	30-Nov-2022	Dec-15-2022	May-2023	Read me
ATMS	ATMS SDR	30-Nov-2022	Dec-15-2022	May-2023	Read me
CrIS	CrIS SDR	Feb-2023	Apr-2023	Sep-2023	Read me
VIIRS	VIIRS SDR	Feb-2023	Mar-2023	Jul-2023	Read me
OMPS	OMPS Nadir Mapper SDR	Feb-2023	Apr-2023	Dec-2023	
OMPS	OMPS Nadir Profiler SDR	Feb-2023	Apr-2023	Dec-2023	
VIIRS	KPP Imagery EDRs	Feb-2023	Mar-2023	Jul-2023	Read me

On February 9 and 10, science data from NOAA-21 and VIIRS thermal emissive bands, CrIS, and OMPS began production following the resolution of the NOAA-21 Ka transmitter anomaly.

The STAR CrIS SDR, VIIRS SDR, OMPS SDR, and VIIRS Imagery EDR teams participated in Beta maturity reviews on February 23. All of these products were declared Beta maturity at that time except OMPS Nadir Profiler and Nadir Mapper, which are awaiting lookup table updates and further observation before approval.

Highlights from the Science Teams (February)

NOAA-21 OMPS first light imagery



The OMPS instrument onboard NOAA-21, which carry three sensors - the Nadir Mapper (NM), Nadir Profiler (NP), and Limb Profiler (LP). The OMPS NM and NP acquired their first two consecutive days of Earth View radiance with a nominal resolution on February 17 and 18, 2023. The OMPS measures the health of Earth's ozone layer, and continues a crucial global data stream produced by current ozone monitoring systems. Measurements of ozone throughout Earth's atmosphere are key to issuing air quality warnings and creating the National Weather Service's UV indexes.

The OMPS instrument suite onboard NOAA-21 has several significant innovations compared to the previous OMPS on NOAA-20. One is the high-resolution mode for OMPS-NM (Mapper). The ground pixel size is reduced to 8.5km by 12 km at nadir for NOAA-21. The NOAA-20 Mapper has a ground pixel size of 17x50 km, while the SNPP Mapper has a ground pixel size of 50x50 km. This signification improved spatial resolution enables us to better detect, track and monitor ozone and other greenhouse gasses such as SO_2. The NOAA-21 OMPS suite has the limb profiler instrument which is absent on the NOAA-20 OMPS suite and is present on the S-NPP OMPS.

Figure. OMPS Nadir Mapper 360.8 nm radiance (top) and Nadir Profiler (bottom) 307.5 nm radiance.

Preliminary/non-operational data

Accomplishments

Delivery Date	Delivery Algorithm Packages (DAPs) – Enterprise Products:	Recipient
02/05/23	Derived Motion Winds (DMW) J2 Final CCAP Patch to include dockerfile and executables	NCCF
02/06/23	HEAP Kernel Averaging Preliminary CCAP to OSPO for SCR	Google Drive
02/06/23	MiRS v11.9 Final CCAP Patch to update python script	NCCF
02/09/23	Offline LSE Final DAP to CSPP LEO	UW/CIMSS
02/17/23	LST Final CCAP	NCCF
02/24/23	EN Rainfall Estimates Preliminary CCAP to OSPO for SCR	NCCF
02/24/23	Regional hourly Advanced Baseline Imager and Visible Imaging Radiometer Suite Emissions (RAVE) CCAP	NCCF
03/01/23	NOAA-21 OMPS NM OSOL LUT, OMPS NM wavelength LUT, and NP wavelength LUT for wavelength scale registration to fix 3-pixel wavelength shift errors	

Accomplishments – JPSS Cal Val Support

NOAA-20/S-NPP Operational Calibration Support:

S-NPP	Weekly OMPS TC/NP Dark Table Updates	**02/07/23, 02/14/23, 02/21/23, 02/28/23**
NOAA-20	Weekly OMPS TC/NP Dark Table Updates	**02/07/23, 02/14/23, 02/21/23, 02/28/23**
S-NPP	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	**02/14/23, 02/28/23**
NOAA-20	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	**02/07/23, 02/21/23**
S-NPP	Monthly VIIRS LUT Update of DNB Offsets and Gains	**02/27/23**
NOAA-20	Monthly VIIRS LUT Update of DNB Offsets and Gains	**02/27/23**
NOAA-21	Monthly VIIRS LUT Update of DNB Offsets and Gains	**03/02/23**
NOAA-21	Weekly OMPS TC/NP Dark Table Updates	**02/14/23, 02/21/23, 03/07/23**

Upcoming NOAA-21 Cal/Val Maturity Reviews

- **February, 2023 Maturity Review(s):**
  - VIIRS SDR Beta Maturity Review successfully completed on 02/23
  - VIIRS KPP Imagery EDRs Beta Maturity, successfully completed on 02/23
  - CrIS SDR Beta Maturity successfully completed on 02/23
  - OMPS-NM/NP Beta Maturity successfully completed on 02/23
- **March, 2023 Maturity Review(s):**
  - VIIRS SDR Provisional Maturity, **TBC: 3/30**
  - VIIRS KPP and non-KPP Imagery Provisional Maturity, **TBC: 3/30**
  - OMPS NP/TC Ozone EDR Beta Maturity, **TBC 3/30**
- **April, 2023 Maturity Review(s)**
  - CrIS SDR Provisional Maturity, **TBC: 4/27**
  - OMPS NM/NP Provisional Maturity, **TBC: 4/27**
- **May, 2023 Maturity Review(s)**
  - Snow Fall Rate Beta Maturity, **TBC: 5/25**
  - MiRS EDR Products Beta Maturity, **TBC: 5/25**

JSTAR Code/LUT/Product Deliveries

Date	DAPs to DPMS
1/19/2023	NOAA-21 OMPS LUT update (DPMS Regression results confirmed by Trevor February 13)
2/2/2023	**Redelivered** NOAA-21 ATMS permanent S/W update to correct the H/S alerts
3/3/2023	**Delivered** NOAA-21 OMPS NM/NP OSOL wavelength LUTs for wavelength scale registration and fix 3-pixel wavelength shift errors.
3/15/2023	**Planned Delivery:** CrIS J2 Eng. Pkg. update delivery EPv211(for Provisional Maturity)

Date	Remaining J2-Ready DAPs to NCCF
March, 2023	J2-ready OMPS LP DAP to NCCF (ASSISTT □ NCCF)
March, 2023	J2-ready Ocean Color DAP to NCCF (ASSISTT □ NCCF)

FY23 STAR JPSS Milestones

Milestones	Original Date (column I)	Forecast Date	Actual Completion Date	Variance Explanation
Algorithm Updates DAPs/CCAPs				
ATMS J2 PCT updates (as needed)	Jan-23	Jan-23	Delivered	
CrIS J2 Eng Pkg update delivery	Jan-23	02/09	Delivered on 02/09 for Beta	
VIIRS J2 LUTs update delivery	Jan-23	Jan-23	Delivered (January 26)	
OMPS J2 LUTs update delivery	Jan-23	Jan-23	Delivered	
OMPS LP J2 ready DAP (to NCCF)	Mar-23	Mar-23	**Larry can deliver by end of March for L1 and L2**	
Ocean Color J2 ready DAP (to NCCF)	Mar-23	Mar-23		
CCAP to NCCF (Aerosol AOD & ADP)	Oct-22	Oct-22	10/26/22	
CCAP to NCCF (CM, Phase, Height, CBH, CCL, COMP)	Oct-22	Oct-22	10/26/22	
CCAP to NCCF (VPW, Cryosphere, Volcanic Ash)	Nov-22	Nov-22	11/15/2022, 11/18/2022, **VPW: 01/06/2023**	
CCAP to NCCF (LST, LSA)	Nov-22	Nov-22	Delayed to 12/15/2022 **Delayed: 01/20/2023**	
CCAP to NCCF (VI, GVF)	Nov-22	Nov-22	11/15/2022, **1/11/2023**	
CCAP to NCCF (MiRS, OMPS NP V8Pro)	Jan-23	Jan-23	MiRS:12/31(separate delivery) **MiRS: v11.9 Final CCAP Delivered:1/26/2023** **Delivered: OMPS 12/23**	
CCAP to NCCF (HEAP, N4RT)	Mar-23	Mar-23	**Code delivered for SCR 2/6**	
CCAP to NCCF (ACSPO SST)	Apr-23	Apr-23		
Enterprise Fires	Apr-23	Apr-23		
CCAP to NCCF (VH, VOLCAT Phase 1, OMPS V8TOz)	May-23	May-23		
CCAP to NCCF (Gridded Land)	Jul-23	Jul-23		
CCAP to NCCF (Cloud Provisional)	Jul-23	Jul-23		

FY23 STAR JPSS Milestones

Milestones	Original Date	Forecast Date	Actual Date	Variance Explanation
Algorithm Cal/Val/LTM				
JPSS-2 First Light Images (Nov-22: ATMS; Dec-22: VIIRS VIS/NR, Feb-2023 VIIRS TEB, Feb-2023 VIIRS DNB, Feb-2023 OMPS, Feb-2023 CrIS)	Dec-22	Dec-22	11/22/2022 ATMS 12/05/2022 VIIRS VIS/NIR 02/09/2023 VIIRS TEB 02/09/2023 VIIRS DNB 02/12/2023 CrIS SDR 02/18/2023 OMPS	Ka Transmitter anomaly delayed doors opening for VIIRS/CrIS/ OMPS
FY22 End of Year Science Team Presentations (all teams)	Nov-22	Nov-22	Not Needed	
FY24 Program Management Review (all teams)	Jun-23	Jun-23		
AST-2022 (VIIRS Annual Surface Type)	Sep-23	Sep-23		
Transfer reprocessed S-NPP SDR data to CLASS (finish by Oct-2023); Start EDR reprocessing for some products	Sep-23	Sep-23		
JPSS-3 pre-launch test data review/analyze (SDR teams); JPSS-3/JPSS-4 activities/reviews support	Sep-23	Sep-23		
Maintain / Update ICVS (develop ICVS JPSS-2 modules to support varies activities: monitoring, inter-sensor comparison, …)	Sep-23	Sep-23		
Maintain / Expand (to include JPSS-2 products) JSTAR Mappers	Sep-23	Sep-23		
Images of the Month	Monthly	Monthly		

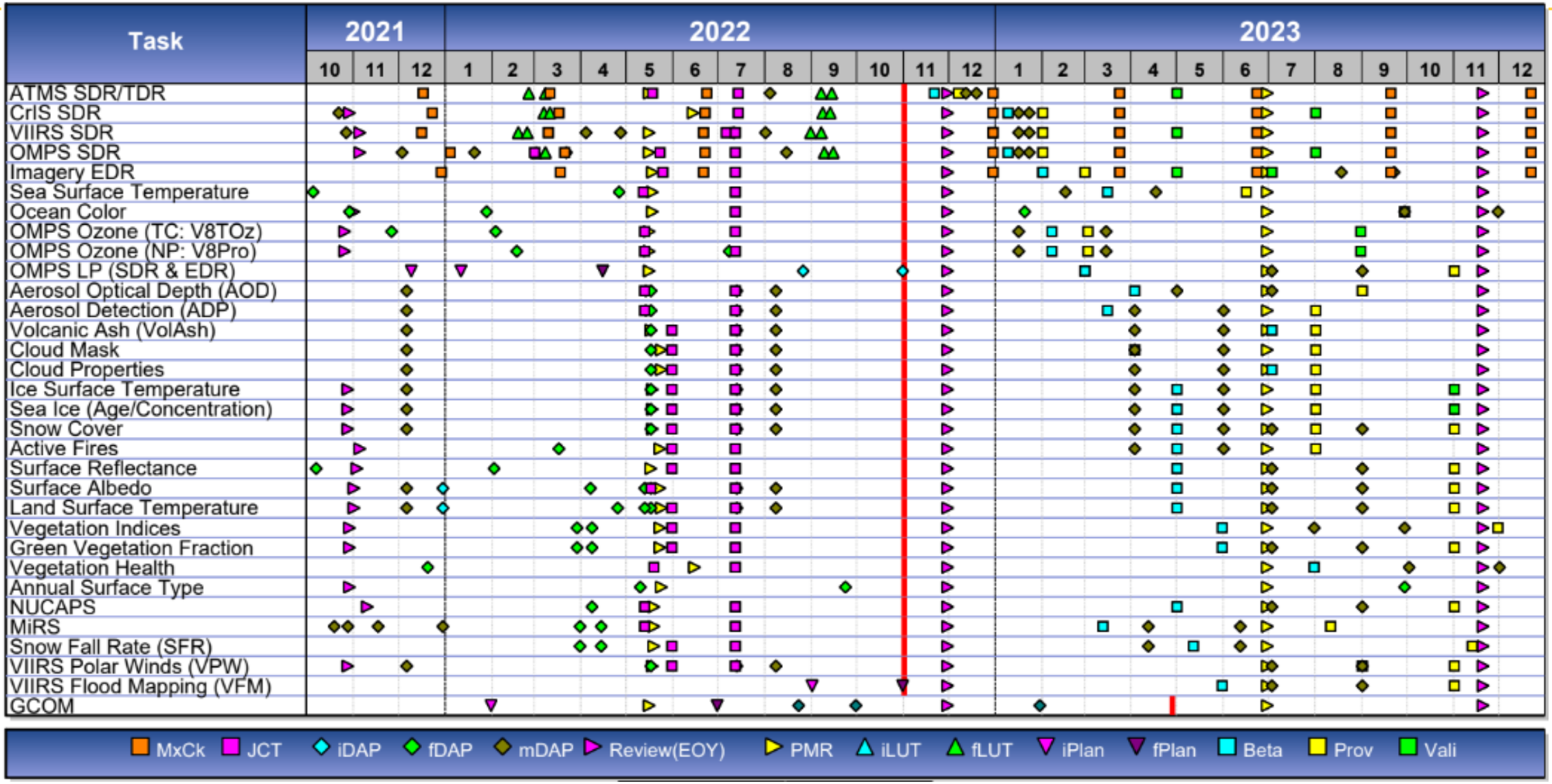
FY23 STAR JPSS Milestones

Milestones	Original Date	Forecast Date	Actual Date	Variance Explanation
NOAA-21 Cal/Val Maturity Reviews				
ATMS TDR/SDR (B/P: Dec-2022; V: May-2023)	May-23	May-23	Provisional Achieved: 12/15; Validated Planned: 05/10	
CrIS SDR (B: Jan-23; P: Feb-23; V: Aug-23)	Aug-23	Aug-23	Beta Achieved: Feb 23; Provisional Planned: 04/27 Discussion on-going to expedite Provisional	Ka band Transmitter swap
VIIRS SDR (B: Dec-22; P: Feb-23; V: May-23)	May-23	May-23	Beta Achieved: Feb 23; Provisional Planned: 03/30	Ka band Transmitter swap
OMPS SDR (B: Jan-23; P: Feb-23; V: Aug-23)	Aug-23	Aug-23	Beta Achieved: Feb 23 pending LUT update; P: 04/27	Ka band Transmitter swap
KPP VIIRS Imagery (B: Jan-23; P: Feb-23; V: May-23)	May-23	May-23	Beta Achieved: Feb 23; Provisional Planned: 03/30	Ka band Transmitter swap
Non-KPP VIIRS Imagery (B: Feb-23; P: Mar-23; V: Jul-23)	Jul-23	Jul-23	Beta Achieved: Feb 23; Provisional Planned: 03/30	Ka band Transmitter swap
Clouds (B: CM: Apr-23; Others: Jul-23; P: Aug-23)	Aug-23	Aug-23	Requires approximately a delay of 2 months to reach Beta and Provisional maturity. Since the validated maturity has a longer span, there is a possibility that the science teams may be able meet the validated maturity dates without any delays. **Dates finalized and available on JSTAR website.**	Ka band Transmitter swap
Aerosol AOD (B: Apr-23; P: Sep-23)	Sep-23	Sep-23		Ka band Transmitter swap
Aerosol ADP (B: Mar-23; P: Aug-23)	Aug-23	Aug-23		Ka band Transmitter swap
Volcanic Ash (B: Jul-23; P: Aug-23)	Aug-23	Aug-23		Ka band Transmitter swap
Cryosphere (B: May-23; P: Aug-23 for Sea Ice & Binary Snow)	Aug-23	Aug-23		Ka band Transmitter swap
Active Fires (B: May-23; P: Aug-23)	Aug-23	Aug-23		Ka band Transmitter swap
LST/LSA/SR/GVF/VI (B: May-23)	May-23	May-23		Ka band Transmitter swap
Vegetation Health (B: Jul-23)	Jul-23	Jul-23		Ka band Transmitter swap
Ocean Color (B: Sep-23)	Sep-23	Sep-23		Ka band Transmitter swap
SST (B: Mar-23; P: Jun-23)	Jun-23	Jun-23		Ka band Transmitter swap
VPW (B: Sep-23)	Sep-23	Sep-23		Ka band Transmitter swap
VFM (B: May-23)	May-23	May-23		Ka band Transmitter swap
NUCAPS (B: May-23)	May-23	May-23		Ka band Transmitter swap
MiRS (B: Mar-23; P: Aug-23)	Aug-23	Aug-23		Ka band Transmitter swap
SFR (B: May-23)	May-23	May-23		Ka band Transmitter swap
OMPS NP EDR V8Pro & V8TOz (B: Feb-23; P: Mar-23)	Mar-23	Mar-23		Ka band Transmitter swap
OMPS LP (B: Mar-23)	Mar-23	Mar-23		Ka band Transmitter swap

FY23 STAR JPSS Milestones

Milestones	Original Date	Forecast Date	Actual Completion Date
Operational/Program Support			
S-NPP: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	10/04/22, 10/12/22, 10/19/22, 10/26/22, 11/01/22, 11/08/22, 11/15/22, 11/22/22, 11/28/22, 12/06/22, 12/13/22, 12/19/22, 01/03/23, 01/10/23, 01/17/23, 01/23/23, 0131/23**, 02/07/23, 02/14/23, 02/21/23, 02/28/23**
S-NPP: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	10/12/22, 10/26/22, 11/08/22**,** 11/22/22, 12/06/22, 12/19/22**,** 01/03/23, 01/17/23, 1/31/23**, 02/14/23, 02/28/23**
S-NPP: Monthly VIIRS LUT update of DNB Offsets and Gains	Monthly	Monthly	10/04/22, 11/01/22, 11/28/22**,** 01/03/23, 01/30/23, **02/27/23**
NOAA-20: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	10/04/22, 10/12/22, 10/19/22, 10/26/22, 11/01/22, 11/08/22**,** 11/08/22, 11/15/22, 11/22/22, 11/28/22, 12/06/22, 12/13/22, 12/19/22, **01/03/23,** 01/03/23, 01/10/23, 01/17/23, 01/23/23, 0131/23, **02/07/23, 02/14/23, 02/21/23, 02/28/23**
NOAA-20: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	10/04/22, 10/19/22, 11/02/22, 11/15/22, 11/29/22, 12/13/22**,** 01/03/23, 01/10/23, 01/24/23, **02/07/23, 02/21/23**
NOAA-20: Monthly VIIRS LUT update of DNB Offsets and Gains	Monthly	Monthly	10/04/22, 11/01/22, 11/28/22, **01/03/23,** 01/30/23**, 02/27/23**
NOAA-21: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	**01/31/23, 02/14/23, 02/21/23, 03/07/23**
NOAA-21: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	**03/06/23**
NOAA-21: Monthly VIIRS LUT update of DNB Offsets and Gains	Monthly	Monthly	**03/6/23**
Mx builds deploy regression review/checkout (Mar-23 Mx8; Jun-23 Mx9; Sep-23 Mx10; SDRs and VIIRS Imagery teams)			MX8 SOL STAR 'Go/No GO' Report Due: SOL (March 9th) March 27 (Go/No GO) MX8 I &T STAR 'Go/NOGO' Report Due: May 10

STAR JPSS Schedule: TTA Milestones



- Chart not updated for status as of end November 2022 ~ onboarding Quality Assurance (QA) Analyst.

Backup:
Quad charts from science teams

Color code:

Green: **Completed Milestones**

Gray: **Ongoing FY23 Milestones**

Active Fires

February 2023

Accomplishments / Events:

- Continued validation and cross-check against MASTER and VOLCAT detections to evaluate impact of atmospheric correction and detection sensitivity
- The team provided an update on the performance of the NOAA-21 VIIRS I-band Active Fire product. These results were first presented at the bi-weekly Radiance Science Team meeting on February 21. Some of the results were also incorporated into the VIIRS SDR Beta Maturity briefing on February 23.

Overall Status:

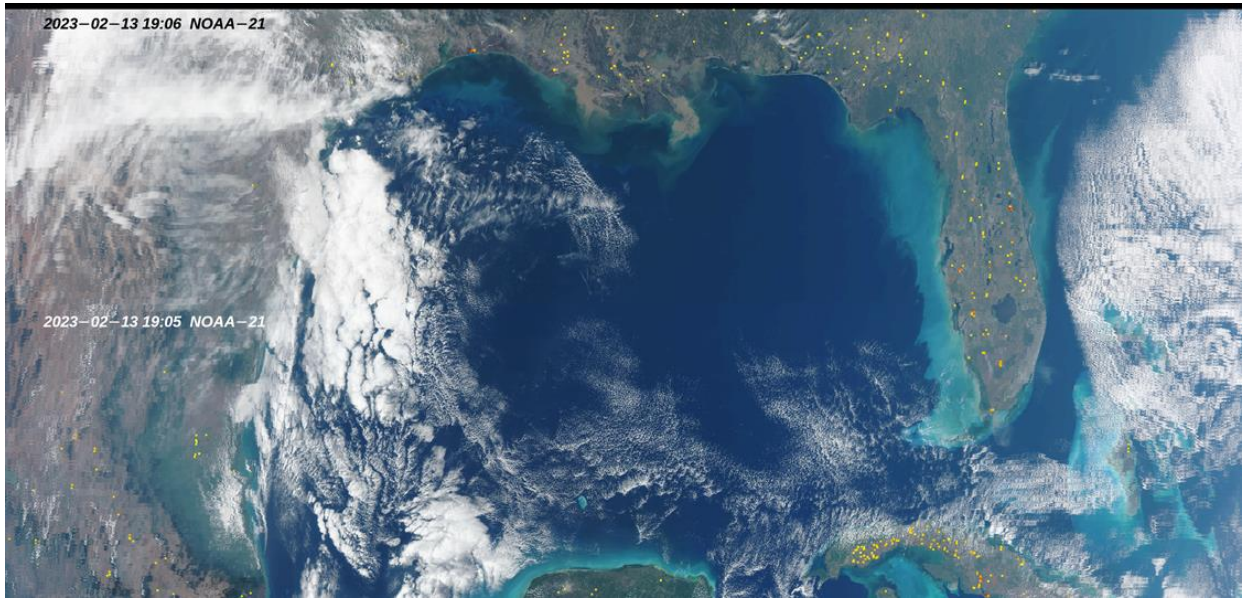
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		x			
Technical / Programmatic		x			
Schedule		x			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 Beta Maturity	May-23	May-23		
NOAA-21 Provisional Maturity	Aug-23	Aug-23		
NOAA-21 post-launch testing towards Provisional Maturity	Mar-23	Mar-23		
I-band algorithm improvements for non-optimal conditions and ATBD updates	Sep-23	Sep-23		
Science code updates to ASSIST/CSPP for eFire for NDE/NCCF	Sep-23	Sep-23		
Reactive maintenance of Suomi NPP and NOAA-20 M-band and I-band NDE products	Sep-23	Sep-23		
LTM & Anomaly Resolution (L) with Suomi NPP / NOAA-20 data analysis and feedback	Sep-23	Sep-23		

Daytime VIIRS I-band fire radiative power data on February 13, 2023, NOAA-21 preliminary,



Aerosol

February 2023

Accomplishments / Events:

- Evaluated NOAA-21 AOD retrievals. A qualitative examination of the AOD fields for selected days showed no visually discoverable issues. Developed the code needed for collocating GFS model data, NOAA-21 AOD and ground-based AERONET AOD. The initial validation performed for a limited number of days presented expected performance and similar to that from S-NPP and NOAA-20.
- Continued reprocessing of NOAA-20 AOD retrievals on the AWS. Examined reprocessed Aug-Oct,2022 AOD retrievals. Collected datasets needed, and reprocessed the AOD for November 2022.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 Aerosol Products (ADP, AOD) Beta Maturity	Mar-23 Apr-23	Mar-23 Jun-23		
NOAA-21 Aerosol Products (ADP, AOD) Provisional Maturity	Aug-23 Sep-23	Aug-23 Nov-23		
Update to a faster version AI-based surface-reflectance-relationship algorithm (ML-SFRA)	Jun-23	Sep-23		developer left the team
Develop “smoke AOD and smoke concentration” product for health impact studies	Jul-23	Jul-23		
Maintain and continue reprocessed ADR product	Jul-23	Jul-23		
Work with ASSIST team in delivering DAPs associated with algorithm updates	Sep-23	Sep-23		

Overall Status:

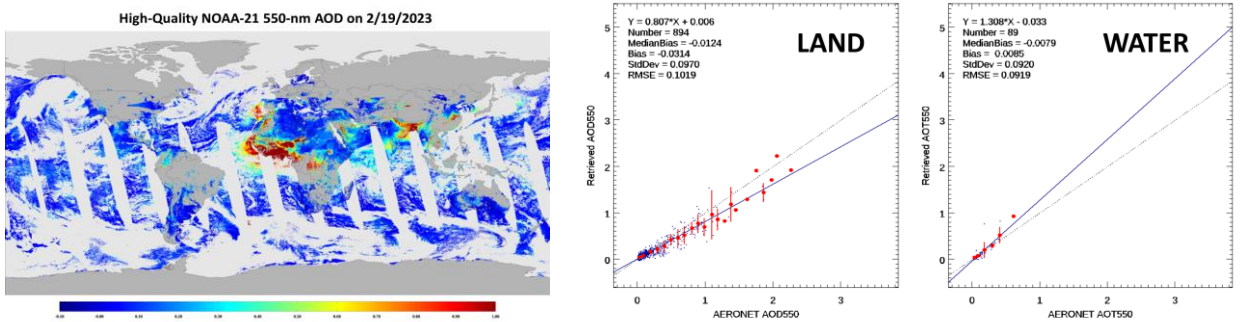
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

No risks. Issue: Developer of the ML-SFRA has left the team; date of milestone will slip.

Highlight:



Left: High-quality NOAA-21 AOD on 2/19/2023. *Right*: Quantitative evaluation of NOAA-21 AOD over land and water with AERONET AOD. Quality of NOAA-21 AOD is as expected.

Preliminary/non-operational data

ATMS SDR

February 2023

Accomplishments / Events:

- Continue to analyze the NOAA-21 ATMS Noise Characterization, Environmental Characterization before and after permanent pitch adjustment, Constant Speed Scanning during OMPS pitch maneuver, and Active Geolocation Accuracy PLT data sets to characterize the NOAA-21 ATMS post-launch performance.
- Discussed the static and dynamic cold calibration correction algorithms to improve the TDR data quality. It has been demonstrated the dynamic cold bias correction algorithm can better handle the impact of earth radiation contamination when cold space observations are sampled. Further study is ongoing. A experimental prototype correction algorithm will be developed and tested to verify if there is a improvement in calibration accuracy.
- Discussed the impact of near field satellite radiation contamination on ATMS radiance data. Preliminary analysis results indicate that the limb side bias may be effective mitigated by adding such near field contamination correction terms. Study is still ongoing. Additional progress will be reported later.
- Presented NOAA-21 ATMS on-orbit performance in GSICS annual meeting to promote the usage of ATMS data in international satellite user communities.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 ATMS TDR/SDR First light and Beta Maturity	Nov-23	Nov-23	11/30/22	
NOAA-21 ATMS TDR/SDR Provisional Maturity	Dec-23	Dec-23	12/15/22	
NOAA-21 ATMS TDR/SDR Validated Maturity	May-23	May-23		
Evaluate new NEDT algorithm performance	Sep-23	Sep-23		
LTM and Anomaly Resolution (S-NPP, NOAA-20, NOAA-21)	Aug-23	Aug-23		

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

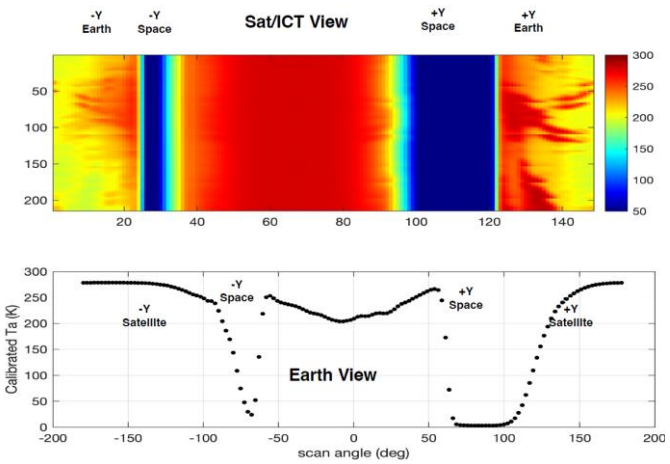
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

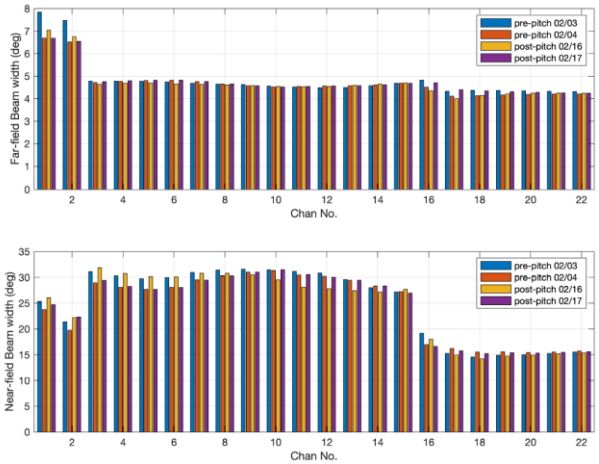
None

Highlights:

N21 ATMS Channel 1 Environmental Characterization Data Collected on February 17 After Permanent Pitch Adjustment



NOAA-21 ATMS Far and Near- field beam width comparison before and after permanent pitch adjustment



Clouds

February 2023

Accomplishments / Events:

- A paper titled “A Framework for Satellite-based 3D Cloud Data: An Overview of the VIIRS Cloud Base Height Retrieval and User Engagement for Aviation” has been published in *Remote Sensing* - Special Issue on “VIIRS 2011–2021: Ten Years of Success in Earth Observations” which was co-authored with CIRA researchers and NOAA collaborators (*Noh et al. 2022*).
- A summary of cloud cross-section product development and user engagement was provided in the 2022 NESDIS Science Report (‘Clouds’ section), and the product was introduced in the AOPA (Aircraft Owners & Pilots Assoc.) 2022 Weather Survey for pilots’ feedback. CIRA’s aviation website has been also updated for users’ evaluation.
- The Cloud team continues to prepare for evaluations from NOAA-21 for beta and provisional reviews. Dates are TBD due to N21 Ka transmitter issue.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Develop VIIRS/CALIOP validation tools for JPSS-2	Dec-22	TBD		Code completed but requires N21 data to test
Integrate latest Enterprise Cloud Mask (ECM) version within NDE	Dec-22	Dec-22		Cloud algorithms delivered to ASSISTT. NDE is integrating code
Prepare Cloud Base Height (CBH)/Cloud Cover Layers (CCL) algorithm transition and operation for JPSS-2	Jan-23	Jan-23		
Integrate new ECM lookup table to allow easier threshold changes	Mar-23	Mar-23		
JPSS-2 Beta Review (ECM)	Apr-23	TBD		TBD due to Ka transmitter issue
Validate CCL that was recently delivered, especially convective/supercooled layers as part of CCL Beta review	Jul-23	TBD		TBD due to Ka transmitter issue
NOAA-21 Cloud Products Beta Maturity	Jul-23	TBD		TBD due to Ka transmitter issue
NOAA-21 Cloud Products Provisional Maturity	Aug-23	TBD		TBD due to Ka transmitter issue

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Highlights:

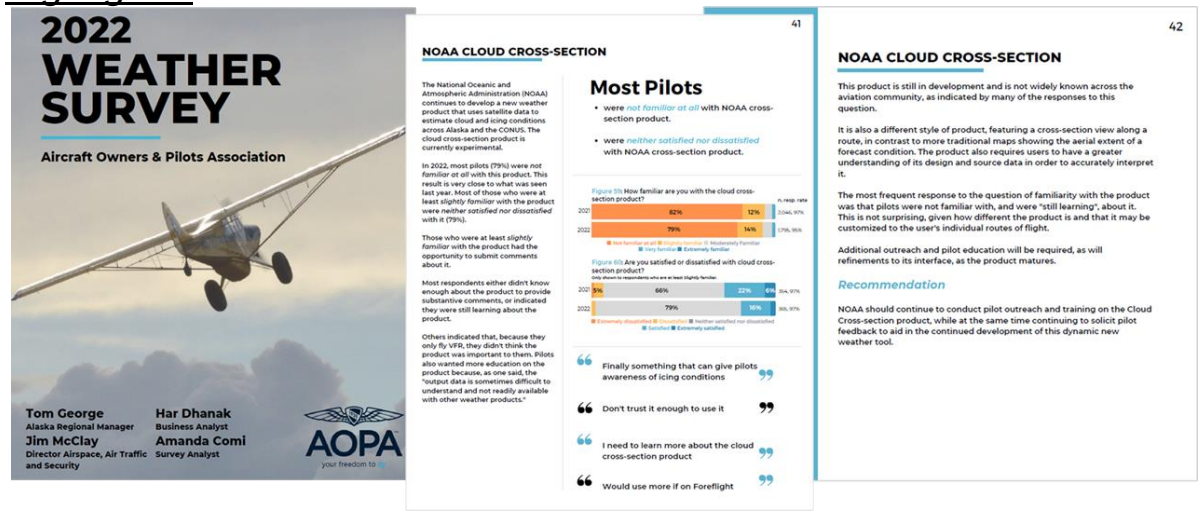


Figure 1. The Cloud Vertical Cross-section product has been introduced in the Aircraft Owners & Pilots Association (AOPA) 2022 Weather Survey for pilots’ feedback. Most pilots are “still learning", but most of those who were at least slightly familiar with the product found usefulness and wanted more outreach and training. We continue to improve the product and the website tool based on user feedback from aviation users and forecasters (e.g., NWS Cleveland, OH).

CrIS SDR

February 2023

Accomplishments / Events:

- Continue to record and monitor the timeline of the NOAA-21 CrIS commissioning and Cal/Val plan (**Fig.1**) as well as the related events associated with the satellite, e.g., the update to the activation of NOAA-21 CrIS and the OMPS maneuvers.
- Successful monitoring and reporting on the recovery of NOAA-21 CrIS data after recovery of the SMD data from the NOAA-21 satellite. (**Fig. 2)**
- Reported on the February 10th NOAA-21 CrIS First Light images and analysis that were published on the NESDIS website on February 16, 2023 (**Fig. 3**)
- Completed the NOAA-21 CrIS Beta Maturity Science Review on February 23rd: Successfully demonstrated that NOAA-21 CrIS SDR product satisfies Beta Maturity level requirements, and the science data was declared to have achieved beta on February 23, 2023 (**Fig. 4, Fig. 5** and **Fig. 6** for three examples of the analysis). Submitted a beta maturity review presentation and ReadMe file for the review.
- Performed Intensive Monitoring and assessment of the Spectral and Radiometric Accuracy, Telemetry monitoring, Bit trim mask verification, noise performance, geolocation, and intercomparisons using the early commissioning data at STAR, UW and UMBC in preparation for the Beta maturity review.
- Support, tested, and verified the operational algorithm update, which is a critical preventive patch for NOAA-21 CrIS to mitigate the impact of invalid Neon lamp readings if the Neon lamp failed to start on time.
- Supported the successful upload of Engineering Packet v210 with TVAC nonlinearity coefficients and ILS parameters, marking the successful completion of reaching Effective Beta Maturity level.
- Making progress on the preparation of several journal articles, including for the commissioning of NOAA-21 CrIS, the Neon Mitigation plan, and one on the CrIS Spike Anomaly Algorithm.
- The geolocation accuracy assessment code that does not require SCDR was updated for N21 CrIS
- Performed nonlinearity assessments at STAR and UW using diagnostic mode (DM) data (**Fig. 7**) to verify the nonlinearity coefficients of Engineering Packet v210 & performed an initial optimization of the ILS parameters.
- Assessed the observation of elevated imaginary radiance levels in NOAA-21 CrIS in the -45 to -60 deg Latitude region (Fig. 9.). These observed radiances do not have an impact on the resulting calibrated radiances.
- Continued to refine the new STAR CrIS SDR Cal/Val website.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Transition the J2 CrIS SDR data product to the Beta Maturity Level by Launch+57 days	Jan-23	Jan-23	Feb-23	Delayed to Feb due to J2 KA transmitter anomaly and switch to side-2 KA transmitter
Transition the J2 CrIS SDR data product to the Provisional Maturity Level by Launch+82	Feb-23	Feb-23		" "
Transition the J2 CrIS SDR data product Validated Maturity Level by Launch+8 months	Aug-23	Aug-23		
Participate in commissioning of NOAA-21 CrIS, requiring at least 6 months of intensive calibration and validation activities.	Sep-23	Sep-23		
Maintain 3 CrIS sensors (SNPP, NOAA-20 and NOAA-21) in orbit providing Key Performance Parameter (KPP) products.	Sep-23	Sep-23		

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic			X		See Issues/Risks
Schedule			X		See Issues/Risks

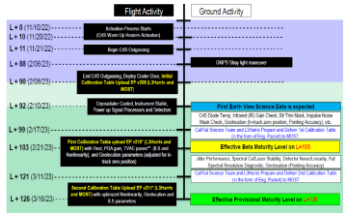
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

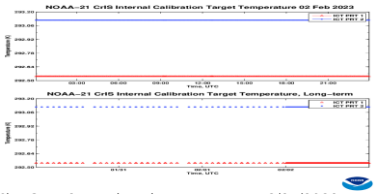
- The CrIS Team got a 100TB storage on STAR servers (data638 and data645) in May 2022. However, the CrIS Team is still in need of hardware/software resources. Presently, there is only one server dedicated to 6 CrIS Team members. We have received access to new servers, but these are shared with other STAR teams, and additional dedicated servers is still desirable. There is a risk for the CrIS SDR Team to continue on such a single server environment for the operational CrIS Cal/Val activities that include 5 CrIS sensors (SNPP, JPSS-1 to -4). This may affect the timely completion of deliverables and program milestones. The recommendation is to have one additional server/storage as soon as possible (< 2 months) and add another server/storage in the next months. A new MATLAB license is also required. Corresponding hardware/software quotations and SNO have been submitted. Corresponding JSTAR CrIS Risk/Issue on Hardware and Software have been submitted for JSTAR interval review on Jan. 6, 2023. Finally, a member of our team, Lin Lin, has left the group on 2/24/2023. A new team member is currently being sought after as a replacement.

Highlights:

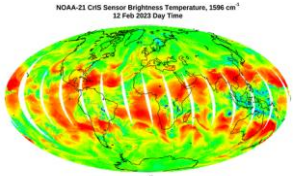
(1) The latest Timeline of NOAA-21 CrIS commissioning and Cal/Val Activities (as of 3/3/2023)



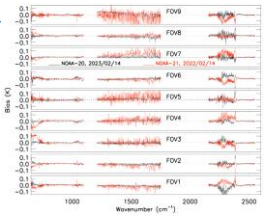
(2) Recovered ICT temperature telemetry for NOAA-21 CrIS after SMD data recovery



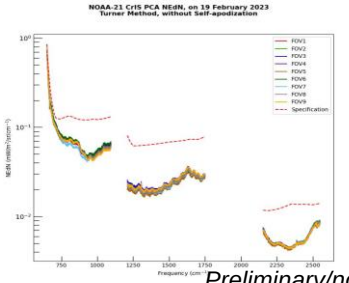
(3) NOAA-21 CrIS BT Map from First Light, 2/12/2023 daytime



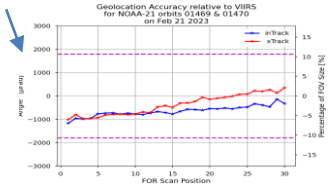
(4) NOAA-21 CrIS FOV2FOV relative radiometric consistency using SDR data for 2/14/2023. The variability is within +/- 0.1 K for all three bands



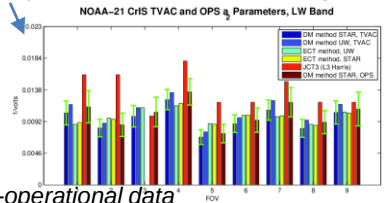
(5) NOAA-21 CrIS PCA NEdN on 2/19/2023 without the self-apodization effects. It should be noted that NOAA-21 has no outliers in the MWIR band and far less variance in the LWIR and MWIR bands for NEdN when compared with NOAA-20. There is also generally improved consistency in noise levels between the FOVs.



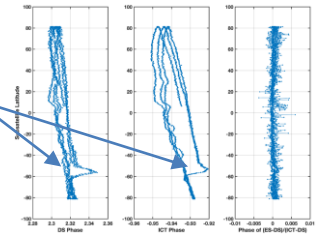
(6) NOAA-21 geolocation accuracy on 2/21/2023 with EP v210



(7) Resulting nonlinearity coefficients for NOAA-21 CrIS evaluated from on-orbit (OPS) Diagnostic mode data, compared to values derived from TVAC testing.



(8) Phase of scenes impacted by imaginary radiances as a function of latitude for DS and ICT scenes (in -45 to -60 deg Latitude). However, the phase of the resulting calibrated radiance is unaffected (right panel) Courtesy of UW)



Preliminary/non-operational data

Cryosphere

February 2023

Accomplishments / Events:

NOAA-20 VIIRS IST vs Helicopter-borne IST. A comparison is performed between the NOAA-20 VIIRS Ice Surface Temperature (IST) Product and IST measured by a helicopter-based IR camera [*Thielke et al*., 2022] during the MOSAiC expedition. IR camera images were used to create 5-m resolution maps of IST using helicopter flights from the RV Polarstern ship during the Fall/Winter 2019-2020. The locations of these flights, which were flown at ~300m altitude, are shown in Figure 1. A typical helicopter flight pattern, along with the locations of the nearest VIIRS grid cell center points, are shown in Figure 2. The differences in the mean IST show that the VIIRS IST and the helicopter-based IST are in good agreement. The RMSE values are larger in absolute value than the mean differences, likely due to the presence of intermittent low clouds, mist, and/or fog

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 Cryosphere Products – Beta Maturity	May-23	May-23		
NOAA-21 Cryosphere Products – Provisional Maturity	Aug-23	Aug-23		
Weekly and monthly snow products composite and statistics	Sep-23	Sep-23		
Prepare to implement blended VIIRS + AMSR2 SIC product	Sep-23	Sep-23		
Physically-based snow and snow-free land BRDF models, algorithm to infer the snow fraction	Sep-23	Sep-23		
Calibration/validation of NOAA-20 and S-NPP products with MOSAiC data	Sep-23	May-23		

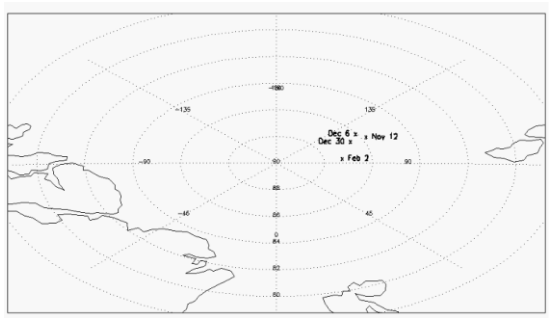


Figure 1. Coverage and dates for 4 of the 5 helicopter flights during MOSAiC (2019-2020). The flight location on Jan 7 was omitted for plot clarity.

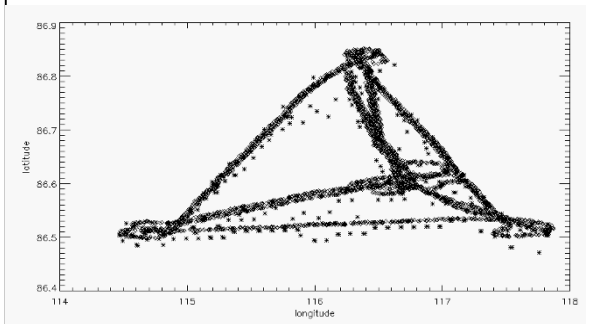


Figure 2. Helicopter flight track (black line / diamonds) and nearest VIIRS IST grid cells (stars) for the Dec 30, 2019 flight.

JSTAR Mapper and NPROVS

February, 2023

Accomplishments / Events:

- The JSTAR Mapper team worked new mapping tile format to bring current format into line with industry standards and tested methods of bacKa processing existing tiles.
- The NPROVS team provided briefings at the NUCAPS All-Hands and JPSS User Initiatives meetings which addressed the latest results with respect to the routine monitoring of NUCAPS characteristic performance **(Highlight)**
- Work continues to reprocess the NPROVS Special datasets for the GCOS Reference Upper Air Network (GRUAN) Data Products (GDP) for Vaisala RS41 and Mesei IMS-100 radiosondes.
- NPROVS team continues to assess the newly available descending node data from AEROSE-2022 campaign focused on the proper interpretation of radiosonde drift information which is needed to define the spatial/temporal coordinates of the descending radiosonde data

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks: None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
JSTAR Mapper: Maintain / expand operational JSTAR Mapper Site, STEMS	Sep-23	Sep-23		
NPROVS: Maintain /expand NPROVS Sounding Product/Sensor Monitoring/Assessment	Sep-23	Sep-23		
JPSS Dedicated Radiosonde Programs: Maintain programs for polar satellite synchronized radiosondes, expand to NOAA-21	Sep-23	Sep-23		
User Support:: Coordinate with JPSS User (NUCAPS) and Hydrological (MiRS) Initiatives	Sep-23	Sep-23		

Highlights

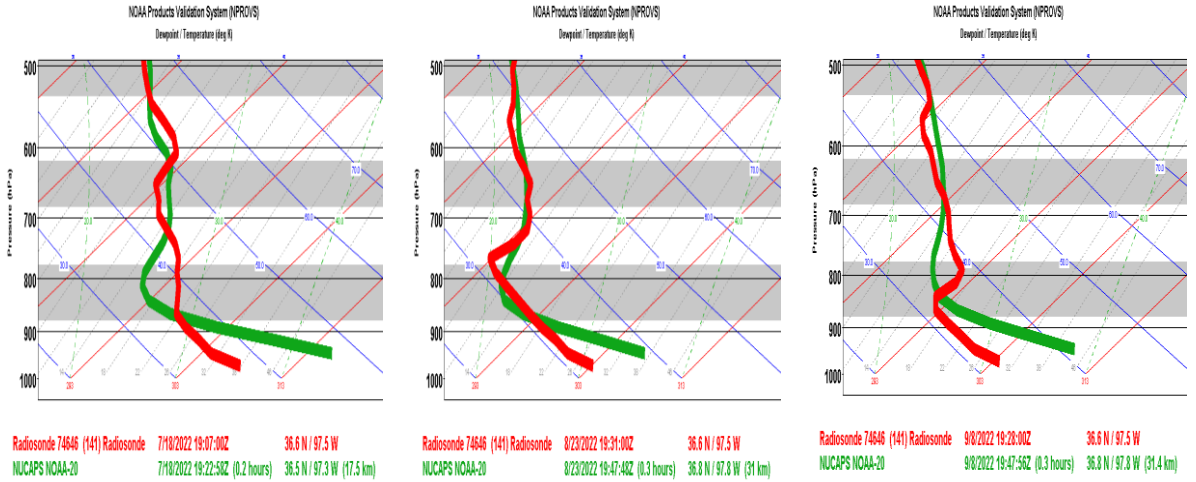


Figure 1: Each panel illustrates ground truth **Radiosonde** from JPSS dedicated radiosonde program that are synchronized with **NUCAPS** soundings from NOAA-20. The panels show collocations in July, August and September (2022) respectively, during daytime, confirming a persistent warm bias in the lower troposphere (below 850 hPa) for NUCAPS ranging from 5 to 10 degrees C. The panels illustrate the high value of dedicated radiosondes to characterize product performance and areas of concern which directly impact NWS users; investigations in coordination with the NUCAPS team continue.

GCOM-W

February 2023

Accomplishments / Events:

A validation study of NOAA-20 VIIRS and AMSR2 Sea Ice Concentration (SIC) over the Drift Ice Zone (DIZ) and Marginal Ice Zone (MIZ) in the Arctic using six-month (April-September 2022) Landsat imagery has been completed. The results show the VIIRS SIC product has better performance than AMSR2 in the DIZ and MIZ areas. The Landsat SIC has spatial resolution of 100 m, while the VIIRS and AMSR2 SICs have spatial resolution of 0.75 km and 10 km respectively. So that the aggregated Landsat SIC at 1 km is a good reference data set to validate the VIIRS and AMSR2 SICs. NOAA-20 Enterprise VIIRS, NASA Team-2 AMSR2 and Landsat SICs were remapped to the same 1-km EASE2 grid. Only scenes with solar zenith angles of less than 80° are used in the validation study. Furthermore, in this study, generally low SIC within 50 km from the ice/water interface is referred to as sea ice edge or MIZ, while dispersed high SIC with intermittent low SIC (<50%) at least 50 km away from ice/water interface is referred to as DIZ.

Overall Status:

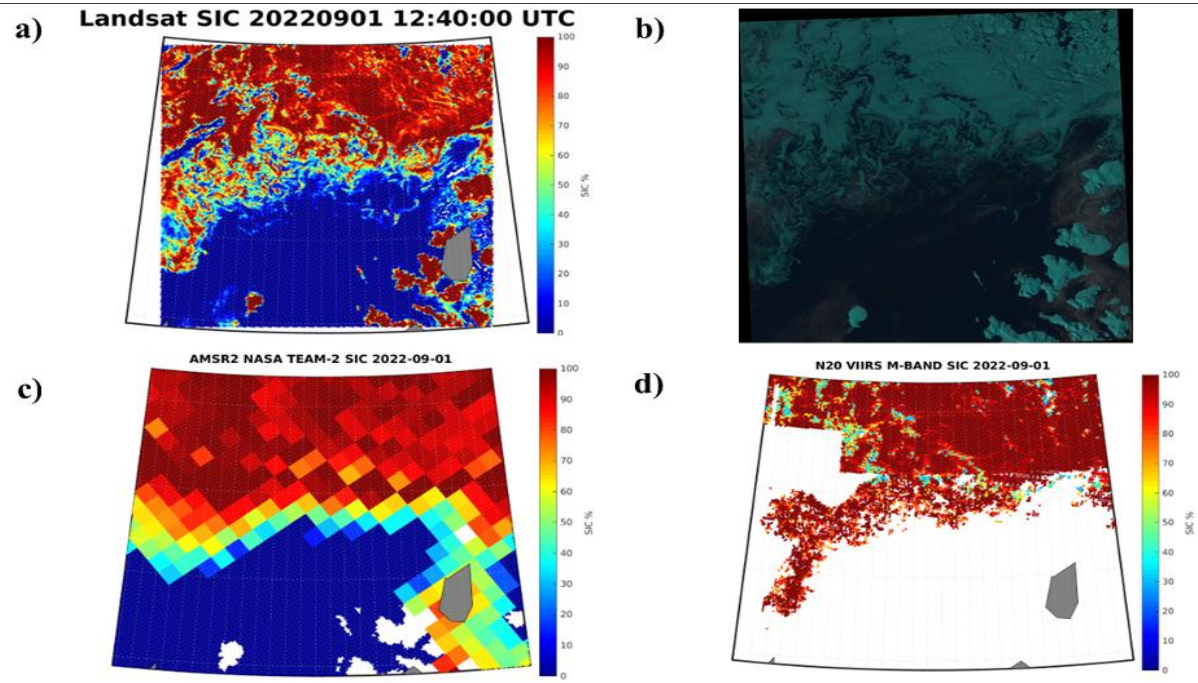
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

Need additional funding for continuity of GCOM-W AMSR2 and GOSAT-GW AMSR3 products

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Assessment of all EDR's for AMSR2, initiate changes for AMSR3	Sep-23	Sep-23		
Continue AMSR2 L1 monitoring; develop AMSR3 capabilities	Sep-23	Sep-23		
Deliver algorithm updates, as appropriate	May-23	May-23		



ICVS

February 2023

Accomplishments / Events:

- Support the generation of the NOAA-21 OMPS NM and NP first light images for the OMPS SDR team. First light image about the NM has been post in NESDIS News Room.
- Detected NOAA-21 CrIS deep space window size degradation events and provided preliminary analysis report to support CrIS SDR team post-launch Cal/Val activities.
- Produced NOAA-21 VIIRS thermal emission band global images in near real time to support VIIRS SDR team post-launch Cal/Val activities.
- Generated NOAA-21 OMPS/CrIS/VIIRS on-orbit data monitoring products to support SDR team Beta maturity reviews.
- Prepared and presented ICVS LTM LEO-LEO/GEO-LEO science data inter-sensor comparison development status report in GSICS annual meeting.
- Continued to improve ATMS/CrIS/VIIRS/OMPS instrument health status and science data quality near real time monitoring product generation packages to improve the result accuracy and execution efficiency/reliability
- Finished revising and submitted the manuscript about ATMS AI manuscript per reviewers' comments.
- Continued to provide NPP and NOAA-20 instrument/science data anomaly report to support SDR teams

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

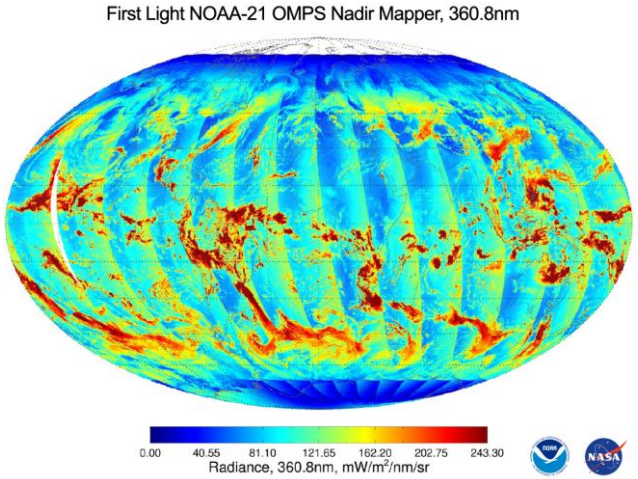
None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Develop ICVS JPSS-2 modules to support J2 RDR/SDR PLT activities	Jan-23 (L+60)			In progress
Develop ICVS modules to support the J2 SDR Beta and Provisional Reviews for the five sensors (e.g., update the SNPP/NOAA-20 SDR image/RGB/QC flags and other basic functions to J2)	Mar-23 (L+90D)			Beta review done
Develop ICVS modules to support the J2 SDR Validated Review for the five sensors (e.g., update the SNPP/NOAA-20 SDR O-B/JPSS inter-sensor functions to J2 if applicable)	May-23 (L+6m)			
Extend the existing OMPS-NM 380nm-VIIRS M1 monitoring to J2	Jun-23			
Develop the ICVS geolocation accuracy operational monitoring module for J2 OMPS (and CrIS if applicable) in coordination with the SDR teams	Jun-23			
Develop J2 ICVS LP monitoring modules (in coordination with the OMPS EDR and SDR teams)	Jul-23			
Develop an ICVS DCC module for the OMPS-NM SDR quality stability monitoring	Aug-23			
Improve the existing ICVS inter-sensor modules by extending them to J2 (e.g., ATMS vs. AMUS-A, OMPS-TC vs. GOME-2, etc.)	Sep-23			
Maintain and sustain the ICVS monitoring functions for SNPP and NOAA-20 spacecraft and five sensors, including report major anomaly events as needed	Sep-23			
Maintain the ICVS ATMS 3D hurricane tool and produce an event report as needed	Sep-23			
Develop new ICVS modules per ad hoc requests from the JPSS/key SDR/EDR users	Sep-23			

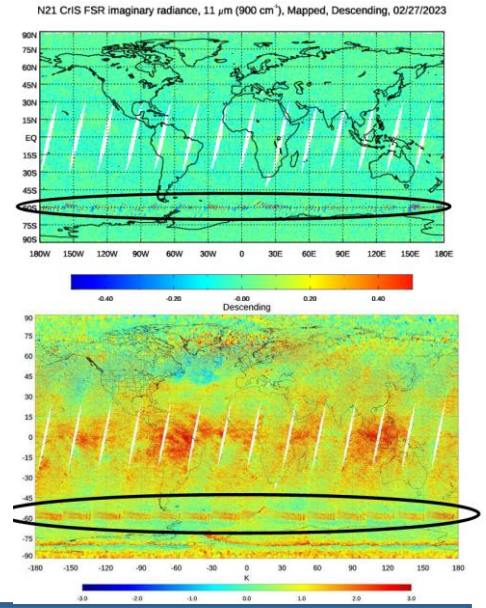
Highlights:

Significantly contribute to STAR SDR Teams

(a) N21 OMPS NM Radiance First Light Image Provided by ICVS Team



(b) N21 CrIS DS Window Size Degradation Impact Observed in Science Data



Preliminary/non-operational data

VIIRS Imagery

February 2023

Accomplishments / Events:

- Continued collection and analysis of NOAA-21 VIIRS Imagery, including comparisons with NOAA-20 and S-NPP, identifying artifacts and communicating them with the SDR team
- Analyzed, created, and shared NOAA-21 VIIRS EDR Imagery IR First Light examples
- Presented for the NOAA-21 VIIRS EDR Imagery Beta Review on Feb 23
- Created and published a VIIRS True Color RGB Imagery Quick Guide, available here
- Recent VIIRS Imagery Publication
  - Rogers, M.A., S.D. Miller, C.J. Seaman, J. Torres, D. Hillger, E. Szoke, and W.E. Line, 2023: VIIRS after 10 Years—A Perspective on Benefits to Forecasters and End-Users. Remote Sensing, 15(4), p.976, https://doi.org/10.3390/rs15040976.
- Recent VIIRS Imagery Social Media Posts
  - VIIRS IR Imagery shows sea ice motion north of Alaska.
  - VIIRS NCC Imagery shows overnight snow cover across high plains
  - VIIRS RGB Imagery characterizes cloud phase over southeast US
  - VIIRS RGB Imagery captures snowmelt across high plains
  - VIIRS RGB Imagery reveals blowing dust in Texas

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		x			
Schedule		X			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Deliver NOAA-21 VIIRS "First Light" EDR Imagery	Dec-22	Dec-22	Dec-22	
Participate in N-21 VIIRS EDR Imagery Maturity Reviews (B:Feb-23, P:Mar-23, V:Jul-23)				
FY23 Program Management Review	Jun-23	Jun-23		
NCC LUT Development Capability	Sep-23	Sep-23		
New Imagery products or product enhancements (display on SLIDER)	Sep-23	Sep-23	continuing	
Realtime Imagery monitoring and display systems (SLIDER, etc.)	Sep-23	Sep-23	continuing	
Interesting VIIRS Imagery to Social Media and Blogs	Sep-23	Sep-23	continuing	
McIDAS-X/V Enhancements for processing/display of VIIRS Imagery	Sep-23	Sep-23	continuing	
Block 2.3 Mx builds deploy regression review/checkout (Mx8/9:May-23, …)				

Highlights: Image of the Month

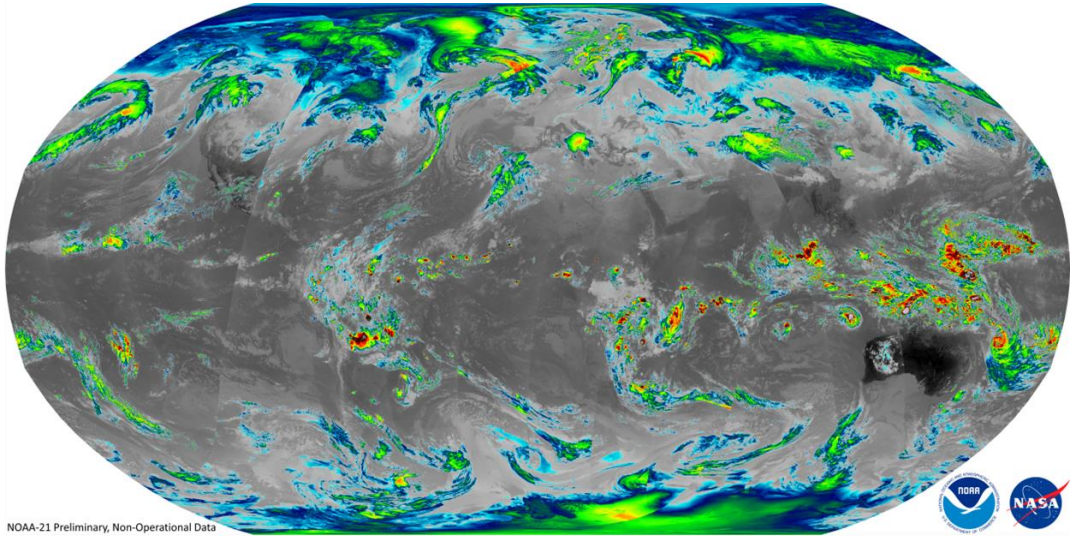


Figure: NOAA-21 VIIRS EDR Imagery IR first light M15 global composite.

Leaf Area Index

February 2023

Accomplishments / Events:

- LAI code refactoring, optimization, prepared for the upcoming code delivery.
- Reprocessing daily LAI data using updated algorithm, in which the training model was derived from sample balanced dataset for each biome type.
- Add convex hull as a criteria to screen the outliers of the training dataset, and use in the retrieval algorithm to flag the input data belong to the category or not.
- Inter-comparison with NASA VNP15 LAI product to preliminary evaluate the LAI product.
- Communicating with the EMC scientist to learn more about the users' requirement for LAI.

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

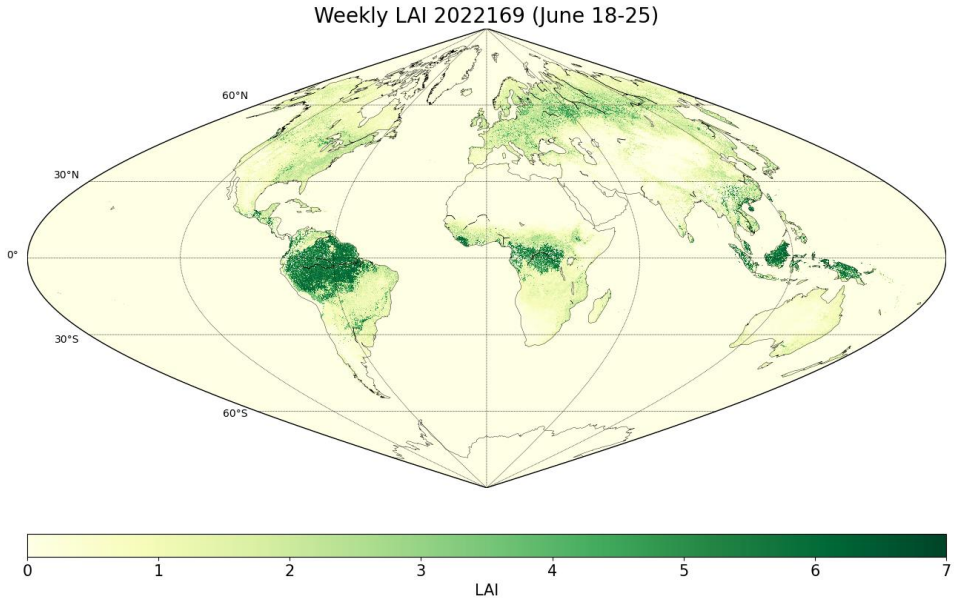
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Quality Monitoring Concept and Long-term Maintenance Concept defined	Oct-22	Oct-22	Oct-22	
Experimental dataset produced for model test	Oct-22	Nov-22	Dec-22	
Development processing system and Initial Information Technology (IT) Security concept defined	Nov-22	Dec-22	Dec-22	
Critical Design Review (CDR)	Feb-23	April-23		Rescheduled by PPM
Code is prepared for implementation	Apr-23	Apr-23		
CCAP Initial Delivery	Jul-23	Aug-23		

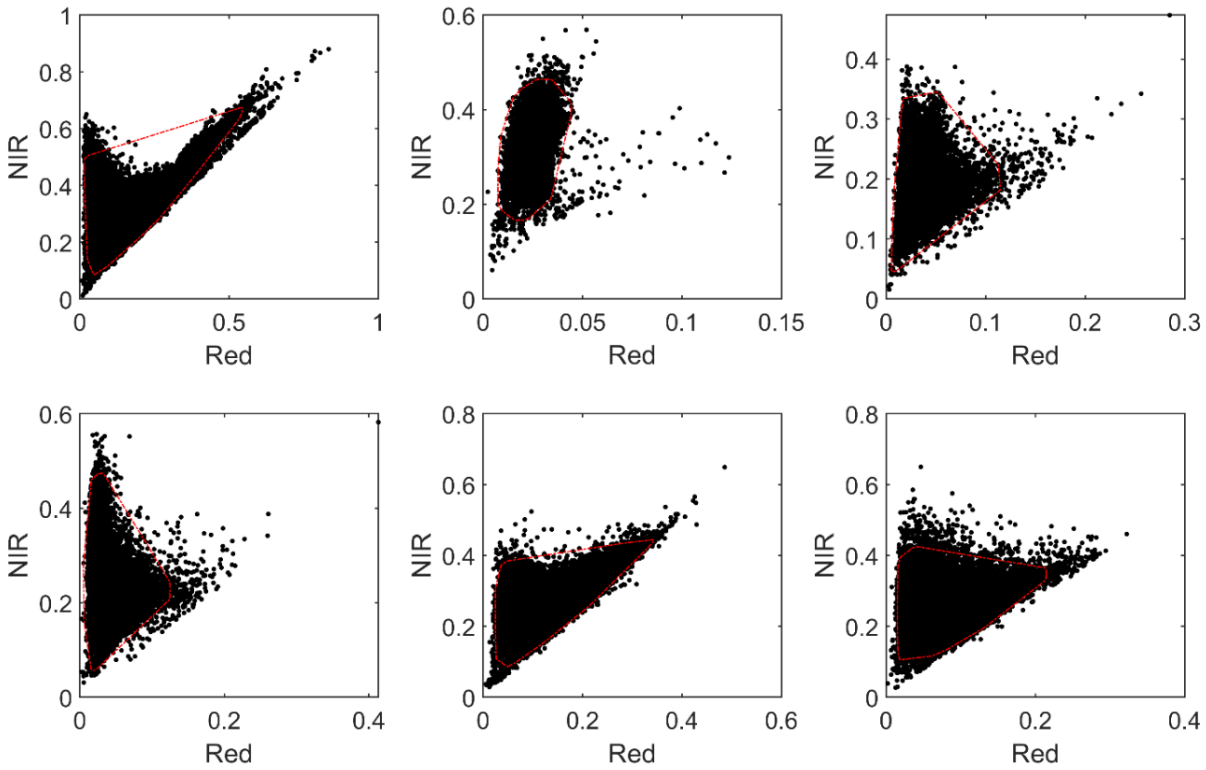
Highlights:



VIIRS Weekly LAI (8-Day) generated using the updated algorithm.

LAI algorithm performance for each biome type

- Convex hull defined from the Red/NIR reflectance space, to further screening the training data and flag the input data when perform the retrieval.

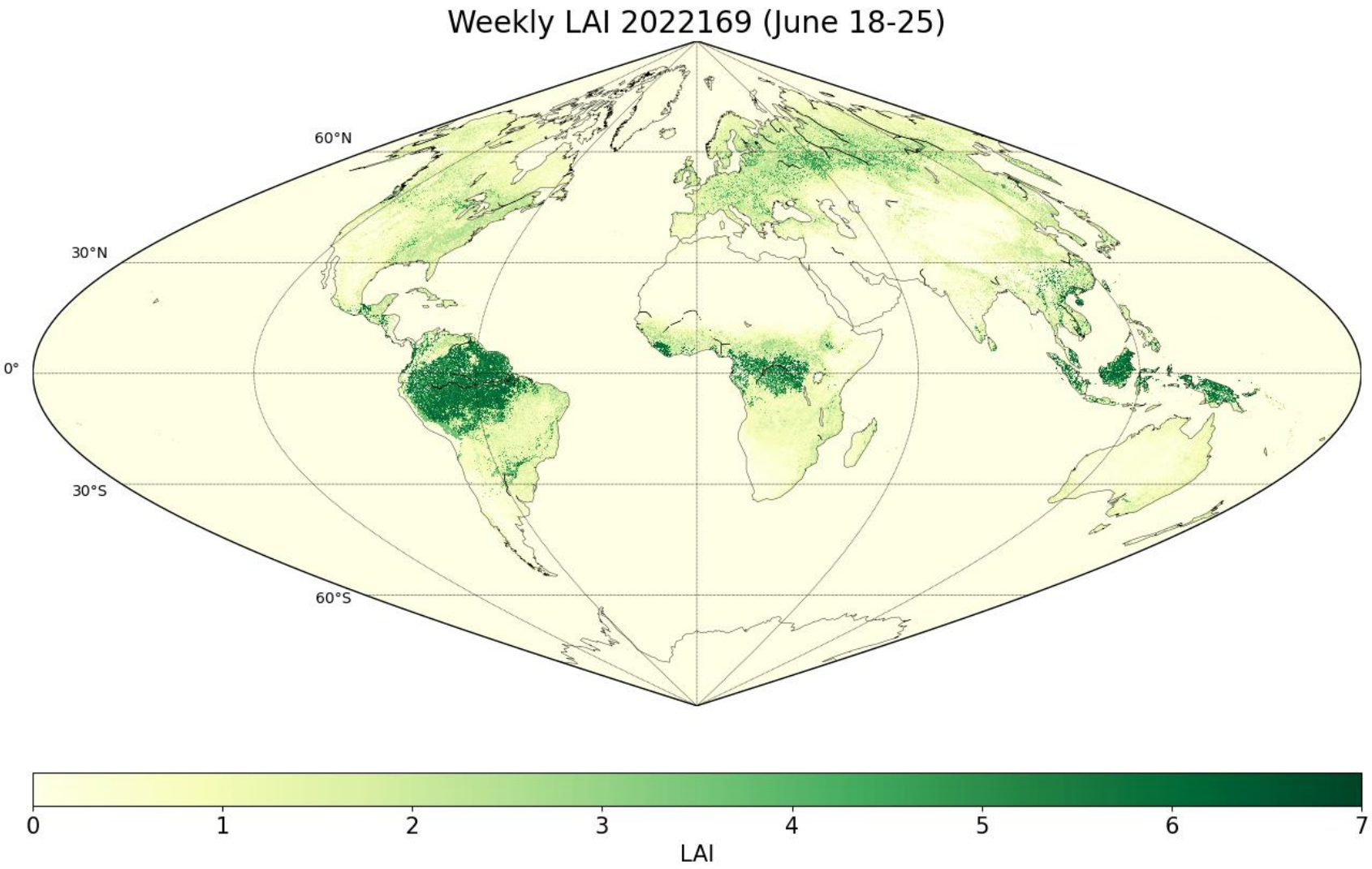


Discard 3% outliers for each type

Validation results for the test data.

	R2	MAPE
General	0.895	18.12%
EBF	0.729	4.19%
Needle Forest	0.851	15.5%
Broadleaf Forest	0.923	14.1%
Shrub land	0.950	14.6%
Savannah	0.884	13.0%

Weekly (8-Day) LAI Compositing



- Based on the daily LAI, weekly LAI is compositing in 8 days period.
- A further temporal smoothing and gap filling process will be performed to get the final results.

Land Surface Temperature

February, 2023

Accomplishments / Events:

- Completed the radiance-based LST validation software package based on python. Fixed issues in the card preparation, MODTRAN run, optimization, etc. It automatically extracts the vertical profile from GDAS model data available at AWS. MODTRAN is used for the forward radiative transfer modeling, and Nelder-mead method is used for optimization (Highlight). Two optimization methods were tested.
- Performed the radiance based SNPP VIIRS LST validation and compared it with the corresponding temperature-based LST validation. The ground measurements from six stations of the SURFRAD network were used and the test data covers the period between Jan. 1, 2022, and June 30, 2022. Slides 2-3 present the site wide validation results. Slide 4 shows the two optimization methods comparison.
- Attended the workshop on NOAA Opportunities for CISESS Researchers
- Learned AWS data access and how to read the data on fly.

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
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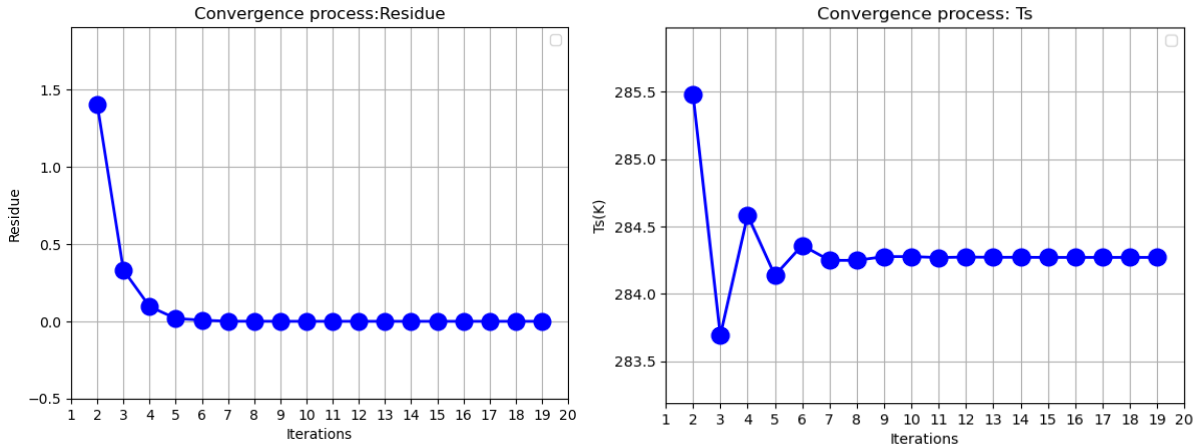
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Annual products performance report for L2 and L3 VIIRS LST	Dec-22	Dec-22	Dec-22	
Beta review of the NOAA-21 LST	Mar-23	Mar-23		
All weather LST update	May-23	May-23		
FY24 Program Management Review	Jun-23	Jun-23		
Routine monitoring tool and its update	Jul-23	Jul-23		
DAP for NOAA-21 if needed	Aug-23	Aug-23		
Provisional review of the NOAA-21 LST	Sep-23	Nov-23		

Highlights:

Radiance based LST optimization plot

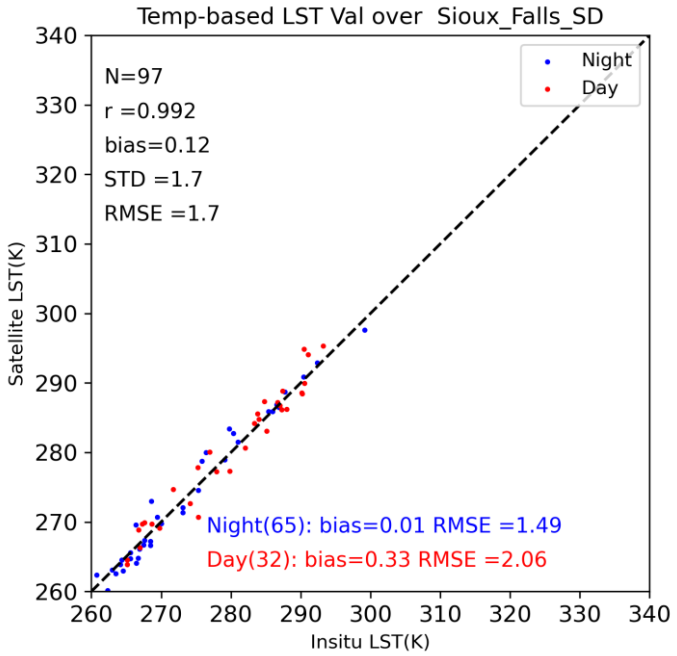


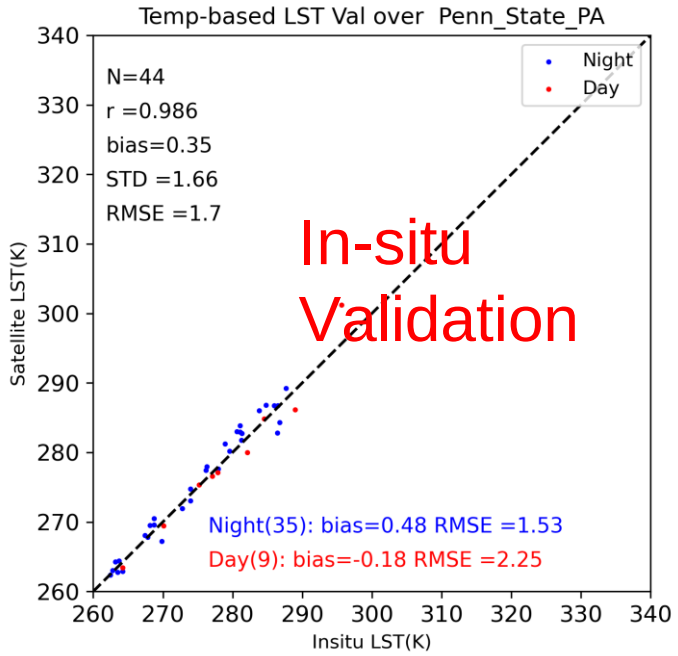
Nelder-mead method is used for the optimization in the R-based LST validation. The plot shows an example of the optimization progress for residue(left) and variable (right)

SNPP VIIRST LST vs SURFRAD 01/01/2022 ~ 06/30/2022

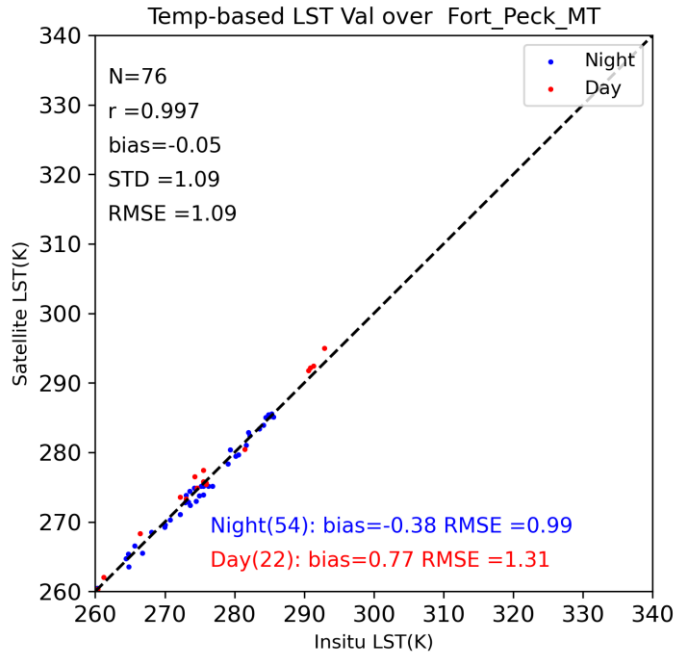
Optimization #1
($BT11_{satellite} - BT$

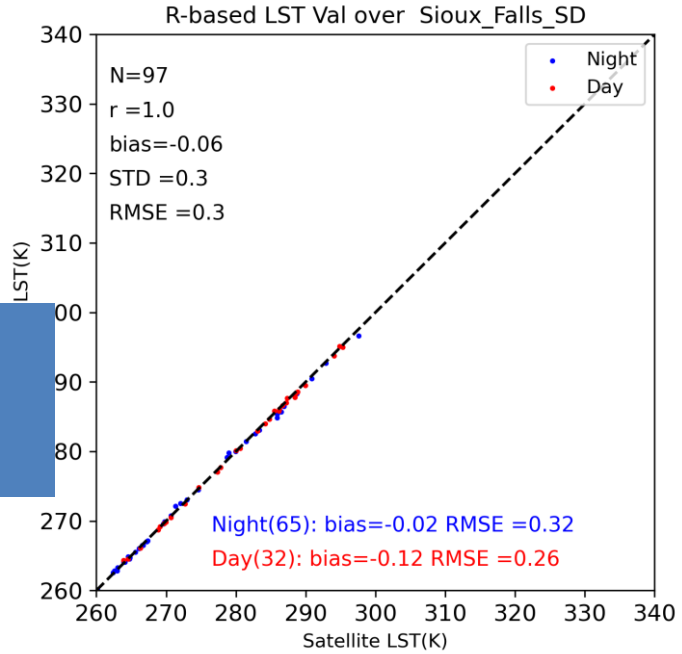
*Abs($BT12_{satellite}$ - $BT12_{simulated}$) <= 0.5 K

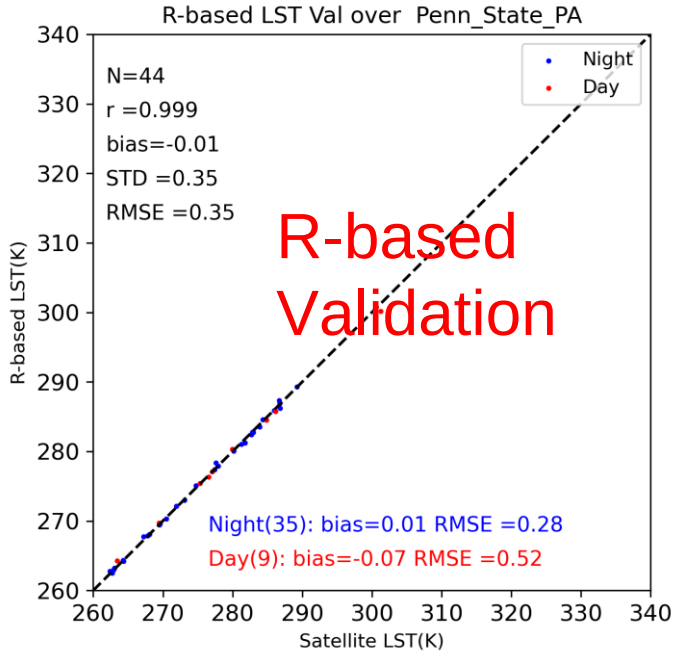




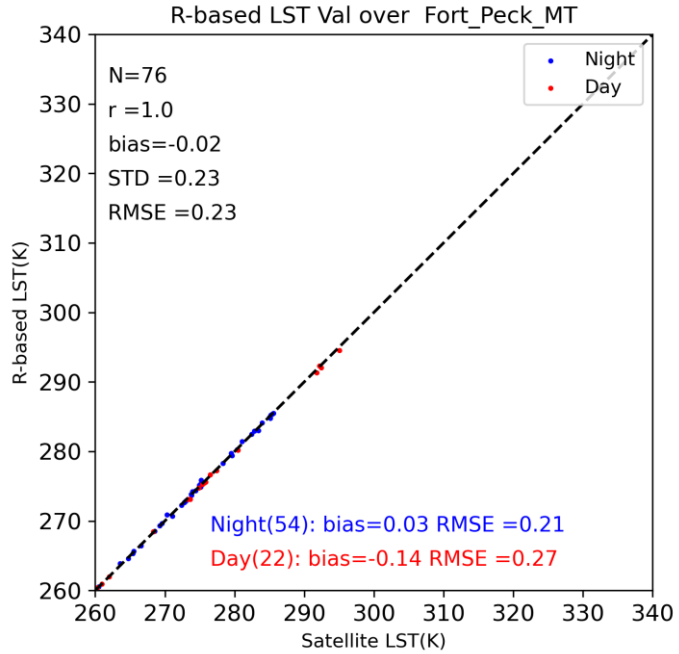
In-situ Validation







R-based Validation

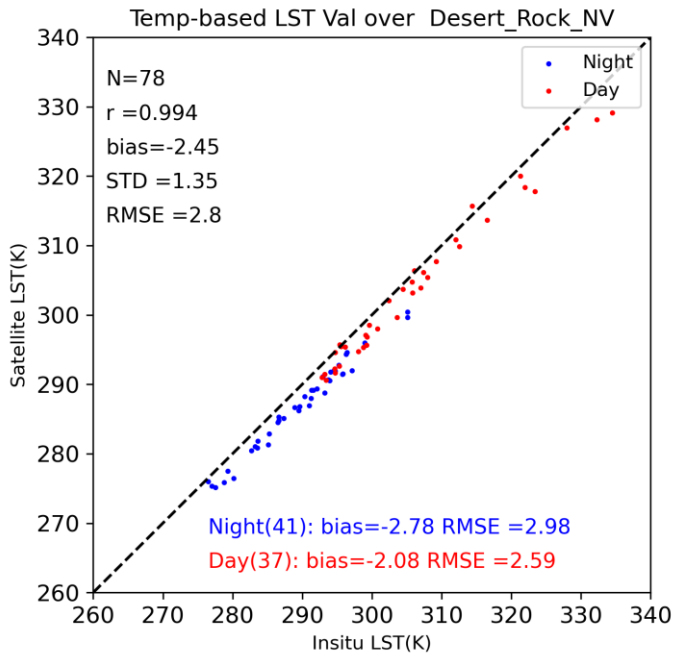


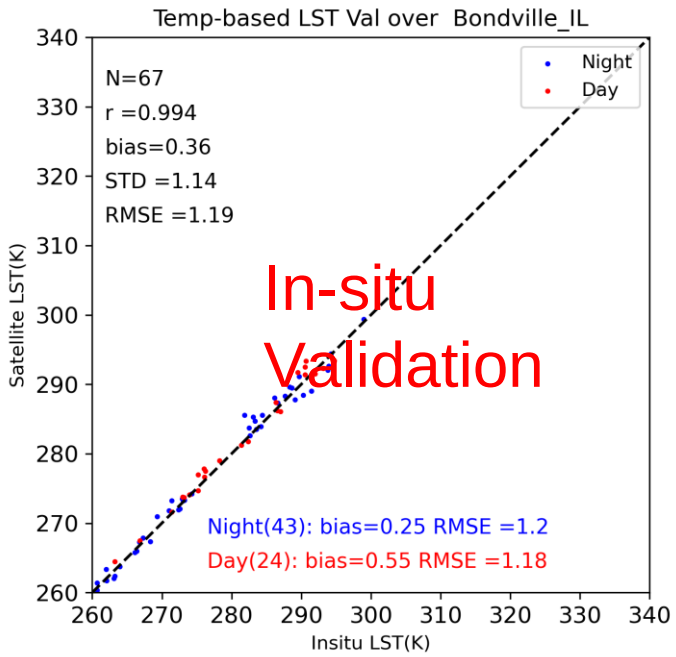
SNPP VIIRST LST vs SURFRAD 01/01/2022 ~ 06/30/2022

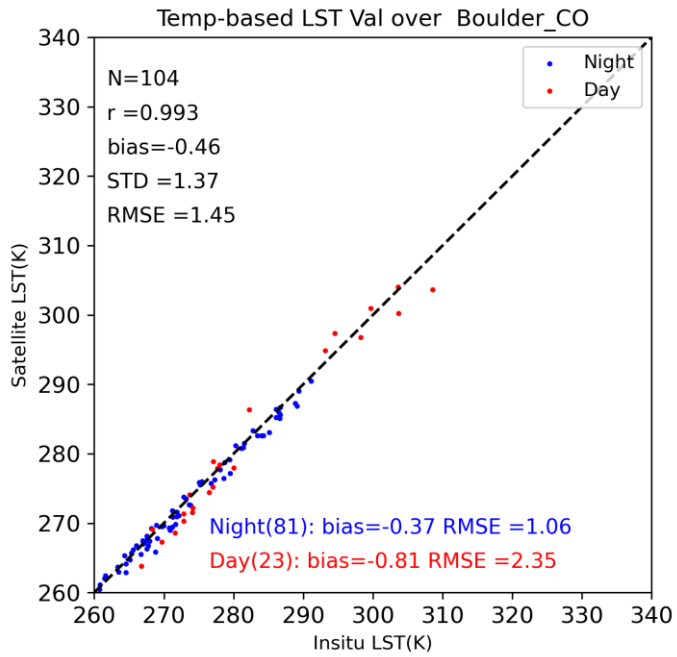
Optimization #1)
$(BT11_{satellite} - BT11$

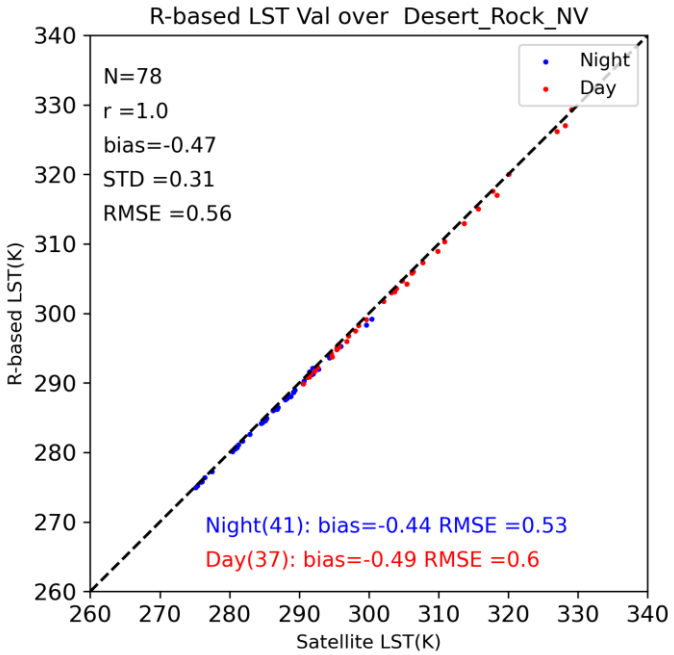
Abs($BT12_{satellite}$ - $BT12_{simulated}$) <= 0.5 K

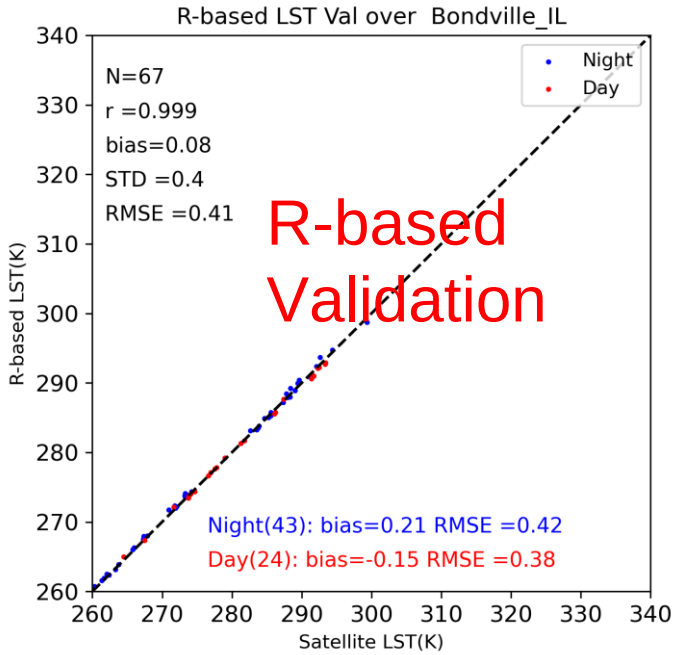
- Overall better statistics i.e. accuracy and precision comparing to the T-based validation for both daytime and nighttime
- Very small bias at nighttime, either positive or negative; RMSE mostly less than 0.5 K
- Daytime accuracy is mostly less than 0.5 K , but all negative ; RMSE less than 0.7 K

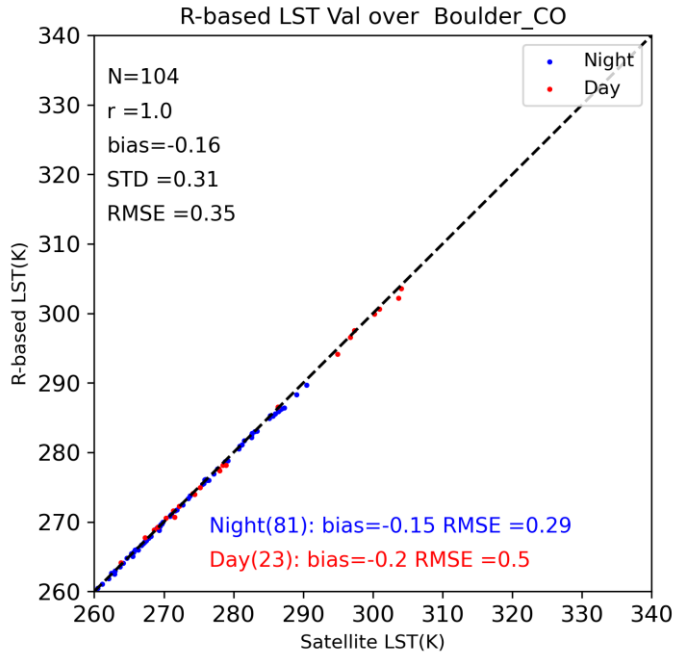












Optimization method comparison

Optimization #1
Minimize $(BT11_{satellite} - BT11_{simulated})^2$ Variable: LST

Optimization #2
Minimize $(BT11_{satellite} - BT11_{simulated})^2 + (BT12_{satellite} - BT12_{simulated})^2$ Variable : LST

	SFX		PSU		FPK	
	N-bias(rmse)	D-Bias(rmse)	N-bias(rmse)	D-Bias(rmse)	N-bias(rmse)	D-Bias(rmse)
Optimization #1	-0.02(0.32)	-0.12(0.26)	0.01(0.28)	-0.07(0.52)	0.03(0.21)	-0.14(0.27)
Optimization #2	0.19(0.33)	-0.14(0.33)	0.16(0.22)	-0.29(0.72)	0.14(0.21)	-0.29(0.4)
	DRA		BON		TBL	
	N-bias(rmse)	D-Bias(rmse)	N-bias(rmse)	D-Bias(rmse)	N-bias(rmse)	D-Bias(rmse)
Optimization #1	-0.44(0.53)	-0.49(0.6)	0.21(0.42)	-0.15(0.38)	-0.15(0.29)	-0.2(0.5)
Optimization #2	-0.01(0.16)	-0.47(0.63)	0.48(0.57)	-0.23(0.52)	-0.04(0.26)	-0.3(0.52)

Findings: optimization #1 generally provides better statistical results for both daytime and nighttime with exception during nighttime over DRA site and TBL site

MiRS Products

February 2023

Accomplishments / Events:

- The NOAA-21 Ka transmitter anomaly that developed in December 2022 was resolved in February. The MiRS science team subsequently resumed processing ATMS data and performing calibration/validation activities. Sounding performance was assessed before and after the anomaly and results show very similar performance with mid-tropospheric water vapor retrievals being slightly more accurate from NOAA-21 than NOAA-20, likely due to improved instrument noise with ATMS aboard NOAA-21. (See highlights).
- In consultation with the JSTAR management, maturity review dates have been shifted to account for the nearly 2-month gap in data due to the transmitter anomaly. Beta and provisional maturity are now scheduled for May and October 2023, respectively. The table below has been updated to reflect this change.

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

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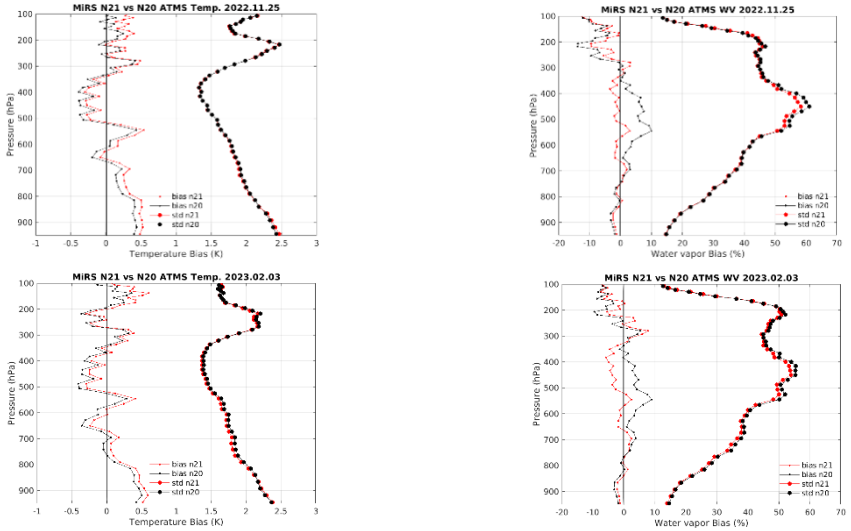
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 MiRS products from J2-Ready MiRS algorithm in support of ATMS TDR/SDR Beta Maturity	Nov-22	Nov-22	Nov-22	
NOAA-21 MiRS products from J2-Ready MiRS algorithm in support of ATMS TDR/SDR Provisional Maturity	Dec-22	Dec-22	Dec-22	
NOAA-21 MiRS product validations, Beta Maturity	Mar-23	May-23		
MiRS DAP (v11.10): integrate SFR algorithm updates, code/science improvements, final J2 launch delivery	Feb-24	Feb-24		
NOAA-21 MiRS product validations, Provisional Maturity	Aug-23	Oct-23		

Highlights:



MiRS NOAA-21 vs. NOAA-20 ATMS temperature (left) and water vapor (right) sounding performance relative to ECMWF analyses. Top row shows results from 2022-11-25 (before transmitter anomaly), and bottom row shows results from 2023-02-03 (after anomaly).

Preliminary/non-operational data

NUCAPS Products

February 2023

Accomplishments / Events

- Supported the CrIS SDR Beta maturity review by providing NOAA-21 NUCAPS products with a J2-Ready algorithm. Processed two days of NOAA-21 NUCAPS products, and produced statistical metrics for temperature, water vapor, and ozone retrievals. NOAA-20 and NOAA-21 RMS differences with collocated ECMWF matches show very similar characteristics. The NUCAPS team is currently evaluating the NOAA-21 trace gas products with collocated TROPMI and OCO-2 data sets. An additional evaluation with another set of focus day matches is planned for the upcoming NOAA-21 NUCAPS Beta Maturity Review (May/June 2023).
- Continued preparations of validation data for the upcoming NUCAPS (JPSS, MetOP) NCCF Operational Readiness Review. These include sanity checks of the NUCAPS offline version runs with the ASSISTT integrated HEAP version runs, and validation of the NUCAPS NOAA-20 and MetOp-B/C products using a compilation of 12 focus day runs and matched ECMWF, TROPOMI/OCO, and TCCON in-situ measurements.
- Coordinated the NUCAPS all-hands meeting and a discussion with the NPROVS team on the VALAR data sets and augmentation for NOAA-21.

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

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4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

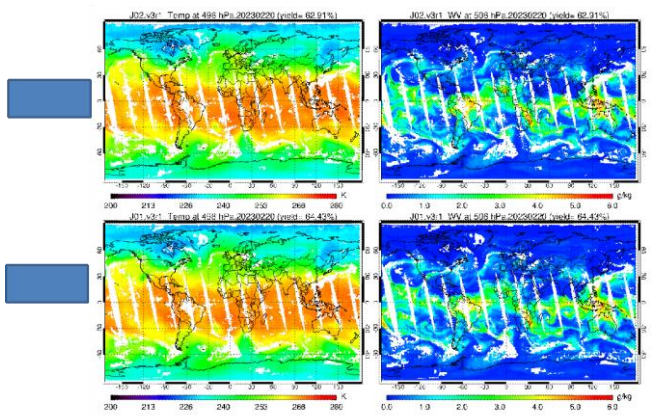
None

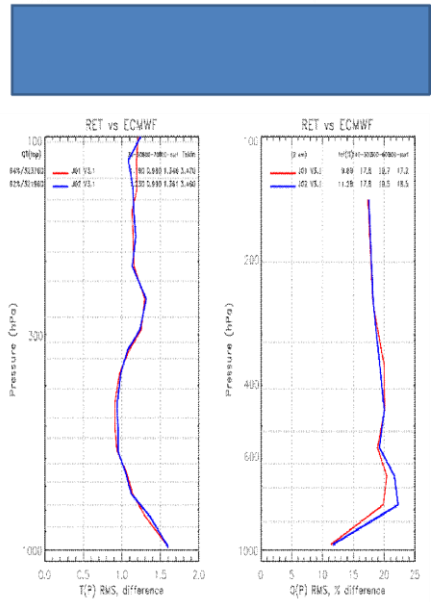
- Continued working on the recent Arctic Blast event (December 20-26,2022) with additional analysis from the HYSPLIT model.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
DAP Delivery with updates related damping factor, surface corrections, MetOp-B/C Averaging Kernels	Oct-22	Oct-22	11/04/22	
NOAA-21 Ready NUCAPS product evaluations with the upcoming CrIS first light data and ATMS TDRs, and user support for the CrIS Beta Maturity Review	Feb-23	Feb-23	02/23/23	NOAA-21 Ka band transmitter swap
Implementing Validation Archive (VALAR) and focus-day data collections for NOAA-21 NUCAPS product validations	May-23	May-23		
NOAA-21 NUCAPS Product Beta Maturity	May-23	May-23		
NOAA-21 NUCAPS T(p), q(p), O3(p) Provisional Maturity	Nov-23	Nov-23		

Qualitative evaluation of NOAA-21 vs. NOAA-20 NUCAPS products, and statistical metrics with ECMWF collocated matches.

The results of evaluation show very similar characteristics between NOAA-20 and NOAA-21





Preliminary/non-operational data

Vegetation Index and Green Vegetation Fraction

February 2023

Accomplishments / Events:

- Made January NDVI and EVI climatology from years 2014, 2016-2020 historical data. Found January 2023 VI means and anomalies by subtracting 2023 means from climatology.
- Made 1, 7, and 16-day VI based on VIIRS NBAR data. Compared NBAR VI to operational VI.
- Investigated and finished improving the gridding procedure in the current NVPS product
- Finished C++ coding for the VI v2r1 algorithm and replicated Mingshi's output
- Investigated an anomaly of VIIRS weekly TOC NDVI product and found the high TOC NDVI areas were related to the high view zenith angle areas

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		x			
Technical / Programmatic		x			
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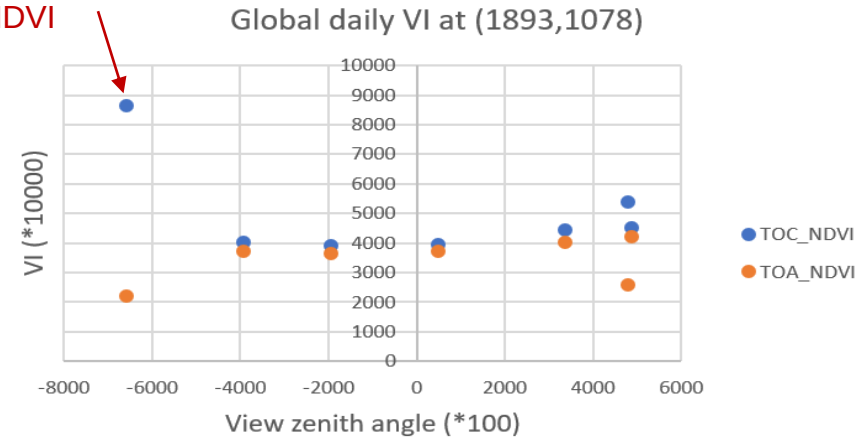
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
1km global VIIRS VI and GVF code ready for delivery	Dec-22	Dec-22		
Report on methods for improving consistency between ABI and VIIRS VI	Feb-23	Feb-23		Deferred to March due to personal leave of the scientist
FY24 Program Management Review	Jun-23	Jun-23		
Annual algorithms/ products performance report	Aug-23	Aug-23		
Calibration/ Validation update for SNPP and NOAA20 VI and GVF products,	Sep-23	Sep-23		
JPSS-2 provisional review	Sep-23	Nov-23		

Highlights:

Selected weekly NDVI

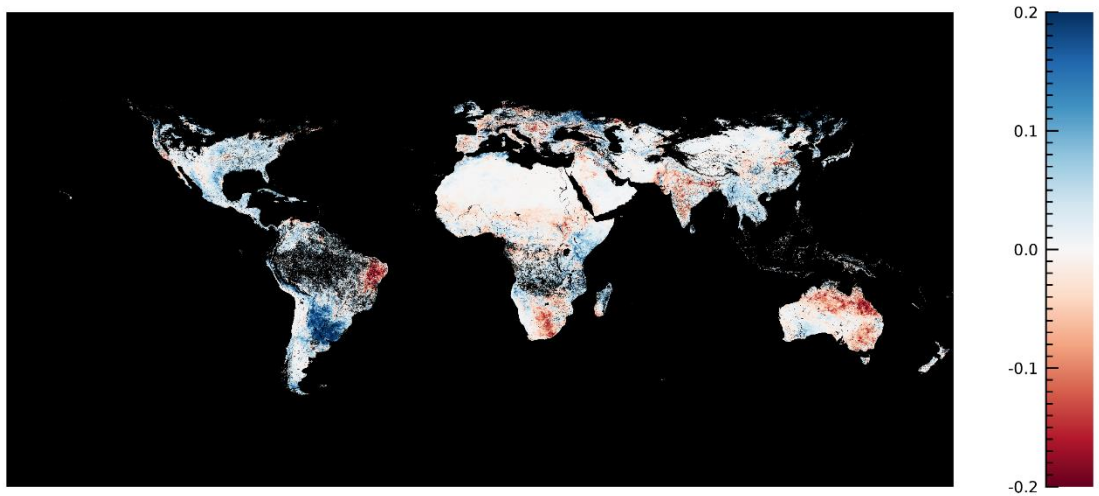


VIIRS TOA and TOC NDVI were plotted as functions of the view zenith angle

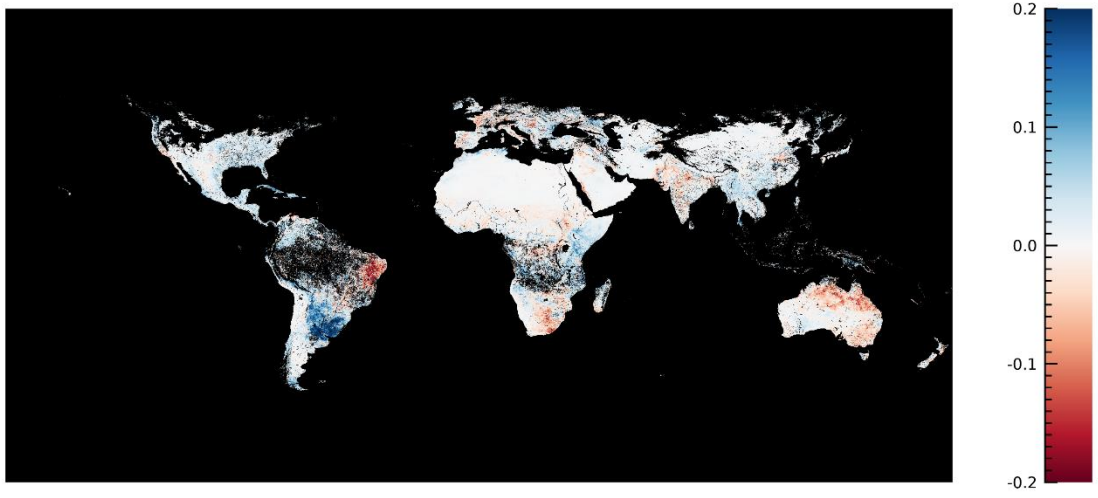
- In some cases where the off-nadir observations are extremely (abnormally) higher than the rest observations and beyond the normal view angle effects on VI, then the extreme high VZA observation is selected by the composite algorithm

January 2023 mean VI anomalies relative to 6-year climatology

NDVI



EVI



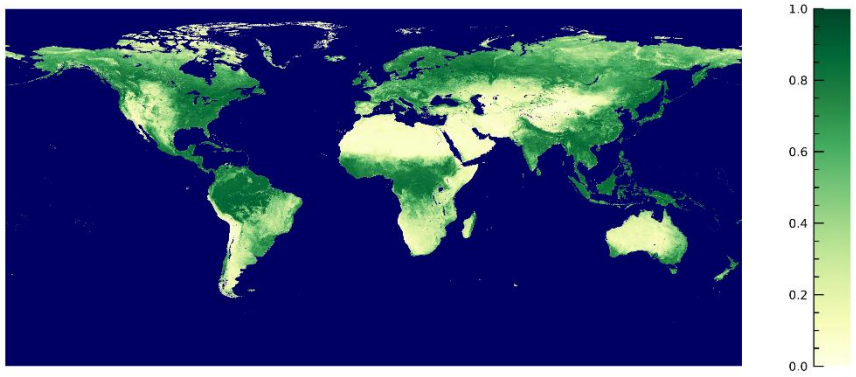
- Red indicates January 2023 VI is higher, blue that January VI climatology is higher.
- High VI anomaly in Australia, India, southern Africa, eastern South America.
- Low VI anomaly in southern South America, southeast Asia, North America.
- La Nina may still be affecting Australia. The cause of the other anomalies is unknown.

Generation of VIIRS NBAR VIs and comparison to operational VIs: Procedure and summary

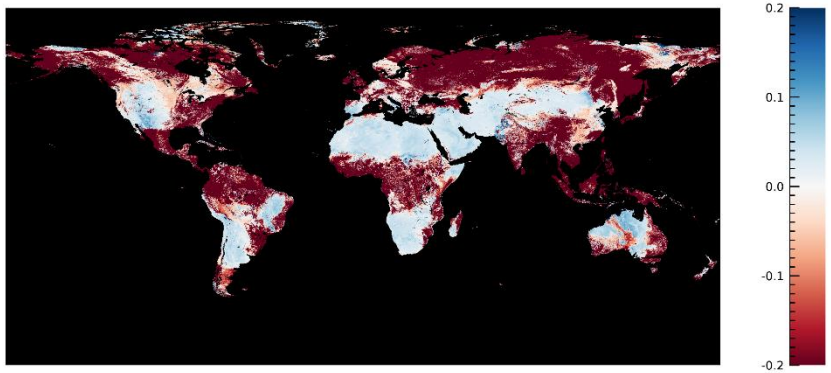
- 16 days worth of VIIRS NBAR data were produced. From these data, 1-day, 8-day, and 16-day VI were produced using the maximum VI compositing method.
- NBAR-based VI was compared to the operational VIIRS VI for the corresponding time periods.
- Daily NBAR-based VI was higher than operational VI, which is not surprising due to the higher data quantity and quality included in the NBAR-based VI
- Discrepancies occur between the operational and NBAR-based weekly and biweekly VIs that are difficult to explain.

Daily VIIRS NBAR VI and comparison with operational VIIRS VI

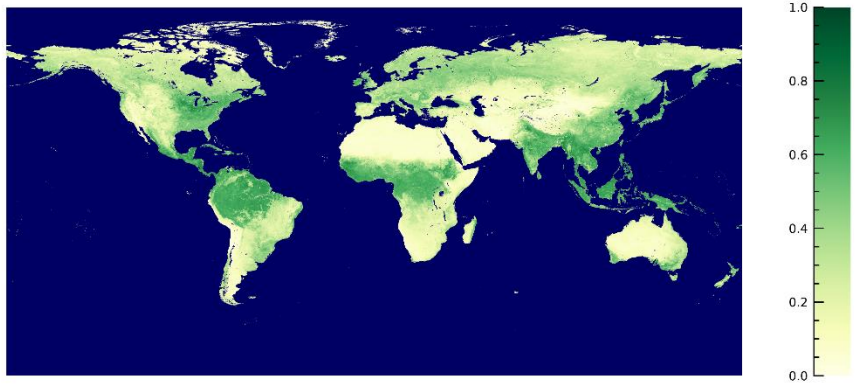
NBAR NDVI, 20220906



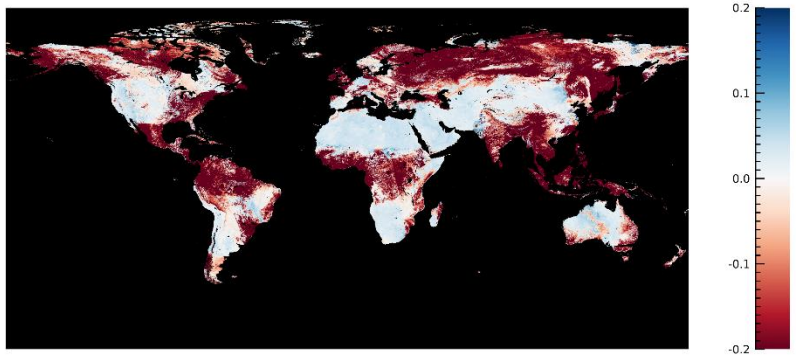
Operational NDVI – NBAR NDVI, 20220906



NBAR EVI, 20220906

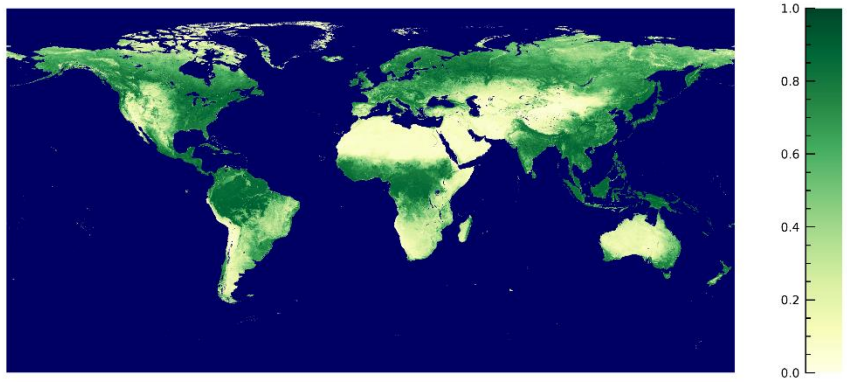


Operational EVI – NBAR EVI, 20220906

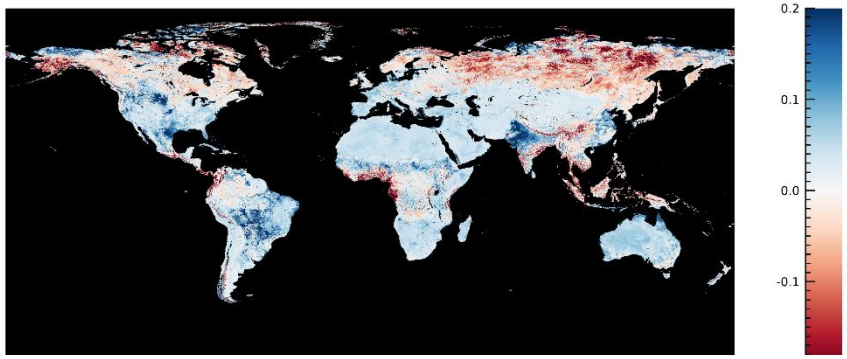


Biweekly VIIRS NBAR VI and comparison with operational VI

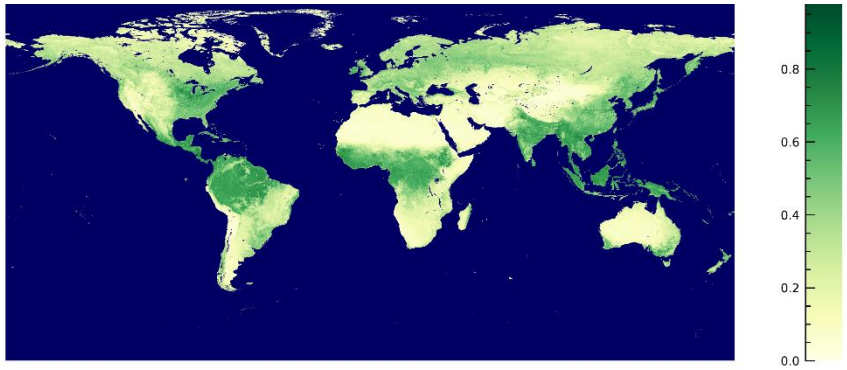
NBAR NDVI, 20220906-20220921



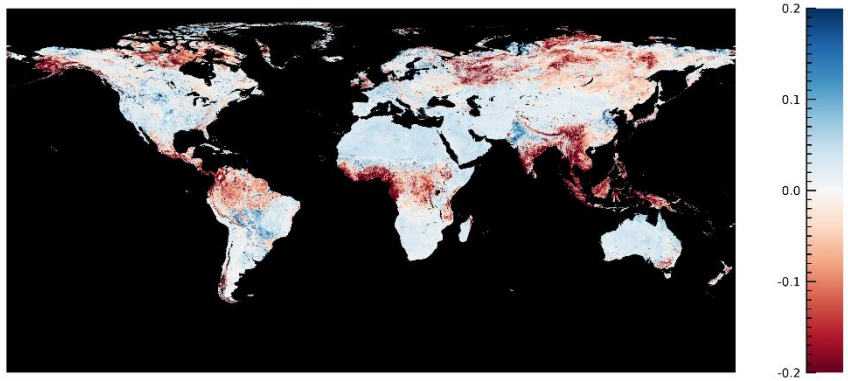
Operational NDVI – NBAR NDVI, 20220906-20220921



NBAR EVI, 20220906-20220921



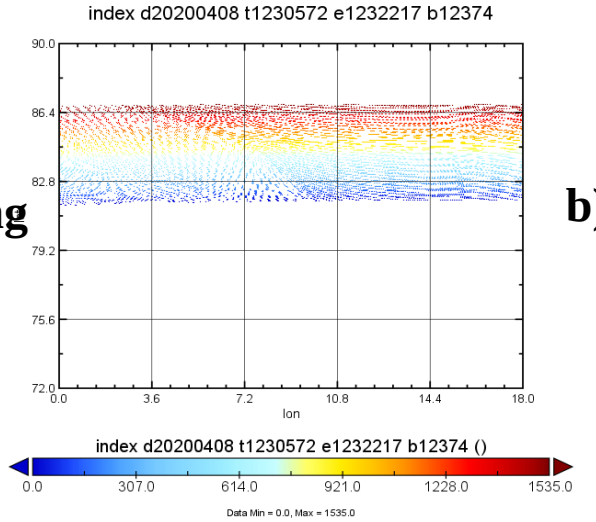
Operational EVI – NBAR EVI, 20220906-20220921



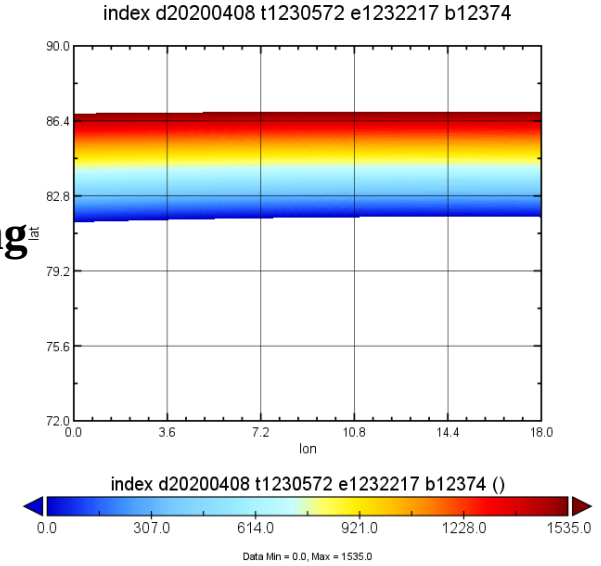
Improving the gridding procedure in the current NVPS product

- Instead of performing gridding & mapping together with reflectance, VI, and quality flag in the current VI algorithm, the new gridding tool is designed by first ingesting geolocation data solely and output the mapping index file.
- Forward mapping is used for this purpose, and thus the most important step of this approach is to fill gaps (e.g., Figure 1a), especially for tiles in the polar regions.
- The gap filling is performed by
  1. Searching for neighboring pixels within a local region in the tile grid;
  2. Find the location of those neighboring pixels in the original granule and to envelope a local region in the granule;
  3. Scan all pixels in that local region and use the closest one to the gap pixel in the tile grid to fill it.

a) Before gap filling



b) After gap filling

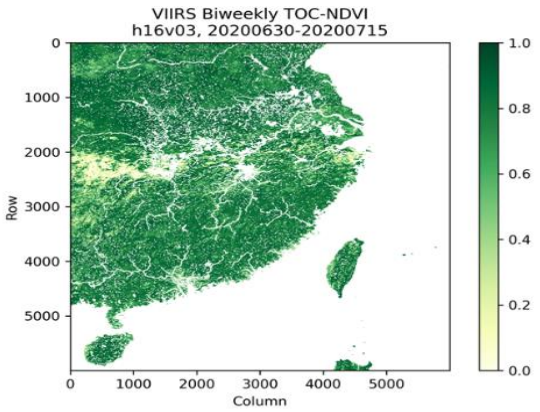


Row index mapping to NVPS tile h10v00 from VIIRS granule d20200408_t0045 a) before and b) after gap filling

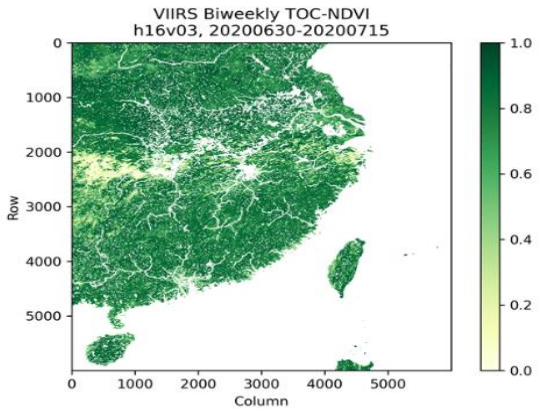
Finished C++ coding for the VI v2r1 algorithm

- After fully reviewing and understanding the v2r1 VI algorithm package, the local C++ coding has been finished
- The local output has been verified with Mingshi's output.
- Taking TOC-NDVI as examples, The figures show the exact matching between those two outputs.

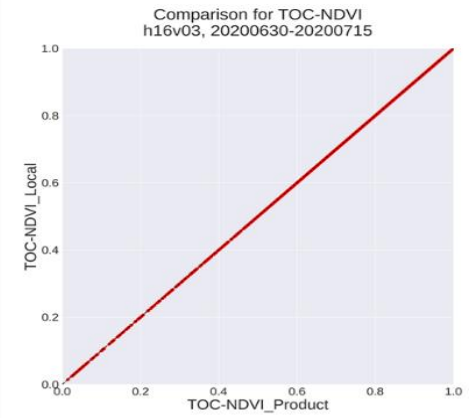
Comparisons between local and Mingshi's output for TOC-NDVI to verify the effectiveness of the local codes package



Local run



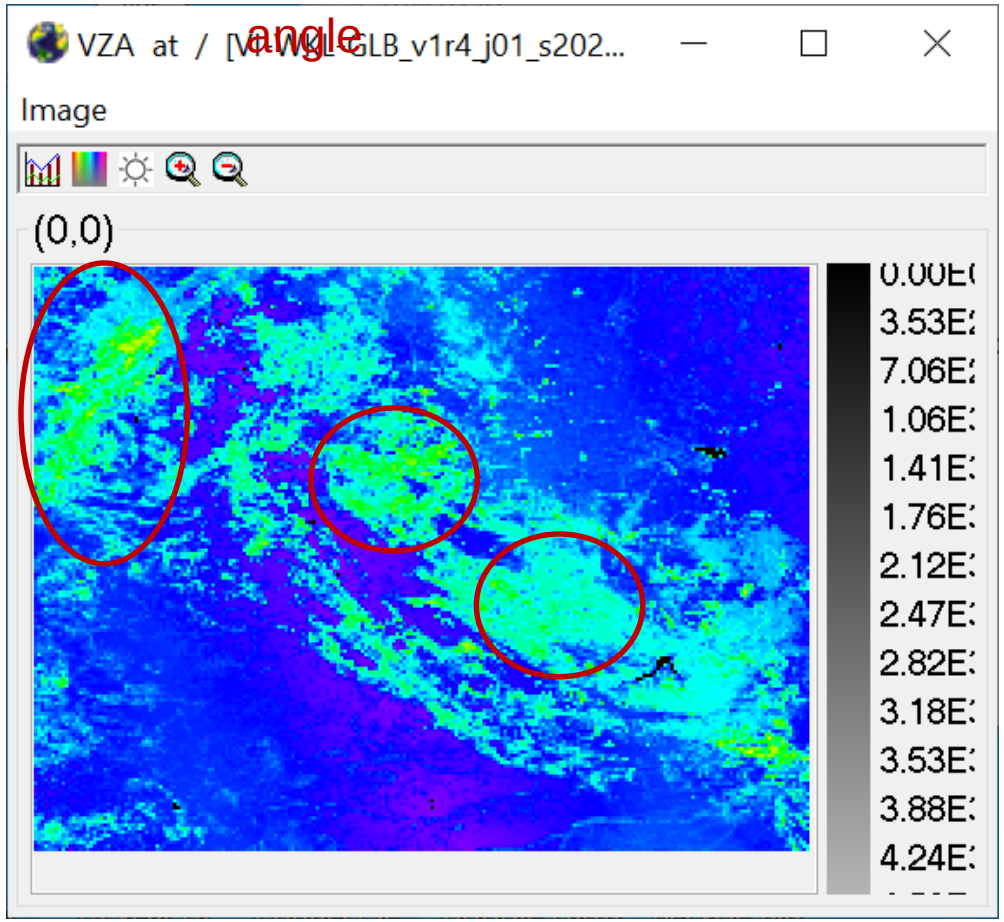
Product from Mingshi



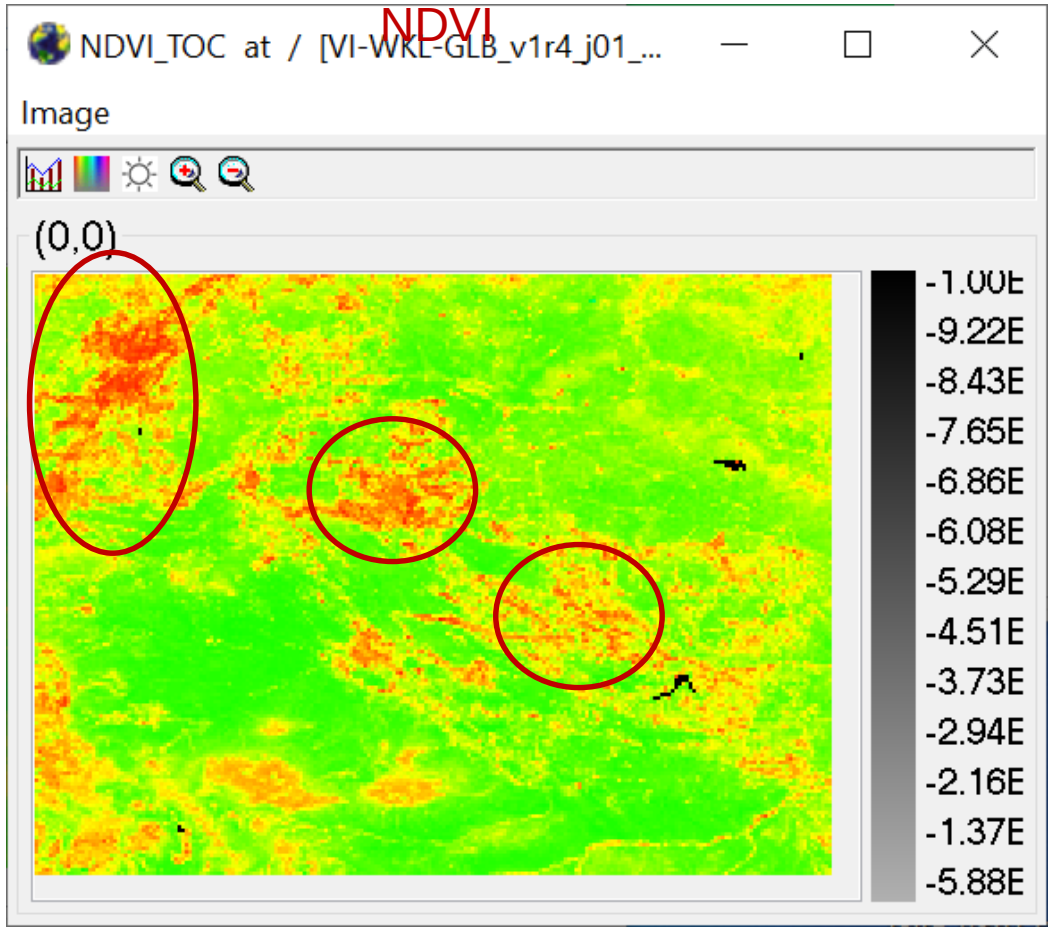
Comparison

Investigation of VIIRS weekly TOC NDVI anomaly

View zenith angle



TOC NDVI



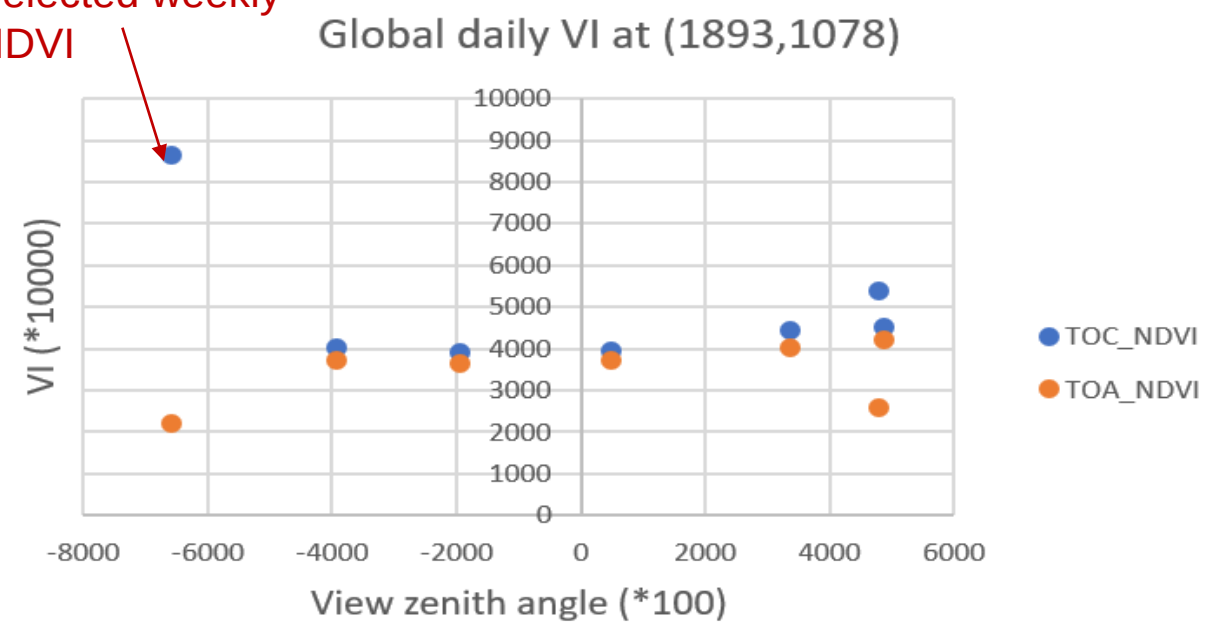
location: -113 W to -105 W, 46 N to 52 N

- A user reported high TOC NDVI patches in the VIIRS weekly composites NDVI map
- High TOC NDVI areas were found to be coincident to the high view zenith angle areas
- TOC NDVI was sensitive to VZA in the areas

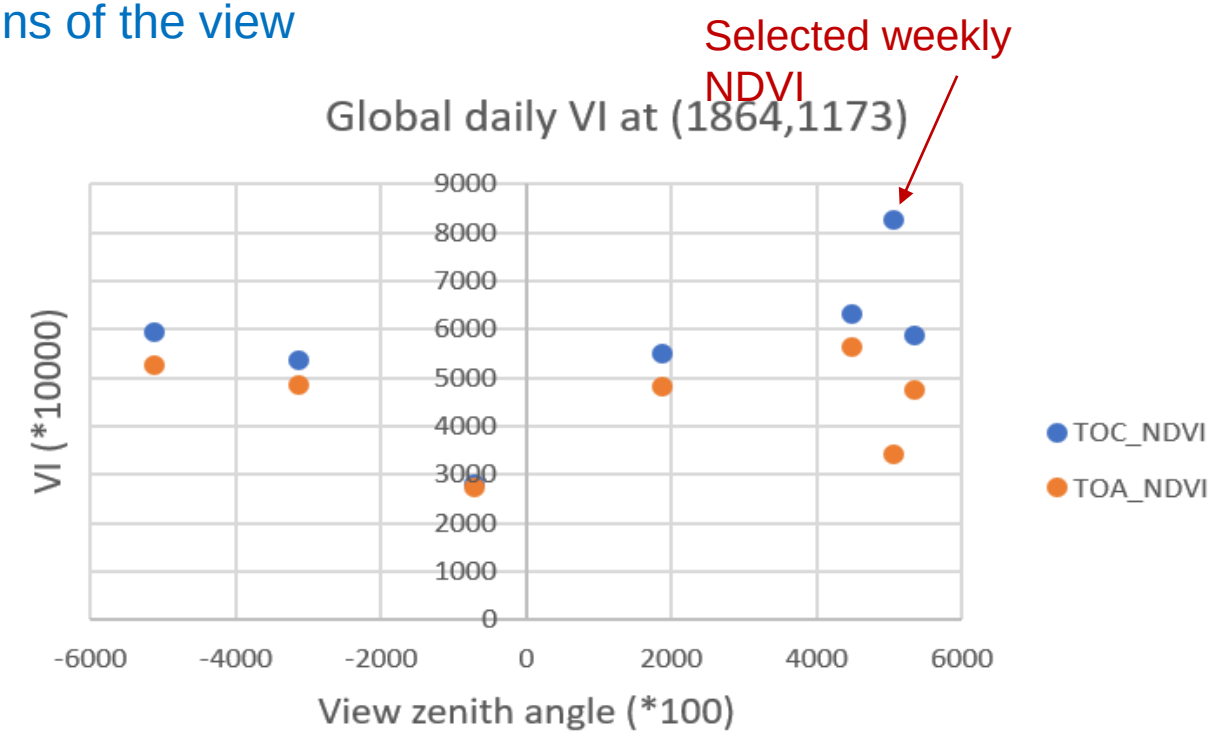
Investigation of VIIRS weekly TOC NDVI anomaly

VIIRS TOA and TOC NDVI were plotted as functions of the view zenith angle

Selected weekly NDVI



Selected weekly NDVI

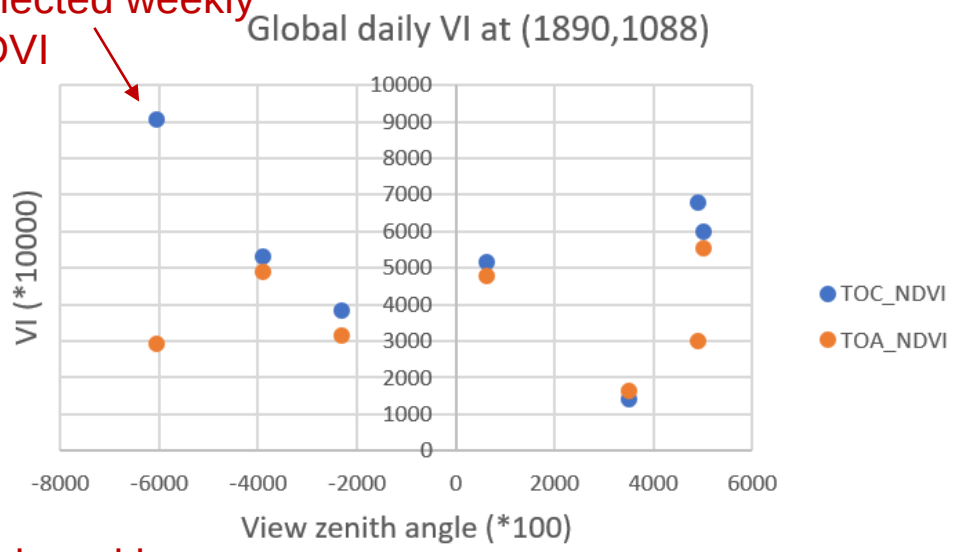


View-angle Adjusted SAVI: $VA\text{-}SAVI = SAVI - C \times SZ^2$ where $C = C_1 - C_2(SAVI_{max} - 0.5)^2$

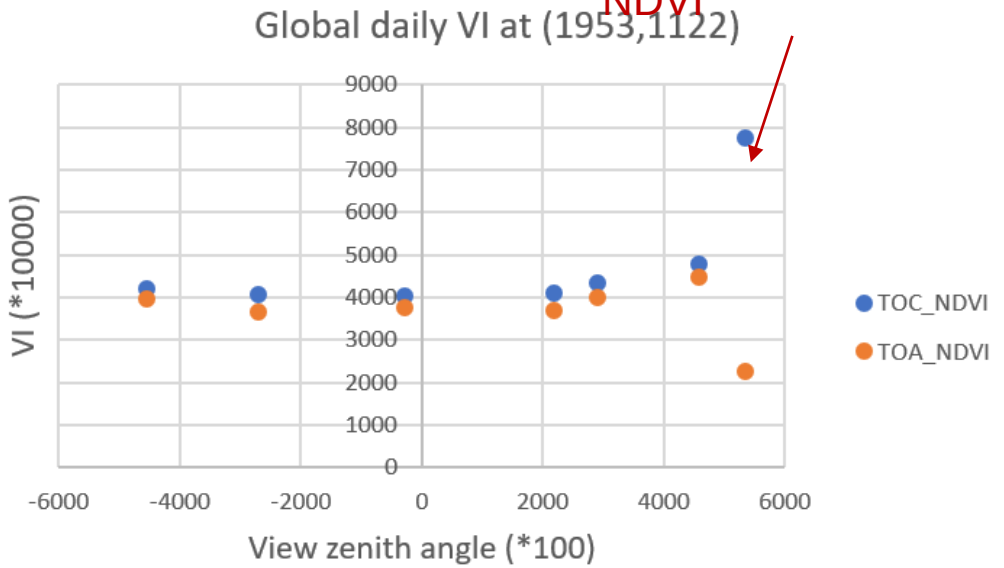
- VA-SAVI accounts for the view angle effects on VI
- The maximum VA-SAVI observation is selected as the weekly observation
- In some cases where the off-nadir observations are extremely (abnormally) higher than the rest observations and beyond the normal view angle effects on VI, then the extreme high VZA observation is selected by the composite algorithm

Investigation of VIIRS weekly TOC NDVI anomaly

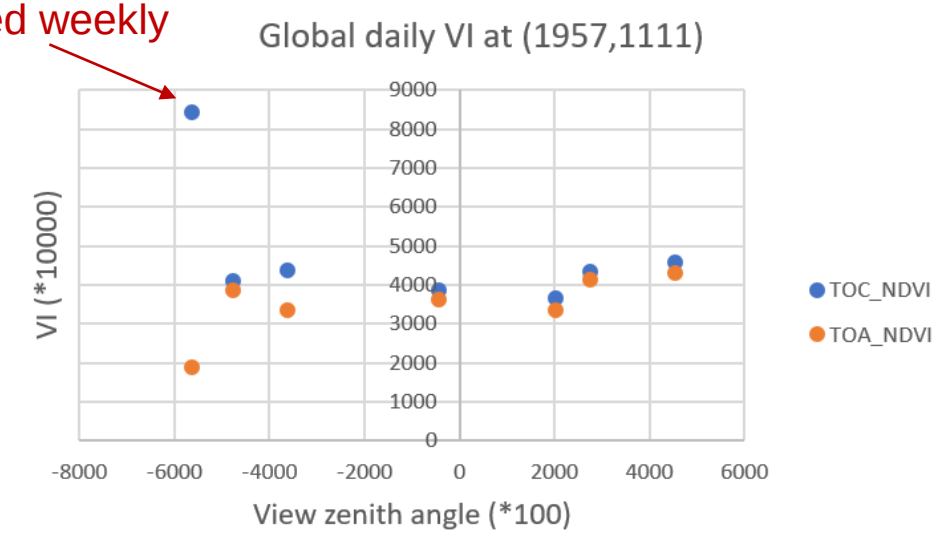
Selected weekly NDVI



Selected weekly NDVI



Selected weekly NDVI



Possible solutions:

1. Exclude high view zenith angle observations (e.g. VZA>60°)
2. Check the TOC_NDVI- TOA_NDVI difference and exclude high difference observations (e.g. TOC_NDVI- TOA_NDVI >0.4)
3. Increase the C_1 value from 0.00008 to 0.00012 to account for larger view zenith angle effects
4. Replace the Max-SAVI by a monthly NDVI climatology dataset (it also saves processing time)

Investigation of the new operational GVF product

GVF pcf file

VIIRS_GVF.pcf - Notepad

File Edit Format View Help

```
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INPUT=VI-SR-J01_s20230208_e20230208_h04v02_c202302090339520.h5
INPUT=VI-SR-J01_s20230208_e20230208_h06v02_c202302090345260.h5
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```

- We found that there is only 24 input data files (in the GVF pcf file) for GVF for Feb 8th, 2023. Whereas, it should have 106 input data files
- Possible reason: GVF system started before VI surface reflectance (SR) daily gridding process is finished
- GVF system should start after the VI SR daily gridding process is finished
- Reported the problem to the NDE and OSPO teams to modify the operational GVF production

OMPS SDR

February 2023

Accomplishments / Events:

- Derived and delivered SNPP/NOAA-20 OMPS NP solar irradiance bi-weekly LUTs.
- Derived and delivered NOAA-21 OMPS NM/NP weekly dark rate LUTs.
- Successfully completed the NOAA-21 OMPS NM and NP SDR beta maturity review on 23 Feb. 2023, by conducting intensive J2 OMPS early-orbit data analysis, e.g.,
  - Delivered the first light image report in a timely manner (02/21/2023).
  - Derived the first version of NOAA-21 OMPS wavelength registration changes.
  - Analyzed nominal operational data from NOAA-21 OMPS for SNR and quality consistency.
  - Identified the NOAA-21 OMPS TC 3-pixel-wavelength-shift issue.
  - Derived the six updated NOAA-21 LUTs to improve the quality issues including the 3-pixel-shift problem.
  - Routinely analyzed the NOAA-21 OMPS dark LUT and LED gain performance.
  - Examined the updated NOAA-21 OMPS albedo coefficients particularly in the overlap region.
  - Continued investigating the CRTM OMPS simulation accuracy issues.
  - Conducted additional analyses in support of the NOAA-21 beta maturity review.

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule			x		

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 First Light OMPS NM, NP SDR First Light and Beta Maturity	Feb-23	Feb-23	Feb-23	J2 Ka transmitter problem
OMPS NM, NP SDR Provisional Maturity	Mar-23	Apr-23		J2 Ka transmitter problem
Inter-sensor comparison among SNPP, NOAA-20, and NOAA-21 (OMPS NM)	Apr-23			
Inter-sensor comparison among SNPP, NOAA-20, and NOAA-21 (OMPS NM)	May-23			
Improve the calibration accuracy of NOAA-21 OMPS SDR towards Validated Review	Jun-23			
Inter-sensor comparison with Tropomi since the door-open	Aug-23			
OMPS NM, NP SDR Validated Maturity: Status Preview	Sept-23	Sep-23		Ka transmitter problem+ J2 TC high resol.
Delivery of weekly dark LUTs for NM and NP	Sep-23	Sep-23		
Delivery of wavelength and solar flux LUTs for NM and NP	Sep-23	Sep-23		

Observed Southern Hemisphere Tropical Storm on 18 February 2023 by Three OMPS NMs

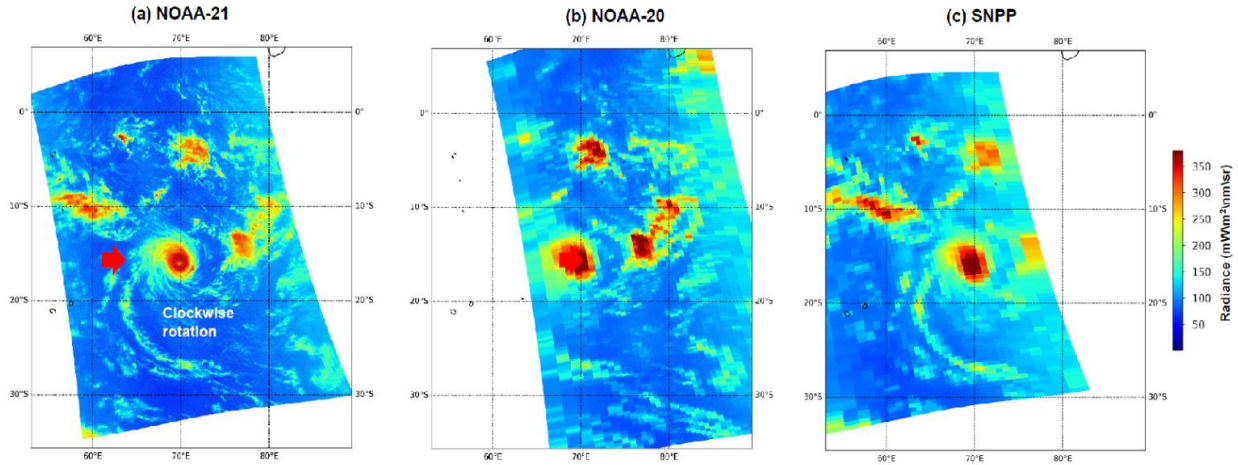


Figure Southern Hemisphere tropical storm structure on 18 February 2023 observed by NOAA JPSS OMPS NM 380nm from three satellite missions from SNPP, NOAA-20 and NOAA-21, demonstrating a much improved capability of NOAA-21 OMPS NM due to its higher spatial resolution than both NOAA-20 and SNPP. (a) NOAA-21. (b) NOAA-20. (c) SNPP *Preliminary/non-operational data*

OMPS Ozone (V8Pro, V2Limb & V8TOz)

February 2023

Accomplishments / Events:

- R. Lindsay continued work to use the new V2.7Limb Level 1 codes as input for the Level 2. We now have agreement for S-NPP Level 1A, 1B and 1G between NASA and STAR. We are trying to determine the sources of Level 2 Aerosol and Ozone Differences. NASA has run the V2.7 on NOAA-21 OPS Limb RDRs, and created Level 2 products.
- J. Niu has completed the updates to GOME-2 operational calibration or Metop-B and is now working on Metop-C. He also verified the performance of the TOAST products.
- L. Flynn chaired the GSICS UVN Spectrometer Subgroup meeting on February 28th. He provided a talk on the use of the V8TOz to identify biases between satellite instruments. He also gave a presentation at the NOAA-21 OMPS SDR beta maturity review with contributions from the Ozone Team.
- Z. Zhang continued reprocessing the NOAA-20 ozone products following reprocessing by the SDR Team. He also began comparing NOAA-21 V8TOz and V8Pro with NOAA-20.
- E. Beach continued to work on the monitoring figures for NOAA-21. The has begun transfering ancillary files we will need to process the NOAA-21 OMPS Limb Profiler. He is capturing the NOAA-21 OMPS data that arrives at SCDR.
- Z. Zhang and J. Niu both had journal papers accepted:
  https://egusphere.copernicus.org/preprints/2023/egusphere-2022-1500/
  https://www.tandfonline.com/doi/full/10.1080/2150704X.2023.2185111

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Verify performance of V8TOz for MetOp-B & -C for GOME-2	Dec-22	Dec-22	Dec-22	
Provide new Level 1a, 1b and 1g for S-NPP OMPS V2Limb	Dec-22	Dec-22	Dec-22	
Provide Delta to Level 1a, 1b and 1g for NOAA-21 OMPS V2Limb	Jan-23	Apr-23		NASA progress
Document Beta Maturity for V8TOz and V8Pro	Jan-23	Mar-23		Antenna
NOAA21 OMPS Ozone V8Pro, V8TOz Beta Maturity	Feb-23	Mar-23		Antenna
Update V8TOz and V8Pro tables for NOAA-21 Provisional	Feb-23 Mar-23	Apr-23 May-23		Antenna

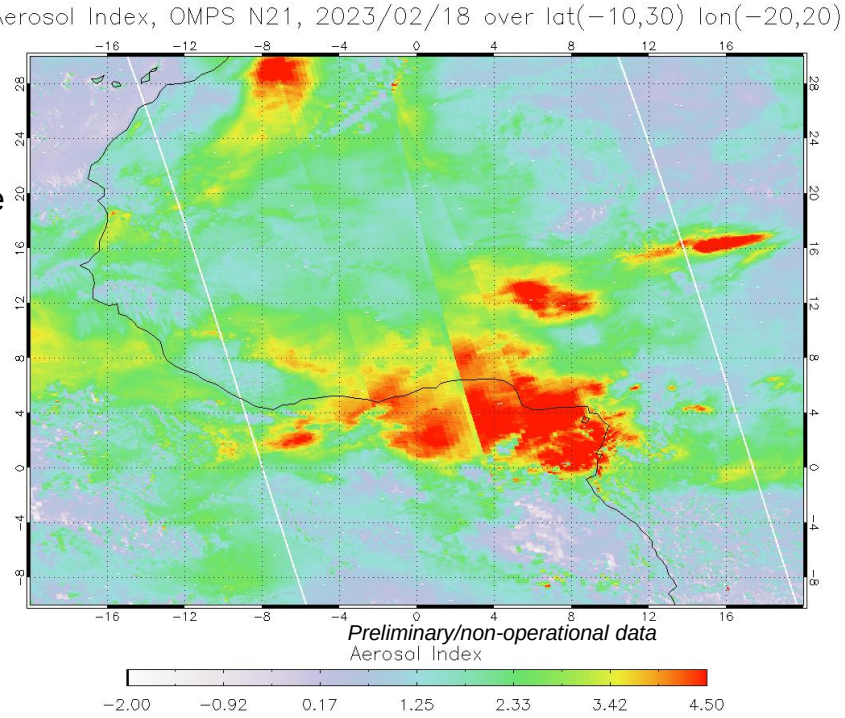
Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule			X		

1. Project has completed. 2. Project is within budget, scope and on schedule.
3. Project has deviated slightly from the plan but should recover.
4. Project has fallen significantly behind schedule, and/or significantly over budget.

Issues/Risks: None

The false color map to the right shows the NOAA-21 OMPS V8TOz aerosol index for February 18,, 2023. While additional soft calibration adjustments are needed to remove striping and an overall bias, the values capture the Saharan Dust (top left) and smoke from biomass burning (middle) with improved spatial resolution compared to NOAA-20. The broad channel approach provides estimates with low noise.



SDR and EDR Reprocessing

February 2023

Accomplishments / Events:

- The official transition of the reprocessed SNPP SDRs to CLASS/NCEI started on December 1, 2021.
- The transition of the reprocessed SNPP ATMS (V1 and V2), CrIS, and OMPS (V1 and V2) data was completed in December 2021, February 2022 and March 9, 2022, respectively. These data are available at CLASS website now.
- The transition of the reprocessed SNPP VIIRS started on March 15, 2022.
- The reprocessed SNPP VIIRS SDR data from 1/2/2012 to 5/23/2017 (**1031.2T, 63.85%** of total) has been completed as of Feb. 28, 2023.
- It's expected that the VIIRS data transition will complete in October 2023.
- The new staff started to contact the ASSIST team to obtained the EDR algorithm package
- Likun Wang has replaced Lin Lin as the coordinator of the Reprocessing Working Group (RWG) starting from February 2023

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Complete transition of reprocessed SNPP VIIRS SDR to CLASS	03/2022	10/2023		1 month
Complete VIIRS EDR reprocessing for Clouds, polar wind, Ice Concentration; Ice Thickness; Snow Cover; and Ice Surface Temperature	02/2023	10/2023		1 month

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		x			
Technical / Programmatic		x			
Schedule		x			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Highlights: Status of the Reprocessed SNPP Data Transition

Sensor	Data Type (name)	Period	Notes	Volume (Tb)	Status
ATMS	TDR (TATMS)	2011-11-08 to 2019-10-15	V2	0.406	Completed on Dec. 20, 2021
	SDR (SATMS)	2011-11-08 to 2019-10-15	V2	0.431	
	GEO (GATMO)	2011-11-08 to 2019-10-15	V2	0.420	
ATMS	TDR (TATMS)	2011-11-08 to 2017-03-08	V1	0.273	Completed on Dec. 30, 2021
	SDR (SATMS)	2011-11-08 to 2017-03-08	V1	0.289	
	GEO (GATMO)	2011-11-08 to 2017-03-08	V1	0.283	
CrIS	GCRSO	2012-02-20 to 2020-01-29	V2	0.369	Completed on Feb. 25, 2022
	SCRIS	2012-02-20 to 2020-01-29	V2	67.994	
	SCRIF	2014-12-04 to 2020-01-29	V2	74.455	
OMPS	TC (SOMTC, GOTCO)	2012-01-30 to 2018-09-30	V1	1.2	Completed on Mar. 4, 2022
	NP (SOMPS, GONPO)	2012-01-25 to 2017-03-08	V1	0.134	
OMPS	NP (SOMPS, GONPO)	2012-01-25 to 2021-06-30	V2	0.246	Completed on Mar. 9, 2022
	TC (SOMTC, GOTCO)	2012-01-30 to 2021-06-30	V2	1.695	
VIIRS	VIIRS ALL SDR	2012-01-02 to 2020-04-30	V2	1615	Completed **63.85**%
Total				1764.65	

Sea Surface Temperature

February 2023

Accomplishments / Events:

- Continue working SOCD Management to fund the FY23 SST cluster hardware refresh. Coordination with JSTAR Ingrid Guch and GOES-R AWG Jaime Daniels for funding allocation.
- N21 VIIRS Cryoradiator Door opened 2/08/23 @15:46Z. The first full global day (00Z-24Z) with high quality thermal IR data was 2/11/23. SST processing and Cal/Val in STAR has been routinely performed since that date, with N20 SST LUTs and settings.
- Based on initial evaluation of the first 2 weeks of data, biases in N21 SSTs were observed and mitigated by adjusting the free term of the regression and reprocessing full month of Feb 2023.
- Results of validation of nighttime SSTs from NPP, N20 and N21, for the full month of Feb'23, against in situ data are shown in Figure below. The results are very comparable between 3 VIIRSs.
- Daytime N21 SDs are more degraded, compared to their NPP/N20 counterparts, at least in part due to using the N20 regression coefficients.
- We continue Cal/Val and plan to recalculate regression coefficients once have sufficient number of match-ups (approximately, at the end of Mar'23).
- All tasks and milestones are on schedule

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

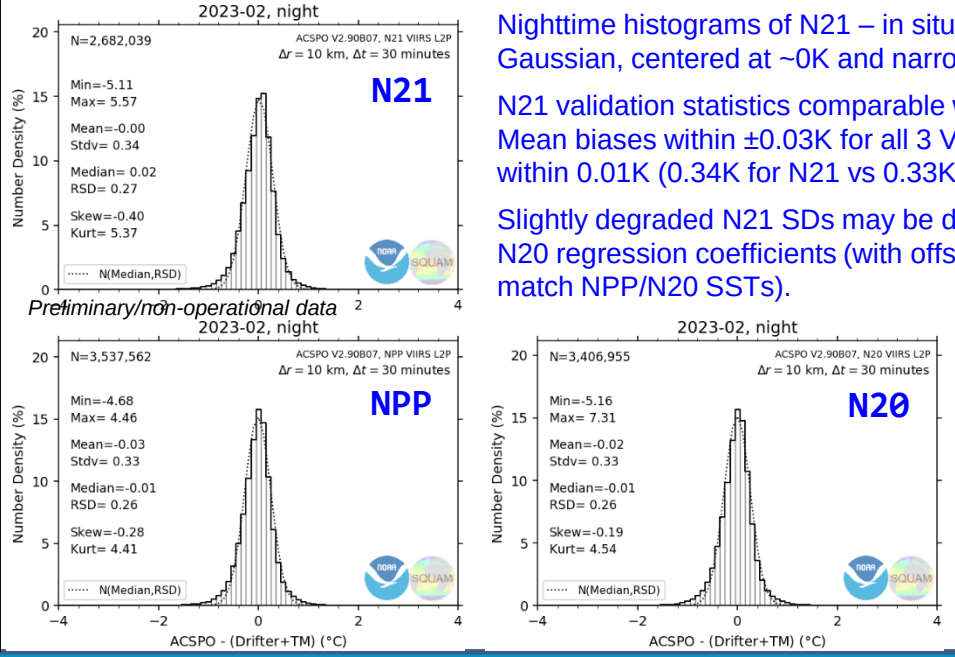
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

Delay with opening cryoradiator doors on N21 VIIRS pushes back the reviews by approximately 2 months.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Deliver update to ACSPO v2.80 to retire GMODO	Aug-23	Apr-23		
NOAA-21 SST product Beta Maturity	Jul-23	Jul-23		
NOAA-21 SST product Provisional Maturity	Oct-23	Oct-23		
Product consistency & validation activities w/NPP/N20, non-JPSS LEO SSTs (AVHRR GAC/FRAC & MODIS).	Sep-23	Sep-23		

Highlights: Ongoing N21 Cal/Val



Preliminary/non-operational data

Nighttime histograms of N21 – in situ SST are near-Gaussian, centered at ~0K and narrow, as expected.

N21 validation statistics comparable with NPP/N20. Mean biases within ±0.03K for all 3 VIIRSs. The SDs within 0.01K (0.34K for N21 vs 0.33K for NPP/N20).

Slightly degraded N21 SDs may be due to using the N20 regression coefficients (with offset adjusted to match NPP/N20 SSTs).

Surface Albedo

February 2023

Accomplishments / Events:

- Compare the NBAR between GOESR and VIIRS
  -- In progress: Mapping the data from VIIRS to GOESR
  -- Follow on with testing the BRDF from combined GOESR and GOEST
- Updated the multi-parameter anomaly images of Jan 2023
- Analyzed climate patterns and the Australia anomaly pattern change
- Keep checking the **J2 SURFALB** product availability
- Attended the meeting with the EMC team scientist Michael Barlage about promoting the application of land satellite products in models.
  - Discussed about the soil albedo assessment
  - Communicated about comparing satellite albedo and model albedo

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		x			
Schedule		X			

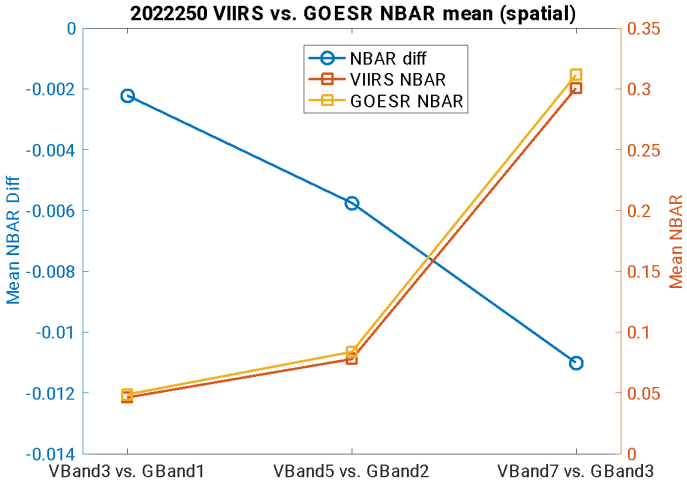
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

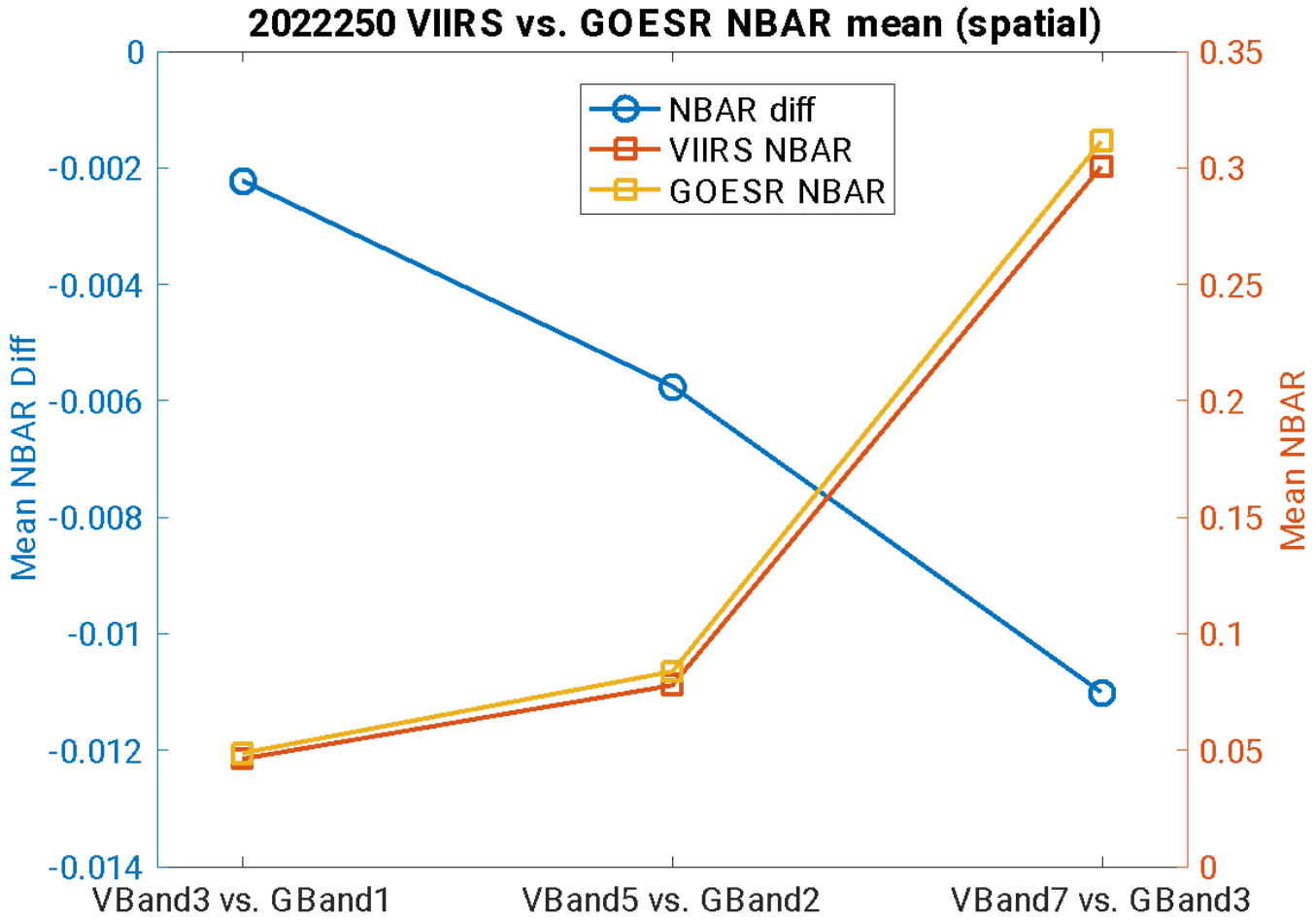
Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Beta review of the NOAA-21 albedo	Mar-23			
PMR review	May-23			
mDAP for NOAA-21 if needed	Aug-23			
Provional review of NOAA-21 LSA	Nov-23			

Highlights: The overall difference between VIIRS and GOESR NBAR

- VIIRS and GOESR NBAR are compared over GOESR FD region for one day's NBAR data (09/07/2022)



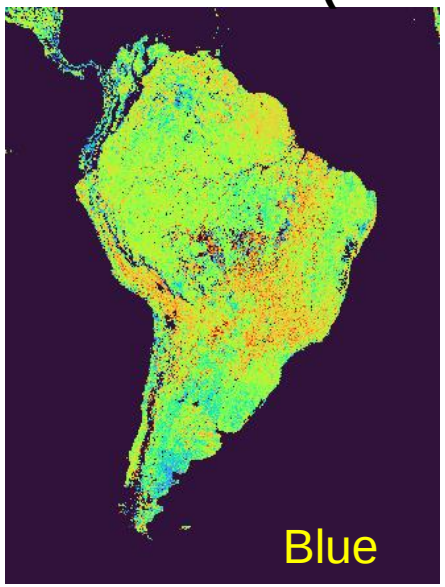
VIIRS NBAR vs. GOESR NBAR

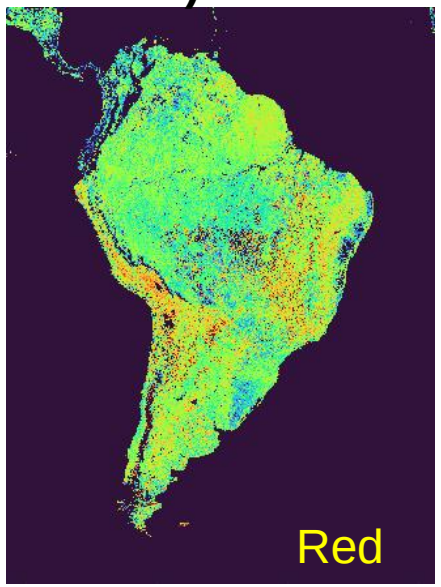


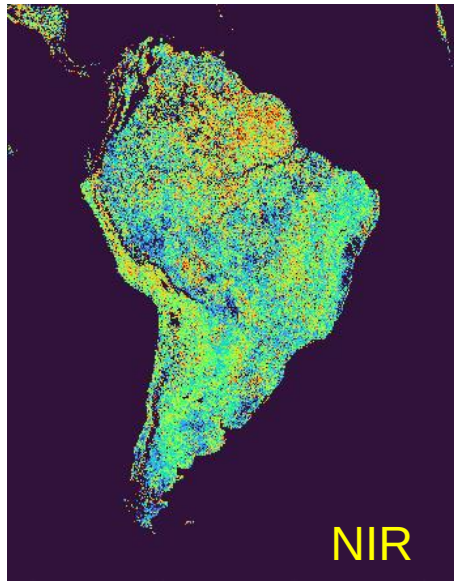
- Left figure demonstrates statistics over GOESR FD region for one day's NBAR data (09/07/2022)
- The spatial mean suggests GOESR NBAR is slightly larger than VIIRS NBAR, especially in RED (by 0.006) and NIR (by 0.012)
- The relative difference is 4.8%, 7.4%, and 3.7% respectively.

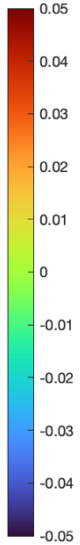
VIIRS and GOESR NBAR Difference

(VIIRS – GOESR) NBAR over South America

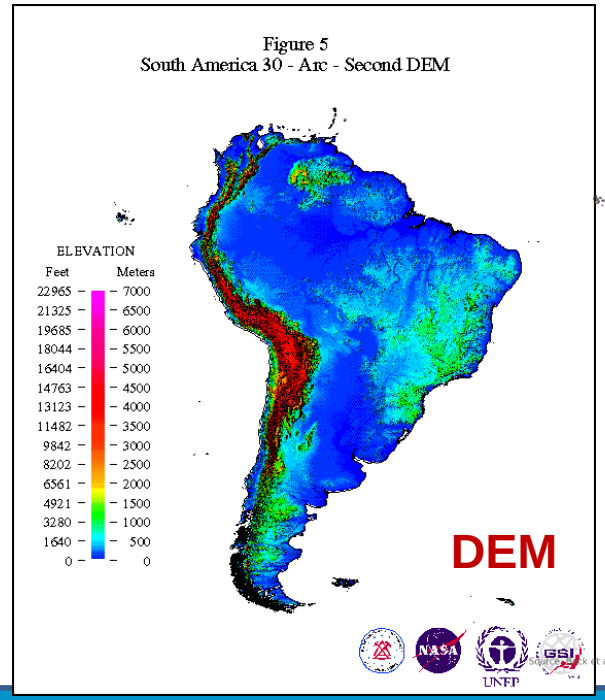




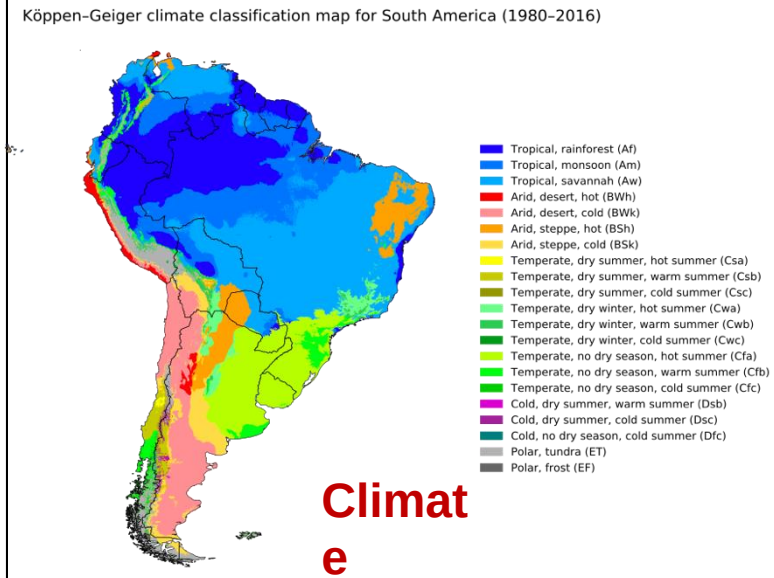




Surface Type



DEM

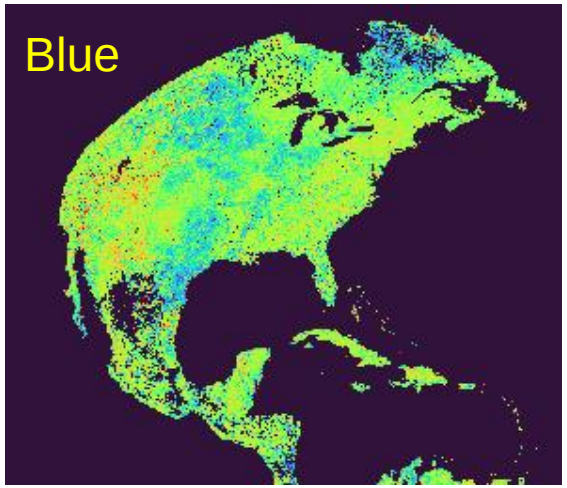


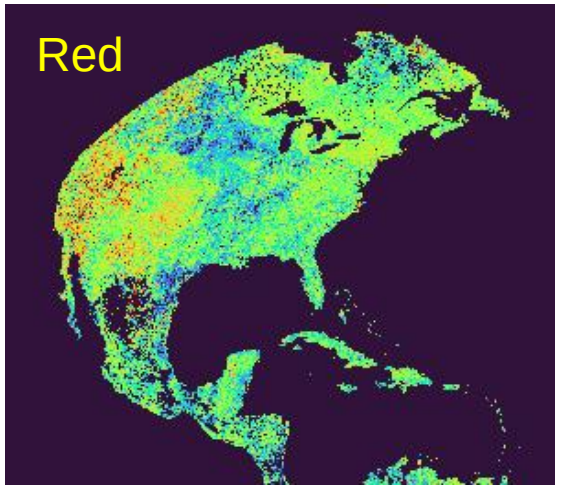
Climate

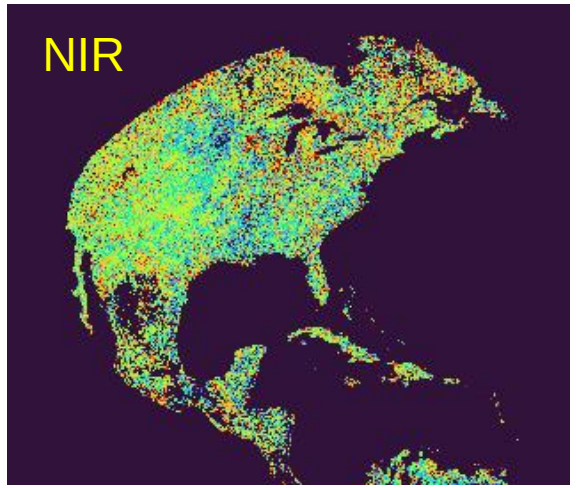
- Crop/Grassland in temperate region shows larger NBAR diff in blue and red bands
- Tropical rainforest shows larger NBAR diff in NIR band

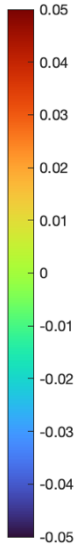
VIIRS and GOESR NBAR Difference

(VIIRS – GOESR) NBAR over North America

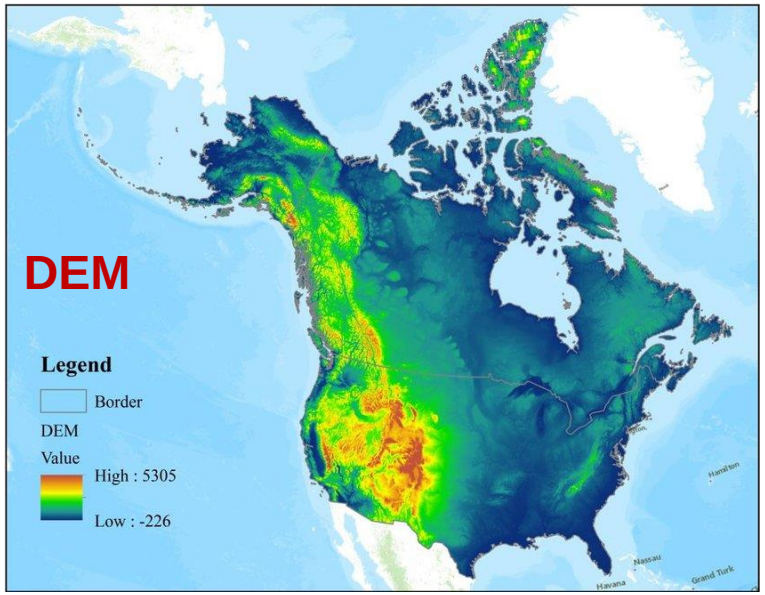


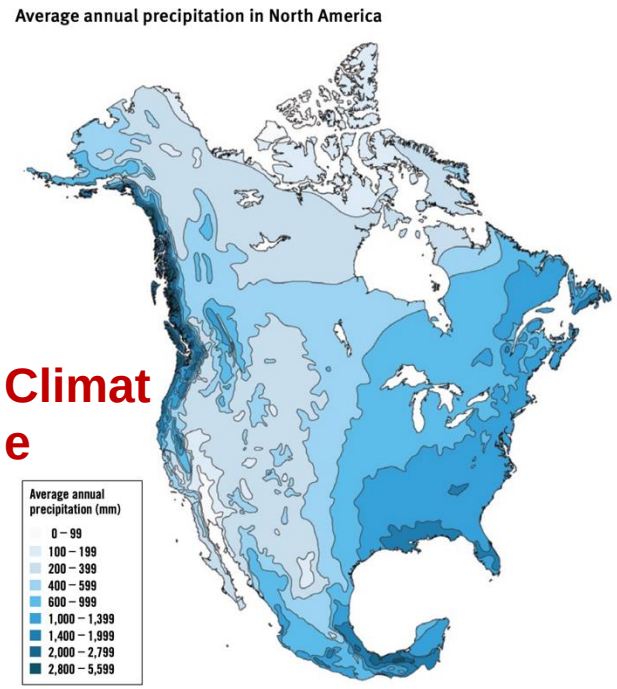


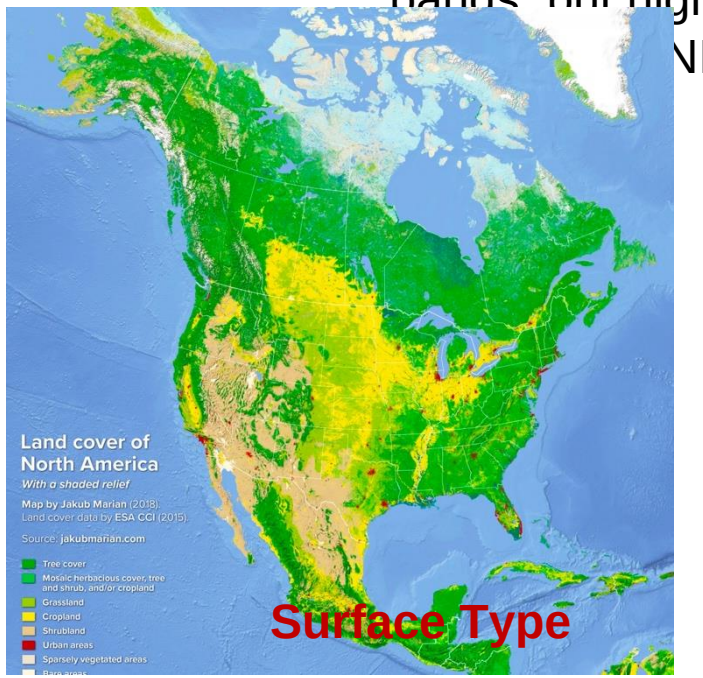




- Crop/Grassland: GOESR shows higher NBAR
- Shrubland in western area with higher DEM: VIIRS shows higher NBAR
- Forest area shows closer NBAR in blue and red bands, but higher NIR band

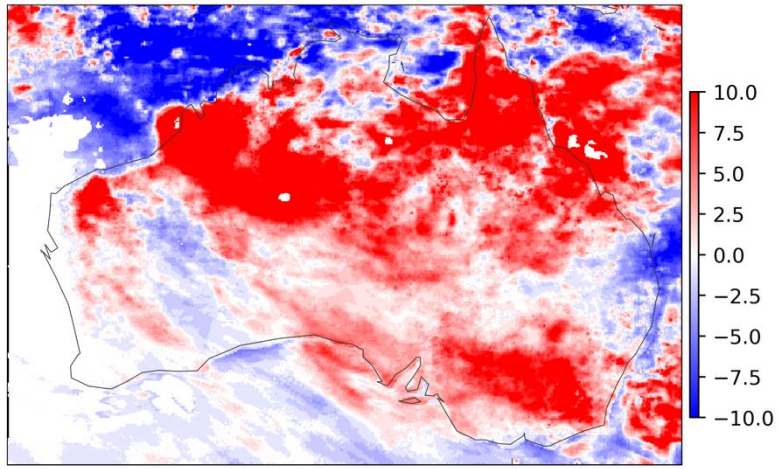






MJO influence on Australia in Jan 2023

Atmospheric disturbance



Different from ENSO which is stationary. MJO is an *eastward moving* disturbance of clouds, rainfall, winds, and pressure that traverses the planet in the tropics from the Indian Ocean to the western Pacific and returns to its initial starting point in 30 to 60 days, on average.

Red arrows indicate direction of wind and red (blue) SST labels indicate positive (negative) SST anomalies respectively. (Madden and Julian, 1971; 1972.)

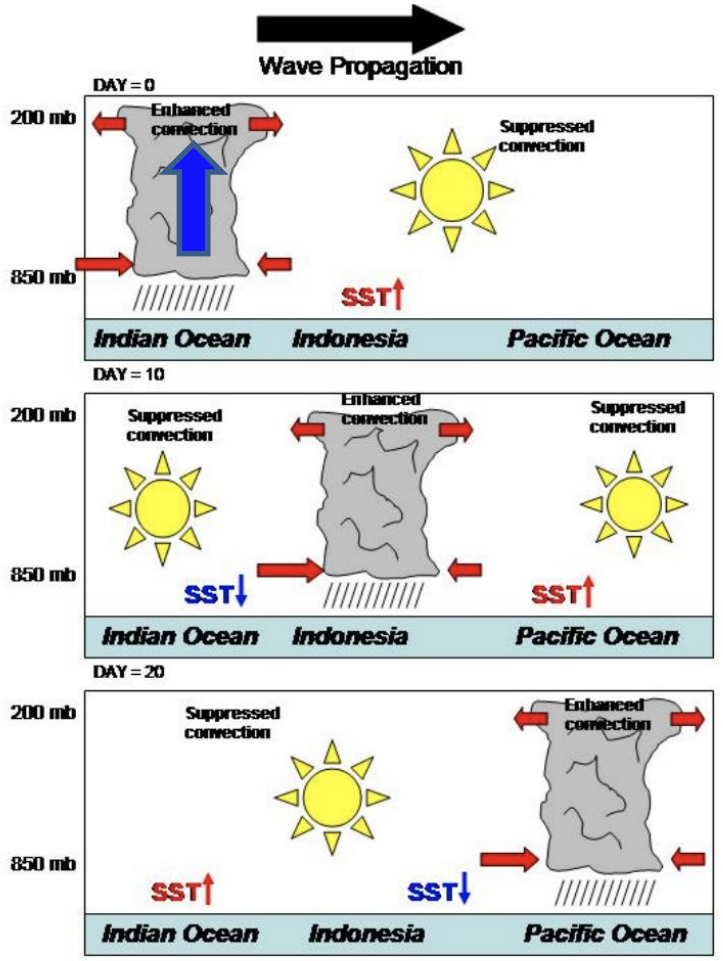
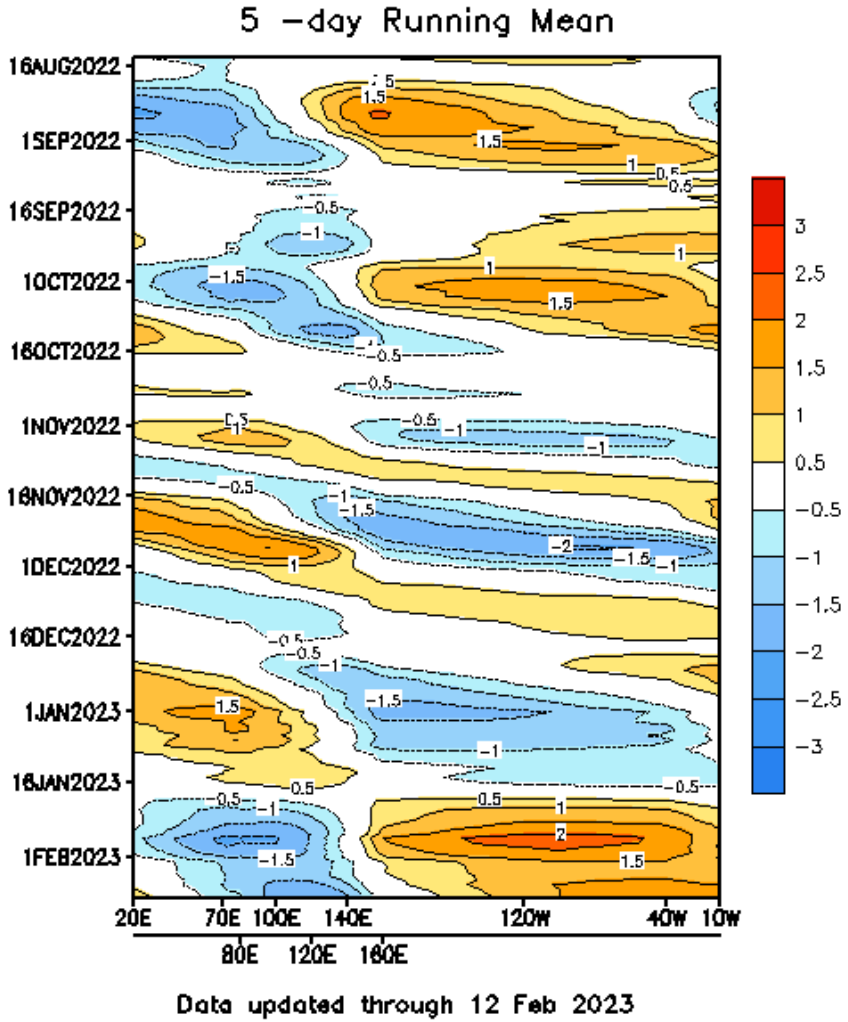
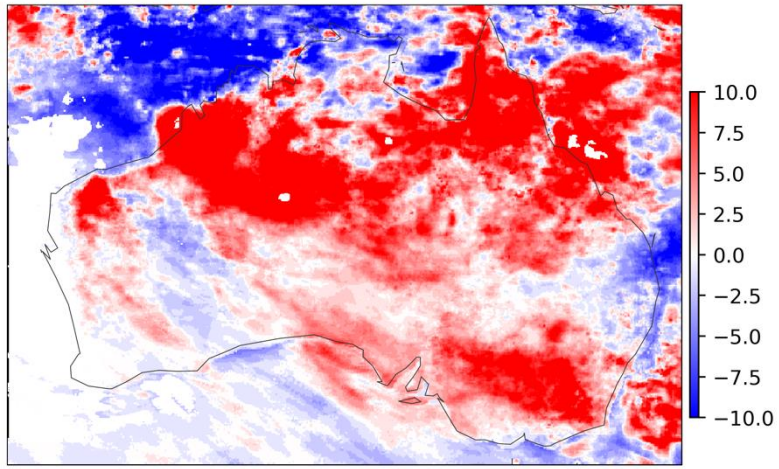


Figure 1: Equatorial vertical cross section of the MJO as it propagates from the Indian Ocean to the western Pacific. Red arrows indicate direction of wind and red (blue) SST labels indicate positive (negative) SST anomalies respectively. Figure adapted from Madden and Julian, 1971; 1972.



MJO influence on Australia in Jan 2023

Atmospheric disturbance



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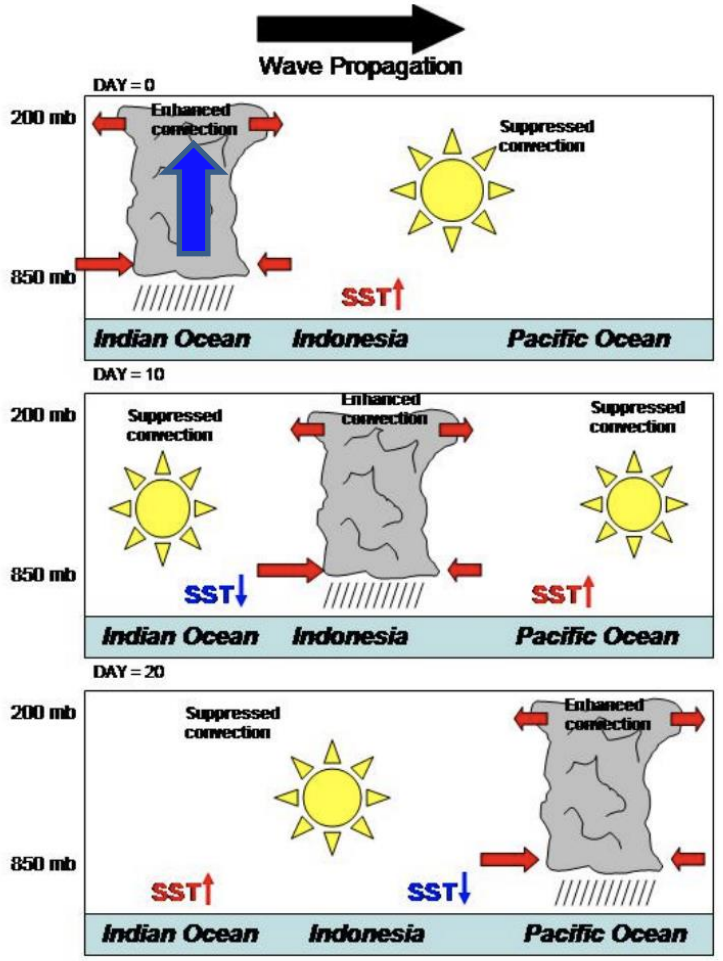
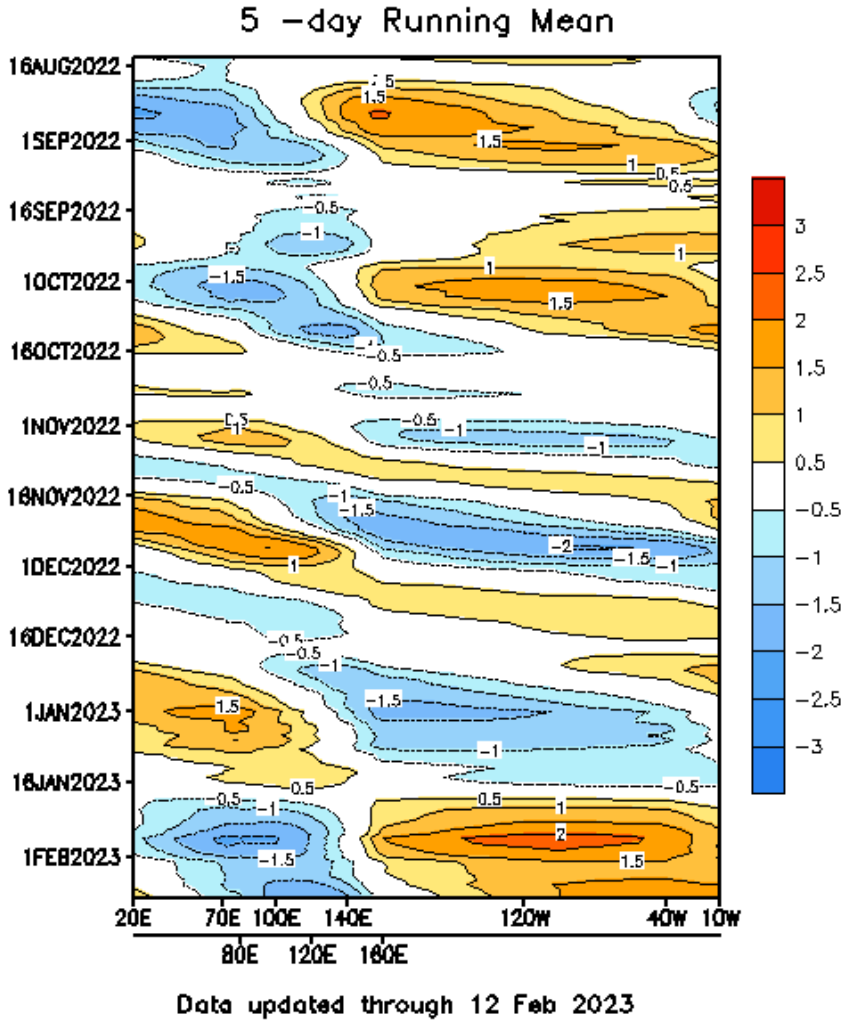


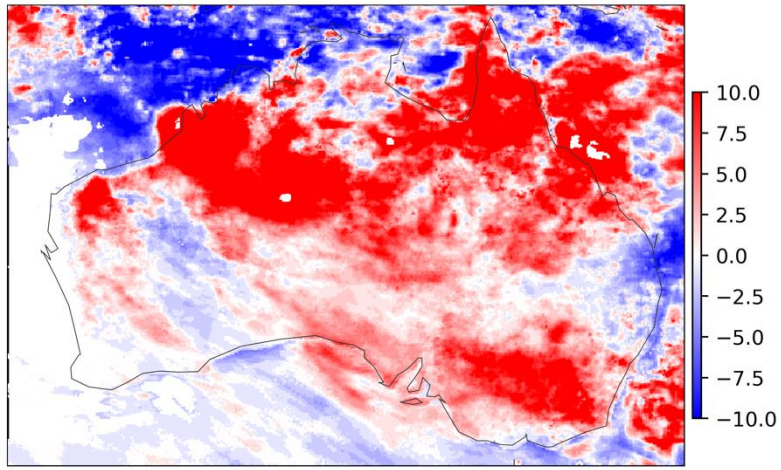
Figure 1: Equatorial vertical cross section of the MJO as it propagates from the Indian Ocean to the western Pacific. Red arrows indicate direction of wind and red (blue) SST labels indicate positive (negative) SST anomalies respectively. Figure adapted from Madden and Julian, 1971; 1972.



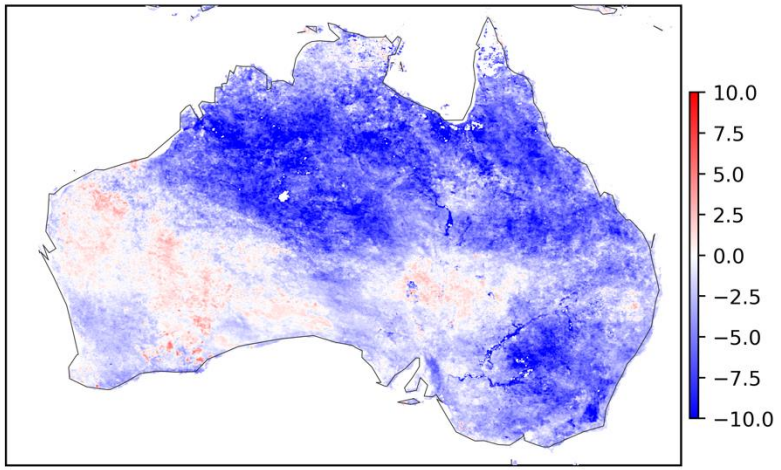
Analyzed MJO influence on Australia in Jan 2023

Increased precipitation → Decreased temperature

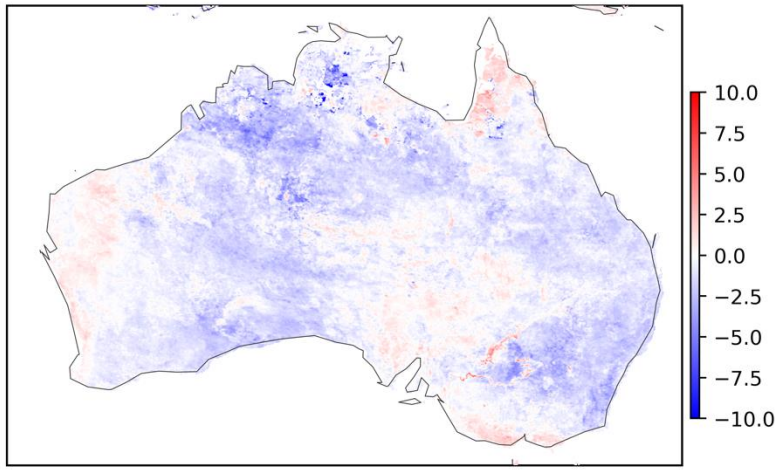
Australia precipitationCal anomaly 2023-01



Australia LST_Day_1km anomaly 2023-01



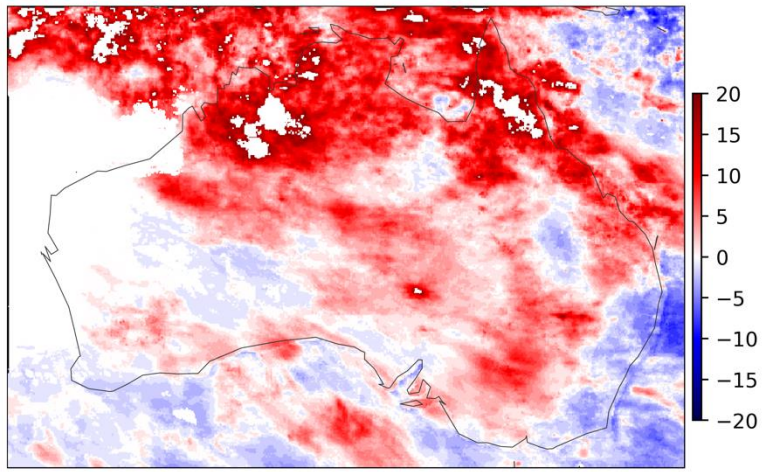
Australia LST_Night_1km anomaly 2023-01



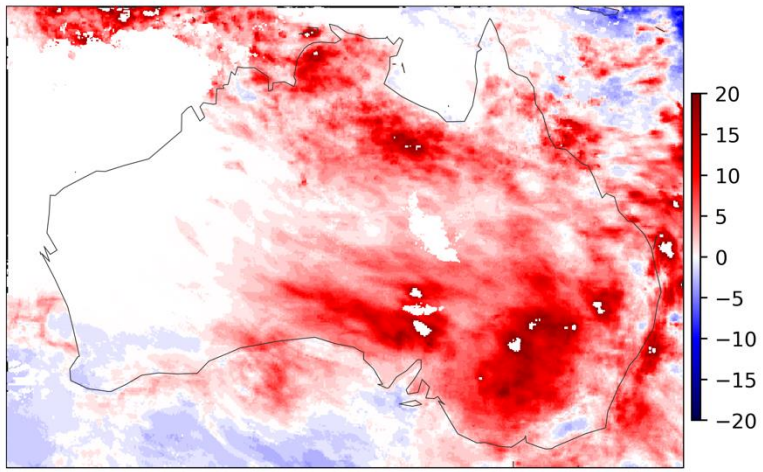
Two other cases:

October 2022
November 2022

Australia precipitationCal anomaly 2022-11

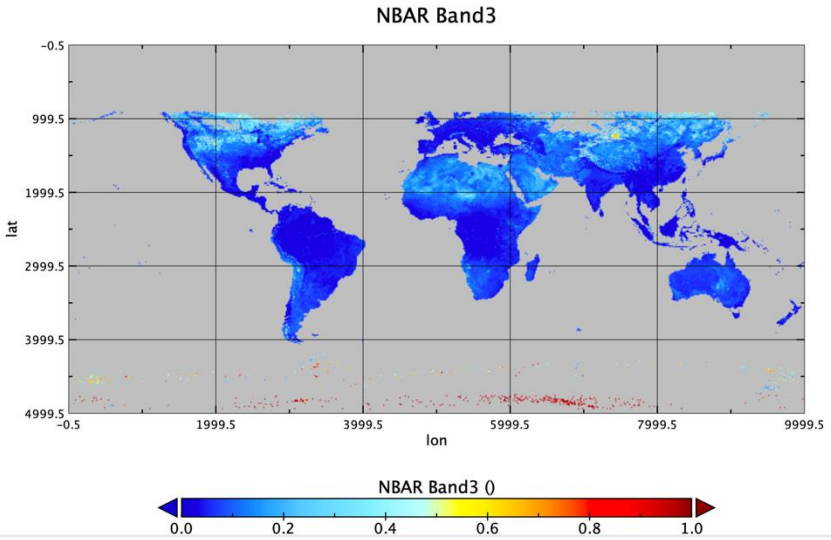


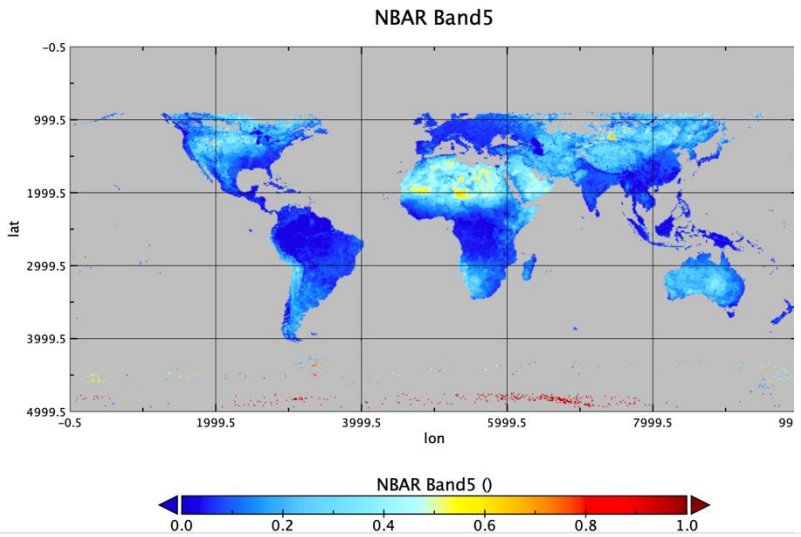
Australia precipitationCal anomaly 2022-10

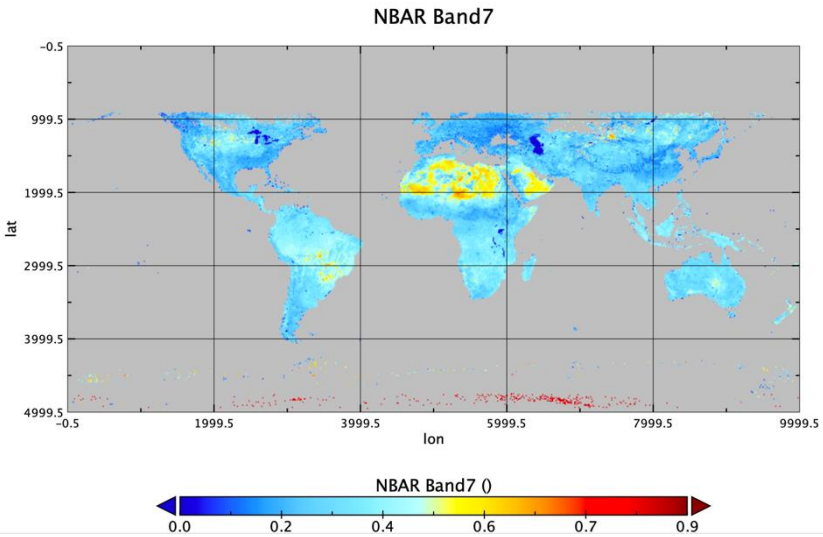


Providing more NBAR data to vegetation team

- Provided VIIRS NBAR test data to VIIRS vegetation team (data span from 09/06/2022 to 12/30/2022)
- The dataset contains NBAR for band 3, 5, 7
- The projections include Sinusoidal, 1km Lat/Lon, 4km Lat/Lon.
- BRDF_QC are contained for quality control







Snowfall Rate

February 2023

Accomplishments / Events:

- The current machine learning snowfall detection algorithm tends to miss snowfall over coastlines. A new ML model is being developed that can improve the performance over coastal areas. The preliminary results are very promising (see the Highlights section). Once the algorithm is validated and mature, it will be transitioned to operation in the next delivery to ASSISTT.
- Yongzhen Fan (CISESS) attended the Virtual Workshop on Precipitation Estimation from LEO Satellites: Retrieval and Application and gave a presentation about snowfall retrieval. The workshop was sponsored by the JPSS program and organized by the Center for Hydrometeorology and Remote Sensing (CHRS) at the University of California, Irvine.

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		x			
Technical / Programmatic		x			
Schedule		x			

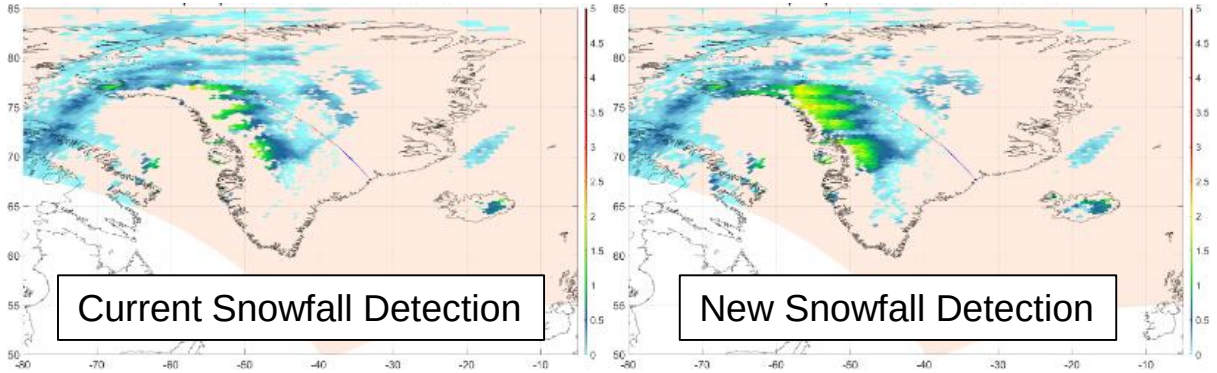
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Train a new machine learning snowfall detection model using N21 observations	Apr-23	Apr-23		
Train new machine learning models for 1DVAR initialization and SFR bias correction using N21 observations	Apr-23	Apr-23		
NOAA-21 SFR beta maturity review	May-23	May-23		
Enterprise SFR science code delivery to ASSISTT including N21 beta maturity SFR	May-23	May-23		
Enhance orographic snowfall retrieval through machine learning	Sep-23	Sep-23		

Highlights: New ML Snowfall Detection Improves Coastline Performance



A new version of machine learning snowfall detection model is capable of capturing more snowfall over coastlines than the existing model

Surface Reflectance

February 2023

Accomplishments / Events:

- Collaborate with NASA science team, generated whole package of the new LUTs for SNPP, NOAA20 and JPSS-2, test the LUT using global AERONET data and NASA VNP09 product.
- Investigated the performance and uncertainty of the aerosol product, learn the dust aerosol model setting and the validation error from the aerosol team.
- Update the aerosol model default setting in current algorithm, tested the new update performance and prepared for the upcoming delivery.
- Summarized long term SR validation results and analyzed the issues and tried to improved the algorithm.
- Continue the SR long-term monitoring and follow up the status of the JPSS2 data.

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		x			
Technical / Programmatic		x			
Schedule		x			

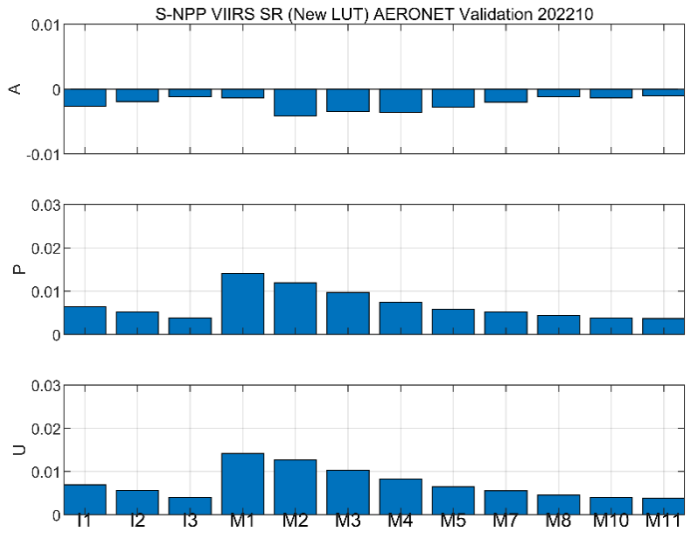
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
SR LUT update and Test for SNPP, NOAA20 and J2	Oct-22	Nov-22	Dec-22	we generated two sets of LUTs for final decision
SNPP & N20 consistency analysis and correction.	Dec-22	Dec-22	Dec-22	
SR beta review for JPSS-2	Jan-23	Mar-23		
DAP update and delivery, if needed	Apr-23	May-23		
JPSS program Annual review	May-23	Jun-23		
JPSS-2 SR provisional Review	Aug-23	Sep-23		

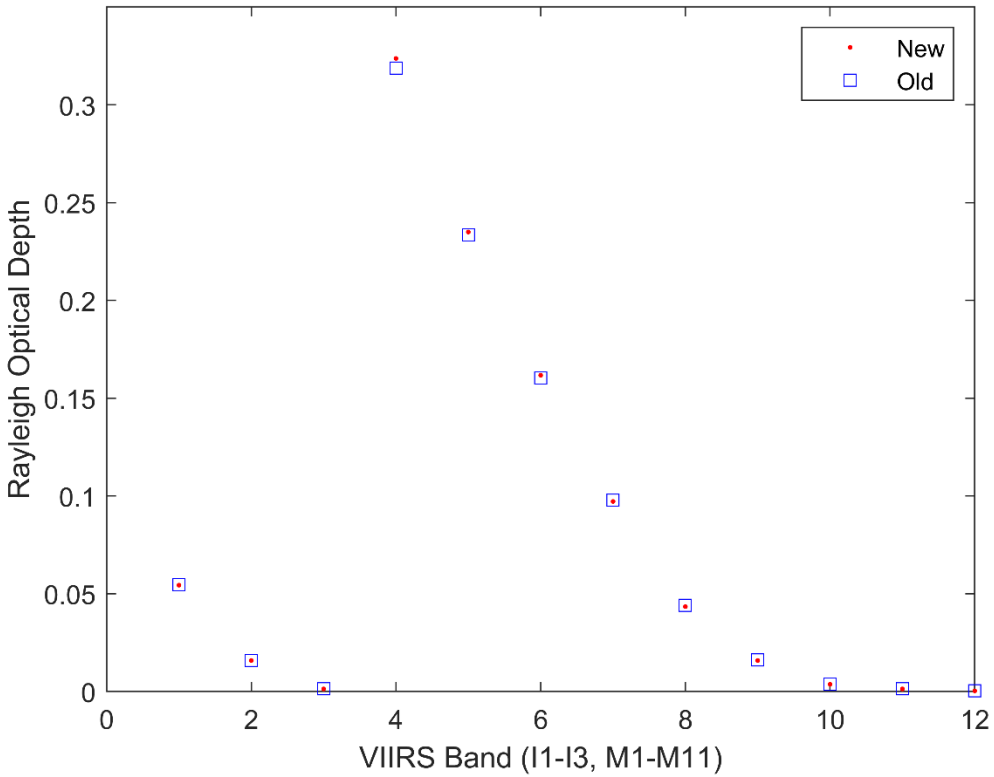
Highlights:

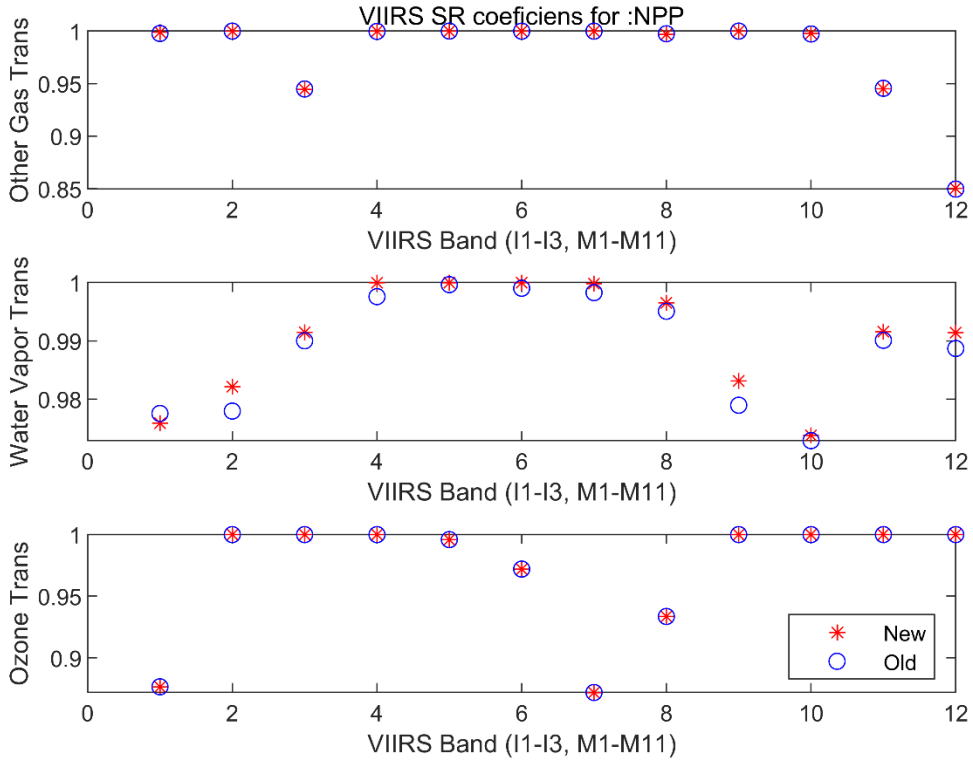


The new LUT for both SNPP and NOAA20 have a good agreement with AERONET based SR.

The Rayleigh and Gases coefficients Update

For SNPP, the current coefficients (old LUT) and new ones comparison.

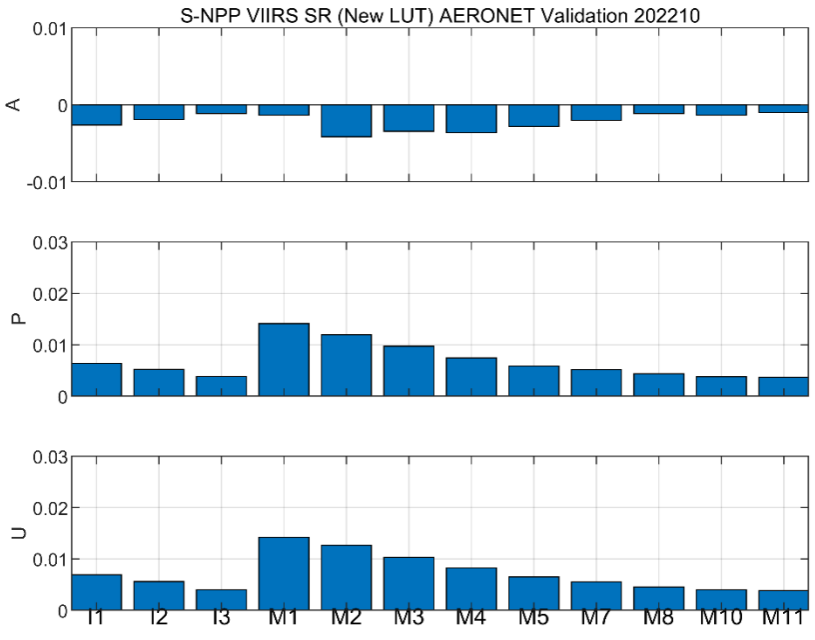




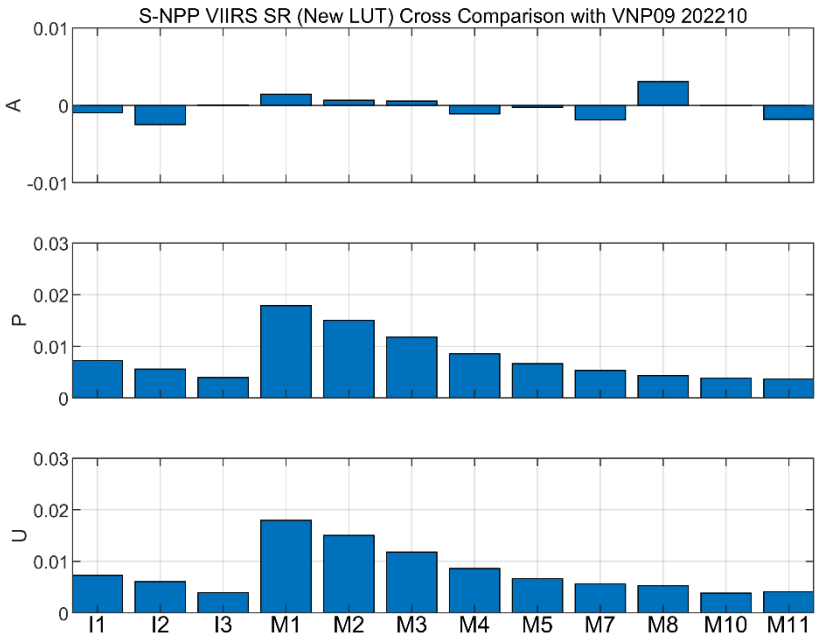
Water vapor coefficients have a little bit larger difference, due to the update of the 6S, overall the update will not bring big difference on SR.

New LUT Performance for SNPP and NOAA20

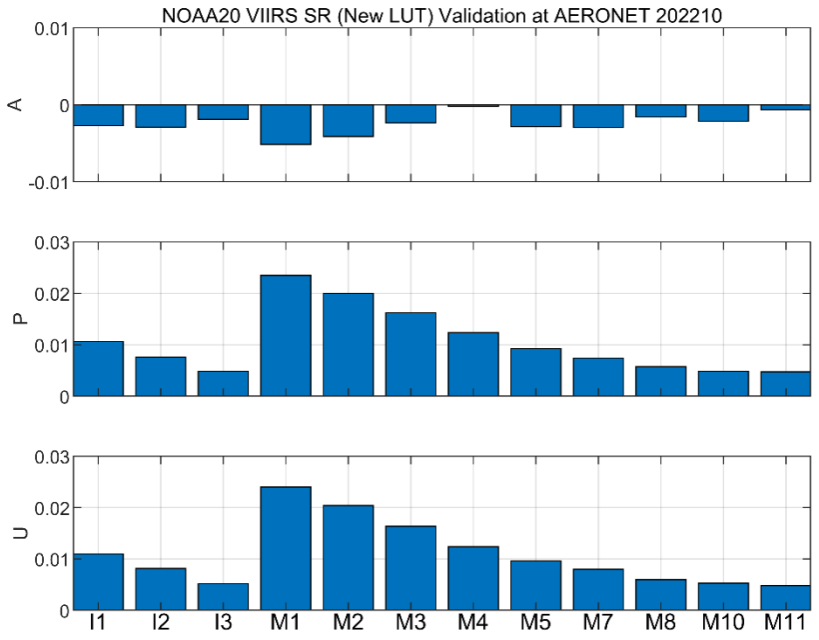
To Evaluate the new LUT performance, AERONET based SR and NASA VNP09 SR are used, the AERONET validation results shows both SNPP and NOAA20 have good agreement with AERONET SR and improved consistency, the intercomparison with VNP09 shows the two product are comparable.



SNPP SR Validation at AERONET

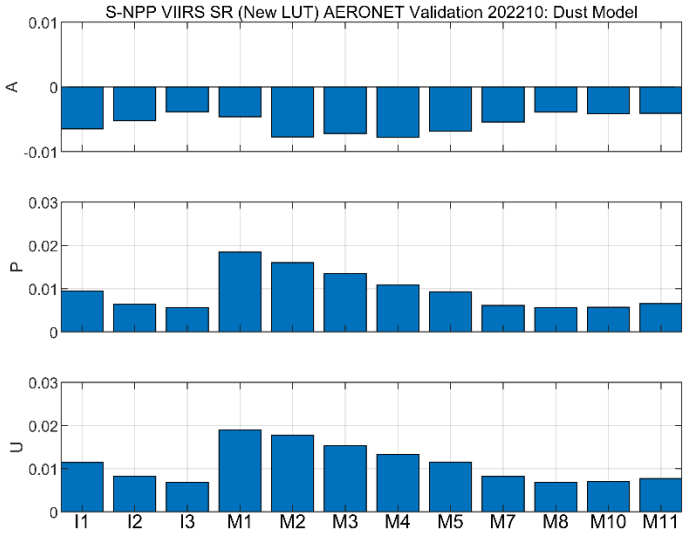


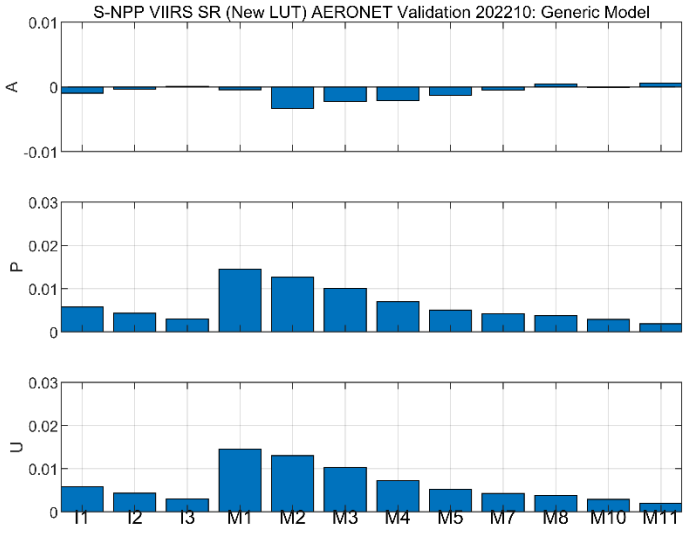
SNPP SR Compared with NASA VNP09

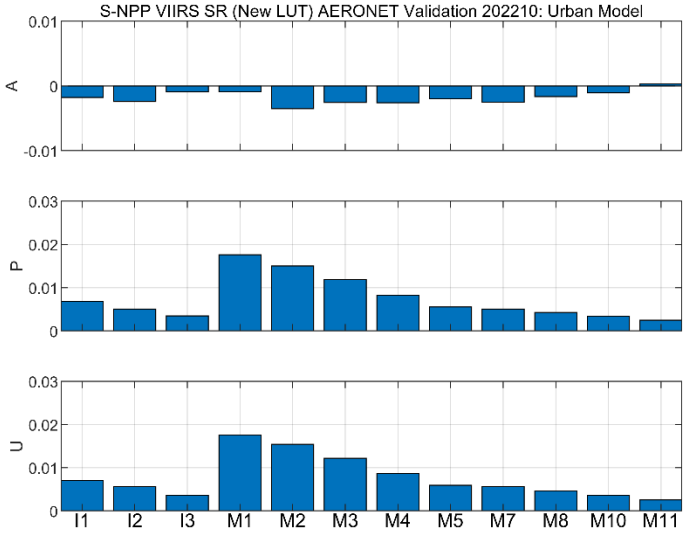


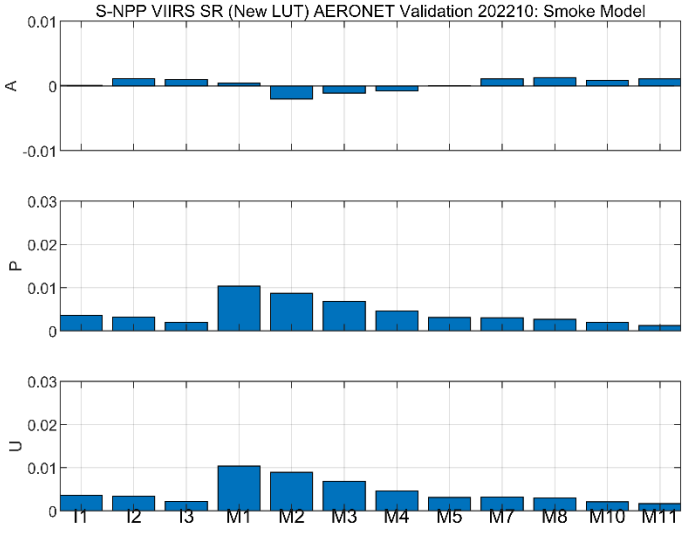
NOAA20 SR Validation at AERONET

Investigate the SR performance of Dust Aerosol Model







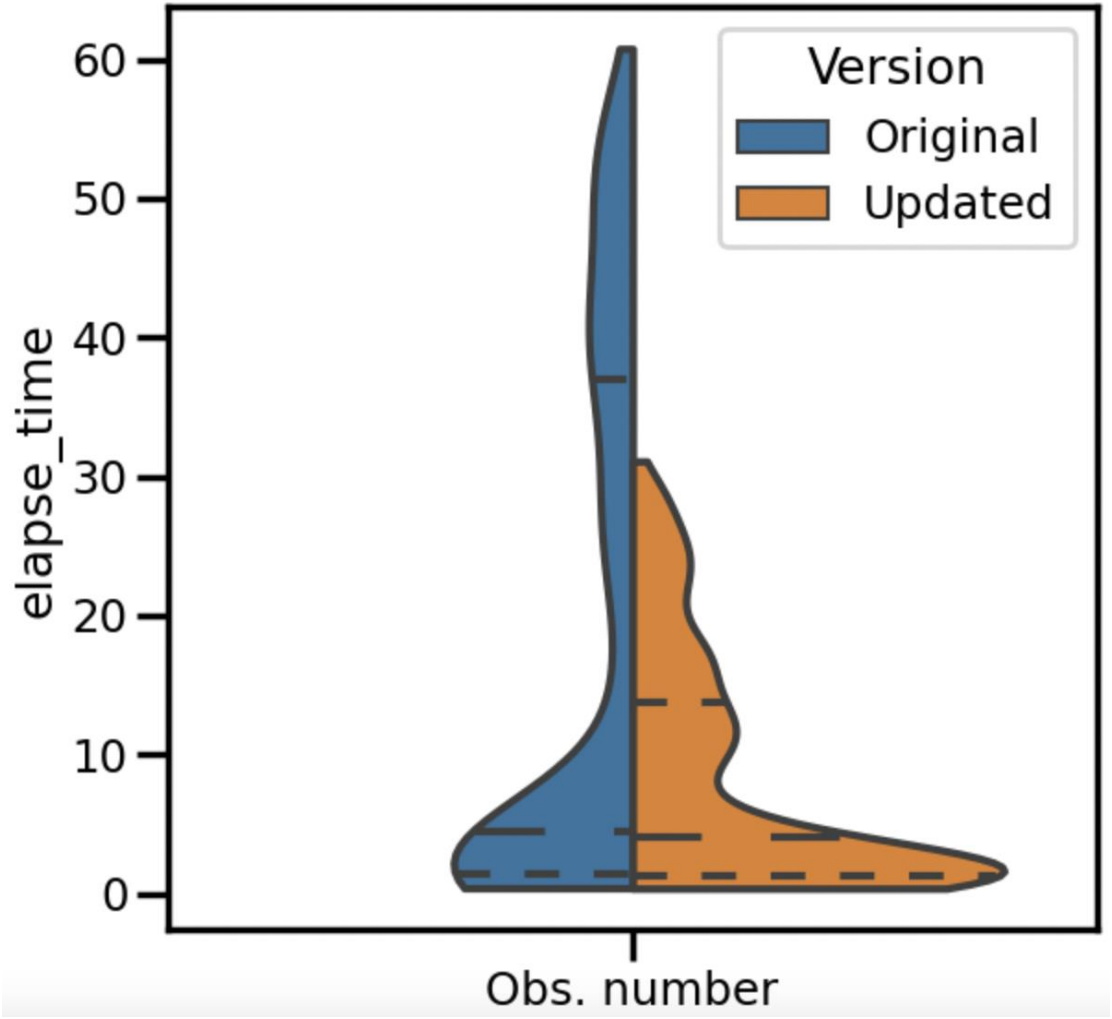


In the validation dataset, the dust model are dominate type, and when perform the SR validation for each type, the dust model with significant negative bias compared with AERONET SR.

A resolution is under exploration to mitigate the SR uncertainty for the pixels classified as dust model.

VIIRS BRDF code package efficiency improvement

- The C++ version of the BRDF retrieval program has been updated.
- The output values of BRDF parameters for all bands are same as the original version.
- The code efficiency has been largely improved.
  - Correction includes the rearrangement of the estimation processes of the observations
  - The modification of variable types (from short to float).
  - Several redundant processes have been eliminated to speed up the program.
- The efficiency of the updated program is more than 2 times that of the original one. The following figure shows the distribution of the time used between the original and updated BRDF programs (the minimum, 25%, medium, 75%, and maximum values have been given).



VIIRS SDR

February 2023

Accomplishments / Events:

- Monitored resolution of the NOAA-21 (N21) Ka-band transmitter anomaly and return to nominal operations; monitored opening of the VIIRS cryoradiator door and confirmed cooldown of the Cold FPA temperatures to the nominal operating values of 82 K
- After adapting and testing the processing software for the N21 VIIRS DNB Calibration data, created, tested and submitted for deployment in the IDPS operations the N21 VIIRS DNB DN0 and GAIN-RATIOS LUTs that were updated based on measurements acquired during the new moon on 2/20/2023
- Analyzed the latest CPM results for N21 VIIRS SDR geolocation products and determined that the geolocation errors remained unchanged after application of the spacecraft pitch bias of -600 arcsec (for OMPS Limb Profiler) and after VIIRS mid-mission outgassing of the Cold FPA dewar
- Assisted in scheduling and analyzed data from NOAA-20 (N20) and Suomi NPP (NPP) VIIRS lunar calibration with spacecraft roll maneuvers on 2/1/2023
- Created and delivered for deployment in the IDPS operations updated N20 and NPP VIIRS DNB DN0 and GAIN-RATIOS LUTs generated using the new moon calibration data from 2/20/2023

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		x			
Technical / Programmatic		x			
Schedule		x			

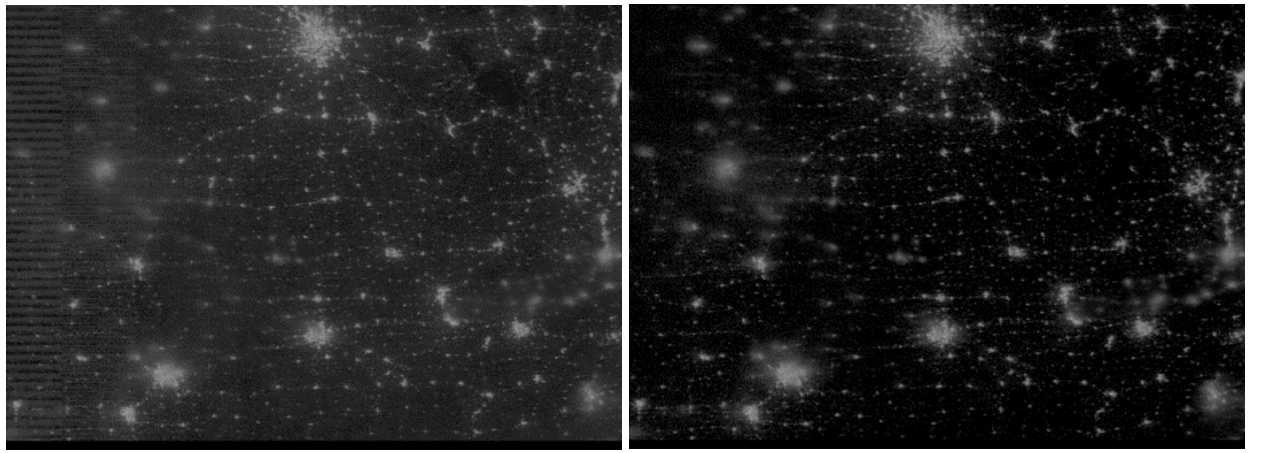
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Post-launch Cal/Val for J2 (from First light to VIIRS SDR Beta Maturity)	Dec-22	Feb-23	2/23/2023	KaTX anomaly
VIIRS SDR Provisional Maturity	Feb-23	Mar-23		KaTX anomaly
VIIRS SDR Validated Maturity	May-23	Jun-23		KaTX anomaly
Monthly lunar calibration (predictions and analyses)	Jul-23	Jul-23		
Monthly delivery of VIIRS DNB calibration LUTs	Sep-23	Sep-23		
Geolocation monitoring using CPM (for NPP, N20 and N21)	Sep-23	Sep-23		
J2 on-orbit calibration LUT development	Sep-23	Sep-23		

Highlights:



Preliminary/non-operational data

NOAA-21 VIIRS SDR DNB image (2/20/2023 7:15 UTC) processed before (left) and after (right) the DNB LUT update: striping visible on the left side of the image before the update diminished after it

Volcanic Ash

February, 2023

Accomplishments / Events:

- Routine validation of existing JPSS volcanic ash EDRs from current sensors and JPSS-2 will continue as needed, including support for ASSISTT/NDE evaluations. VOLCAT is long-term plan.
- During the past month the volcanic ash science team modified validation and imaging tools to prepare for NOAA-21 EDR and SDR data. The figure at the bottom right shows SDR and EDR visualization from the JPSS-2 Proxy data from October 2022. The imaging and validation tools will be used to validate the ash detection and retrieval fields and to prepare Beta/Provisional/Full Maturity review materials. (Note: the JPSS volcanic ash EDR algorithm performs ash retrievals on pixels that based on spectral signatures alone *may* contain volcanic ash and hence will have many more retrieved pixels compared to VOLCAT since VOLCAT uses sophisticated spectral and spatial methods to more skillfully denote regions of volcanic ash and no volcanic ash.)
- Quality/Oversight Continued to ensure high quality Volcanic Ash retrievals from EDR algorithms and VOLCAT. Routine validation of existing JPSS volcanic ash EDRs from current sensors and JPSS-2 will continue as needed, including support for ASSISTT/NDE evaluations. VOLCAT is long-term plan.

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Develop updated user training material	May-23	May-23		
Improve VIIRS volcanic ash plume identification and extraction	Jun-23	Jun-23		
Improve near source VIIRS volcanic ash height information	Jul-23	Jul-23		
NOAA-21 Volcanic Ash Beta Maturity	Jul-23	Jul-23		
NOAA-21 Volcanic Ash Provisional Maturity	Aug-23	Aug-23		
Maintain and monitor quality of volcanic ash EDR and JPSS-based products in VOLCAT	Sep-23	Sep-23		

Highlights: Volcanic ash science team imaging and validation tools are now ready to ingest, analyze, and visualize JPSS-2 EDR and SDR data. The images below are examples from the JPSS-2 EDR Proxy run from 2022. Left is Ash RGB and right is EDR ash detection confidence.