NOAA JPSS Monthly Program Office

AMP/STAR
FY25

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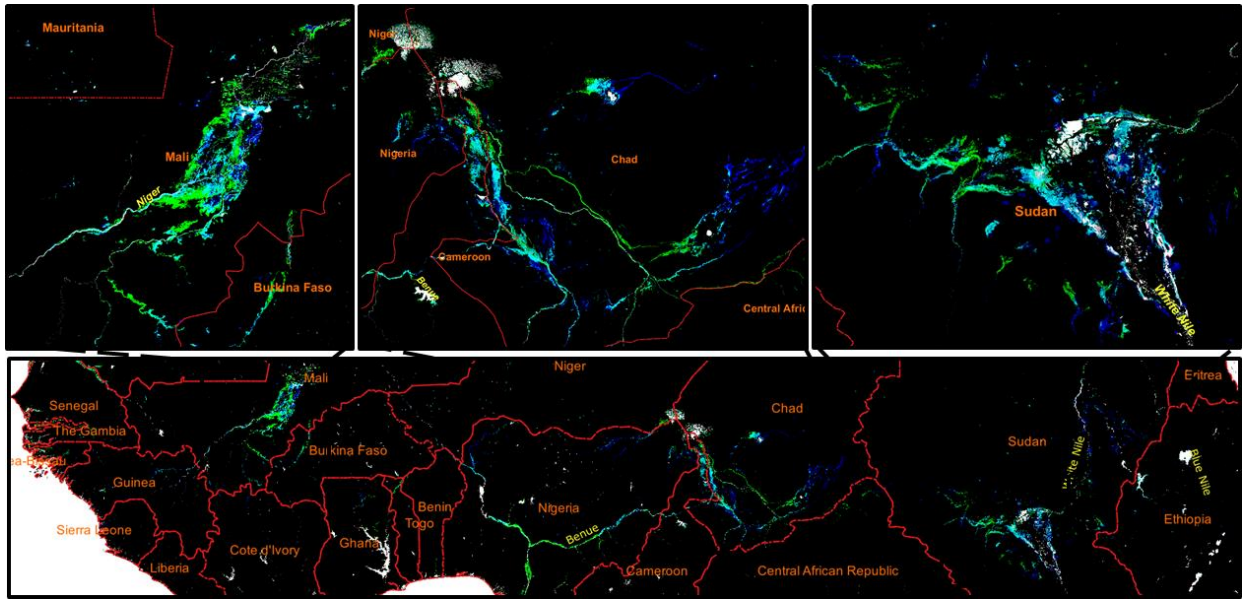
Ingrid Guch, Acting JPSS STAR Program Manager

January, 2025

Highlights from the Science Teams (December 2024)

Global 250 m SWF product captures record level flooding across Africa

Figure. Flood extent using an RGB combination of the 2024 surface water fraction (SWF) product for October (blue), September (green) and May (red). Green, blue, and cyan colors indicate flooding in September and/or October, while white/gray tones indicate pre-flood (i.e., areas inundated in all three months) water levels.



Africa's tropical zone experienced much heavier rainfall in 2024 than historical averages, causing month-long flooding between September and November over large areas in countries from Mali to Nigeria, Cameroon, Chad, and Sudan. Some of the major damages include ~2500 fatalities, hundreds of thousands of livestock lost, and millions of people displaced. Global 250 m SWF products are being produced by the VIIRS surface type team for each month. The water surface fraction maps were one of the surface type data product EMC requested for their updates of land/water mask data layer as input of their numerical weather prediction models.

Highlights from the Science Teams (December 2024)

Evaluation of Total Precipitable Water Trends from Reprocessed MiRS SNPP ATMS Observations

A meeting outlining a EUMETSAT-NOAA Scientific Cooperation Plan in coordination with the EPS-SG Cal/Val activities was held in late November. The purpose of this project is to collaborate on activities related to the Cal/Val of the EPS-SG mission, including exchanges on calibration and validation analysis, long-term monitoring methods and tools, reference datasets in support of EPS-SG calibration and validation activities. This would include the exchange of campaign data on an opportunistic basis.

Topics of interest included the coordination of programs which target polar satellites and ground truth observations, for example, interaction with the ongoing JPSS dedicated radiosonde program was discussed. In this context, a subset of operational WMO synoptic radiosondes that are typically (naturally) synchronized with MetOp satellites and routinely compiled in the NPROVS system was illustrated. These synoptic radiosondes represent a potentially important source of remote ocean cal/val data *at little or no additional cost to EUMETSAT or NOAA.*

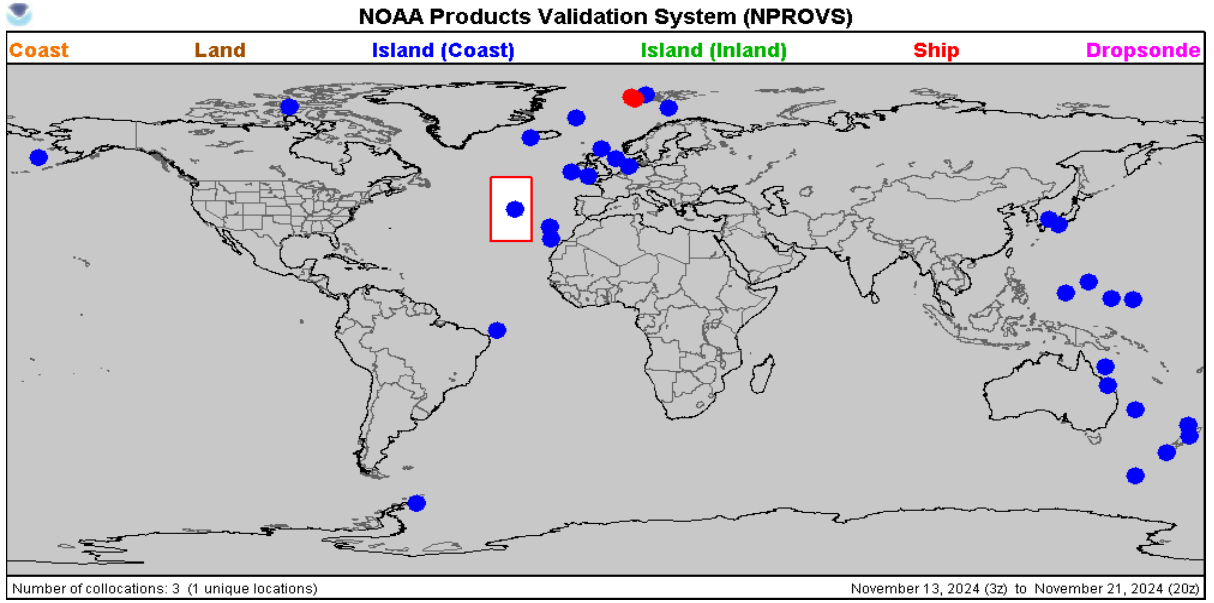


Figure. The upper panel shows the global distribution of WMO synoptic operational conventional radiosonde sites, over 30 sites, each launching high technology RS41 radiosondes that are routinely (naturally) concurrent with MetOp-C overpass

Highlights from the Science Teams (December 2024)

Evaluation of Total Precipitable Water Trends from Reprocessed MiRS SNPP ATMS Observations

A newly published study focused on trend analysis using the TPW retrieval product from the recently reprocessed SNPP ATMS MIRS data, and compared it with ERA5 reanalysis. The primary results show that the global TPW trend during 2012-2021 from reprocessed SNPP ATMS is 0.46 mm/decade, in relatively good agreement with the trend from ERA5 of 0.39 mm/decade. Trends for tropical and mid-latitude subregions are also in good agreement, with essentially the same trend of 0.43 mm/decade seen in both datasets in the mid-latitudes. Both datasets show a large positive anomaly associated with the strong El Nino event in 2015-2016, which increased TPW amounts in the tropics. We also found that the TPW trend is not uniformly distributed spatially, with significant regional variations in both sign and amplitude.

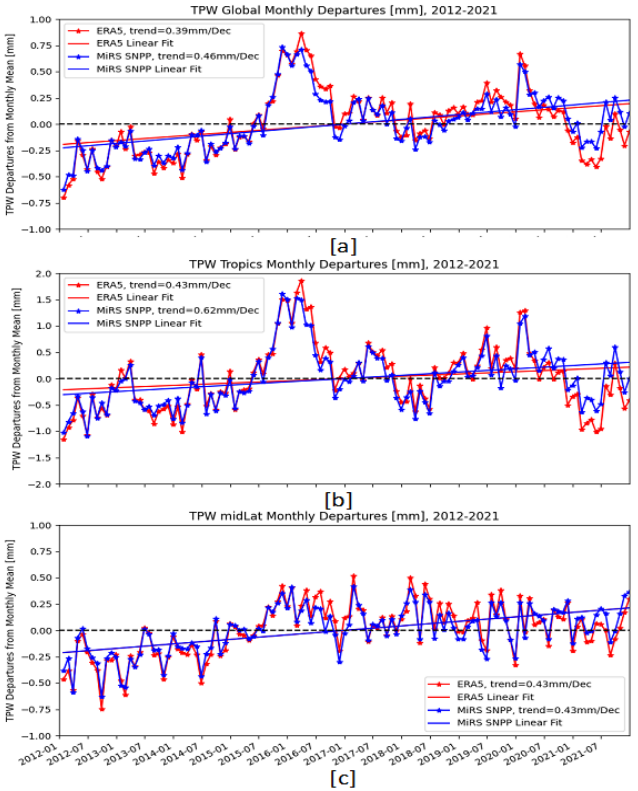


Figure. Monthly TPW anomaly time series shown in red for ERA5 and blue for MiRS SNPP, 2012-2021. The straight lines are the linear regression fits. [a] is for global, [b] for Tropics, and [c] for mid-latitude regions, respectively.

Reference: Zhou, Y., Grassotti, C., Liu, Q. H., Liu, S. Y., & Lee, Y. K. (2024). Evaluation of Total Precipitable Water Trends from Reprocessed MiRS SNPP ATMS Observations, 2012-2021. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 17, 19798-19804. https://10.1109/jstars.2024.3481444.

Highlights from the Science Teams (December 2024)

VIIRS Blowing Snow RGB helps forecasters

Bill Line published a blog post titled “Early Dec 2024 Northern Plains Blowing Snow”. The post highlights VIIRS Imagery from a blowing snow event, including how the imagery was leveraged in NWS operations. The link to the post can be found here.

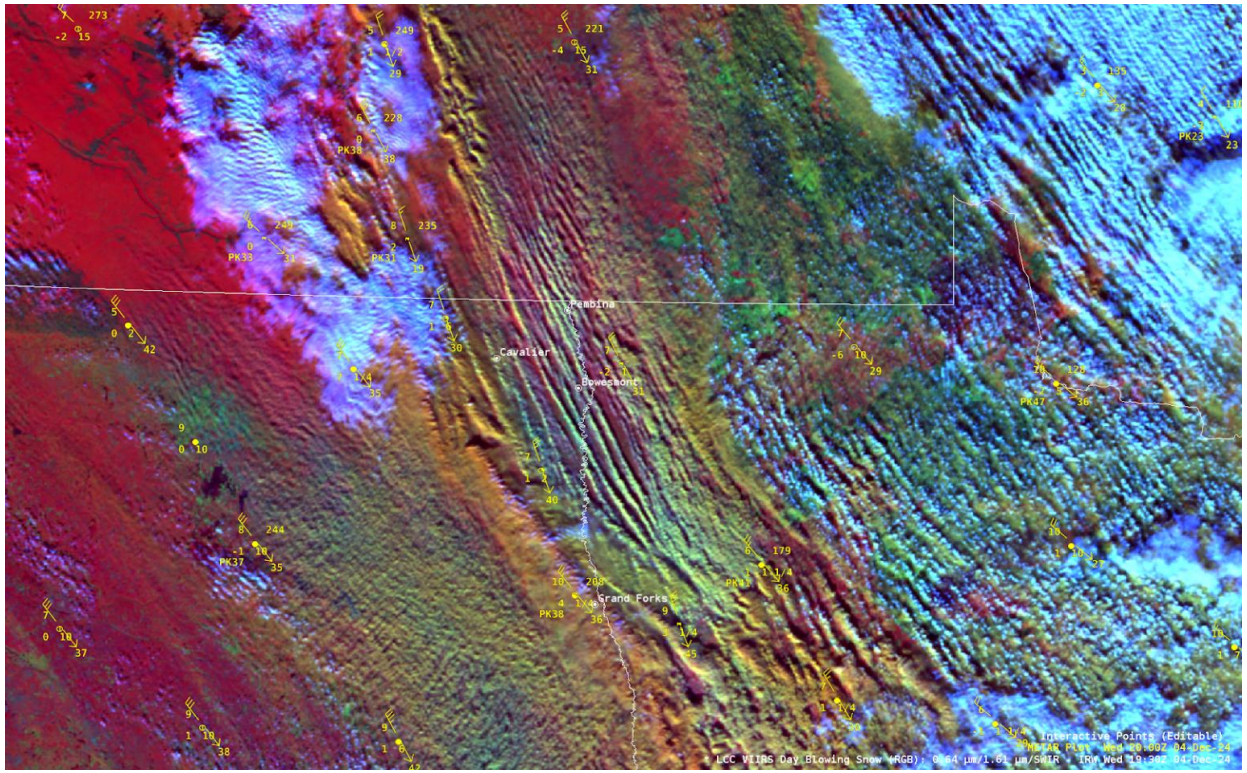


Figure. 4 Dec 2024 NOAA-21 VIIRS Blowing Snow RGB Imagery with surface obs. HCR-like plumes associated with the blowing snow are apparent from Canada extending south across the international border and along the ND/MN border.

Accomplishments

Delivery Date	Cloud Containerized Algorithm Packages (CCAPs) – Enterprise Products:	Recipient
12/03/2024	OMPS: V8TOS (SO2 Corrected V8 Total Ozone): v2 Final CCAP to CSPP. This delivery is for V8TOS Validated Maturity for N21 + error handling code	CSPP
12/06/2024	Patch delivery of the GAASP-Ocean_v1-1 (GCOM AMSR2) CCAP to the NCCF s3 bucket to fix two bugs found during the testing in operations	NCCF
12/11/2024	Delivery of the JPSS-IceConcentration_v2-1 CCAP to CSPP. This patch delivery is to fix the change of year bug encountered in operations.	NCCF
12/16/2024	Patch delivery of Arctic Composite Imagery (uses VIIRS I1, I4, M15, M16) v2-1 which contains the following updates:	NCCF
12/17/2024	Polar Pre-product Processing (PPP) Legacy Migration CCAP to OSPO for Delta Software Code Review. PPP produces MetOp-B and -C 1b granules and orbital products from recorded and direct readout observation data. Instrument calibration and Earth location are appended to produce the 1b data set. (**Legacy to NCCF operations**)	SCR to OSPO
12/18/2024	This is a Preliminary delivery of EN-TOz (v1 CCAP) which include 3 algorithms, the OMPS, the GOME and the L3 total ozone. The OMPS unit includes Version 8 Total Ozone Algorithm (V8TOz); it has the current satellite capabilities of S-NPP OMPS, NOAA-20 OMPS, NOAA-21 OMPS. The GOME unit and the L3 unit include Level-2 Total Ozone, MgII and Level-3 processing for GOME-2. It will process GOME-2 data from Metop-B/C. (Implementation of EN-Toz will replace OMPS-Toz operations)	SCR to OSPO
01/06/2025	Preliminary EN-CloudMask CCAP v1-0 delivery for SCR by OSPO. This CCAP includes Cloud Mask updates and a separate unit for Ancillary files.	SCR to OPO

Accomplishments – JPSS Cal Val Support

NOAA-20/21/S-NPP Operational Calibration Support:

S-NPP	Weekly OMPS TC/NP Dark Table Updates	09/3/24, 09/10/24, 09/17/24, 09/24/24, 10/1/24, 10/8/24, 10/16/24, 10/22/24, 10/29/24, 11/5/24, 11/12/24, 11/19/24, 11/26/24, 12/03/24, **12/10/24, 12/17/24, 12/30/24, 01/7/25**	✔ **Routine, Ongoing**
NOAA-20	Weekly OMPS TC/NP Dark Table Updates	09/3/24, 09/10/24, 09/17/24, 09/24/24, 10/1/24, 10/8/24, 10/16/24, 10/22/24, 10/29/24, 11/12/24, 11/19/24, 11/26/24, 12/03/24, **12/10/24, 12/17/24, 12/30/24, 01/7/25**	✔ **Routine, Ongoing**
NOAA-21	Weekly OMPS TC/NP Dark Table Updates	09/3/24, 09/10/24, 09/17/24, 09/24/24, 10/1/24, 10/8/24, 10/16/24, 10/22/24, 10/29/24, 11/12/24, 11/19/24, 11/26/24, 12/03/24, **12/10/24, 12/17/24, 12/30/24, 01/7/25**	✔ **Routine, Ongoing**
S-NPP	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	09/10/24, 09/24/24**,** 10/8/24, 10/22/24, 11/5/24, 11/19/24**, 12/3/24, 12/17/24, 12/31/24,**	✔ **Routine, Ongoing**
NOAA-20	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	09/03/24, 09/17/24, 10/1/24**,** 10/16/24, 10/29/24, 11/12/24, 11/26/24, **12/10/24, 12/31/24, 01/08/25**	✔ **Routine, Ongoing**
NOAA-21	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	09/03/24, 09/17/24, 10/1/24**,** 10/16/24, 10/29/24**, 11/12/24, 11/26/24, 12/10/24, 12/31/24, 01/08/25**	✔ **Routine, Ongoing**
S-NPP	Monthly VIIRS LUT Update of DNB Offsets and Gains	9/9/24, 10/9/24, 11/7/24, 12/6/24, **1/7/25**	✔ **Routine, Ongoing**
NOAA-20	Monthly VIIRS LUT Update of DNB Offsets and Gains	9/9/24, 10/9/24, 11/7/24, 12/6/24, **1/7/25**	✔ **Routine, Ongoing**
NOAA-21	Monthly VIIRS LUT Update of DNB Offsets and Gains	9/9/24, 10/9/24, 11/7/24, 12/6/24**, 1/7/25**	✔ **Routine, Ongoing**
NOAA-21	Monthly VIIRS DNB Straylight correction update	10/23/23, 11/21/23, 12/18/23, 01/22/24**,** 02/15/24, 03/18/24, 4/15/24**,** 5/14/24**,** 6/11/24, 7/16/24, 8/13/24 (Further updates reuse earlier correction LUTs based on the month)	✔ **Routine, Ongoing**

All NOAA-21 products attained Validated Maturity !!

FY25 STAR JPSS Milestones (1 of 2)

Milestones/Algorithm Updates	Original Date	Forecast Date	Actual Completion Date	Variance Explanation	Status
Ocean Color_v2 (Legacy migration to NCCF)	Jan-25	Jan-25	On-track for January 27, 2025	ASSISTT has provided the full list of products to OSPO, NCCF, and STAR for review on December 13, 2024.	Being tracked as part of FY25
Blended SST (Legacy migration to NCCF)	Jan-25	Jan-25	On-track for January 21, 2025.	ASSISTT moved CCAP from 01/07 to 01/21. They received approval from OSPO and STAR for two day test case.	Being tracked as part of FY25
VOLCAT (Phase 1) NCCF implementation	Dec-23	May-25	SCR: August 17, 2023 Target CCAP Moved from January 9 to Jan 30, 2025 and now scheduled for Feb 26, 2025	Received MSG/HRIT code and test case from science teams on Dec 22, and final CCAP planned for 2/26/2025	Being tracked as part of FY25
Cloud Mask J2 Validated; No code updates needed only maintenance CCAP (we can keep it as FY25 milestone). Tracked as FY25 maintenance releases	Mar-25	Mar-25	Target CCAP Moved from Feb 6 to March 18, 2025 (ASSISTT to NCCF)	Maintenance updates (separate unit for Ancillary files to be included) as well as solving for latency issues	Being tracked as part of FY25 Maintenance release
Cloud Base Height (CBH), Cloud Cover Layer (CCL), Cloud Height, Phase and Type: (Different CCAPs for Cloud implementation) J2 Validated: No code updates, only maintenance CCAPS. Tracked as FY25 maintenance release	Mar-25	Mar-25	Target CCAP Pushed one month from January to Feb 6, 2025, and now to March 18, 2025.		
Aerosol Detection Product (ADP) Updates	Mar-25	Mar-25	SCR expected (01/27) and final CCAP (3/20/25)	Updates to use Volcanic ash input. Removes dependency on volcanic ash product.	Being tracked as part of FY25 Maintenance release
Hurricane Intensity and Structure Algorithm (HISA) maintenance CCAP (uses MiRS from S-NPP/NOAA-20/21, MetOp-B/C	Mar-25	Mar-25	On-track. Science team delivered the code updates to ASSISTT on December 16, 2024. Awaiting feedback from science teams.		Being tracked as part of FY25 Maintenance release
GOSAT-GW End to End	Aug-24	Apr-25	GOSAT launch: **June/July 2025** Will be continued as part of FY25 milestones	Continued from FY24 based on program timelines. GOSAT-GW RFCT #2 (End-To-End 1-orbit Interface Test) and RFCT #3 (Pre-Launch 3-day Operational Test) test events have been moved to the April timeframe (SIWG	Ongoing as part of FY25
AST-2024 (VIIRS Annual Surface Type)	Sep-25	Sep-25	On-track		Ongoing as part of FY25
Reprocessing and transfer of EDRs to CLASS	Sep-24	May-25	Continue as part of FY25 milestones	JSTAR Team submitted a request to CLASS to archive reprocessed AOD/ADP. CLASS is working on Engineering Assessment.	Ongoing as part of FY25

FY25 STAR JPSS Milestones (2 of 2)

Milestones (Algorithm Cal/Val and LTM)	Original Date	Forecast Date	Actual Date of Completion	Variance Explanation	Status
FY26 Program Management Review (all teams)	Jun-25	Jun-25	Continue as part of FY25 milestones		
Maintain / Update ICVS (develop ICVS modules to support various activities: monitoring, inter-sensor comparison, …)	Sep-25	Sep-25	Follow FY25 PMR schedules		Ongoing
Maintain / Expand (to include JPSS-2 products) JSTAR Mapper, adopting to STEMS	Sep-25	Sep-25	Follow FY25 PMR milestones		Ongoing
Images of the Month	Monthly	Monthly	Follow FY25 PMR milestones		Ongoing
SDR and VIIRS Imagery Cal/Val Plans that include finalized J4 schedules: June 30, 2025	Jun-25	Jun-25			Ongoing
SDR and VIIRS Imagery Look-Up Table Deliveries for J4: June 30, 2025	Jun-25	Jun-25			Ongoing
JPSS-3/JPSS-4 pre-launch test data review/analysis and activity support (SDR teams);	Sep-25	Sep-25		FY24 milestones for J3 JCT1/JCT2, J3 Spacecraft TVAC, and J4 instrument TVAC completed as part of FY24 milestones. Science team efforts will continue in FY25.	Continuing as part of FY25 milestones
NEON (Quick Sounder initial and final PCT)	Jun-25	Jun-25	ATMS team delivered Quick Sounder PCT (v001) to the ASSISTT (Nov 2024)	On-track	
NEON (Quick Sounder pre-launch and post-launch Cal/Val Plan)	Dec-24	Dec-24		Currently two CCRs are in review. 471-CCR-24-0069 471-CCR-24-0070	
JPSS-3/JPSS-4 Pre-launch characterization reports for all SDRs: December 30, 2024	Dec-24	Mar-25	J4 ATMS: Team delivered J4 (June 2024) J3 ATMS: Team delivered pre-launch report in Dec 2024 J3 CrIS: Team delivered J3 pre-launch report in June 2024.		Ongoing

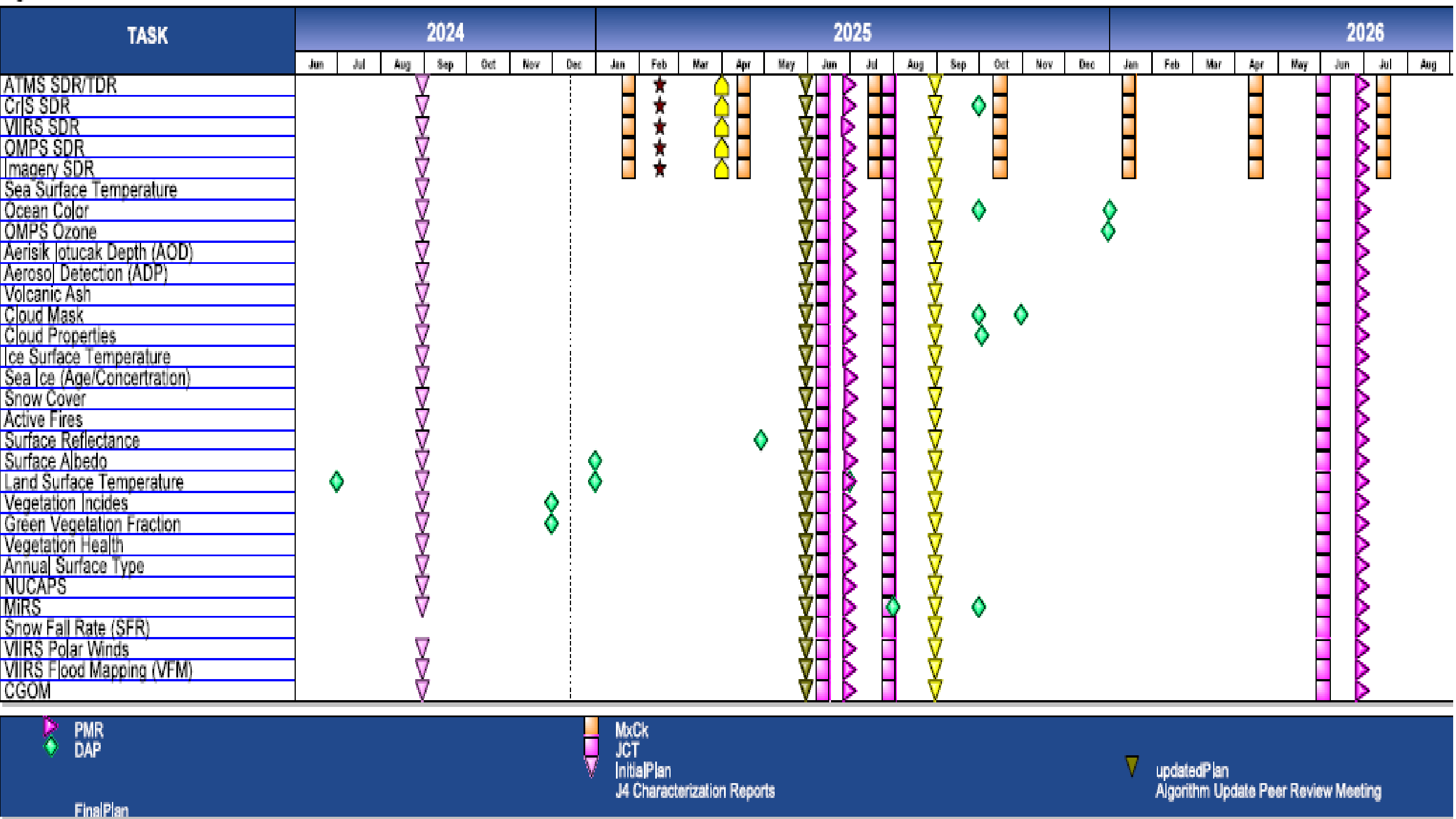
FY25 STAR JPSS Milestones - JPSS Cal Val Support

Operational/Program Support	Original Date	Forecast Date	Actual Completion Date	Status
S-NPP: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	09/3/24, 09/10/24, 09/17/24, 09/24/24, 10/1/24, 10/8/24, 10/16/24, 10/22/24, 10/29/24, 11/5/24, 11/12/24, 11/19/24, 11/26/24, **12/03/24, 12/10/24, 12/17/24, 12/30/24, 01/7/25**	✔ **Routine, Ongoing**
S-NPP: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	09/10/24, 09/24/24, 10/8/24, 10/22/24, 11/5/24, 11/19/24, **12/3/24, 12/17/24, 12/31/24,**	✔ **Routine, Ongoing**
S-NPP: Monthly VIIRS LUT update of DNB Offsets and Gains	Monthly	Monthly	9/9/24, 10/9/24, 11/7/24, **12/6/24**	✔ **Routine, Ongoing**
NOAA-20: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	09/3/24, 09/10/24, 09/17/24, 09/24/24, 10/1/24, 10/8/24, 10/16/24, 10/22/24, 10/29/24, 11/5/24, 11/12/24, 11/19/24, 11/26/24, **12/03/24, 12/10/24, 12/17/24, 12/30/24, 01/7/25**	✔ **Routine, Ongoing**
NOAA-20: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	09/03/24, 09/17/24, 10/1/24, 10/16/24, 10/29/24, 11/12/24, 11/26/24, **12/10/24, 12/31/24,**	✔ **Routine, Ongoing**
NOAA-20: Monthly VIIRS LUT update of DNB Offsets and Gains,	Monthly	Monthly	9/9/24, 10/9/24, 11/7/24, **12/6/24**	✔ **Routine, Ongoing**
NOAA-21: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	09/3/24, 09/10/24, 09/17/24, 09/24/24, 10/1/24, 10/8/24, 10/16/24, 10/22/24, 10/29/24, 11/5/24, 11/12/24, 11/19/24, 11/26/24, **12/03/24, 12/10/24, 12/17/24, 12/30/24, 01/7/25**	✔ **Routine, Ongoing**
NOAA-21: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	09/03/24, 09/17/24, 10/1/24, 10/16/24, 10/29/24, 11/12/24, 11/26/24, **12/10/24, 12/31/24, 01/08/25**	✔ **Routine, Ongoing**
NOAA-21: Monthly VIIRS LUT update of DNB Offsets and Gains	Monthly	Monthly	9/9/24, 10/9/24, 11/7/24, **12/6/24**	✔ **Routine, Ongoing**

All NOAA-21 products attained Validated Maturity !!

FY 25 IDPS Mx Build Review/Checkout

IDPS Mx Schedule	Mx12	Mx13	Mx14
SOL (DP_FE) regression test	Nov. 4 – Dec. 9, 2024 Completed.	Feb. 18 - Mar. 18, 2025	May. 15 – Jun. 17, 2025
STAR SOL review/checkout feedback (Go/No-Go & Report)	Offline verification by STAR team for J3/J4 VIIRS granule size change using early look of Mx12 ADL	Mar. 18, 2025	Jun. 17, 2025
I&T (DP-TE) regression test	Dec. 19, 2024 - Jan. 23, 2025. Dataflow enabled through GRAVITE (1/9)	Apr. 3 – Apr. 16, 2025	Jul. 3 – Jul. 18, 2025
STAR I&T review/checkout feedback (Go/No-Go & Report)	Jan. 24, 2025	Apr. 16, 2025	Jul. 18, 2025
TTO	Feb. 18, 2025	May. 6, 2025	Aug. 5, 2025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CrIS SDR
VIIRS SDR
OMPS SDR
Imagery SDR
Sea Surface Temperature
Ocean Color
OMPS Ozone
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Snow Cover
Active Fires
Surface Reflectance
Surface Albedo
Land Surface Temperature
Vegetation ncides
Green Vegetation Fraction
Vegetation Health
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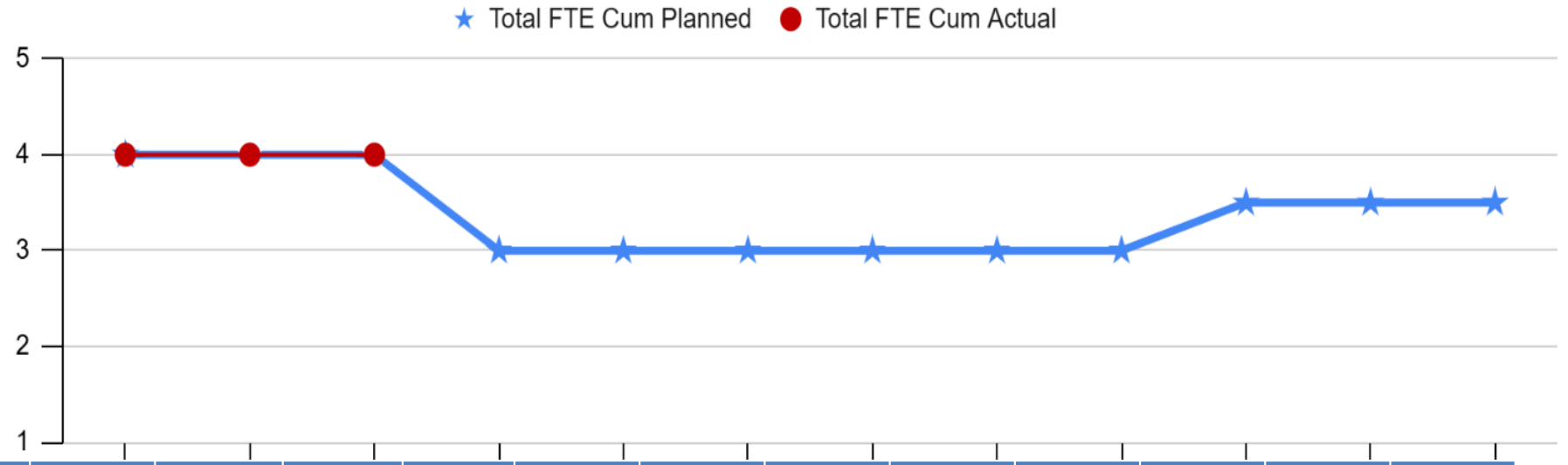
NUCAPS
MiRS
Snow Fall Rate (SFR)
VIIRS Polar Winds
VIIRS Flood Mapping (VFM)
CGOM
PMR
DAP
FinalPlan
MxCk
JCT
InitialPlan
J4 Characterization Reports
updatedPlan
Algorithm Update Peer Review Meeting

J-STAR FY25 Planned Program Management Staffing Plan v Actuals



J-STAR FTEs	Oct'24	Nov '24	Dec '24	Jan '25	Feb '25	Mar'25	Apr'25	May'25	Jun'25	Jul '25	Aug '25	Sep '25
Cum Planned (CS)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Cum Actual (CS)	0.00	0.00	0.00									
Cum Planned (WYE)	4.00	4.00	4.00	3.00	3.00	3.00	3.00	3.00	3.00	2.50	2.50	2.50
Cum Actual (WYE)	4.00	4.00	4.00									
Total FTE Cum Planned	4.00	4.00	4.00	3.00	3.00	3.00	3.00	3.00	3.00	3.50	3.50	3.50
Total FTE Cum Actual	4.00	4.00	4.00									

CS: Vacant (prev. Alisa Young)

WYE: Qingyuan Richard Zhang (through Dec), *Prasanjit Dash, Murty Divakarla, Tom Atkins, Jeffrey Weinrich, Wei W. Li , Tess Valenzuela*

Color code:

Green: **Completed Milestones**

Gray: **Ongoing FY24 Milestones**

Active Fires

November 2024

Accomplishments / Events:

- Continued analysis of the EFIRE data record to evaluate algorithm performance for a wide range or observing and environmental conditions
  - Analyzed frequency of residual bowtie-related duplicate detections
  - Analyzed SNPP vs. NOAA-20 continuity during the overlap period
- Continued work on NGFS vs. EFire comparisons after resolving the time stamp difference issue

Overall Status:

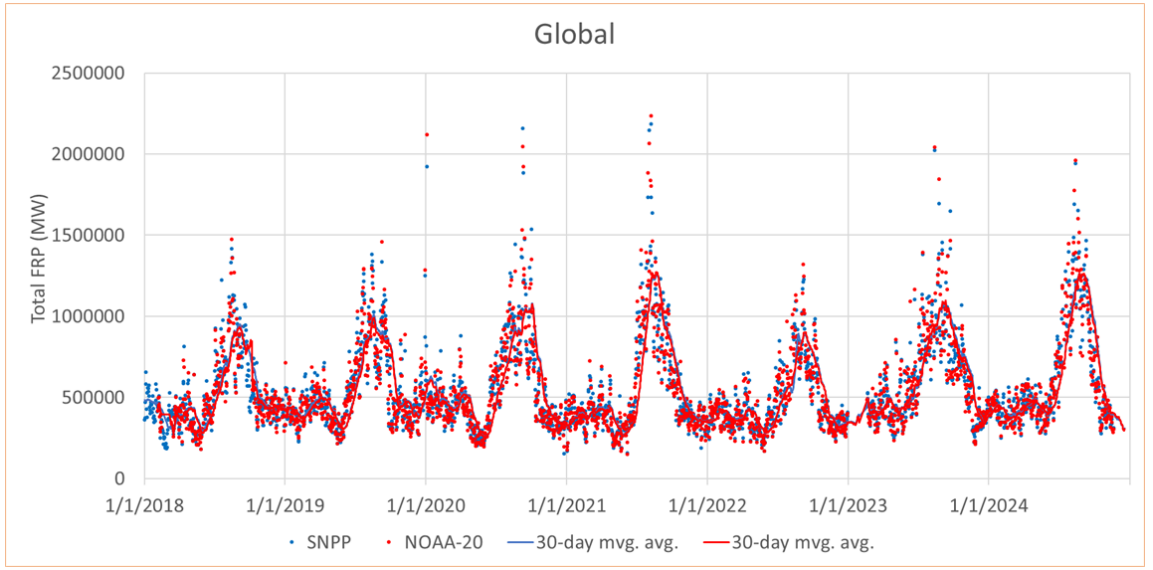
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		x			
Technical / Programmatic		x			
Schedule		x			

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:

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Evaluate Suomi NPP and NOAA-20 reprocessed data record	*3/25*	*3/25*		
Identify environmental and observing conditions with inferior perf.	*6/25*	*6/25*		
Create science code update for algorithm improvements	*9/25*	*9/25*		
Generate cross-verification datasets	*12/24*	*12/24*		
Generate / update opportunistic in-situ reference data	*3/25*	*3/25*		
Generate statistical analysis for eFire – NGFS detection perf.	*9/25*	*9/25*		
Feasibility analysis for CSPP update	*12/24*	*TBD*		*NGFS coord.*
Implementation of science code updates	*3/25*	*TBD*		
CSPP user support as needed for transition	*9/25*	*9/25*		
Reactive maintenance of SNPP, N20 and N21 I-band products	*9/25*	*9/25*		
Sensor anomaly resolution support	*9/25*	*9/25*		
Suomi NPP, NOAA-20 NOAA-21 data analysis and feedback	*9/25*	*9/25*		

Highlight: long-term EFIRE VIIRS I-band data record



Time series of total daily fire radiative power from SNPP and NOAA-20

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 1: eFire cal/val	*September 2025*			
Subtask 1.1: Evaluate Suomi NPP and NOAA-20 reprocessed data record	*March 2025*			
Subtask 1.2: Identify environmental and observing conditions with inferior algorithm performance	*June 2025*			
Subtask 1.3: Create science code update for algorithm improvements	*September 2025*			
Task 2: eFire – NGFS cross-verification	*September 2025*			
Subtask 2.1: Generate cross-verification datasets, including opportunistic in-situ reference data	*December 2024*			
Subtask 2.2: Generate / update opportunistic in-situ reference data	*March 2025*			
Subtask 2.3: Generate statistical analysis for eFire – NGFS detection performance	*September 2025*			
Task 3: Direct Broadcast support	*September 2025*			
Subtask 3.1: Feasibility analysis for CSPP update	*December 2024*			
Subtask 3.2: Implementation of science code updates as determined by Task 4.2	*March 2025*			
Subtask 3.3: CSPP user support as needed for transition	*September 2025*			
Task 4: Maintenance, LTM and anomaly resolution	*September 2025*			
Subtask 4.1: Reactive maintenance of Suomi NPP, NOAA-20 and NOAA-21 I-band NCCF products	*September 2025*			
Subtask 4.2: Sensor anomaly resolution support	*September 2025*			
Subtask 4.3: Suomi NPP, NOAA-20 NOAA-21 data analysis and feedback	*September 2025*			

Aerosol

February 2024

Accomplishments / Events:

- Work done by STAR aerosol team is featured in NESDIS Impacts Briefings in the article entitled “Pollution”. Team members Hai Zhang, Michael Cheeseman, and Pubu Ciren contributed to the work that is part of this article
- NOAA Greenhouse Gas (GHG) Team co-lead Kondragunta wrote the Impact Briefings article on GHGs. JPSS Program Scientist Kalluri and JSTAR manager Zhou and Jeff Privette (also NOAA GHG team co-lead) also contributed to the article on GHGs
- Team member Cheeseman has done a lot of analyses using reprocessed aerosol optical depth data to understand the Environmental Justice aspect of fine particle pollution. This work is informing that despite meeting the health standard, fine particle pollution disproportionately impacts racially and economically disadvantaged communities
- Team member Huff contributed to the writing of QuickGuide for VIIRS aerosol optical depth product. She also provided half-a-day training in Singapore on the use of JPSS fire and smoke products. JPSS Program Scientist Kalluri and AAC team lead Kondragunta also provided lectures on air quality products and their applications for Association of Southeast Nations (ASEAN).
- Team member Limbacher is developing a new aerosol optical depth algorithm that includes new aerosol models and numerical methods that is expected to speed up the enterprise algorithm and hopefully provide better retrievals as well.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation

Overall Status:

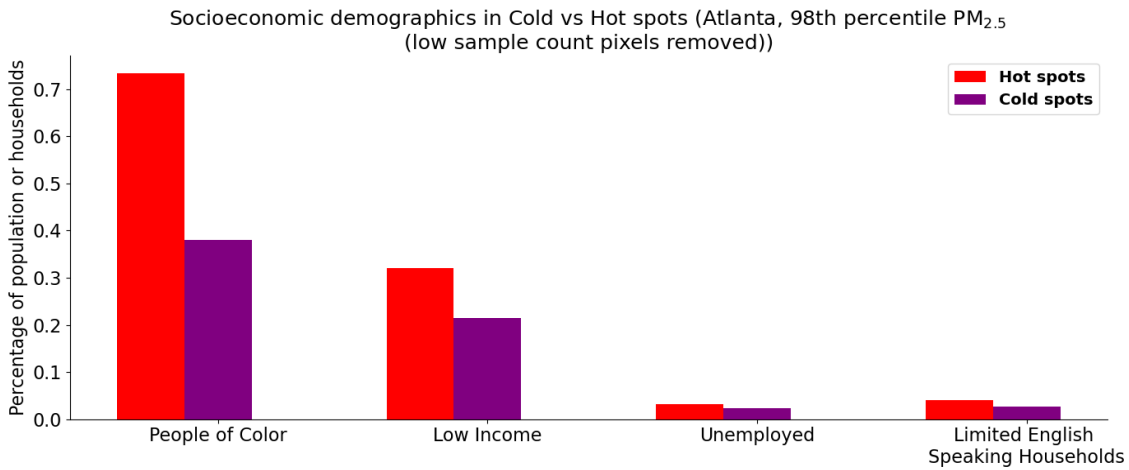
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

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 is TBD.

Highlight:



Statistics in the figure show analysis for Atlanta where hot spots and cold spots are those areas with high and low fine particle pollution respectively based on Moran’s I analysis

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 1: Deliver updated bright-land Enterprise AOD algorithm	*September 2025*			
Subtask 1.1: Generate special dataset of satellite reflectances and reference surface AOD over bright land	*January 2025*			
Subtask 1.2: Develop new LUTs and PCTs for over bright-land retrieval	*June 2025*			
Subtask 1.3: Test updated algorithm over bright land and quantify improvement	*August 2025*			
Subtask 1.4: Deliver updated bright-land AOD algorithm to ASSISTT	*September 2025*			
Task 2: Develop an alternative method to AOD retrieval with simultaneous spectral fitting	*September 2025*			
Subtask 2.1: Complete theoretical design of using simultaneous multi-spectral reflectance fitting for AOD retrieval	*April 2025*			
Subtask 2.2: Complete coding and testing of new AOD algorithm	*August 2025*			
Subtask 2.3: Deliver new AOD algorithm to ASSISTT if its performance is superior to the current algorithm	*September 2025*			
Task 3: Deliver evaluation of all enterprise AOD products	*September 2025*			
Subtask 3.1: Complete assessment of a multi-year VIIRS EPS SNPP, NOAA-20 and NOAA-21 AOD	*August 2025*			
Subtask 3.2: Complete evaluation of an extended record of merged/gridded VIIRS global AOD products	*September 2025*			
Task 4: Evaluate merits of TEMPO/PACE aerosol data for improving VIIRS AOD retrievals	*September 2025*			
Subtask 4.1: Understand available TEMPO/PACE aerosol data	*December 2024*			
Subtask 4.2: Develop theoretical framework for using TEMPO/PACE aerosol information	*June 2025*			
Subtask 4.3: Implement, test and evaluate concept	*August 2025*			
Subtask 4.4: Submit assessment report to team lead	*September 2025*			

ATMS SDR

December 2024

Accomplishments / Events:

- Per LEO office's request, generate the JPSS-3 ATMS SN 306 pre-launch characterization report. The pre-launch performance of SN306, including noise, striping index, non-linearity, inter-channel correlation, and several other parameters, has been derived from the pre-launch TVAC data and compared to those from other ATMS builds aboard S-NPP, NOAA-20, NOAA-21, and JPSS-4. All key parameters of SN-306 meet the requirements. The best V-band channels NEdT are observed in SN-306. The lowest (best) inter-channel correlation is observed in both SN-306 and SN-305. All channels stripping indexes are within the family and the second to the best. The science data quality related waivers and science team evaluation results are also documented in this report. The SN306 pre-launch initial PCT has not been delivered yet, but will submit it following the LEO timeline.Due to the EAR/CUI access restriction, the key figures and charts are only provided using the sharepoint links. The final version is submitted to the STAR JPSS and LEO office at the end of December.
- NASA ATMS team delivered the official updated NOAA-21 ATMS SRF data. The SRF data has been transferred to CRTM simulation coefficients by JCSDA. To evaluate the impact of SRF based CRTM simulation, the experiment has been conducted to compare the results to what was simulated using Boxcar based CRTM coefficients. Preliminary results indicate that there are different discrepancies over land and ocean. Shown in Figure 1 is the NOAA-21 channel 7 CRTM simulation bias between boxcar and measured SRF coefficients. A significant FOV dependent bias is observed over middle to low latitude regions. It is also found that the impact in simulation is channel dependent. A full report is expected to be provided for team discussion soon.
- Delivered a new version of the ATMS Nonlinearity Derivation Report (version 2.1) outlining the full description and derivation of the different forms and components of the radiometric calibration equation. Will later be incorporated into the updated ATMS ATBD.
- Provide JPSS ATMS on-orbit inter-channel radiance correlation analysis. Shown in Figure 2 is NOAA-20 ATMS channel correlation.

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 Date	Variance Explanation
JPSS-3 SN306 ATMS Pre-launch Characterization Report	Dec-24	Dec-24	Dec-24	
Update ATMS ATBD	Mar-25	Mar-25		
Final Version of the JPSS-4 SN305 ATMS Cal/Val Plan	Jun-25	Jun-25		
Review/Checkout of IDPS Mx Builds SOL and I&T Deploy Regression data	Sep-25	Sep-25		
Support JPSS-4/JPSS-3 JCT and Test events (J3 Pre-Storage TVAC, IDPS JPSS-3/JPSS-4 Test data Flow, etc.)	Sep-25	Sep-25		
Radiometric inter-comparison of S-NPP, NOAA-20 and NOAA-21 ATMS SDR data against other LEO/GEO Microwave observations and GNSS-RO.	Sep-25	Sep-25		
NOAA-21 ATMS Spectral Response Function (SRF) analysis/report to allow replacement of simulated NOAA-21 ATMS SRFs with measured values	Sep-25	Sep-25		
Evaluate the ATMS Geolocation accuracy assessment tool and determine if the current sliding window can be reduced from 30-day period to a shorter period	Sep-25	Sep-25		
Enhance the ATMS Calibration Website with new capabilities for rapid anomaly and SDR data evaluation response	Sep-25	Sep-25		

Highlights:

Figure 1:NOAA-21 ATMS channel 7 CRTM simulation bias between measured and boxcar SRF

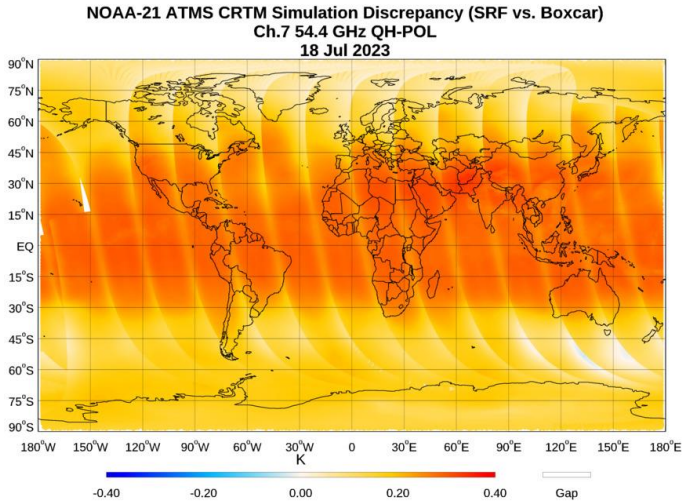
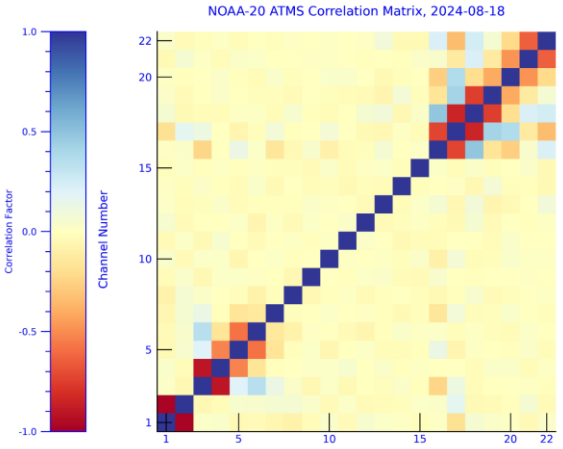


Figure 2:NOAA-20 ATMS channel to channel correlation on August 18, 2024



FY25 Milestones/Deliverables (1/2)

Task Category	Task/Description	Start	Finish	Deliverable	Requirement (Dev Only)
Development (D)	(1) Develop and test calibration algorithm for improvement of SDR data product.	10/1/2024	7/31/2025	Report	
	(2) Review and analysis of JPSS-3 and JPSS-4 ATMS pre-launch data to provide Flight and Ground support.	10/1/2024	9/30/2025	DAP/Report	
	(3) Support ATMS SDR processing system assessment and refinement.	10/1/2024	9/30/2025	DAP	
Integration & Testing (I)	(1) ATMS SDR code integration with ADL	10/1/2024	9/30/2025	ADL package	
	(2) Review/Checkout of IDPS Mx Builds SOL and I&T Deploy Regression data.	10/1/2024	9/30/2025	Report	
Calibration & Validation (C)	(3) Sustain the quality of SNPP, NOAA-20 and NOAA-21 ATMS SDR data products.	10/1/2024	9/30/2025	Report	
	(4) Support J4/J3 JCT and Test events (J3 Pre-Storage TVAC, IDPS J3/J4 Test data Flow, etc.)	10/1/2024	9/30/2025	Report	
	(5) Cal/Val planning of J3/J4 post-launch	10/1/2024	9/30/2025	Report	
	(6) Deliver J4 Pre-launch Characterization Report	10/1/2024	12/31/2025	Report	
	(7) Radiometric inter-comparison of S-NPP, NOAA-20 and NOAA-21 ATMS SDR data against other LEO/GEO Microwave observations and GNSS-RO.	10/1/2024	9/30/2025	Report	
	(8) Support new developments and studies align with NOAA' mission to improve value and usage of present and future satellite data	10/1/2024	9/30/2025	Report	

DAP: Delivery Algorithm Package. PCT: Processing Coefficient Table. LUT: Look-Up Table. JCT: Joint Compatibility Test. I&T: Integration and Test

FY25 Milestones/Deliverables (2/2)

Task Category	Task/Description	Start	Finish	Deliverable	Requirement (Dev Only)
Management & Maintenance (M)	(1) ATMS SDR team day-to-day management and coordination.	10/1/2024	9/30/2025	Report	
	(2) Discrepancy and risk reports to inform present or potential departures from specifications due to the presence of anomalies.	10/1/2024	9/30/2025	Report	
	(3) Annual, quarterly, monthly and weekly ATMS SDR performance reports.	10/1/2024	9/30/2025	Report	
	(4) Update ATMS ATBD.	10/1/2024	3/31/2025	Report	
	(5) Support of ATMS SDR JPSS reviews and science meetings.	10/1/2024	9/30/2025	Report	
	(6) Report results in international conferences.	10/1/2024	9/30/2025	Presentation	
	(7) Submit manuscripts.	10/1/2024	9/30/2025	Manuscript	
LTM & Anomaly Resolution (L)	(2) Perform regular RDR and SDR data analysis for instrument and data health.	10/1/2024	9/30/2025	Reports	
	(3) Implement new or improved capabilities for LTM, after properly assessing the methodologies for the validation and monitoring of the ATMS instruments and SDR data.	10/1/2024	9/30/2025	Reports	
	(4) Support anomaly event investigation and resolution of SNPP, NOAA-20 and NOAA-21 ATMS sensors.	10/1/2024	9/30/2025	Reports and solutions	

DR: Discrepancy Report. ATBD: Algorithm Theoretical Basis Document. RDR: Raw Data Record. SDR: Raw Data Record. LTM: Long Term Monitoring.

Clouds

December 2024

Accomplishments / Events:

- The Cloud team continued evaluating the ECM from the SAPF using the new LUTs. They successfully helped add in a varying number of bytes to the packed bit structure, which will ensure that all tests are available to the team and downstream users

- Continued the evaluation of of the ECM phase as a replacement for the Enterprise Phase algorithm.,One of the things that was noticed is that there is a “ring of fire (ice)” along the cloud edges in the Enterprise cloud phase algorithm. This is detrimental to the ACHA heights and shows that the ECM Phase should replace the Enterprise Phase algorithm within the ground system processing as soon as possible.

Milestones - 1-4Q in the above table denotes that the specific milestone listed is ongoing algorithm developmental work that will likely span the entire year. Quarterly updates will be provided as needed.	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Investigate DCOMP sensitivity to ice crystal habit and channel-set for cirrus clouds	Sep-25	1-4Q		
Enhance and maintain websites as a public interface to access product imagery	Sep-25	1-4Q		
In collaboration with Polar Winds team, investigate ACHA performance as it relates to Atmospheric Motion Vector (AMV) height assignment	Sep-25	1-4Q		
Prepare CLAVRx cloud top phase algorithm to replace current operational cloud phase algorithm	Sep-25	1-4Q		
Investigate new AI/ML techniques to improve multiple products (e.g., ECM, DCOMP/NCOMP)	Sep-25	1-4Q		
Investigate DCOMP precipitation applications	Sep-25	1-4Q		
Prepare tools that leverage new datasets for algorithm development and validation (e.g., EarthCARE)	Sep-25	1-4Q		
Prepare CLAVRx cloud top phase algorithm to replace current	Sep-25	1-4Q		

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:

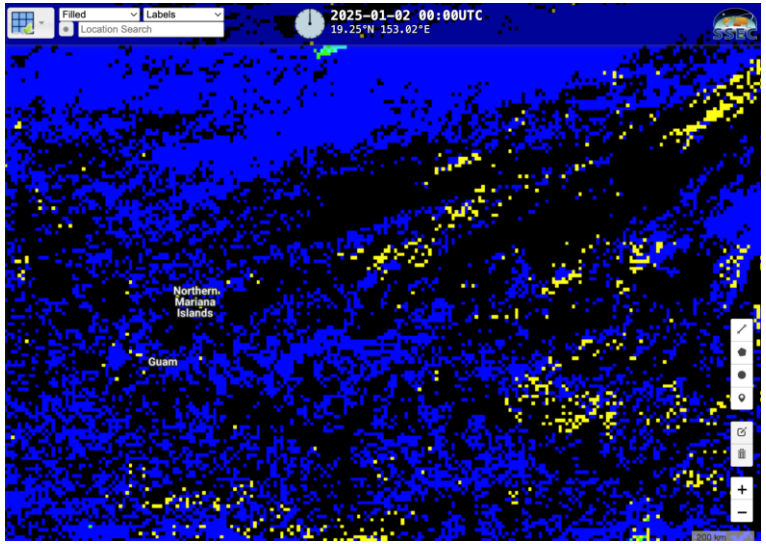


Figure 1.This shows the “ring of fire” effect on the cloud edges over the Pacific from NOAA-20 on 2 January 2025 along the ascending node.

Cloud Team FY25 Milestones

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY25 Program Management Review	Aug-24	Aug-24	Aug-24	
FY25 Mid-term Program Management Review	Dec-24	Dec-24		
Assist with operational DAP deliveries, updates, and post-delivery product reviews	Sep-25	1-4Q		
Conduct long term monitoring of all products	Sep-25	1-4Q		
Investigate DCOMP sensitivity to ice crystal habit and channel-set for cirrus clouds	Sep-25	1-4Q		
Enhance and maintain websites as a public interface to access product imagery	Sep-25	1-4Q		
In collaboration with Polar Winds team, investigate ACHA performance as it relates to Atmospheric Motion Vector (AMV) height assignment	Sep-25	1-4Q		
Prepare CLAVRx cloud top phase algorithm to replace current operational cloud phase algorithm	Sep-25	1-4Q		
Investigate new AI/ML techniques to improve multiple products (e.g., ECM, DCOMP/NCOMP)	Sep-25	1-4Q		
Investigate DCOMP precipitation applications	Sep-25	1-4Q		
Prepare tools that leverage new datasets for algorithm development and validation (e.g., EarthCARE)	Sep-25	1-4Q		

Cloud Team FY25 Milestones

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Continue evaluating all products using surface and satellite observations	Sep-25	1-4Q		
Interact with operational users and obtain user feedback	Sep-25	1-4Q		
Develop a test data package to help AWIPS-2 implementation and develop enhanced product displays based on user feedback	Sep-25	1-4Q		
Provide algorithm cal/val documents and review materials	Sep-25	1-4Q		
Continue product demonstration and public release for general users	Sep-25	1-4Q		
Identify limitations of products through continued intensive validation and refine algorithms accordingly	Sep-25	1-4Q		
Provide information on prospective algorithm refinements to improve operational algorithm performance	Sep-25	1-4Q		
Support JPSS Aviation and Hydrology Initiatives	Sep-25	1-4Q		
Update ATBD's as needed	Sep-25	1-4Q		

1-4Q in the above table denotes that the specific milestone listed is ongoing algorithm developmental work that will likely span the entire year. Quarterly updates will be provided as needed.

CrIS SDR

December 2024

Accomplishments / Events:

- Investigated and reported on the Theoretical Analysis of the Temperature Sensitivity of the Laser Wavelength and Verification of Laser Prediction Method Fit Coefficients (**Fig. 1**)
- Observed yet another SyncShift on S-NPP CrIS. This matches previous patterns and is likely a symptom of external factors; it does not represent a risk at this time. (**Fig. 2**)
- Observed Missing S-NPP Granules (**Fig. 3**)
- Continued configuration and verification of the CRTM Coefficient Generation Package on STAR servers
- Continued supporting the Lunar and Solar Intrusion project's machine learning model to predict the DS scenes.
- Drafted and revised a latest version of the JPSS-4 CrIS Prelaunch Characterization Report. Currently waiting for feedback and approval by NASA.
- Progress on Preparing IGARSS Paper about N21 CrIS Calibration Error Mitigation
- Presented ADR 10909 (NOAA-21 CrIS elevated noise artifact). to the DRAT.
- Presented "NOAA-21 CrIS Elevated Noise and Radiometric Bias Artifact Mitigation Effort." at AGU Fall 2024. (**Fig. 4**)

Milestones	Category	Original Date	Actual Completion Date	Variance Explanation
Delivery of the JPSS-4 CrIS PreLaunch Characterization Report	Sustain	Dec-24		Awaiting NASA Feedback
Delivery of the Final JPSS-4 CrIS Cal/Val Plan	Sustain	Jun-25		
Delivery of the JPSS-4 CrIS Initial PCT LUT	Sustain	Jun-25		
Implement and Test Solutions of Calibration Error Reduction for JPSS-4 Launch Risk Mitigation	Sustain	Sep-25		
Delivery of the JPSS-4 CrIS Engineering Packet with New PRT Coefficients	Sustain	Sep-25		
Provide support to Metop-SG Joint Cal/Val Activities	Sustain	Sep-25		
Radiometric Intercomparison of the Operational CrIS SDR data against other LEO/GEO IR observations and GNSS-RO	Sustain	Sep-25		
Review/Checkout of IDPS Mx Builds SOL and I&T Deploy Regression data	Maintain	Sep-25		
Perform the transition of Cal/Val activities to the Cloud environment	Maintain	Sep-25		
Conduct maintenance including investigation and anomaly resolution of on-orbit CrIS sensors	Maintain	Sep-25		

Overall Status:

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

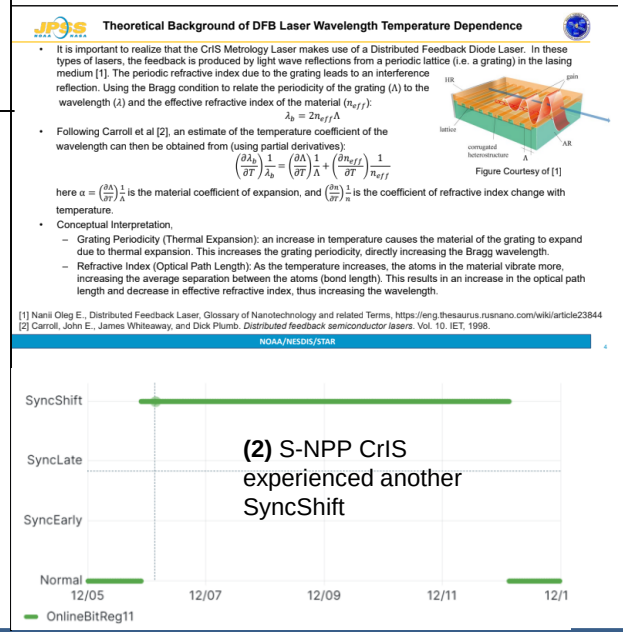
Red: It has been announced that JPSS-4 TVAC data and documents are now ITAR. STAR IT does not have a secured environment to host or process ITAR data.

Yellow: The CrIS Team is still in need of hardware resources. Presently, there is only two servers dedicated to 5 CrIS Team members. Access to additional servers is still desirable. There is a risk for the CrIS SDR Team to continue on such a dual-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 as soon as possible (< 2 months) and add another server in the next months. Corresponding hardware 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. UPDATE: The purchasing of the corresponding hardware is currently in progress, in coordination with STAR IT. A new MATLAB license has been delivered and installed properly. There was a SCDR data disruption starting June 30 and ending July 11. Data gaps are unfilled 30 days later. This complicated S/NPP GPS Anomaly investigations. SCDR outages may be increasing.

Blue: ASSIST Team has agreed to accept ADL code change tested on CentOS 9.

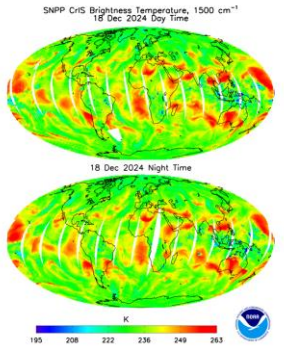
Highlights:

(1) Investigation into Temperature Sensitivity of Laser Wavelength

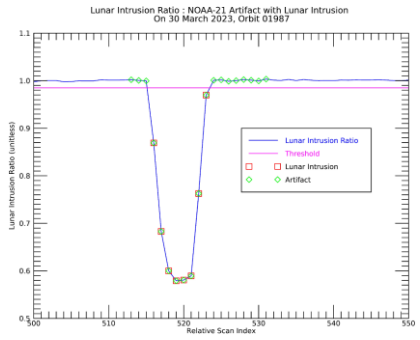


(2) S-NPP CrIS experienced another SyncShift

(3) Observed missing granules for S-NPP



(4) Lunar Intrusion detection for NOAA-21 CrIS.



FY25 Milestones/Deliverables (1/2)

Task Category	Task/Description	Start	Finish	Deliverable	Requirement (Dev Only)
Development (D)	(1) Implement and test calibration solutions for imaginary radiance reduction in the NOAA-21 CrIS SDR product.	10/1/2024	6/30/2025	Report	
	(2) Review and analysis of JPSS-3 and JPSS-4 CrIS pre-launch data to provide Flight and Ground support.	10/1/2024	9/30/2025	DAP/Report	
	(3) Support CrIS SDR processing system assessment and refinement.	10/1/2024	9/30/2025	DAP	
Integration & Testing (I)	(1) CrIS SDR code integration with ADL	10/1/2024	9/30/2025	ADL package	
	(2) Review/Checkout of IDPS Mx Builds SOL and I&T Deploy Regression data.	10/1/2024	9/30/2025	Report	
Calibration & Validation (C)	(3) Sustain the quality of SNPP, NOAA-20 and NOAA-21 CrIS SDR data products.	10/1/2024	9/30/2025	Report	
	(4) Support J4/J3 JCT and Test events (J3 Pre-Storage TVAC, IDPS J3/J4 Test data Flow, etc.)	10/1/2024	9/30/2025	Report	
	(5) Cal/Val planning of J3/J4 post-launch	10/1/2024	9/30/2025	Report	
	(6) Deliver J4 Pre-launch Characterization Report	10/1/2024	12/31/2025	Report	
	(7) Radiometric inter-comparison of S-NPP, NOAA-20 and NOAA-21 CrIS SDR data against other LEO/GEP IR observations and GNSS-RO.	10/1/2024	9/30/2025	Report	
	(8) Support new developments and studies align with NOAA' mission to improve value and usage of present and future satellite data	10/1/2024	9/30/2025	Report	

DAP: Delivery Algorithm Package. PCT: Processing Coefficient Table. LUT: Look-Up Table. JCT: Joint Compatibility Test. I&T: Integration and Test

FY25 Milestones/Deliverables (2/2)

Task Category	Task/Description	Start	Finish	Deliverable	Requirement (Dev Only)
Management & Maintenance (M)	(1) CrIS SDR team day-to-day management and coordination.	10/1/2024	9/30/2025	Report	
	(2) Discrepancy and risk reports to inform present or potential departures from specifications due to the presence of anomalies.	10/1/2024	9/30/2025	Report	
	(3) Annual, quarterly, monthly and weekly CrIS SDR performance reports.	10/1/2024	9/30/2025	Report	
	(4) Update CrIS ATBD.	10/1/2024	3/31/2025	Report	
	(5) Support of CrIS SDR JPSS reviews and science meetings.	10/1/2024	9/30/2025	Report	
	(6) Report results in international conferences.	10/1/2024	9/30/2025	Presentation	
	(7) Submit manuscripts.	10/1/2024	9/30/2025	Manuscript	
LTM & Anomaly Resolution (L)	(1) Upgrade the JSTAR CrIS Website.	10/1/2024	9/30/2025	Website	
	(2) Perform regular RDR and SDR data analysis for instrument and data health.	10/1/2024	9/30/2025	Reports	
	(3) Implement new or improved capabilities for LTM, after properly assessing the methodologies for the validation and monitoring of the CrIS instruments and SDR data.	10/1/2024	9/30/2025	Reports	
	(4) Support anomaly event investigation and resolution of SNPP, NOAA-20 and NOAA-21 CrIS sensors.	10/1/2024	9/30/2025	Reports and solutions	

DR: Discrepancy Report. ATBD: Algorithm Theoretical Basis Document. RDR: Raw Data Record. SDR: Raw Data Record. LTM: Long Term Monitoring.

Accomplishments / Events:

Two major improvements to the Enterprise Ice Thickness product:

The Enterprise JPSS/GOES Ice Thickness/Age algorithm is the product of the One-dimensional Thermodynamic Ice Model (OTIM) that uses the Enterprise Ice Surface Temperature (IST) as a major input. Previously, the IST, which is the skin temperature of the ice or snow, was assumed to be the same as the snow-ice interface temperature if snow is present on the ice. In situ surface and snow-ice interface temperatures from the Surface Heat Budget of the Arctic Ocean (SHEBA) field campaign (1997-1998) are used to infer a relationship between the two through a regression model that has two different equations for day (1) or night (2) conditions.

The second major improvement to the OTIM is the replacement of snow depth climatology lookup tables for estimating snow depth to the use of a snow depth regression model derived from SHEBA observations. Again, two different equations are used depending on day (3) versus night (4) conditions. A comparison between the OTIM before and after the improvements is given in Figure 1. The mean and median differences for this case were observed to be 6 cm, with noticeable lower ice thickness values in the eastern Laptev Sea west of the New Siberian Islands. Similar results are expected to be observed when the improvements are tested with more VIIRS and GOES data.

Routine assessment of the GOES-19 ABI Binary Snow product accuracy has begun:

A comparison of GOES-19 snow retrieval with snow retrievals from operational geostationary satellites (GOES-16 and GOES-18) has demonstrated a similar rate of agreement of all satellite products to the IMS. This is illustrated by Figure 2, which presents a time series of the accuracy estimates of GOES-19 and GOES-16 snow products. On some days the products may drop below 90%, but overall, the mean accuracy is generally within 92 to 96%. This may be considered as another indication of a good quality of GOES-19 ABI snow products.

The results presented so far should be considered as preliminary since at this time of the year there is too little snow on the ground to allow a full-scale validation of the GOES-19 snow product. Nevertheless, the available results are encouraging and leave little doubts about the robust and reliable performance of GOES-19 snow products during the winter season.

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:

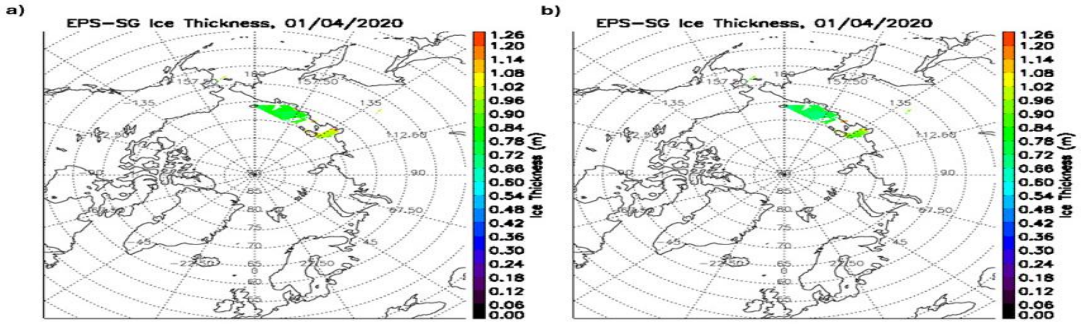
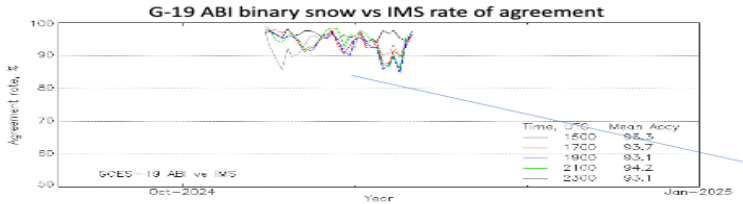


Figure 1. Sea ice thickness retrieved with EPS-SG proxy data on January 4, 2020, without the improvements implemented (a) and with the improvements implemented (b).



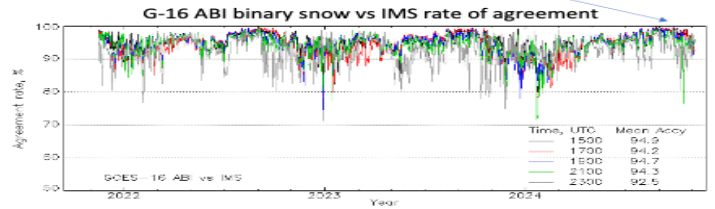


Figure 2. Example of ABI-based snow cover maps (G-16 and G-17) and matching IMS products on the same day and on the day after. ABI snow maps exhibit a better agreement to the IMS product labeled with the next day date. This is explained by a different approach to the time stamping of the two products.

FY25 Milestones/Deliverables (in general)

Task Category	Task/ Description	Start	Finish	Deliverable	Requirement (Dev Only)
Development (D)	Blend AMSR2 into the VIIRS binary snow product, finalize the algorithm, Begin routine offline generation.	10/2024	9/2025	Routinely generated daily blended gap-free snow map based on combined VIIRS and microwave data	Same as snow product EDRs
Development (D)	Melting/frozen snow pack discrimination. Algorithm and software development	10/2024	9/2025	Daily map of the snowpack state (melting/frozen)	Same as snow cover EDR
Development (D)	Upgrade web-page displaying VIIRS snow cover products. Enable viewing and analysis of gridded snow product at full (1km) spatial resolution	10/2024	9/2025	Enhanced web page	N/A
Development (D)	Finalize supplemental cloud mask for daily VIIRS snow products: Compensate for weaknesses of the cloud mask	10/2024	9/2025	Final algorithm and software to generate VIIRS supplemental cloud mask	N/A
Development (D)	Melt/freeze discrimination and degrees above melting.(Daytime only)	10/2024	9/2025	Expansion of IST product	Enhanced usability by analysts and forecasters.

FY25 Milestones/Deliverables (in general)

Task Category	Task/ Description	Start	Finish	Deliverable	Requirement (Dev Only)
Development (D)	Updates on the ice surface temperature, including research on impacts of angular emissivity of snow and ice	06/2024	03/2025	IST surface temperature algorithm update	Improved accuracy for all users
Integration and Testing (I&T)	Improvements to the Sea Ice Concentration product.	10/2023	9/2026	Algorithm enhancements to improve SIC near sea ice edge	Same as ice concentration EDR
Integration and Testing (I&T)	Include Blended SIC and NOAA-21 ice products into RealEarth	10/2024	09/2025	Graphics	**Streamlined validation**
Integration and Testing (I&T)	Improvements to the Ice Thickness and age products.	10/2024	9/2025	Improved ice thermal and physical dynamic parameterizations (growing and melting processes), using ice-snow interface temperature product	IceAge EDR
Maintenance	Additions and Improvements to Blended Sea Ice Concentration product	10/2024	9/2025	Include observational weights into output Netcdf files.	**Request by users**

Polar Winds

August, 2024

Accomplishments / Events:

- **Tandem JPSS winds for SWIR band are now generated:** Currently, VIIRS single band Atmospheric Motion Vectors (AMVs) from the shortwave-infrared band (SWIR, M11, 2.2 µm) is being prepared for operational implementation in the near future. The next logical step was to expand the use of SWIR band into the tandem orbit setting, where successive orbits of NOAA-20 and -21 satellites are used to develop AMVs with greater coverage and smaller time differences, which should result in a more accurate winds product. Recent examples of the experiment product are shown in Figure 1.
- The Tandem SWIR product does a good job in covering mid-upper-level wind motions associated with jet stream across northern Russia and mid-lower-level winds associated with polar cyclone over the central Arctic. Initial comparisons to single JPSS SWIR AMVs (either NOAA-20 or -21) show speed (direction) RMS of under 3 ms^{-1} (20 deg).

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation

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:

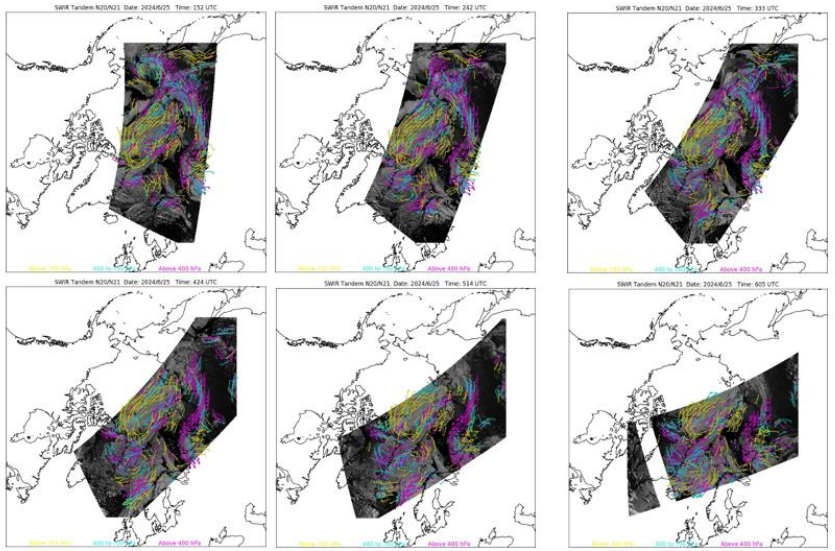


Figure 1: VIIRS JPSS (NOAA20/21) Tandem SWIR AMVs overlaid with 2.2 µm reflectances from 25 June 2024 over the Arctic region in polar stereographic projection. Near polar crossing times starting from upper-left and ending at lower-right: 01:52, 02:42, 03:33, 04:24, 05:14 and 06:05 UTC.

Status of FY25 Milestones/Deliverables *(1/2)*

Task Category	Task/ Description	Start	Finish	Deliverable	Requirement (Dev Only)
Development (D)	Demonstration and validation of Polar ***"Tandem-Satellite"*** VIIRS SWIR & LWIR wind datasets over a 4-6 week time period and make them available to NWP Centers	Aug 2024	Jun 2025	Polar ***"Tandem-Satellite"*** VIIRS SWIR & LWIR wind BUFR datasets; Wind validation results	Refer to IORD/L1RD; NESDIS priorities.
Development (D)	Incorporate VIIRS DNB (Near-Constant Contrast) updates from heritage to enterprise winds algorithm in FW2.x	Aug 2024	Jun 2025	Updated enterprise winds software.	INNOVATION
Development (D)	Develop and validate approaches to generate VIIRS winds from tandem-satellite pairs of images (enables global coverage)	Aug 2024	Jun 2025	Updated enterprise winds software Validation study reports	INNOVATION
Development (D)	Feature tracking QC for VIIRS winds: Investigate scan angle diffs between successive orbits & impact on VIIRS winds quality; account for parallax	Aug 2024	Jun 2025	Informal/internal assessment report. Updates to enterprise winds software	
Development (D)	Development of updated VPW Validation and monitoring system	Oct 2024	Jun 2025	Updated validation software Updated winds monitoring web pages Documentation	

Status of FY25 Milestones/Deliverables *(2/2)*

Task Category	Task/ Description	Start	Finish	Deliverable	Requirement (Dev Only)
Integration & Testing (I)	Support transition of ***"Single-Satellite"*** VIIRS SWIR winds into operations	Oct 2024	Sep 2025 (Est)	Validation reports	Refer to IORD/L1RD; NESDIS priorities
Integration & Testing (I)	Begin transition of ***"Tandem-Satellite"*** VIIRS LWIR and SWIR winds to operations *(if funded)*	Oct 2024	Sep 2025 (Est)	Updated enterprise winds software & enterprise winds ATBD Validation reports	Refer to IORD/L1RD; NESDIS priorities
Calibration & Validation (C)					
Maintenance	Deliver enterprise winds algorithm updates, as needed	Oct 2024	Sep 2025	Updated software, as needed; Updated Enterprise Winds ATBD, as needed	
LTM & Anomaly Resolution (L)	Dev and testing of minor algorithm updates as needed. Continued monitoring and validation of VPW winds; Addition of ERA5 analysis to winds team's validation tool set	*Oct 2024*	*Sep 2025*	Graphics, statistics Webpage product monitoring graphics; Updated winds validation/monitoring software, as needed	

GCOM-W/AMSR2 & AMSR3

December, 2024

Accomplishments / Events:

- The preliminary AMSR3 Snowfall Rate (SFR) algorithm was delivered to ASSISTT in the SFR v3r0 package on Dec 20.
- In preparation for AMSR3 Day-1 Precip Algorithm delivery:
  - Fortran compilers used by the ASSISTT to run AMSR2 algorithm are installed and successfully tested within CISESS computing environment.
  - JAXA level-1b proxy product is investigated to define necessary adoptions of the current (AMSR2) retrieval package
- A presentation on the development of an AMSR2 Precipitation machine learning algorithm and two presentations on AMSR2 and SMOPS soil moisture products were presented at AGU.
- Finished training of a machine learning algorithm for AMSR2 soil moisture EDR using daily gridded TBs with SMAP soil moisture as the reference at 0.25-degree resolution.
- Worked on the new AMSR2 SM EDR package with the ML algorithm using GAASP orbital TB as the input.
- Designed and started compute code in Python to upgrade GAASP for both AMSR2 and AMSR3 soil moisture EDR after GOSAT-GW AMSR3 data becomes available.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Assessment of all EDR's for AMSR2, initiate changes for AMSR3	6/2025			
Reprocessing of L2 EDR's	7/2025			
Continue AMSR2 L1 monitoring; develop AMSR3 capabilities	9/2025			
Deliver any algorithm updates	5/2025			

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.*
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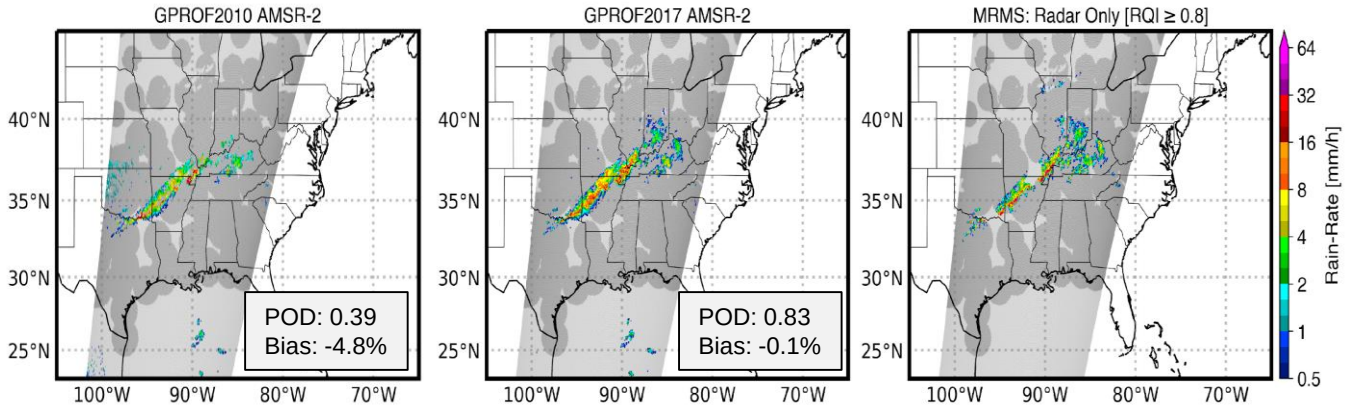
Issues/Risks:

Highlights:



AMSR2 Rainfall Rate, Dec 18th 2024. (left) Old product - GPROF2010; (middle) New product - GPROF2017; (right) MRMS reference

FY25 Milestones/Deliverables (in general)

Task Category	Task/ Description	Start	Finish	Deliverable	Requirement (Dev Only)
Development (D)	Assessment of all EDR's for AMSR2, initiate changes for AMSR3	Oct 2024	Sept 2025	Beta versions of Pre-launch algorithms and LUTs	Refer to IORD/L1RD; NESDIS priorities; STAR-National Center User Engagements
Integration & Testing (I)	Reprocessing of L2 EDR's	Nov 2024	July 2025	Full L2 products from launch through July 2023	
Calibration & Validation (C)	Continue AMSR2 L1 monitoring; develop AMSR3 capabilities	Oct 2024	Sept 2025	Annual cal/val report; AMSR3 prototype off-line system	
Maintenance	Deliver any algorithm updates	Jan 2025	May 2025	Updated code to ASSISTT	

ICVS

December 2024

Accomplishments / Events:

- Update ICVS VIIRS sync loss monitoring package to correct the NOAA-21 VIIRS sync loss counter error. The syn loss counter accuracy is important for VIIRS Cal/Val and EDR teams.
- Fixed the ICVS VIIRS GEO quality flag monitoring package processing bug to provide daily full global coverage maps to support VIIRS Cal/Val geolocation error analysis activities.
- Investigated the potential application of detecting the CrIS geolocation anomaly with the ABI data during the SNO events. The NPP CrIS geolocation anomaly events is used in this study. We found that the best index for this study is the RMSE of the linear fitting between CrIS and ABI radiance at the water vapor bands (Fig. 1).
- Verified OMPS SDR NP OSOL look up tables by comparing reprocessed NP SDR among SNPP, NOAA20 and NOAA21 using a 32 days average difference. The top panel shows normalized radiance difference vs wavelength between NOAA20 NP and SNPP NP, NOAA-21 NP and NOAA-20 NP, NOAA21 NP and SNPP NP, respectively. The bottom panel shows normalized radiance difference from reprocessed SDR vs wavelength between NOAA20 NP and SNPP NP, NOAA-21 NP and NOAA-20 NP, NOAA21 NP and SNPP NP, respectively. Illustrated in the figure 2 show a smaller bias.

Milestone	Original Date	Completion Date	Variance Explanation
Identify ICVS-lite modules for transition to OSPO operational environment in coordination with OSPO	Nov-24	Nov-24	
Initialize new algorithms/functions to monitor SDR data's quality in terms of requirements using NOAA-21 SDR data as test data sets	Feb-25		
Develop a new monitoring framework to improve timeliness and performance in preparation of J3/J4 missions	May-25		
Initialize an algorithm for estimating OMPS NM geolocation errors in the absence of VIIRS data from the same satellite	Aug-25		
Continue supporting NCCF cloud migration discovery activity: test the ICVS functions in cloud as needed	Sep-25		
Develop new ICVS algorithms\modules in support of future JPSS-04/03 missions	Sept-25		
Support JPSS spacecrafts and instruments recovery activities, JPSS data anomaly analysis activities by STAR SDR and EDR teams, JPSS flight , OSPO and NWP	Sep-25		
Maintain and sustain the LT ICVS product monitoring performance for SNPP, NOAA-20, NOAA-21, including 3D-ATMS-VIIRS SDR hurricane core observations	Sep-25		
Support STAR SDR calibration/validation activities, including innovation idea test, and LEO program's ad hoc requests (e.g., SDR data impact demonstration)	Sep-25		

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:

Departure of ICVS team members may delay maintenance and sustainment of the ICVS-VIIRS LTM modules, including missing ICVS-VIIRS products

Highlights:

Figure 1 NPP CrIS vs G18 ABI inter-sensor comparison

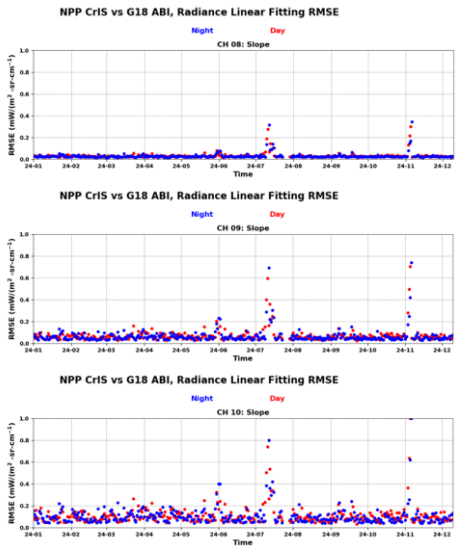
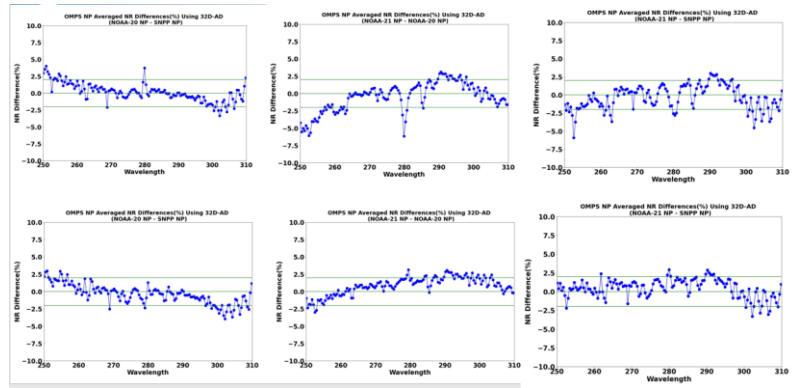


Figure 2 OMPS NP OSOL LUT comparison against reprocessed SDR



ICVS FY25 Milestones/Deliverables

	Milestone	Start	Finish	Deliverable
1	Identify ICVS-lite modules for transition to OSPO operational environment in coordination with OSPO	Oct-24	Nov-24	Deliver a ppt file to introduce basic functions of the ICVS-lite package
2	Initialize new algorithms/functions to monitor SDR data's quality in terms of requirements using NOAA-21 SDR data as test data sets	Dec-24	Feb-25	Provide a dynamically updated color table about NOAA-21 instrument SDR radiance (Tb or reflectance or normalized radiance) per requirement: green, yellow, red
3	Develop a new monitoring framework to improve timeliness and performance in preparation of J3/J4 missions	Mar-25	May-25	A new monitoring framework within the ICVS system
4	Initialize an algorithm for estimating OMPS NM geolocation errors in the absence of VIIRS data from the same satellite	Apr-25	Aug-25	Software and new ICVS products
5	Continue supporting NCCF cloud migration discovery activity: test the ICVS functions in cloud as needed	Feb-25	Sep-25	Software; testing results, updated discovery book
6	Develop new ICVS algorithms\functions/modules in support of future JPSS-04/03 missions	May-25	Sept-25	Module Software and proxy J4 ICVS products
7	Support JPSS spacecrafts and instruments recovery activities, JPSS data anomaly analysis activities by STAR SDR and EDR teams, JPSS flight team, OSPO and NWP	Oct-24	Sep-25	ICVS products; JPSS data anomaly monitoring reports
8	Maintain and sustain the LT ICVS product monitoring performance for SNPP, NOAA-20, NOAA-21, including 3D-ATMS-VIIRS SDR hurricane core observations	Oct-24	Sep-25	ICVS products; module software updates
9	Support STAR SDR calibration/validation activities, including innovation idea test, and LEO program's ad hoc requests (e.g., SDR data impact demonstration)	Oct-24	Sep-25	Software; new ICVS products

D	I	C	M	L
Development	Integration &Testing	Calibration & Validation	Maintenance	LTM & Anomaly Resolution

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 1: Maintain the LT consistency of ICVS products in a NRT mode for monitoring of RDR and SDR LT performance spanning 3 spacecrafts and 12 instruments from SNPP, NOAA-20 and NOAA-21 missions	*October 2024 to September 2025*			
Subtask 1.1: Check the availability of ICVS products in case of any missed products or unexpected stopped cron-jobs	*October 2024 to September 2025*			
Subtask 1.2: Fix the issues to recover *unexpected stopped cron-jobs*	*October 2024 to September 2025*			
Subtask 1.3: Reprocess the data to fill in missed products	*October 2024 to September 2025*			
Subtask 1.4: Produce historical (intermediate) ICVS products per ad hoc requests from key users	*Ad hoc*			
Task 2: Monitor LT performance of the JPSS spacecrafts, instruments and SDR data in a NRT mode and report anomalous feature monitoring results in support SDR team and other key users	*October 2024 to September 2025*			
Subtask 2.1: Monitor performance of the JPSS spacecrafts, instruments and SDR data based on current ICVS products	*October 2024 to September 2025*			
Subtask 2.2: Provide monitoring reports with good ICVS images in the presence of newly detected anomalies for spacecraft, instrument and SDR data	*October 2024 to September 2025*			
Task 3: Maintain and upgrade the ICVS severe weather event (radiometric) feature watch portal in a NRT mode	*October 2024 to September 2025*			
Subtask 3.1: Maintain the ICVS ATMS-VIIRS 3D hurricane warm core monitoring system and analysis tools (e.g., Heat Dome) for other severe events	*October 2024 to September 2025*			
Subtask 3.2: Provide briefing report with good images per event in a timely manner	*October 2024 to September 2025*			
Subtask 3.3: Improve AI-based ATMS global high resolution images for Mapper	*October 2024 to September 2025*			
Subtask 3.4: Develop new functions to better demonstrate new values of SDR data in visually observing severe events' radiometric features such as heat wave and atmospheric rivers	*Ad hoc*			

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 4: Monitor and upgrade the N21 LP EDR products in the ICVS web site in support of OMPS EDR review and other cal./val activities	*October 2024 to September 2025*			
Subtask 4.1: Update the ICVS-LP monitoring functions by adding available N21 LP data from the STAR EDR team.	*September 2024*			
Subtask 4.2: Promote the LP monitoring functions to operational ICVS website	*December 2024*			
Subtask 4.3: : Maintain the ICVS LP product website	*October 2024 to September 2025*			
Task 5: Upgrade the ICVS interactive vector tool by adding new products and functions	*September 2025*			
Subtask 5.1: Upgrade the ICVS dynamic interactive tool in the beta ICVS zone by filling in the non-available products in the tables(https://www.star.nesdis.noaa.gov/icvs-beta/metrics_new.php)	*November 2024*			
Subtask 5.2: Upgrade the ICVS dynamic interactive tool with new functions/products towards promotion to operational zone in coordination with the STAR IT team	*January 2025*			
Subtask 5.4: Promote the ICVS dynamic interactive tool with new functions to operational ICVS	*March 2025*			
Subtask 5.3: Maintain and upgrade the ICVS website framework in operational, beta and development zones	*October 2024 through September 2025*			
Task 6: Upgrade the operational ICVS system functions to better monitor/compare LT stability of the spacecrafts/instruments/SDR among 3 JPSS missions	*March 2025*			
Subtask 6.1: Develop new modules to monitor the same parameter in the same figure for 3 spacecrafts (only key parameters)	*October 2024*			
Subtask 6.2: Develop new modules to monitor the same RDR parameter in the same figure for the same instrument among three satellites (only key parameters)	*November 2024*			
Subtask 6.3: Develop new modules to monitor the same statistical parameters (e.g., daily mean and std. over selected sites) in SDR products in the same figure for the same instrument among three satellites	*February 2025*			
Subtask 6.4: Upgrade the ICVS inter-sensor comparison and other advanced capabilities by adding new products to better capture anomalous features in the SDR data	*March 2025*			

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 7: Develop new ICVS algorithms\modules in support of existing and future JPSS-04 missions	*July 2025*			
Subtask 7.1: Develop new ICVS modules about OMPS RTM O-B test cases	*February 2025*			
Subtask 7.2: Update the VIIRS inter-sensor comparison modules by adding NOAA-21 VIIRS	*March 2025*			
Subtask 7.3: Reprocess the ATMS lifetime O-B trending to improve the accuracy by using measured SRF	*May 2025*			
Subtask 7.4: Reprocess JPSS lifetime data with improved quality monitoring algorithms/modules	*July 2025*			
Task 8: Continue supporting NCCF cloud migration discovery activity	*September 2025*			
Subtask 8.1: Reorganize ICVS testing modules that will be migrated into the NCCF environment	*February 2025*			
Subtask 8.2: Convert selected code in Matlab into Python (limit to small efforts)	*April 2025*			
Subtask 8.3: Migrate the ICVS testing modules into the NCCF environment	*June 2025*			
Subtask 8.4: Verify the ICVS testing modules in the NCCF environment with off-line ICVS modules' results	*September 2025*			
Task 9: Develop the ICVS prototype in support of JPSS-4 prelaunch Cal/Val activities in the STAR internal development zone	*September 2025*			
Subtask 9.1: Upgrade the ICVS development website in compliance with IT security requirements	*March 2025*			
Subtask 9.2: Develop the ICVS framework for JPSS-04 by using NOAA-21 RDR as proxy	*June 2025*			
Subtask 9.2: Develop the ICVS framework for JPSS-04 by using NOAA-21 SDR as proxy	*August 2025*			
Subtask 9.3: Develop the ICVS modules in support of SDR teams' J3/J4 JCT test data sets	*September 2025*			

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 10: Explore potential of monitoring geolocation performance upon individual instrument SDR data in preparation of JPSS-04 missions	*February 2025*			
Subtask 10.1: Investigate the feasibility of monitoring geolocation performance by using individual instrument SDR data at window channels: case studies, e.g., OMPS NM at 380nm	*October 2024*			
Subtask 10.2: Initialize testing modules for more case applications	*January 2025*			
Subtask 10.3: Add the testing modules to ICVS website in development zone	*February 2025*			
Task 11: Develop a new monitoring framework within the ICVS system to improve timeliness and performance in preparation of J3/J4 missions	*April 2025*			
Subtask 11.1: Initialize a conceptual region-based ICVS monitoring framework (e.g., divide the whole global coverage into 24 regions)	*October 2024*			
Subtask 11.2: Initialize modules to monitor performance of regional data, including but not limited to daily regional images, daily 'anomaly' images against a multiple-day average, time series of regional data (daily 'anomaly')	*December 2024*			
Subtask 11.3: Improve the framework and algorithms with regional products towards operational transition	*April 2025*			
Task 12: Develop a conceptual PCA-based monitoring framework within the ICVS system to better monitor hyperspectral satellite data quality	*June 2025*			
Subtask 12.1: Initialize a conceptual PCA-based monitoring framework for JPSS hyperspectral instruments (e.g., OMPS NM, OMPS NP, and CrIS)	*October 2024*			
Subtask 12.2: Initialize PCA algorithm developments for OMPS and CrIS over selected regions (see Task 11)	*March 2025*			
Subtask 12.3: Explore potential of PCA-derived products in monitoring and detecting SDR data anomalies	*June 2025*			

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 13: Explore potentials of developing automation monitoring functions for the ICVS system by using innovation techniques in better preparation of J3/J4 missions	*September 2025*			
Subtask 13.1: Investigate feasibility of automatically generating analysis report per event based on the ICVS products from multiple sensors' observations, by taking advantages of task 11 above	*March 2025*			
Subtask 13.2: Develop preliminary innovation-based algorithms to automatically capture large anomaly features, which could be relevant to either radiometric features from severe weather events or spacecraft/instrument/SDR data problems	*May 2025*			
Subtask 13.3: Explore potentials of the new ICVS monitoring functions and innovation algorithms in better capturing impact of JPSS SDR data in better benefit of key users' applications	*September 2025*			
Task 14: Develop an initial algorithm/module to generate OMPS NM Super-Resolution (NOAA-21 resolution) data using CNN in support of geolocation performance monitoring of JPSS OMPS NM SDR data	*August 2025*			
Subtask 14.1: Investigate the feasibility of generating OMPS NM Super-Resolution data using CNN	*March 2025*			
Subtask 14.2: Initialize a testing algorithm for SNPP and NOAA-20	*June 2025*			
Subtask 14.2: Investigate potential of newly generated super-resolution SNPP/NOAA-20 NM SDR data in the geolocation performance monitoring analysis	*August 2025*			

VIIRS Imagery

December 2024

Accomplishments / Events:

- Most of CIRA's real-time data pulls of VIIRS Imagery and geolocation files have been transferred from GRAVITE to NODD.
  - M-band Imagery the exception – waiting for availability
- DNB Article
  - Hillger, D., and G. Toth, 2024: Nighttime visible imagery of Earth from space, *Topical Time*, 76(6), Nov/Dec, 62-72.
- Blog Posts with VIIRS Imagery
  - Early Dec 2024 Northern Plains Blowing Snow
  - Blowing Snow and Convective Streamers in the Red River Valley: 11 Dec 2024
- 24 VIIRS Imagery Posts on CIRA Social Media (X) this Month. A few posts:
  - VIIRS Day Land Cloud RGB of Alaska sea ice growth (6.7K views)
  - VIIRS DNB Imagery of Cuba energy grid collapse (3.8K views)
  - VIIRS DNB Imagery of Ship in Arctic (1.8K views)

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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3. *Project has deviated slightly from the plan but should recover.*
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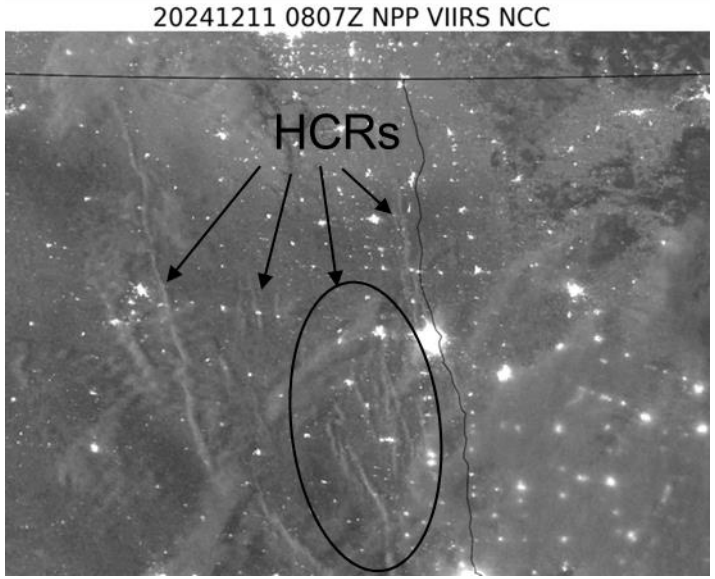
Issues/Risks:

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY26 Program Management Review	Jun-25	Jun-25		
Submit for Publication – CrIS Imagery	Mar-25	Mar-25		
Submit for Publication – Blowing Dust Climo	Jun-25	Jun-25		
Submit for Publication – Blowing Snow Detection via Satellite Imagery	Sep-25	Sep-25		
Completed new DNB-to-NCC LUTs for S-NPP, NOAA-20, and NOAA-21	Sep-25	Sep-25		
New Imagery products or product enhancements (display on SLIDER)	Sep-25	Sep-25	continuing	
Realtime Imagery monitoring and display systems (SLIDER, etc.)	Sep-25	Sep-25	continuing	
Interesting VIIRS Imagery to Social Media and Blogs	Sep-25	Sep-25	continuing	
McIDAS-X/V Enhancements for processing/display of VIIRS Imagery	Sep-25	Sep-25	continuing	
Block 2.3 Mx builds deploy regression review/checkout (Mx12, Mx13, Mx14				

Highlights: Image of the Month

Figure: VIIRS DNB/NCC Imagery of overnight convective streamer, or horizontal convective rolls (HCRs) over eastern ND. Considerable blowing snow was experienced within these plumes.



Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 1: Evaluate/validate VIIRS Imagery EDRs routinely and as part of JPSS ground systems tests.	Ongoing			
Subtask 1.1:				
Subtask 1.2:				
Subtask 1.3:				
Task 2: Continue to pursue the development of new DNB-to-NCC LUTs using recently optimized DNB ASF tool code	Sep - 25			
Subtask 2.1: Generate DNB-to-NCC LUTs specific to NOAA-20, NOAA-21, and S-NPP using new DNB ASF tool code	Mar - 25			
Subtask 2.2: Use new DNB-to-NCC LUTs to produce NCC imagery for each VIIRS, and compare imagery to that using the operational LUT	Jun - 25			
Subtask 2.3: Upon evaluation, if imagery has similar or better quality to that using operational LUT, then pursue operational implementation of new DNB-to-NCC LUTs for each VIIRS.	Sep - 25			
Task 3: Support JPSS Program outreach efforts through the Image Production subgroup.	Ongoing			
Subtask 3.1: Assist the JPSS Program Office and the JPSS Imagery Cal/Val team lead through the production of VIIRS imagery examples	Ongoing			
Subtask 3.2: Distribute VIIRS Imagery examples for use in public relations materials, scientific presentations given by JPSS Program management, forecaster training materials, social media, and scientific blog posts, among others.	Ongoing			
Subtask 3.3:				
Task 4: JPSS-3 and JPSS-4 Cal/Val preparation activities, as requested by the JPSS Program Office.	As Needed			
Subtask 4.1: Cal/val plans and maturity schedules	As Needed			
Subtask 4.2: Data systems test events	As Needed			
Subtask 4.3:				

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 5: Continue to support development and production of VIIRS-related products for Polar SLIDER (https://rammb-slider.cira.colostate.edu/?sat=jpss), CIRA-produced VIIRS imagery products that are delivered to CIMSS' RealEarth website (https://realearth.ssec.wisc.edu), and similar products that are produced at UAF/GINA for distribution to NWS Alaska Region offices.	Ongoing			
Subtask 5.1:				
Subtask 5.2:				
Subtask 5.3:				
Task 6: Coordinate with NESDIS/STAR/JPSS, NWS representatives, TOWR-S, and the JPSS Satellite Liaison on the delivery, display, and training of VIIRS imagery products to the NWS and solicit user feedback	Ongoing			
Subtask 6.1: Newly developed VIIRS Imagery Multispectral products	Ongoing			
Subtask 6.2: CrIS Imagery	Ongoing			
Subtask 6.3: VIIRS Imagery for CONUS users	Ongoing			
Task 7: Provide interesting VIIRS Imagery and Blogs on a regular basis throughout grant period, as well as provide presentations and publications where appropriate.	Ongoing			
Subtask 7.1:				
Subtask 7.2:				
Subtask 7.3:				
Task 8: Contribute to monthly reports on the VIIRS Imagery EDR Team activities, and participate in Imagery Team meetings and relevant JPSS science meetings.	Ongoing			
Subtask 8.1:				
Subtask 8.2:				
Subtask 8.3:				
Task 9: Blowing Dust Climatology Paper submitted (includes VIIRS Imagery)	Sep - 25			
Task 9: CrIS Imagery Paper submitted	Mar - 25			
Task 9: Blowing Snow Paper submitted	Jun - 25			

Leaf Area Index

December 2024

Accomplishments / Events:

- Keep working on the LAI Operational Readiness Review, including LAI test data verification between operational data and local ones, historic LAI in-situ validation and near real time data inter-comparison.
- Work with NOAA/EMC science team on the LAI performance in Noah-MP, the preliminary results show the LAI climatology works great than the prescribed LAI and the NOAA LAI datasets perform slight better in the regional test.
- Keep investigate the stem area index (SAI) and explore the practical method to generate the datasets from the current LAI climatology.
- Work on the LAI evaluation and improve the algorithm mainly focus on the LAI bias at the northern high latitude, temporal smoothness and the investigate the discrepancy between products.

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			

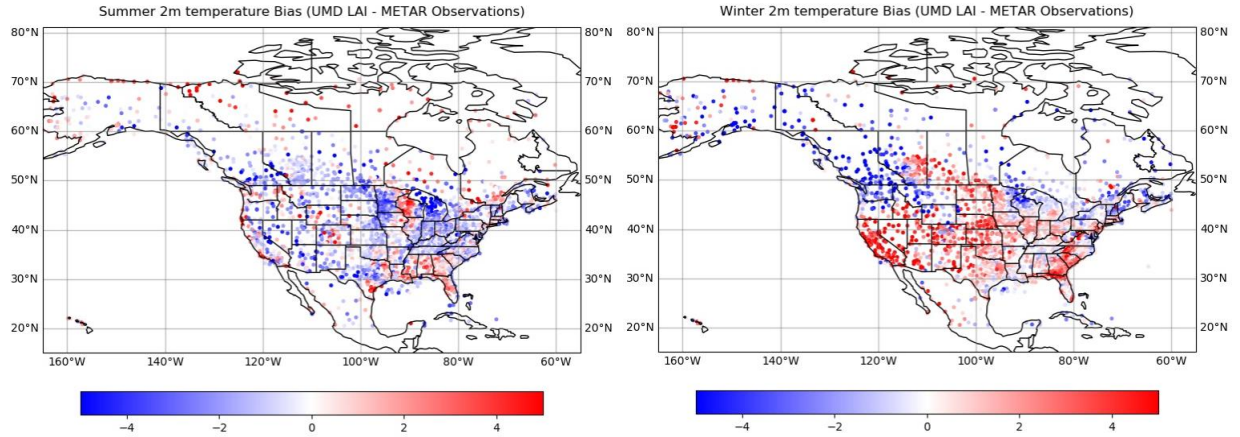
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
CCAP final Delivery	Feb-24	Feb-24	Apr 1, 2024	
Incorporate the LAI test data into the LSM model to evaluate the performance in the model	May-24	May-24	May 30, 2024	
Operational readiness	Jul-24	Jul-24		ASSIST team postponed due to verification data preparation
Develop LAI routine monitoring and validation tool	Sep-24	Sep-24	Sep 27, 2024	
Apply the LAI routine monitoring and validation tool on the operational product	Dec-24	Dec-24		Postponed as the ORR does.
LAI operation data verification and adjustment	Mar-25	Mar-25		

Highlights:

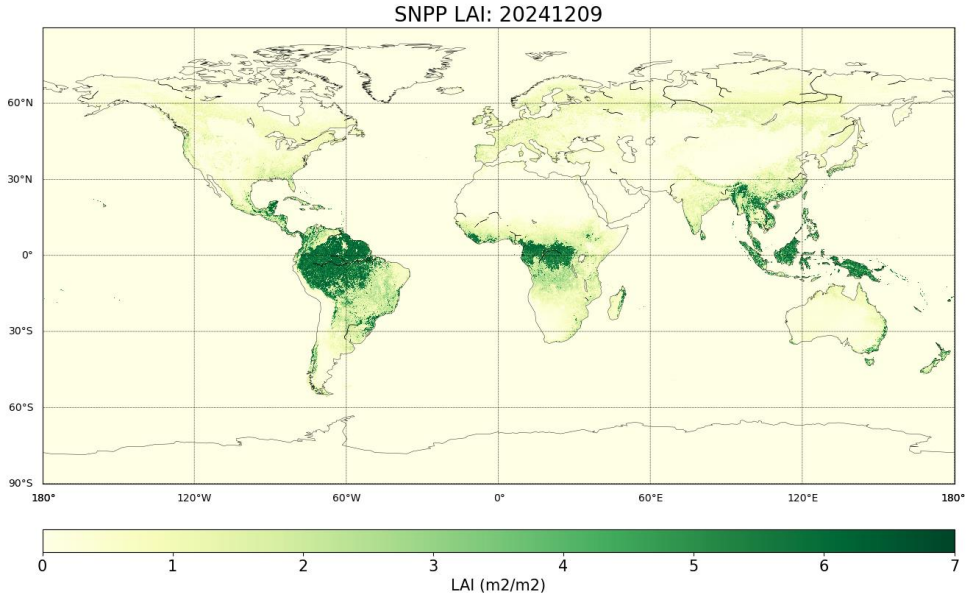


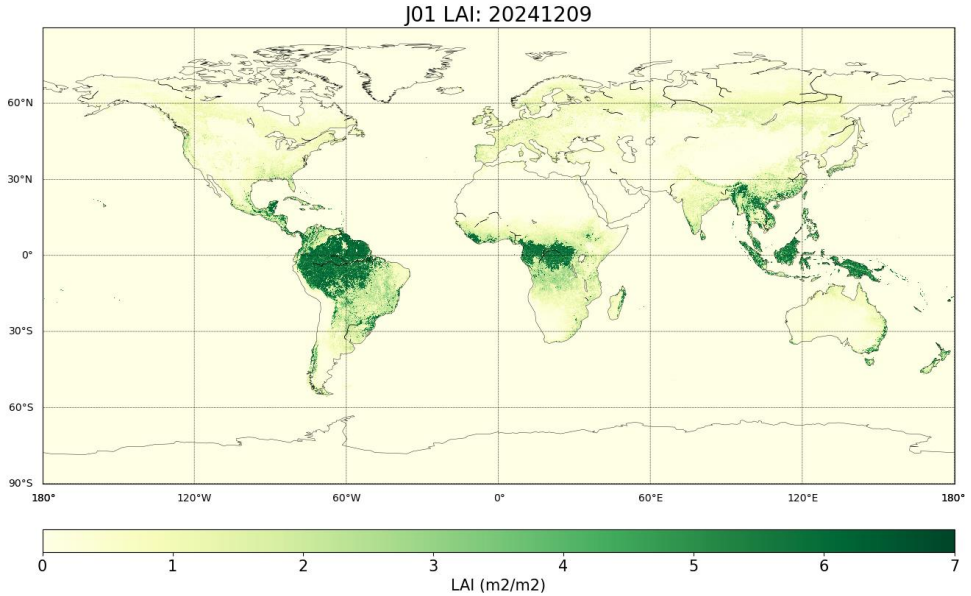
Two satellite based LAI climatology datasets (PNNL LAI and NOAA LAI) and one tabled monthly LAI is used in the Noah-MP model for test and comparison. Similar pattern is observed, but NOAA LAI with better regional heterogeneity in summer and lower bias in winter (credit: Sanath Kumar, NOAA/EMC).

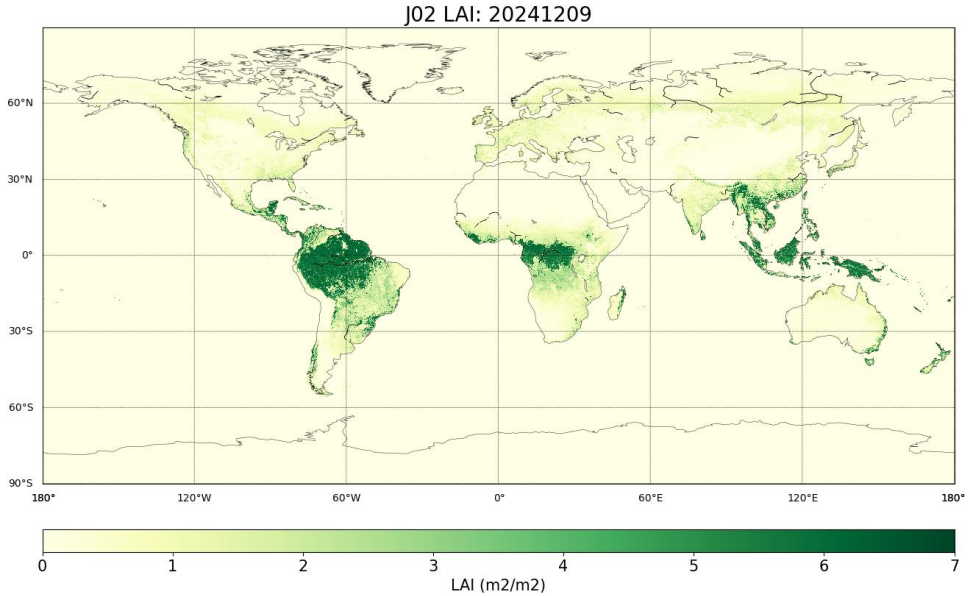
LAI Verification for the Operation Readiness

- LAI operational readiness review works
  - LAI verification between operational test data and local LAI.
  - update the ground measurements (to 2023, latest available) for local historical data ground validation.
  - NASA VIIRS LAI (VNP15/VJ115) v2 for inter-comparison.

Figures show the SNPP, N20, N21 Weekly (8-day) LAI of December 9, 2024.



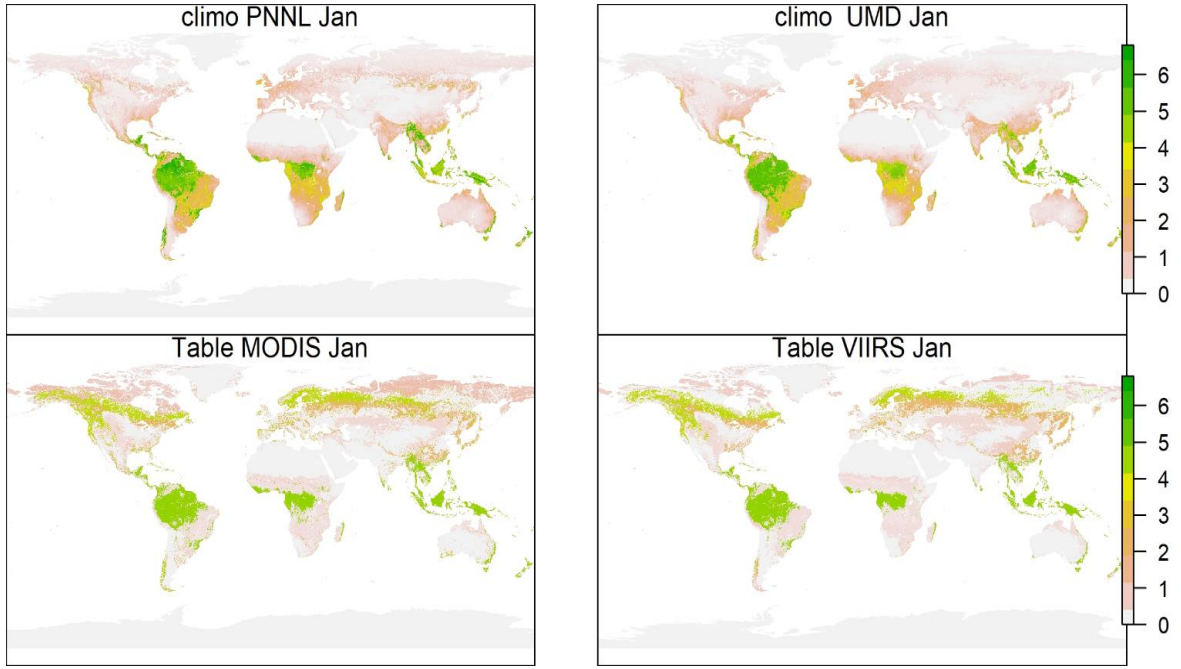


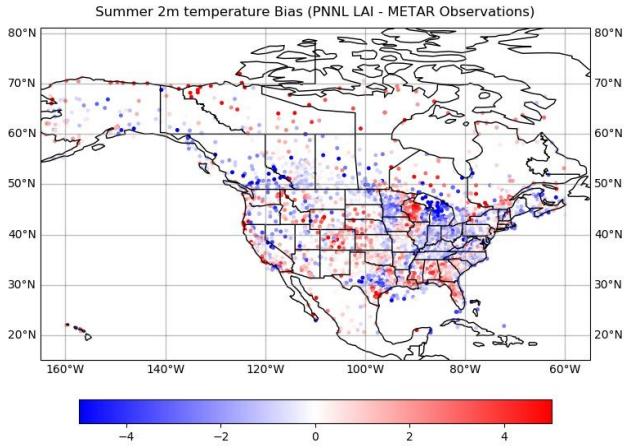


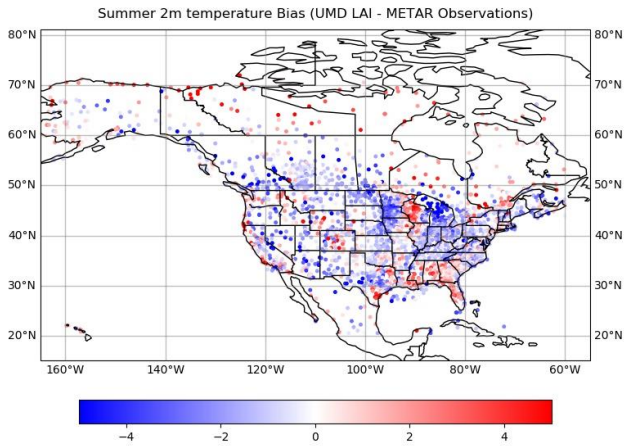
LAI Climatology Test in the Noah-MP model (by EMC)

December 2024

- **Test Datasets**
  - Two spatially non explicit LAI (MODIS & VIIRS) tabulated by month and vegetation type is used.
  - PNNL LAI (2001-2021): reprocessed MODIS (by Yuan, 2011, Beijing Normal University)
  - UMD LAI (2012-2021): GLASS LAI (v60).
- **LAI value comparison**
  - Similar spatial patterns
  - Table LAI is lower in low latitudes and higher in high latitudes compared to observed LAI
  - PNNL LAI and Table LAI greens up (June) almost a month before UMD LAI (July)







- **2m air temperature (summer)**
  - Spatial patterns of bias are similar
  - Regional heterogeneity where one data set seems to be better than other is also evident.
- **2m air temperature (winter)**
  - Spatial patterns of bias are similar
  - Winter warm bias seems lower for UMD LAI

FY25 Milestones/Deliverables

Task Category	Task/ Description	Start	Finish	Deliverable	Requirement (Dev Only)
Development (D)	Algorithm & product improvement according to the validation and model test.	7/1/2025	9/30/2025	Algorithm test report	JPSS LAI product requirements
Integration & Testing (I)	LAI operational data verification and adjustment	1/1/2025	3/31/2025		
Calibration & Validation (C)	LAI product in-situ validation & inter-comparison with other products	3/1/2025	6/30/2025	Validation report	
	Incorporate the LAI test data into the LSM model to evaluate the performance in the model	1/1/2025	9/30/2025	Model test report	
LTM & Anomaly Resolution (L)	Develop and apply LAI routine monitoring and validation tool	10/1/2024	05/31/2025	Monitoring tool package	

D	I	C	M	L
Development	Integration &Testing	Calibration & Validation	Maintenance	LTM & Anomaly Resolution

Surface Albedo

December 2024

Accomplishments / Events:

- Delivered the METOP LSA package.
- Completed the evaluation of blended albedo in different areas.
- Contributed to global land surface anomaly monitoring efforts.
- Prepared presentation slides for AMS2025.

Overall Status:

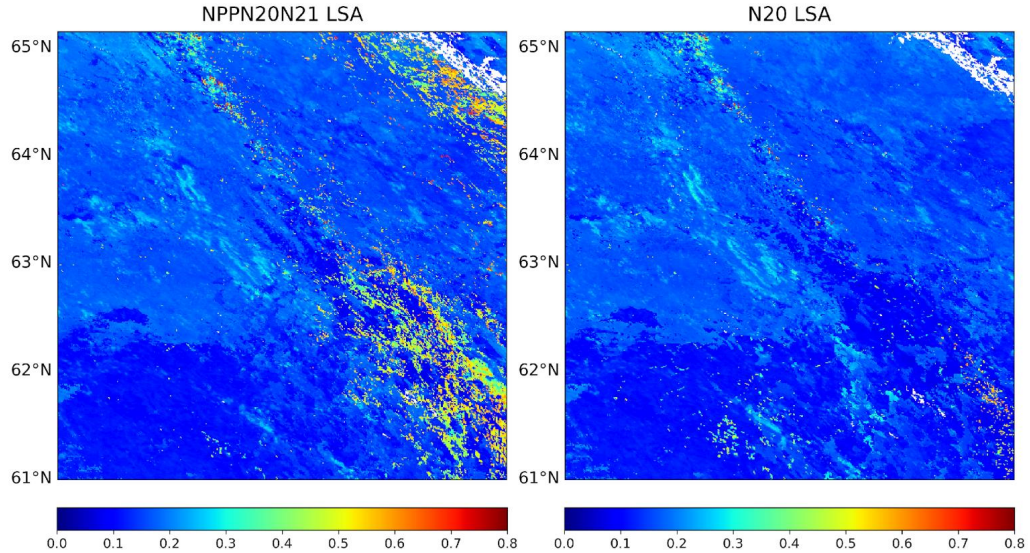
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		x			
Schedule		X			

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	Variance Explanation
Support the integration and cloud transition of the VIIRS BRDF	Dec-2024	Dec-2024	Sep-2024	Delivered in Sep-2024. Integration in 2025
Develop and assess blended VIIRS SURFALB albedo algorithm	Dec-2024	Dec-2024	Dec-2024	
New Satellite Adaptation and algorithm performance improvement	Mar-2025	Mar-2025		
NBAR comparison between LEO and GEO satellites	Jun-2025	Jun-2025		
Generate new VIIRS sea-ice albedo climatology	Jun-2025	Jun-2025		
Exploring albedo applications in radiation force	Aug-2025	Aug-2025		
VIIRS BRDF/albedo data verification, issue investigation and communication for product monitoring	Sep-2025	Sep-2025		
VIIRS albedo data verification, issue investigation and communication for product monitoring	Sep-2025	Sep-2025		

Highlights: The blended albedo enhanced snow albedo detection

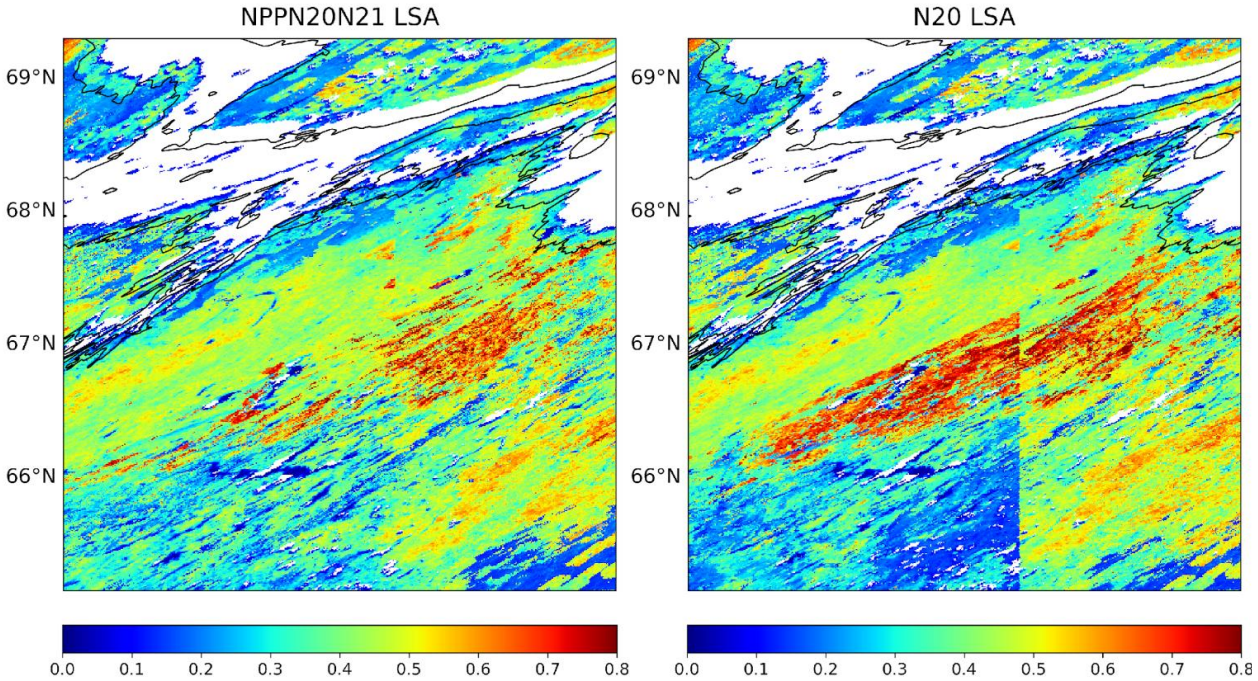


Cloudy albedo from climatology may not account for snow conditions.

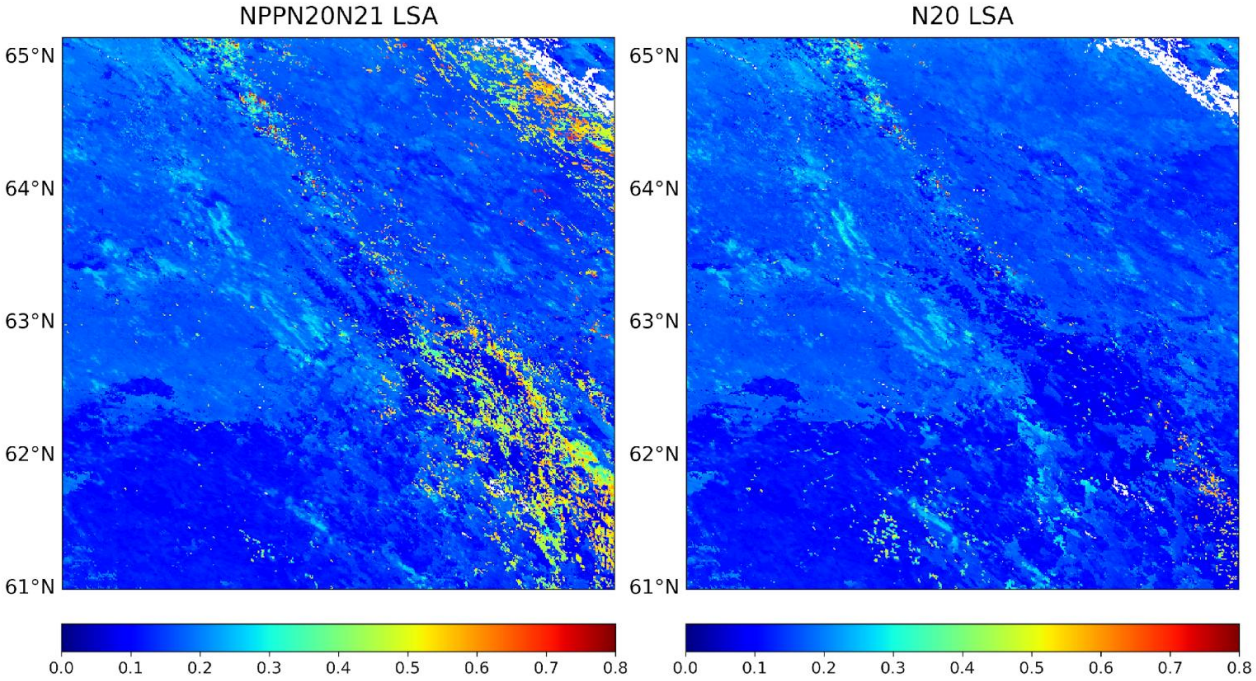
Blended JPSS Albedo

Blended Albedo (left) vs. Single-satellite Albedo (right)

Case 1: Improved Continuity at the Orbit Edges



Case 2: Enhanced Snow Albedo Detection

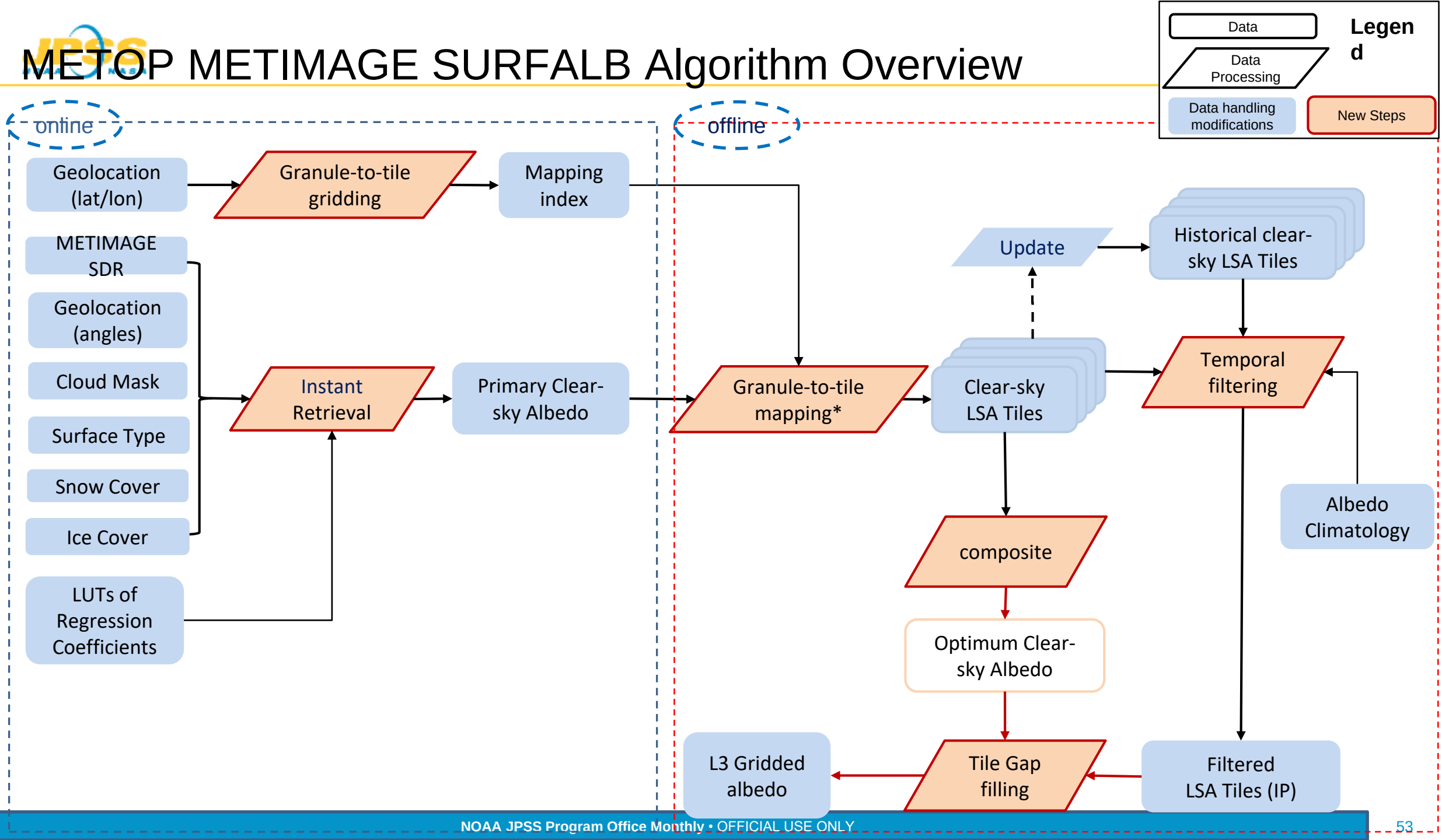


Cloudy albedo from climatology may not account for snow conditions.

METOP-SG LSA Requirements

Product	JPSS VIIRS SURFALB		MetOP-SG MetImage SURFALB
	L2	L3	L3
Geographic coverage	global, including land and ice surface conditions	global, including land and ice surface conditions	global, including land and ice surface conditions
Horizontal Cell Size	0.75 km	1 km	0.5 km
Measurement Range	0 to 1.0 (albedo units)	0 to 1.0 (albedo units)	0 to 1.0 (albedo units)
Measurement Accuracy	0.08 (albedo units)	0.08 (albedo units)	0.08 (albedo units)
Measurement Precision	0.05 (albedo units)	0.05 (albedo units)	0.05 (albedo units)
Latency	3 h	30 h	30 h
Refresh Rate	granule	daily	daily
Formats	netcdf, granule	netcdf, sinusoidal grid	netcdf, sinusoidal grid

METOP METIMAGE SURFALB Algorithm Overview



LST anomaly Website & Interactive Visualization

- **User-Friendly Portal**

  Provides anomaly detection results, statistics for multiple parameters.

- **Monthly reports**

  Since June 2021

  (https://www.star.nesdis.noaa.gov/smcd/emb/land/monthly_lst.php)

- **Video analysis**

  We extract and convey the key points.

FY25 Milestones/Deliverables

	Milestone	Start	Finish	Deliverable	Requirement (Dev Only)	Project
1	Software package for blended SURFALB from all VIIRS sensors	Oct-24	Dec-24	L3 code package for using observations from three satellites in generating blended albedo		JPSS-Albedo
2	Sea-ice albedo climatology dataset	Mar-25	Feb-25	VIIRS albedo climatology being updated over the sea-ice pixels and used in VIIRS albedo algorithm		JPSS-Albedo
3	Application of albedo in radiation force report	July-25	Sep-25	A manuscript, or a memorandum		JPSS-Albedo
4	LSA and other land anomaly monitoring interface	Oct-24	Jul-25	An interactive interface to observe the real-time albedo anomaly		JPSS-Albedo
5	BRDF algorithm based on the joint of NPP, JPSS-1, and JPSS-2	Jul-24	Dec-24	DAP: Software, documents, and test data		PPM-BRDF
6	Scientific report of Albedo/BRDF validation and monitoring	Sep-24	Jul-25	A report		PPM-BRDF

D	I	C	M	L
Development	Integration &Testing	Calibration & Validation	Maintenance	LTM & Anomaly Resolution

Land Surface Temperature

December 2024

Accomplishments / Events:

- Completed the initial DAP delivery of the Metop-SG software package, including the software code, test input and output data, and a Readme file to ASSISTT team. Resolved the issue with incompatible libraries caused by the server update, modified the interface code for two different input datasets, and verified the two LST output files. (highlights & slide 2)
- For all weather LST, added the code to deal with the NDVI input with different spatial resolution including 1 km NDVI in regional domain and 4 km NDVI in global domain. Completed the code and conducted the test. The test output is compared with previous result with 1km global NDVI input. (slide 3-6)
- Attended the AGU 2024 annual conference and presented three posters including “Validation and Performance Evaluation of NOAA-21 VIIRS LST Product”, “All-weather Land Surface Temperature (LST): Methodology and Experiment on JPSS/VIIRS LST”, and “A Preliminary Evaluation of SNPP VIIRS Land Surface Temperature Product with Landsat 8 Data”.
- Prepared an abstract titled “I-band VIIRS LST: Algorithm Development, Validation and Applications” to IGARSS 2025.

Overall Status:

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

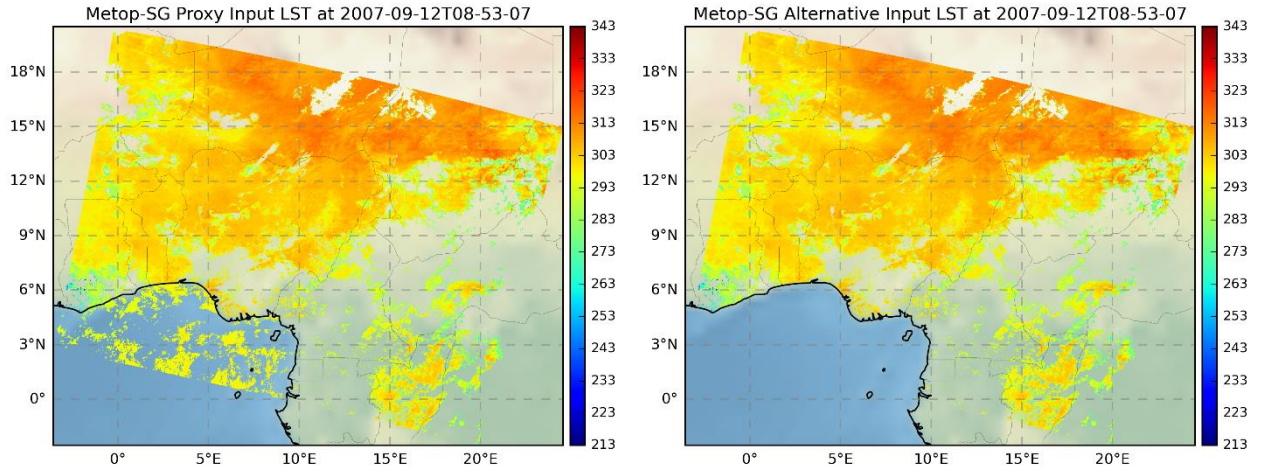
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
N-21 LST data monitoring, consistency and performance evaluation	**Oct-24**	**Dec-24**	**Dec-24**	
L2 & L3 SNPP, NOAA-20 annual validation practice	**Dec-24**	**Jan-25**		
Support to JPSS-3 Data System Test Event	**Jan-25**	**Apr-25**		
I-band LST validation and applications	**Oct-24**	**May-25**		
All weather LST validation and improvement	**Jan-24**	**Aug-25**		
Monitoring and Anomaly watch, analysis and report	**Oct-24**	**Sep-25**		

Highlights:

Metop-SG LST Initial DAP Delivery



Metop-SG LST generated using proxy data (left), and alternative VIIRS-like input data (right). The alternative input includes VIIRS like land mask, cloud mask, snow mask, AOD, and emissivity.

MeTOP-SG LST DAP Package

/data/smcd9/yliu/METOP-SG/DAP_delivery/

Name
- ..
- scienceCode
- output
- input
- notes
- Readme for METImage LST DAP delivery.docx
- metImage_lst_code.tar.gz

/data/smcd9/yliu/METOP-SG/DAP_delivery/input/

Name
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- alternativeInput
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- EPS-SG_VII_GEOLOC_DEM_2007
- EPS-SG_VII_ANCILLARY_2007-0
- METImage_LST_LUT.nc
- METImage_LST_Config_EUM.nc
- EPS-SG_AOD_TPW_2007-09-12T0

/data/smcd9/yliu/METOP-SG/DAP_delivery/input/alternativeInput/

Name
- ..
- bck
- EPS-SG_LandMask_2007-09-12T08-53-07_V4.0.nc
- EPS-SG_VII_GEOLOC_DEM_2007-09-12T08-53-07_V4.0.nc
- METImage_LST_Config_NOAA.nc
- EPS-SG_CloudMask_2007-09-12T08-53-07_V4.0.nc
- EPS-SG_SnowMask_2007-09-12T08-53-07_V4.0.nc
- EPS-SG_Aod_2007-09-12T08-53-07_V4.0.nc
- EPS-SG_Tpw_2007-09-12T08-53-07_V4.0.nc
- EPS-SG_Emissivity_2007-09-12T08-53-07_V4.0.nc

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- metop_interface
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- metimage_lst_input_structure_module.o
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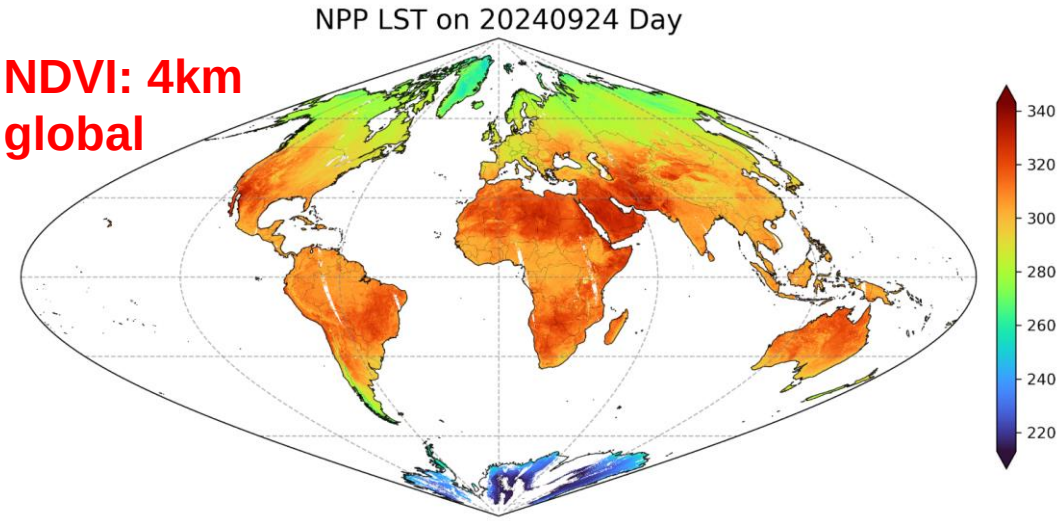
- Framework_Input_Structure_module.o
- framework_enterprise_metimage_lst.mod
- NF_PARM.o
- nf_parm.mod
- framework_input_structure_module.mod
- metop_interface.f90
- Makefile
- Makefile_Bck
- NF_PARM.f90
- metimage_lst_input_structure_module.f90
- Framework_Input_Structure_module.f90
- framework_enterprise_metimage_lst.f90

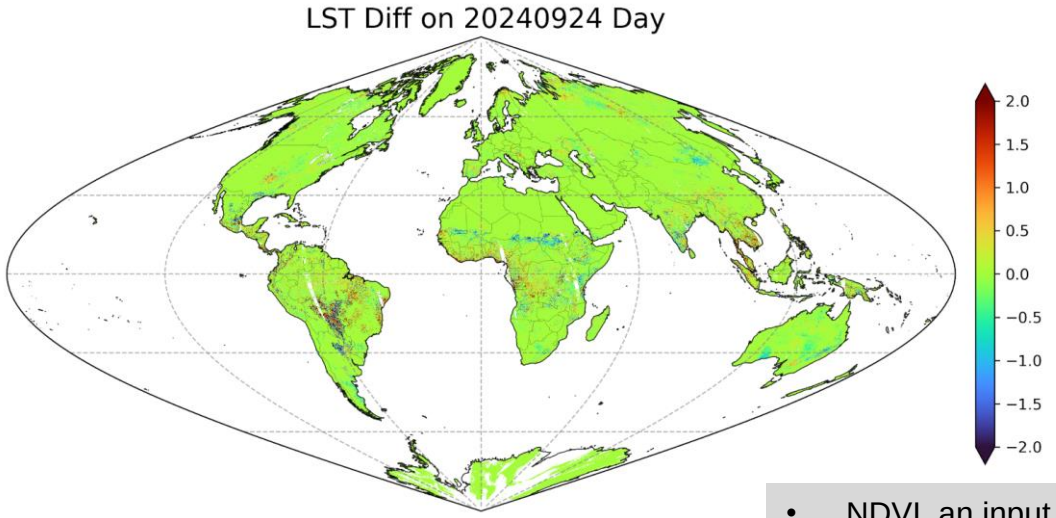
- Metop_LST_2007-09-12T08-53-07_V4.0.nc
- Metop_LST_Alternative_input_2007-09-12T08-53-07_V4.0.nc
- Metop_LST_Alternative_input_2007-09-12T08-53-07_V4.0_unscale.nc

This slide outlines the contents of the MeTOP-SG DAP package. It includes the science code, test input and output data, and a Readme file with detailed information.

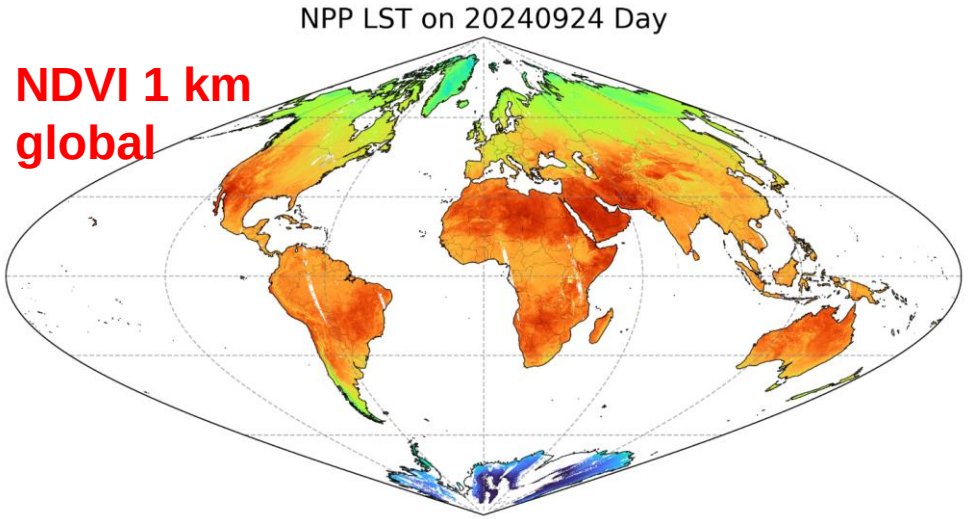
All weather LST –NDVI input update (4 km global, daytime)

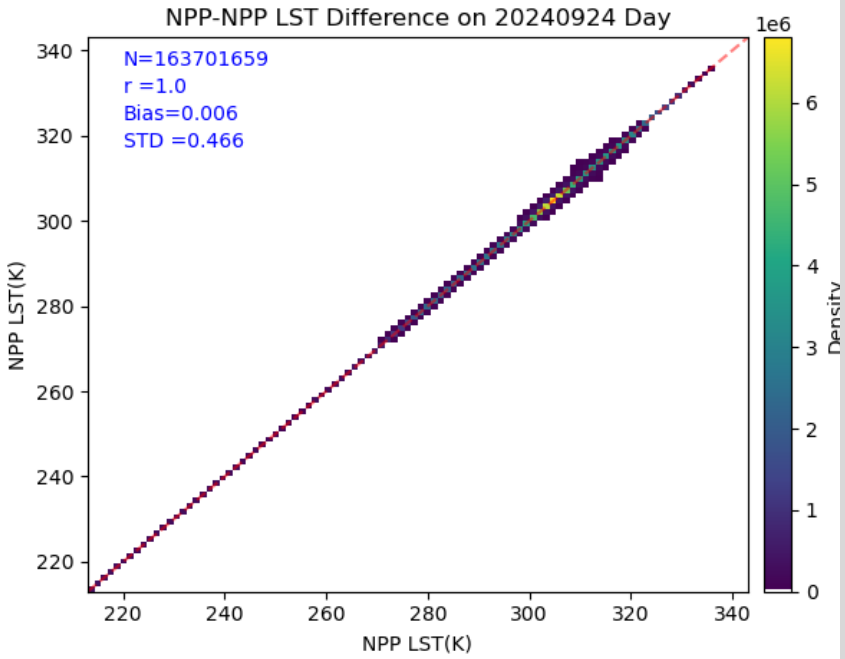
NDVI: 4km global





NDVI 1 km global

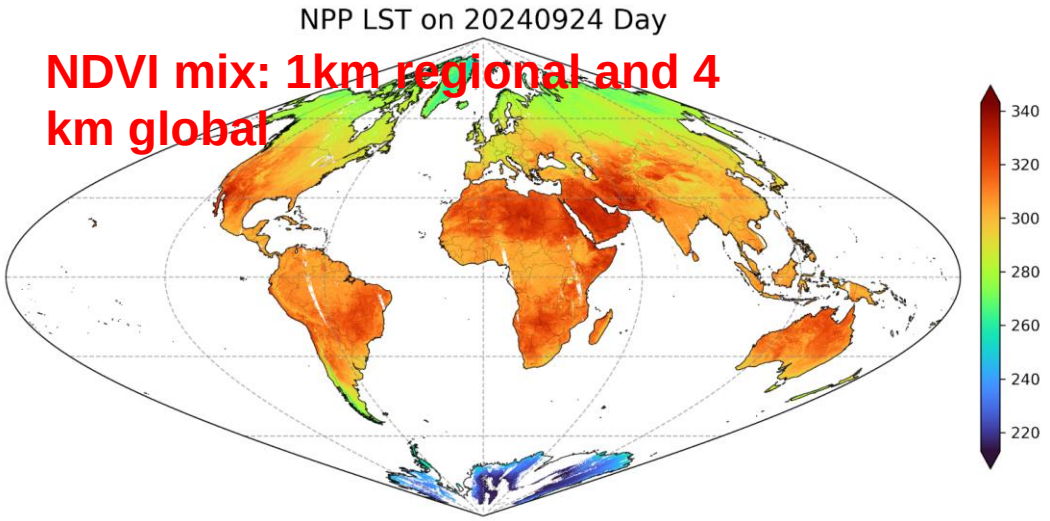


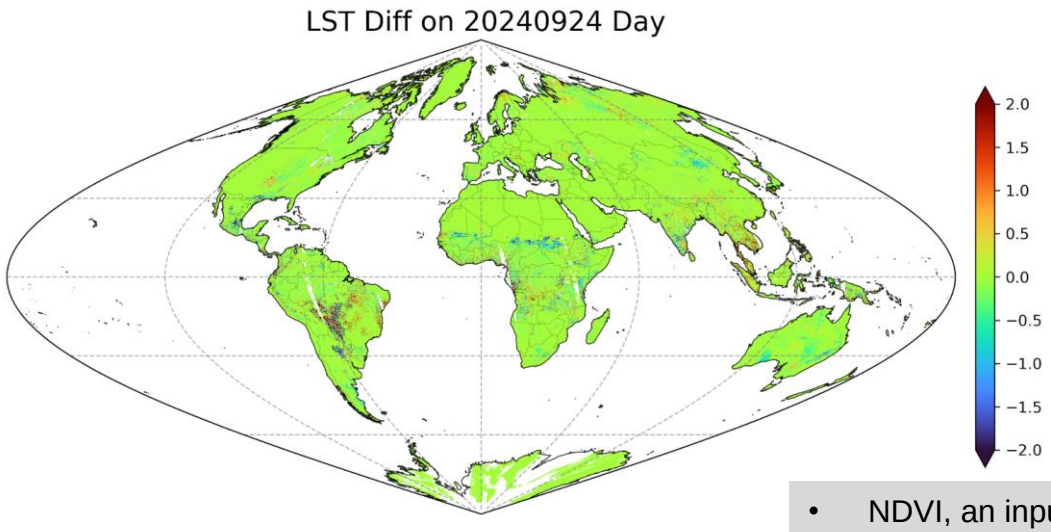


- NDVI, an input for all weather LST, has different spatial resolutions across regional and global domains. It includes 1 km and 4 km resolution for the global domain, as well as a 1 km resolution for regional domain.
- The all-weather LST code can process NDVI input with varying spatial resolutions and mixed combinations.
- This slide presents the result for the daytime scenario using 4 km global NDVI as input.
- The all weather LST output is compared with LST generated using 1 km global NDVI input.
- The results indicate a bias of 0 K and a STD of less than 0.5 K with difference primarily observed in South America and central Africa.

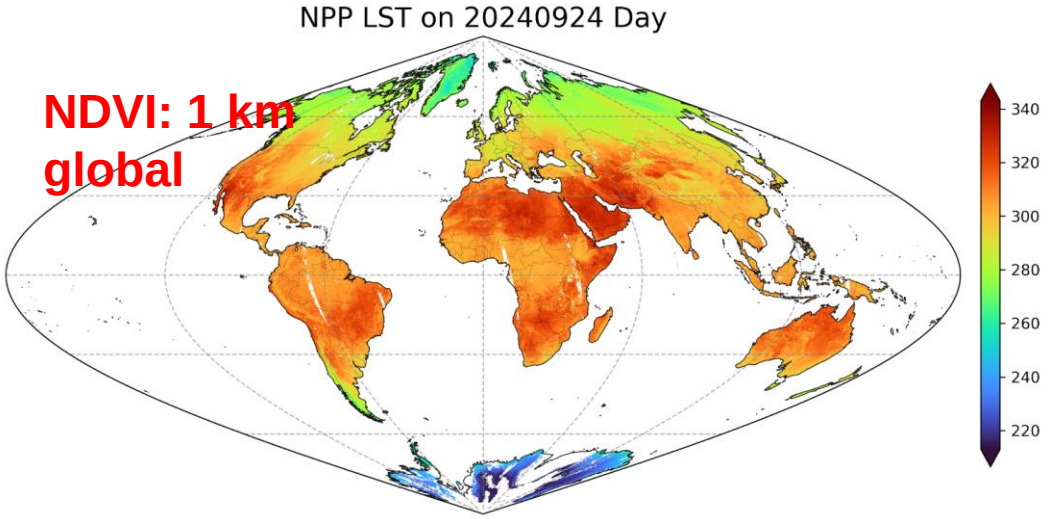
All weather LST –NDVI input update (Mix, daytime)

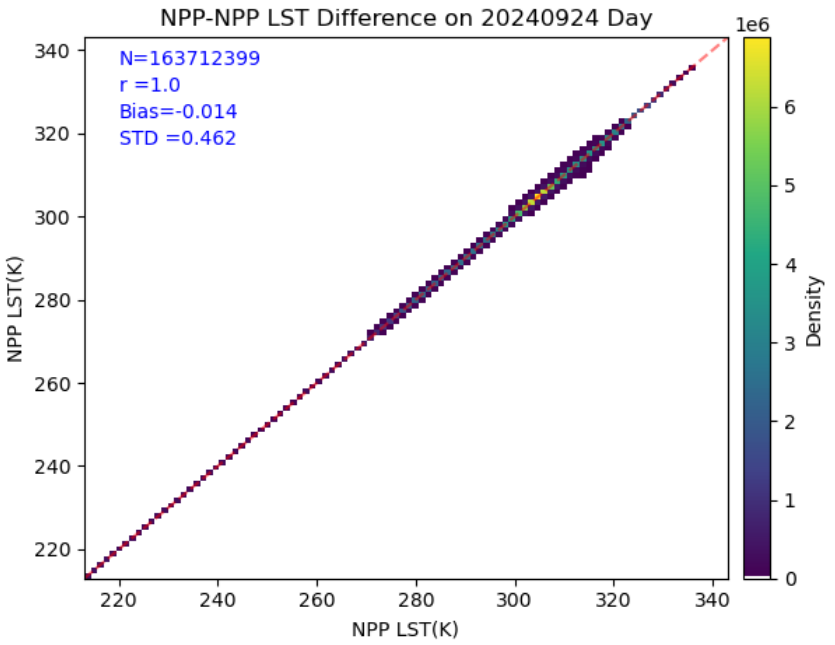
NDVI mix: 1km regional and 4 km global





NDVI: 1 km global

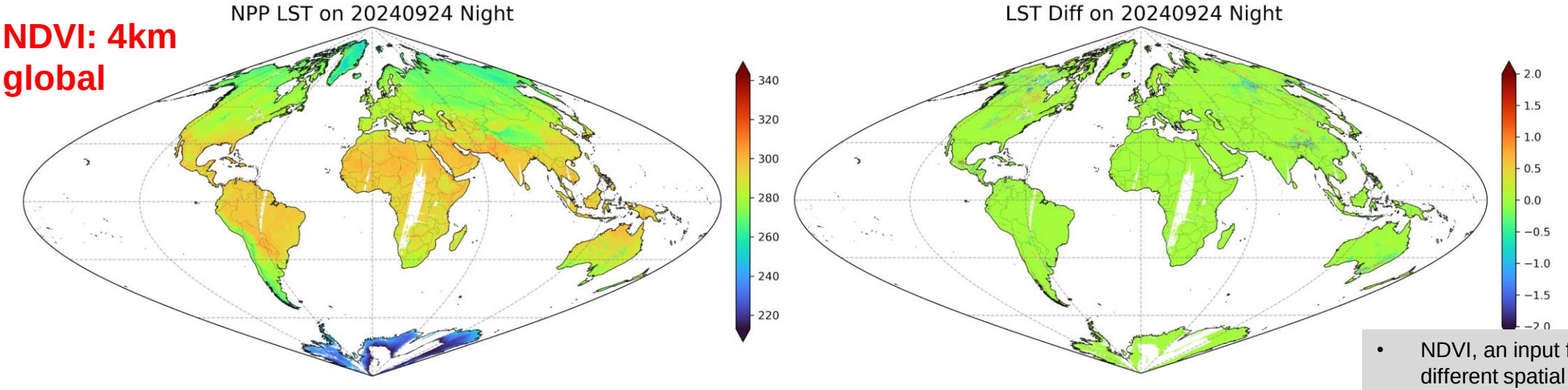




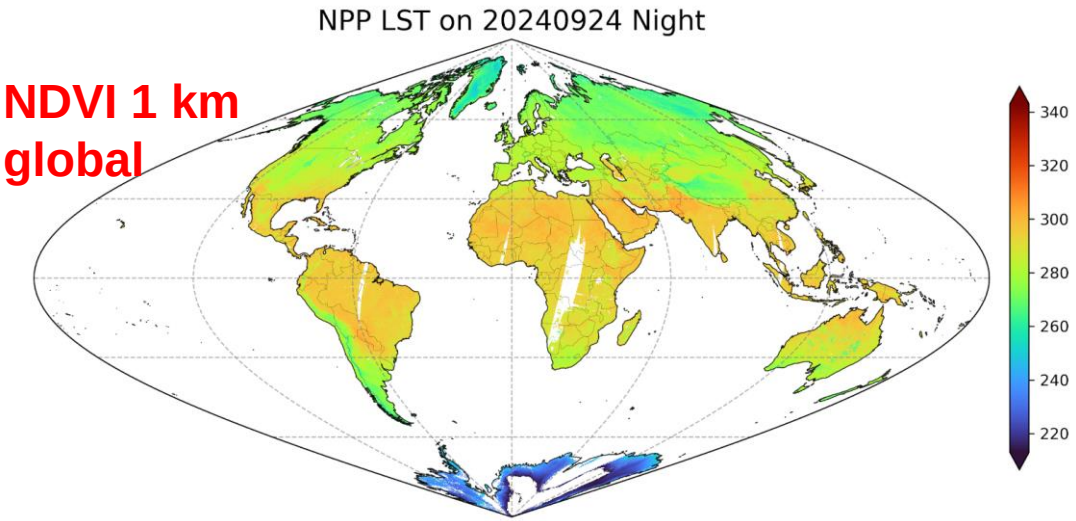
- NDVI, an input for all weather LST, has different spatial resolutions across regional and global domains. It includes 1 km and 4 km resolutions for the global domain, as well as a 1 km resolution for regional domain.
- The all-weather LST code can process NDVI input with varying spatial resolutions and mixed combinations.
- This slide presents the result for the daytime scenario using a mixed input of 4 km global NDVI and 1 km regional NDVI.
- The all weather LST output is compared with LST generated using 1 km global NDVI input.
- The results indicate a bias of 0 K and a STD of less than 0.5 K with difference primarily observed in South America and central Africa.

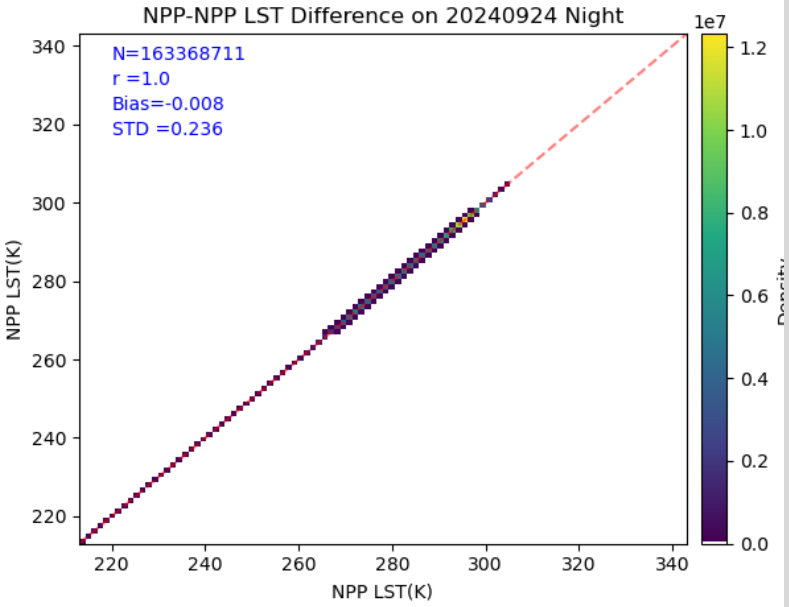
All weather LST –NDVI input update (4km global, Nighttime)

NDVI: 4km global



NDVI 1 km global

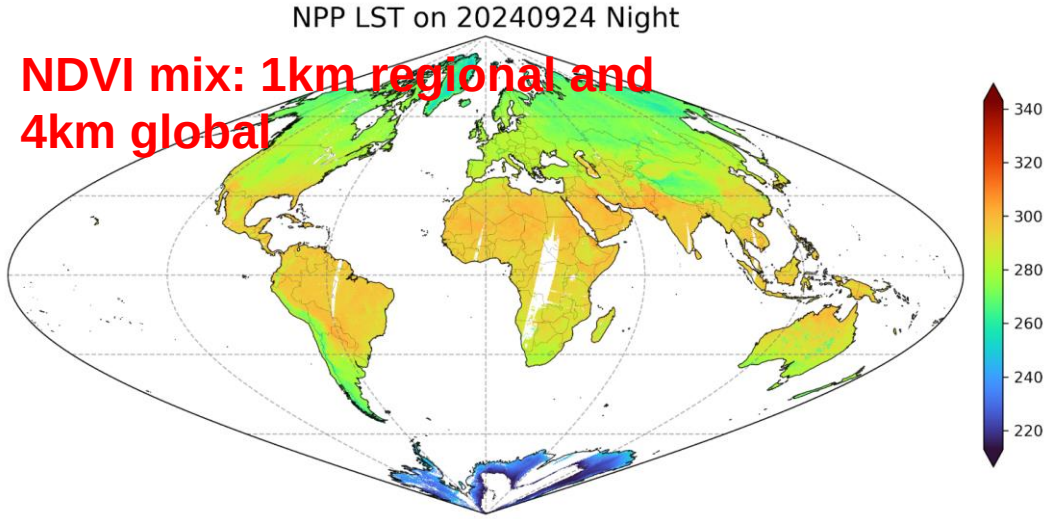


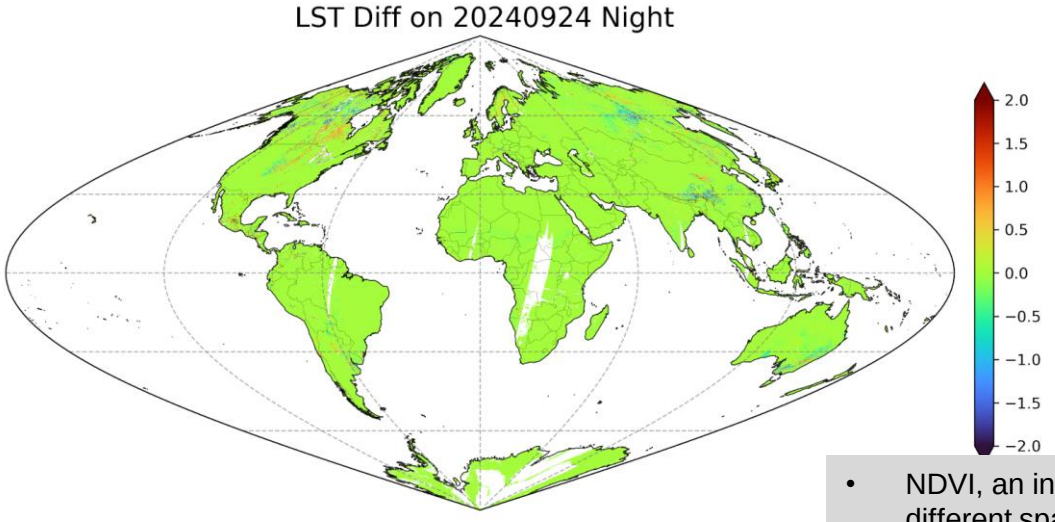


- NDVI, an input for all weather LST, has different spatial resolutions across regional and global domains. It includes 1 km and 4 km resolution for the global domain, as well as a 1 km resolution for regional domain.
- The all-weather LST code can process NDVI input with varying spatial resolutions and mixed combinations.
- This slide presents the result for the nighttime scenario using 4 km global NDVI as input.
- The all weather LST output is compared with LST generated using 1 km global NDVI input.
- The results indicate a bias of 0 K and a STD of less than 0.25 K with difference primarily observed in central strip of North America from north to south, Eastern Russia, Tibetan Plateau and the southeastern coast of Australia.

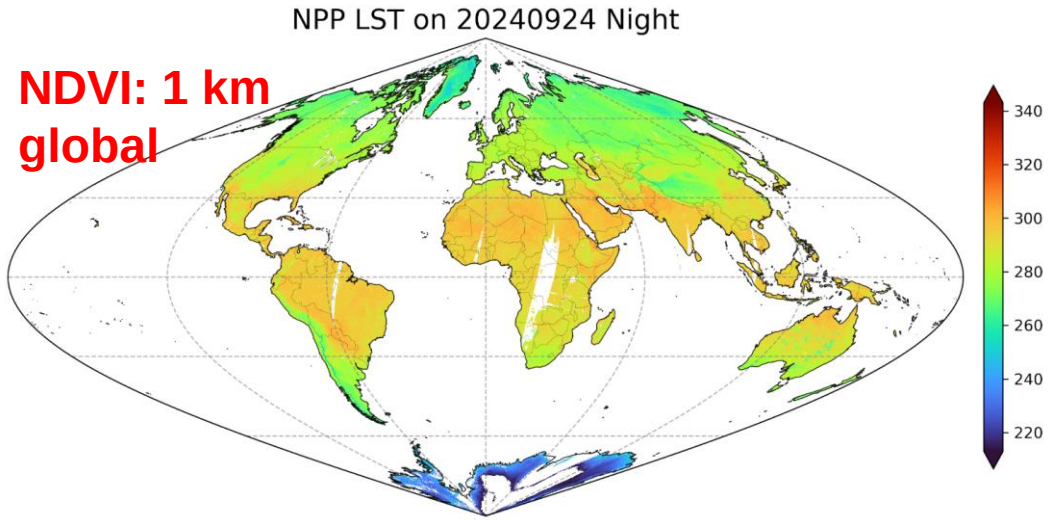
All weather LST –NDVI input update (Mix, Nighttime)

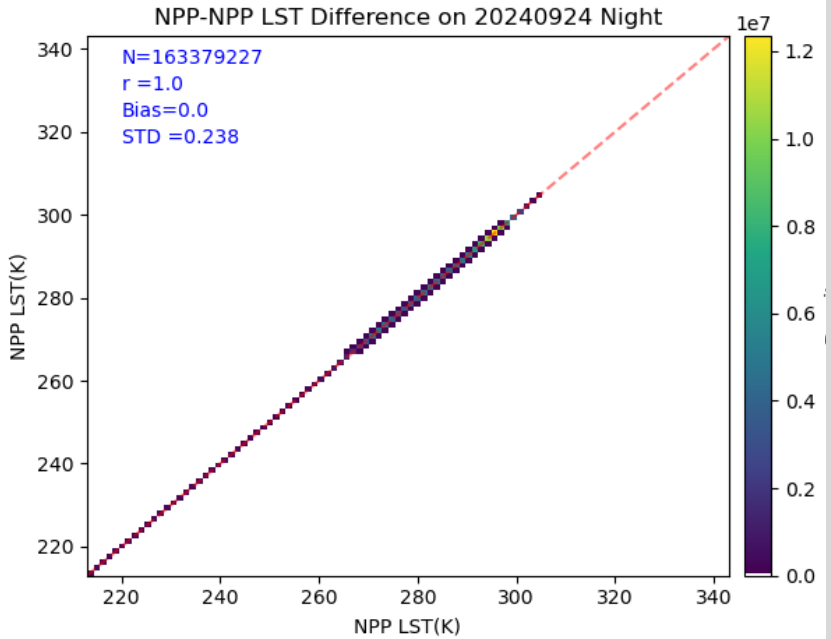
NDVI mix: 1km regional and 4km global





NDVI: 1 km global





- NDVI, an input for all weather LST, has different spatial resolutions across regional and global domains. It includes 1 km and 4 km resolution for the global domain, as well as a 1 km resolution for regional domain.
- The all-weather LST code can process NDVI input with varying spatial resolutions and mixed combinations.
- This slide presents the result for the nighttime scenario using a mixed input of 4 km global NDVI and 1 km regional NDVI.
- The all weather LST output is compared with LST generated using 1 km global NDVI input.
- The results indicate a bias of 0 K and a STD of less than 0.25 K with difference primarily observed in central strip of North America from north to south, Eastern Russia, Tibetan Plateau and the southeastern coast of Australia.

FY25 Milestones/Deliverables

	Milestone	Start	Finish	Deliverable	Requirement (Dev Only)
1	Annual report of L2 and L3 VIIRS LST validation	Nov-24	Dec-24	PowerPoint presentation of the validation results	
2	I-band LST LUT improvement and validation	Oct-24	May-25	Presentation slides of algorithm development and validation results	
3	LST reprocessing preparation	Ocr-24	Sep-25	Progress report	
4	JPSS-3 pre-launch test and evaluation	Jan-25	Apr-25	Presentation slides and LUT (rely on the availability of the sensor response function)	
5	All weather LST scientific readiness and availability	Oct-24	Aug-25	Experimental data and evaluation results	Collaborative works with PPM and EMC
6	Monitoring and Anomaly watch, analysis and report	Oct-24	Sep-25	Report as the cases come up	

D	I	C	M	L
Development	Integration &Testing	Calibration & Validation	Maintenance	LTM & Anomaly Resolution

MiRS Products

December 2024

Accomplishments / Events:

- The MiRS team recently completed a comprehensive reprocessing of SNPP and N20 ATMS data. The reprocessing project aims to resolve inconsistencies of input data and ATMS L1 calibration as well as MiRS version changes to provide high quality data to the scientific community and downstream algorithms. ATMS Level 1 recalibrated brightness temperature measurements were based on the calibration algorithm that was operational since October 15, 2019. The MiRS version used in reprocessing was v11.8. Evaluation is ongoing of the reprocessed retrieval products, including water vapor and precipitation. The highlight shows a recent analysis of warm season precipitation over Europe during the period 2020-2022, comparing MiRS SNPP rainfall with ground-based reference data. The reference data is the European climatological high-resolution gauge-adjusted radar precipitation dataset, EUropean RADar CLIMatology (EURADCLIM). The data are based on 138 ground-based radars and ~7,700 rain gauges. The 1-hour precipitation data on 2-km grid is used in this study. The collocation method is the same as that used in collocating MiRS SNPP/ATMS with Stage-IV over the CONUS. Further results from analysis of reprocessed data will be presented at the AMS 2025 annual meeting in New Orleans. Poster 440: Evaluation of Precipitation and TPW Retrieval based on MiRS SNPP/ATMS Reprocessed Data during 2012-2022 by Shuyan Liu et al.

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				

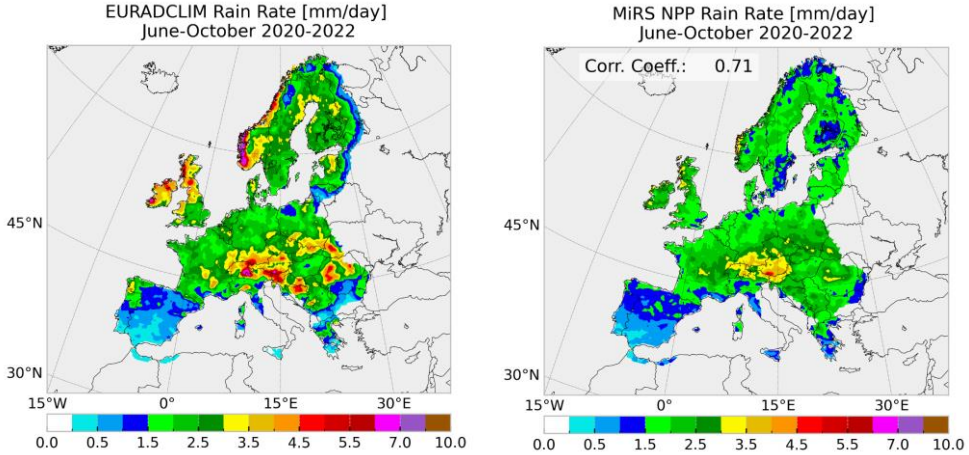
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
MiRS Development Algorithm Package (DAP) version 12.0 delivery	*Oct 2024 to Sep 2025*			
MiRS EDRs Reprocessing and data analysis	*Oct 2024 to Sep 2025*			
MiRS EDRs Maintenance and Monitoring	*Oct 2024 to Sep 2025*			
Implementing new CRTM version into MiRS System	*Sep 2025*			
Develop and evaluate AI/ML MiRS post-processing for precipitation over CONUS and global SST retrieval improvement	*Sep 2025*			
Framework for MiRS JPSS-3/4 ATMS	*Sep 2025*			

Highlights:



Comparison of EURADCLIM ground reference precipitation with MiRS reprocessed SNPP ATMS retrievals for June-October rainfall during the period 2020-2022.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 1: MiRS Development Algorithm Package (DAP) version 12.0 delivery	*October 2024 to September 2025*			
Subtask 1.1: Preparation of the MiRS DAP 12.0 *Two key updates: 1) upgrade the CRTM version 2.1.1 to the latest 2.4.0 in the MiRS DAP; The CRTM version 2.1.1 was released 10 years ago. New sciences and new capabilities have been implemented in the version 2.4.0.* *2) Some' values are stored as integer values in the MiRS EDRs files for saving the storage space and users read the files and converted back to floating values. The process caused the loss of numerical precision that affects the trend study in climate change. Today's data storage is much powerful than previous so that we can directly store the floating values.*	*October 2024 to July 2025*			
Subtask 1.2: The DAP testing and delivery	*October 2024 to September 2025*			
Task 2: MiRS EDRs Reprocessing and data analysis	*October 2024 to September 2025*			
Subtask 2.1: Data Reprocessing *SNPP MiRS EDRs data are reprocessed till December 2021 and NOAA-20 MiRS EDRs data are reprocessed till December 2020. The team will reprocess the NOAA-18 MiRS EDRs data..*	*October 2024 to July 2025*			
Subtask 2.2: Reprocessed Data Analysis *The MiRS reprocessed EDRs provided consistent long data records for study climate changes. The MiRS team will analyze the trends of total precipitable water (TPW) and rain rate at the surface.*	*October 2024 to September 2025*			
Task 3: MiRS EDRs Maintenance and Monitoring	*October 2024 to September 2025*			
Subtask 3.1: Maintenance *MiRS team is responsible for debug and upgrades of the MiRS system. The team is response for any issues reported by OSPO, Community Satellite Processing Package (**CSPP**) and other users.*	*October 2024 to September 2025*			
Subtask 3.2: Monitoring *The MiRS team maintains a visualization system to display daily images of global and CONUS distributions of MiRS 11 EDRs. The system also displays time series of statistical errors (biases and standard deviations) those EDRs.*	*October 2024 to September 2025*			

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 4: Implementing new CRTM version into MiRS System	*September 2025*			
Subtask 4.1: Implementation *The MiRS system currently uses the CRTM version 2.1.1 forward operator in its physical retrievals. The CRTM version was released 10 years ago. The newly released CRTM version 2.4.0 includes the new science improvement. However, the CRTM version doesn't have the jacobian for the surface emissity which is specific component for the MiRS. The team will add the specific part to the CRTM for the MiRS.*	*July 2025*			
Subtask 4.2: Testing and Assessment of the Performance *After the implementation of the CRTM new version, the team will test and evaluate the performance of the new implementation in terms of the accuracy and efficiency.*	*September 2025*			
Task 5: Develop and evaluate AI/ML MiRS post-processing for precipitation over CONUS and global SST retrieval improvement	*September 2025*			
Subtask 5.1: Develop AI/ML MiRS post-processing *AI/ML algorithm can greatly improve the accuracy of MiRS EDRs. For a low cost, we first proposed AI/ML post-processing system without changing MiRS. The MiRS EDRs will be inputs to a deep-learning system to improve the accuracy of EDRs.*	*July 2025*			
Subtask 5.2: Demonstrate the improvement for precipitation and sea surface temperature *The AI/ML MiRS post-processing system will be evaluated the improvements for two candidate EDRs: surface rain rates and the sea surface temperatures.*	*September 2025*			
Task 6: Framework for MiRS JPSS-3/4 ATMS MiRS is an enterprise algorithm. However, the bias correction and tuning still exist deficiency. The MiRS applies the bias correction over oceans to both lands and oceans. Over land, snow and ice surfaces, the bias correction is very challenge because of large uncertainties in the surface emissivity models. The new framework *aims to overcome the difficulties.*	*September 2025*			

FY25 Microwave Sounding Temperature CDR Project

Dec. 2024

Accomplishments / Events:

– Algorithm and software maintenance and quality control to keep the MLT CDR products into operations

Revised data merging in MLT operation, removed S-NPP ATMS data in November 2024 update because S-NPP ATMS data is unavailable after November 19.

– Monthly updates and delivery of CDR Products to NCEI

Produced and delivered the 3 CDR products to NCEI, including

AMSU-A FCDR L1c data product for November 2024
AMSU-A FCDR_Gridded data product for November 2024
NOAA MLT V5.0 data products from November 1978 to November 2024

– Severe weather/climate events observation with long-term fundamental CDR products (see examples next two slides)

Investigated observation of Sudden stratospheric warming (SSW) events with AMSU-A and ATMS daily gridded FCDR data, analyzed the 2019 and 2021 SSW events for case study.

– Microwave Sounding Assessment System for CDR Development (MSASCD)

Revised code for MSASCD to include more satellites, will make it operational.

Milestones	Original Date	Forecast Date	Variance Explanation
Monthly processing and update of microwave sounding CDR products	Sep-25 (Monthly Update)		
Explore impacts of long-term fundamental CDR products in observing severe weather/climate events	Apr-25	Apr-25	
Evaluate bias drifts and inter-sensor biases in SNPP and NOAA-20 ATMS fundamental CDR (FCDR) to produce long-term quality-consistent CDR data set, in coordination with SDR/ICVS teams; perform recalibration, if necessary	Jul-25	Jul-25	
Maintain and sustain the Microwave Sounding Assessment System for CDR Development (MSASCD) website (https://www.star.nesdis.noaa.gov/smcd/emb/mscat/msascd.php)	Sep-25	Sep-25	

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

Monitoring Sudden stratospheric warming (SSW) with AMSU-A and ATMS FCDR Data

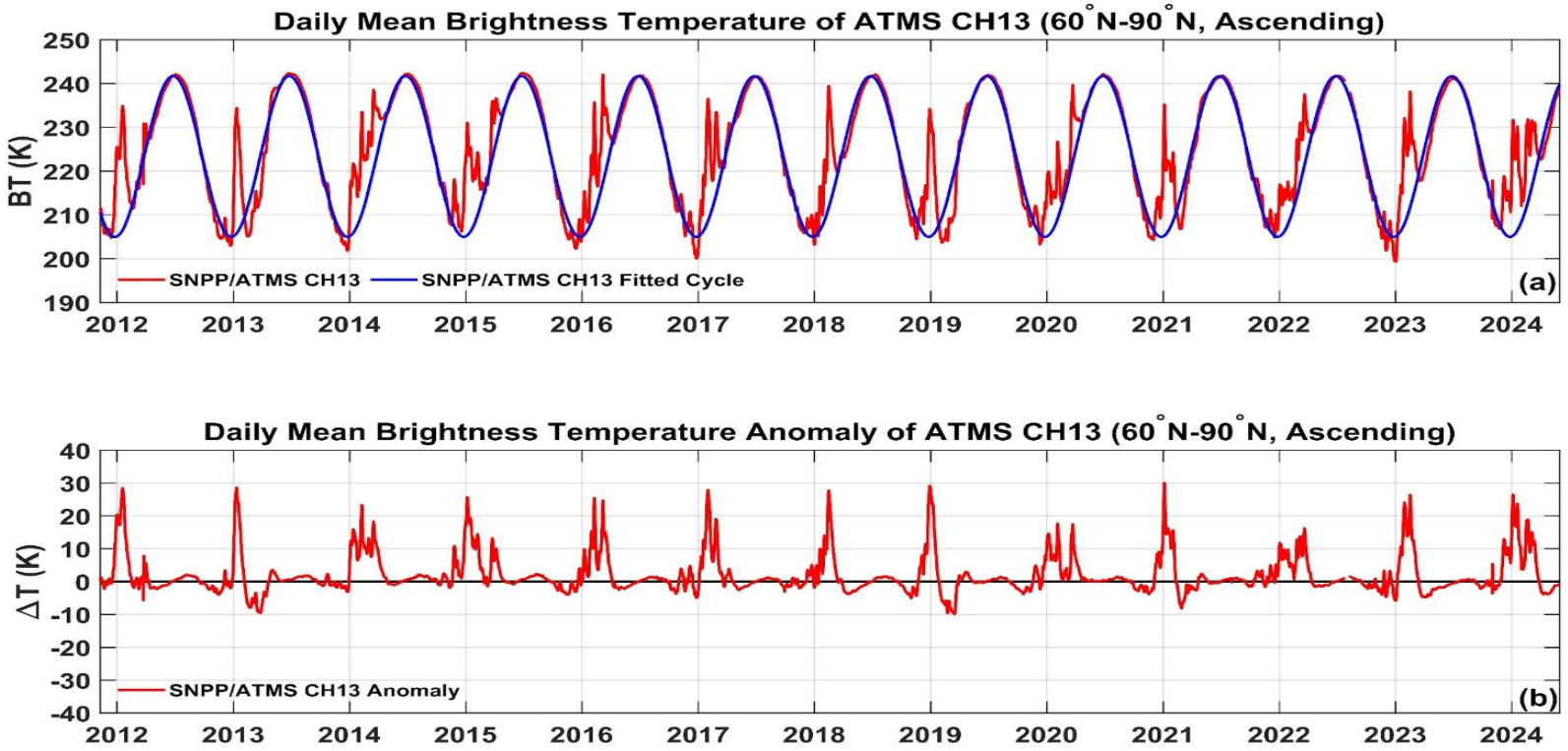


Figure 1. (a) Time series of the daily mean brightness temperature of the region from the north 60 degrees to the west 90 degrees. The red line represents the ATMS The daily mean brightness temperature of S-NPP ATMS channel 13, the blue line indicates the fitted temperature seasonal change cycle based on long term measurements. (b) Time series of the daily mean brightness temperature anomaly representing the difference between the observed temperature and the fitted seasonal cycle. The peak locations correspond to the major and minor SSW events.

Monitoring Sudden stratospheric warming (SSW) with AMSU-A and ATMS FCDR Data Continued (A Movie)

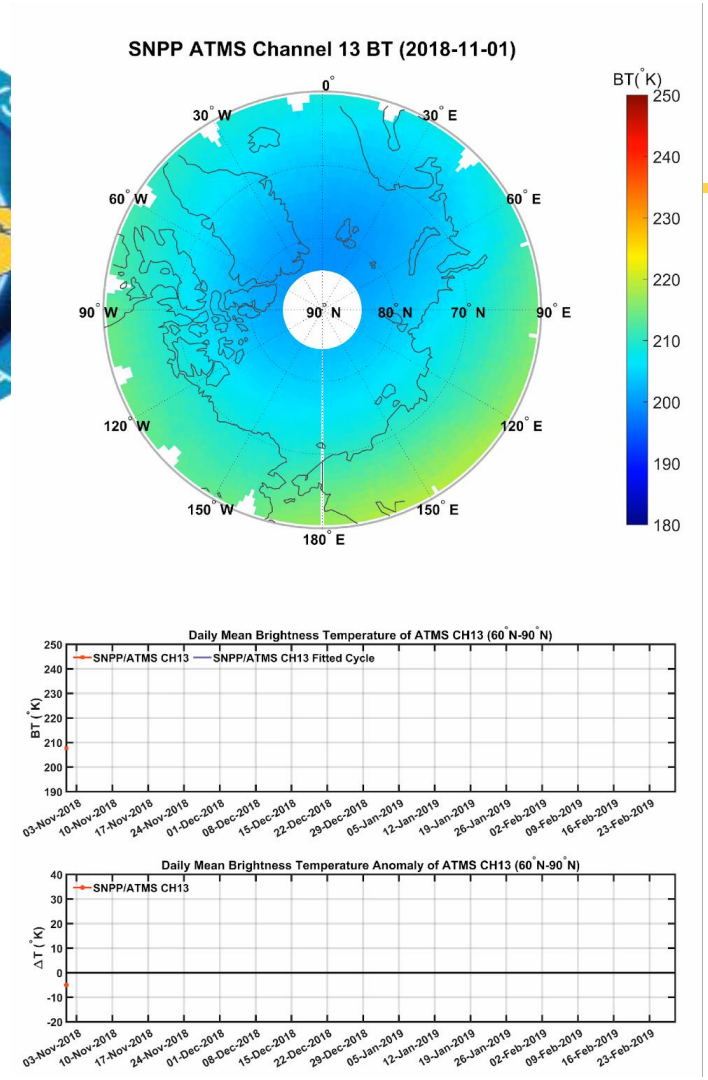


Figure 2 shows an evolution from onset, peak, to decay phases of the 2018-2019 SSW event. During the onset phase, the ATMS CH13 brightness temperature started to exceed the normal seasonal cycle, then increased quickly in the following days to reach the peak phase around December 30, most areas in the polar region reached high temperature at the 10hPa level, then temperature started to decrease, and finally returned to normal condition. For the full life cycle of this SSW event, please watch the video on Google Drive:

FY25 Microwave Sounding Temperature CDR Milestones/Deliverables

	Milestone	Start	Finish	Deliverable
1	Monthly processing and update of microwave sounding CDR products	Oct-24	Sep-25	Deliver monthly microwave sounding CDR Products to NCEI
2	Explore impacts of long-term fundamental CDR products in observing severe weather/climate events	Dec-24	Apr-25	Demonstrate values and impact of long-term (F)CDR data sets in observing severe weather/climate events such as Sudden Stratospheric Warming events
3	Evaluate bias drifts and inter-sensor biases in SNPP and NOAA-20 ATMS fundamental CDR (FCDR) to produce long-term quality-consistent CDR data set, in coordination with SDR/ICVS teams; perform recalibration if necessary	Feb-25	Jul-25	Analysis report (ppt) and/or correction algorithm; long-term quality-consistent CDR data sets
4	Maintain and sustain the Microwave Sounding Assessment System for CDR Development (MSASCD) website (https://www.star.nesdis.noaa.gov/smcd/emb/mscat/msascd.php)	Oct-24	Sep-25	A timely updated MSASCD CDR website

D	I	C	M	L
Development	Integration &Testing	Calibration & Validation	Maintenance	LTM & Anomaly Resolution

NOAA Products Validation System (NPROVS) and JSTAR Mapper/STEMS

December 2024

Accomplishments / Events:

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- In late December the Kīlauea volcanoe in Hawaii began significant outgassing, the resulting plume could be tracked on JSTAR Mapper (**HIGHLIGHT)**
- NPROVS staff (Reale, Sun) provided follow-up planning in support of the November Workshop on EUMETSAT Polar System Second Generation ((EPS-SG) and NOAA collaboration to provide observations for Climate Monitoring and Numerical Weather Prediction; a follow-up meeting with EUMETSAT staff focused on direct NPROVS support including from JPSS dedicated radiosonde programs is scheduled on January 14
- The field distribution of JPSS funded FY24 radiosondes at four (4) DOE ARM sites in support of the JPSS / DOE Dedicated (satellite synchronized) Radiosonde Program is complete with over 320 additional radiosondes distributed among 4 ARMS sites spanning Alaska to the Azores

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Restore high-resolution conventional radiosonde observations in NPROVS	**Q2**	**Q2**		
JSTAR mapper evolution to STEMS	**Q4**	**Q4**		
Dedicated Radiosonde Programs: 1) DOE/ARM and new BNF site in Alabama, 2) AEROSE 2025 campaign support	**Q3**	**Q3**		
NUCAPS 1) routine monitoring and 2) severe weather case studies	**Q4**	**Q4**		

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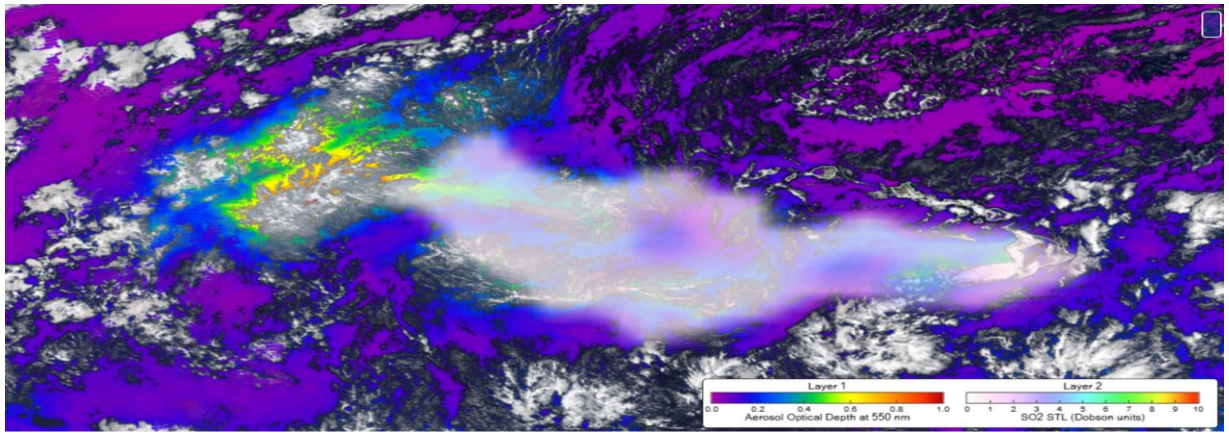
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks: None

Highlights



In late December Kīlauea Volcanoe in Hawaii began significant outgassing. The resulting plume could be tracked on JSTAR Mapper. The above image shows the VIIRS True Color background, along with the VIIRS Aerosol Optical Depth product (rainbow color scale) and the OMPS Sulfur Dioxide product (light purple color scale) for 25 Dec 2024.

NUCAPS Products

- Completed user assessment studies in support to the NOAA-21 CrIS SDR calibration artifact (ADR-10909). Prepared and presented to the DRAFT review board on the NUCAPS downstream product impacts of the CrIS calibration artifact during eclipse exit.
- Evaluated NUCAPS ozone retrievals over Antarctica region and compared total ozone time series for NOAA-20 and NOAA-21 retrievals with O3SNDS and SBUV measurements over the South Pole for the period Sept. to Nov. 2024.
- Presented a discussion about the NUCAPS OLR and the AEROSE-2025 campaign plans in the Sounding Initiative telecon on Dec 18.
- Evaluated NOAA-20/21 AWS NUCAPS retrieval products with the offline focus day datasets as a sanity check in moving forward for S-NPP mission long reprocessing plans.
- Continued the NUCAPS carbon trace gases validations based on the newest TCCON datasets for both NOAA-20/NOAA-21.
- Continued AVTP/AVMP VALAR RAOBs at different GRUAN sites of ENA, NSA, SGP and LIN. Incorporated collection of additional matches for a new station (BNF) and updated the code to process BNF RAOBs.
- Progressed MetOp-B cloudy and clear regression updates removing AMSU-A channels. Results of evaluation show favorable results. Additional investigation is in progress on the observed low yields.

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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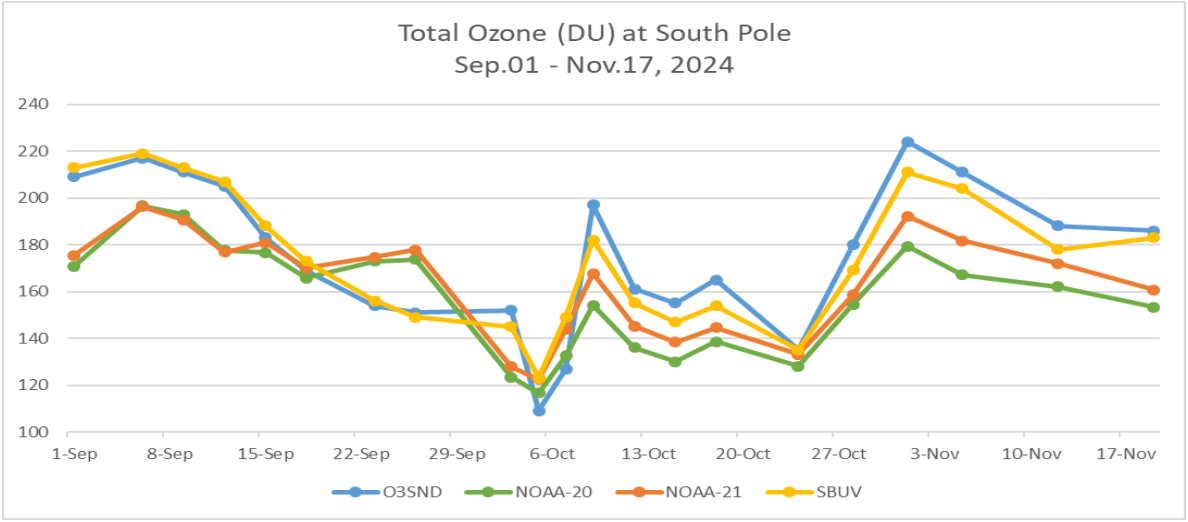
Issues/Risks:

None

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 K-band transmitter swap
NOAA-21 NUCAPS Product Beta Maturity	May-23	May-23	6/1/23	Beta attained effective 3/23
NOAA-21 NUCAPS T(p), q(p), O3(p), OLR, CO, CH4 and CO2 Provisional Maturity	Nov-23	Dec-23	Jan-24	Attained Validated Maturty
Implementing Validation Archive (VALAR) and focus-day data collections for NOAA-21 NUCAPS product validations	May-23	May-23	Mar-24	Continued updates to the data set
NUCAPS Augmentation EPS-SG IASI/NG	Jan-25	Jan-25	On-going Jan/Feb 25	Hopeful to test preprocessor updates and MWS retrieval.
Mission-long reprocessing of NOAA-21 NUCAPS products: Reprocessing version and evaluation of reprocessed products	Jun-24	Jul-24	Delayed but on-going	Pilot-Study in Near Completion

Total column ozone from NUCAPS NOAA-20 and NOAA-21 retrievals and evaluation with O3SND and SBUV measurements over South Pole station during September 1 to November 17, 2024.



FY25 Milestones/Deliverables
Path Forward ~ High priority tasks/milestones

	Milestones	Type	Original Date	Forecast Date	Variance Explanation
Task 1	Routine and reactive maintenance support for the NUCAPS JPSS (NOAA-20/21) and MetOp (C/B) series enterprise version (HEAP4.0)*	R&D, I&T, CV	Sep-25		
	Subtask 1.1 Generation of MetOp-B cloudy and clear regression updates removing faulty AMSU-A channels		Oct-24	Dec-24	Regression updates appears to work alright. However, requires additional patches for AMSU Brightness temperature adjustments.
Task 2	Intensive validation activities using a collection of a hierarchy of validation data sets, processing and intensive validation activities are planned for all of the NUCAPS products (AVTP, AVMP, O3, CO, CO2, CH4, and OLR). Validation of algorithm updates and improvements	R&D, I&T, CV	Sep-25		**Ongoing and on-time**
	Subtask 2.1 Continued generation of matched data sets, NUCAPS product generation and validation with collocated data sets to evaluate product performance over different seasons and regions.	R&D, I&T, CV	Mar-25		
	Subtask 2.2 Algorithm improvements and operational feasibility/implementation of new products	R&D, I&T, CV	Jun-25		
	Subtask 2.3 Coordination and collaboration with NOAA – GML (Theme 1 & 2) validation activities; Support for Greenhouse Gases (GHG) initiatives; Environmental events	R&D, I&T, CV	Jun-25		
	Subtask 2.4: Validation of NUCAPS products with Single Field-of-view Sounding Atmospheric Product (SIFSAP, LaRC) and matched RAOB measurements	R&D, I&T, CV	Sep-25		
Task 3	Mission-long reprocessing of NUCAPS EDR products	R&D, I&T, CV	Mar-25		Ongoing
	Subtask 3.1 Pilot study on NCIS reprocessing of NUCAPS EDRs		Oct-24	Dec-24	Verified NOAA-20/21 AWS runs with offline runs and found them good. Working on S-NPP focus day evaluations.
	Subtask 3.2 Mission-long S-NPP NUCAPS product reprocessing using reprocessed SDRs and with NUCAPS HEAP 4.0 followed by NOAA-20.	R&D, I&T, CV	Mar-25		Delays due to AWS team funding, and due to contract discontinuity for a month that has ripple effects
	Subtask 3.3 Mini-validation review of reprocessed NUCAPS products	R&D, I&T, CV	Apr-25		

Ocean Color

Accomplishments / Events:

- A Scientific Paper Published in Frontiers in Marine Science: Michael Ondrusek, Lide Jiang, and Menghua Wang from the OC team are co-authors of a recent paper published in *Frontiers in Marine Science*, Gilerson et al., "Development of VIIRS-OLCI chlorophyll-a product for the coastal estuaries," *Front. Mar. Sci.*, **11**, 1476425, 2024. https://doi.org/10.3389/fmars.2024.1476425
- Worked on system vicarious calibrations for three VIIRS sensors.
- Continue working on the mission-long VIIRS ocean color data reprocessing using the MSL12 ocean color data processing system.
- Routinely producing VIIRS (SNPP, NOAA-20, and NOAA-21) true color/false color images in OCView.
- Producing global VIIRS (SNPP, NOAA-20, and NOAA-21) ocean color products and showing in OCView routinely : https://www.star.nesdis.noaa.gov/socd/mecb/color/index.php

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation

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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Issues/Risks: None

Ocean Color FY25 Milestones/Deliverables

Task/Milestone	Planned Completion Date	Fiscal Quarter	Comments
NOAA-21 OC data processing			
NOAA-21 OC EDR Cal/Val evaluations using refreshed/new MOBY data	Sep-25	Q4 FY25	
VIIRS calibration/validation			
Continue VIIRS Cal/Val data analysis (SNPP, NOAA-20, and NOAA-21) (using new MOBY data)	Sep-25	Q4 FY25	
Cal/Val team complete the 10th VIIRS ocean color dedicated cruise	Aug-25	Q4 FY25	
In situ data collections from OC Cal/Val team including NOAA dedicated cruise and other opportunities, particularly for NOAA-21 OC validation	Aug-25	Q4 FY25	
VIIRS algorithm refinement (Maintenance DAP)			
Improvement of the OCView tool for routine global VIIRS true color & OC products monitoring	Aug-25	Q4 FY25	
Continue working on improvement of the ocean color data processing system (MSL12), particularly over global coastal and inland water regions	Sep-25	Q4 FY25	
VIIRS OC data processing/reprocessing			
Mission-long OC data reprocessing for VIIRS-SNPP	Sep-25	Q4 FY25	
Mission-long OC data reprocessing for VIIRS-NOAA-20	Sep-25	Q4 FY25	
Mission-long OC data reprocessing for VIIRS-NOAA-21 (depending on evaluation results from refreshed MOBY data)	Sep-25	Q4 FY25	
Producing consistent VIIRS SNPP, NOAA-20, and NOAA-21 OC products from reprocessed OC data	Sep-25	Q4 FY25	
Updated DAP (MSL12) to CoastWatch, if needed	Sep-25	Q4 FY25	

OMPS SDR

December 2024

Accomplishments / Events:

- Derived and delivered OMPS weekly dark LUTs for 3 NPs and NMs.
- Derived and delivered OMPS solar bi-weekly LUTs for 3 NPs.
- Assessed the impact of solar activity adjustment (ADR10832) on 32-Day Normalized Radiance inter-sensor reflectance differences, showing improvements (see Fig. 1).
- Continued working on the J3 OMPS NM and NP sensor pre-launch characterization analysis report outline by adding contents, including comparisons of OMPS NM and NP SDR wavelength values from JPSS-04 against values from NOAA-20 and NOAA-21.
- Expended JPSS-04 OMPS bandpass values to include full-width half-maximum (FWHM) to compare with the other OMPS sensors (see Fig. 2 next slide).
- Continued the ADR 10832 for OMPS NP sensor degradation analysis, including further examining issues in the NOAA-20 NP solar RawFlux data.
- Converted the dark processing code in MATLAB to a Python-updated OMPS dark calibration delivery package (some issues in the Matlab code were fixed).
- Supported the MW sounding CDR project by providing the SNPP OMPS NP solar data to examine potential correlations with recent Sudden Stratospheric Warming (SSW) events.

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		

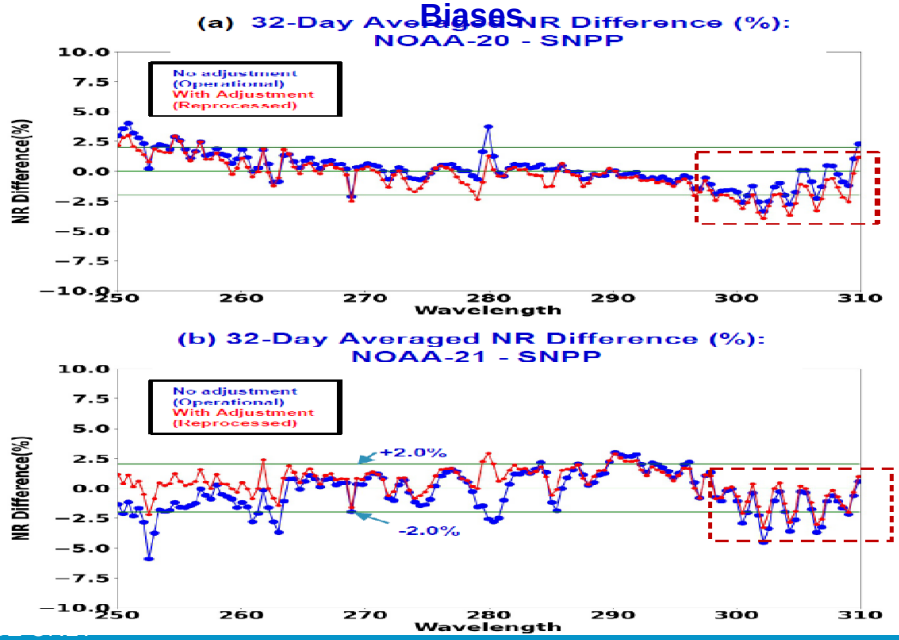
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

One team member (Junye Chen) left team, causing some delay of the tasks; a new contractor needs to be hired to fill in this gap.

Milestones	Original Date	Actual Completion Date	Variance Explanation
Complete the JPSS-4 OMPS SDR calibration plan	Oct-24	Oct-24	
Complete the solar activity adjustment analysis for SNPP, NOAA-20 and NOAA-21 OMPS NP (part of DR10832)	Dec-24	Dec-24	
Complete beta version of JPSS-04 OMPS nadir sensor pre-launch characterization analysis report	Jan-25		
Complete the degradation analysis for SNPP, NOAA-20 OMPS NP (part of DR10832) and NM (a new DR is needed)	Mar-25		
Develop various proxy calibration coefficient LUTs to support JPSS-3/4 OMPS NM SDR processing with a new wavelength range from 380 to 439nm	May-25		
Continuous radiometric data quality stability validation analysis across SNPP/NOAA-20/NOAA-21 OMPS NM and NP instruments: SL correction model standardization/accuracy improvements; wavelength shift gradient impact mitigation	Jul-25		
Establish an off-line OMPS SDR processing package in order to meet new requirements from EDR in retrieving NO2 in future JPSS-03 and JPSS-04 missions (NM wavelength range: from 300-380 nm to 300-430nm)	Aug-25		
Complete beta version of JPSS-03 OMPS nadir sensor pre-launch characterization analysis report	Sep-25		
Continuous radiometric data calibration algorithm accuracy and consistency improvements across SNPP/NOAA-20/NOAA-21 OMPS NM and NP instruments: NM and NP inconsistency in the dichroic, SDR inconsistency across 3 OMPS sensors	Sep-25		
Support CRTM-VLIDORT project for OMPS radiance simulations	Sep-25		
Derive and deliver OMPS NM/NP dark and solar calibration tables for SNPP, NOAA-20, and NOAA-21 OMPS SDR data, including recovery activities	Sep-25		

Fig. 1 Implementing solar activity adjustment to the OMPS NP SDR data: Improving OMPS NP Inter-Sensor Reflectance Biases



Comparisons of OMPS NP Bandpass Full-Width Half-Maximum (FWHM) across Four OMPS Sensors

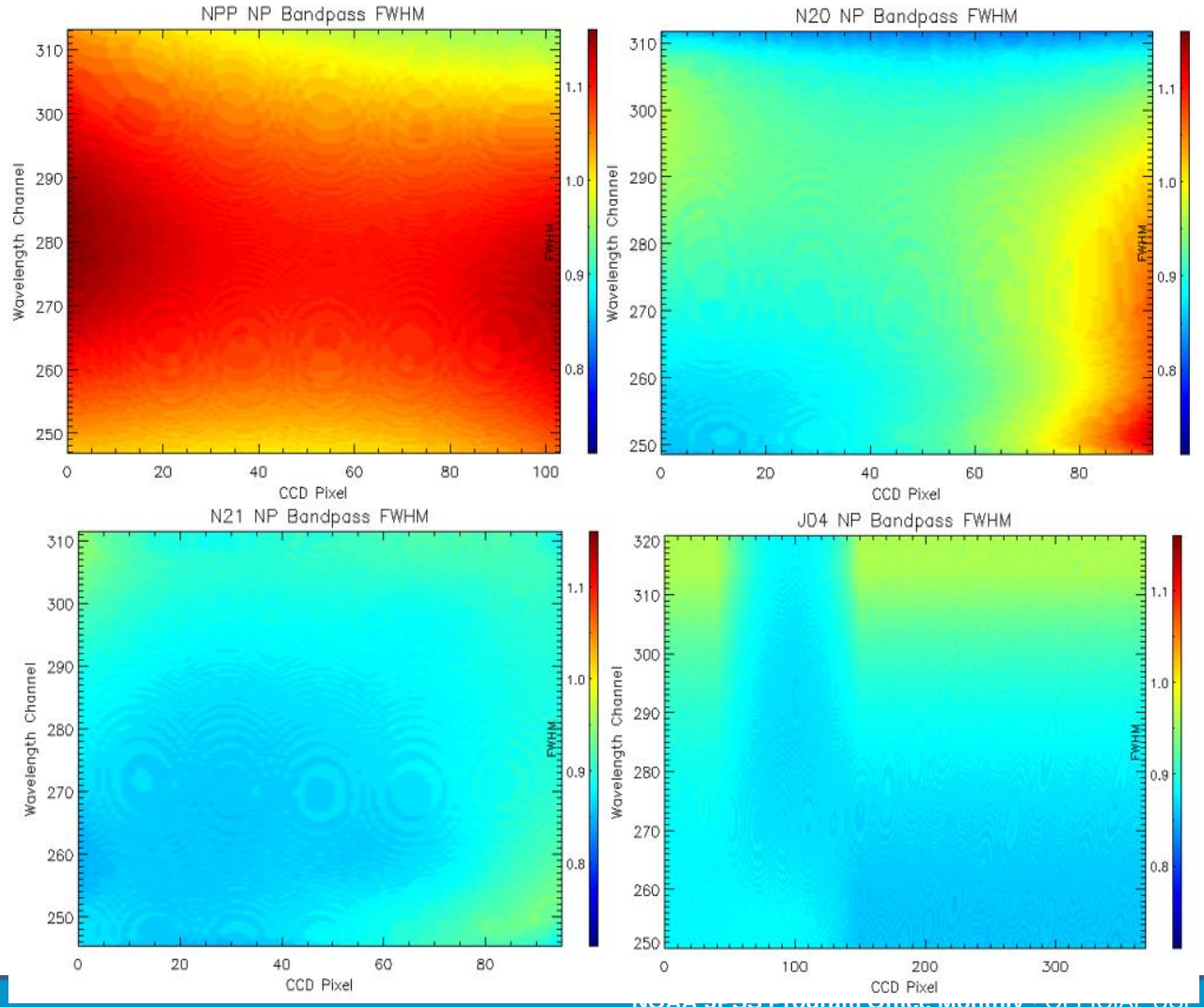


Figure 2: OMPS NP bandpass FWHM values for NPP (top left), NOAA-20 (top right), NOAA-21 (bottom left), and JPSS-04 (bottom right). The values for NPP, NOAA-20, and NOAA-21 are all shown for the active region, while the JPSS-04 values are shown for the full width of the CCD plane with the wavelength scale cut to 250-320nm, as the active region is not currently known. The color scale is consistent across each of the images. Though the JPSS-04 active region is not known, it can be seen that the FWHM values are generally similar in extent to those from NOAA-21, while being slightly narrower than NOAA-20, and significantly narrower than NPP.

FY25 OMPS SDR Milestones/Deliverables

	Milestone	Start	Finish	Deliverable
1	Complete the JPSS-4 OMPS SDR calibration plan	Sep-24	Oct-24	JPSS-4 OMPS SDR calibration plan
2	Complete the solar activity adjustment analysis for SNPP, NOAA-20 and NOAA-21 OMPS NP (part of DR10832)	Jun-24	Dec-24	Software; new OSL tables; reprocessed OMPS NP SDR test data sets;
3	Complete beta version of JPSS-04 OMPS nadir sensor pre-launch characterization analysis report	Sep-24	Jan-25	JPSS-04 OMPS nadir sensor pre-launch characterization analysis report
4	Complete the degradation analysis for SNPP, NOAA-20 OMPS NP (part of DR10832) and NM (a new DR is needed)	Dec-24	Mar-25	New solar wavelength and flux tables; reprocessed test data sets for OMPS EDR team
5	Develop various proxy calibration coefficient LUTs to support JPSS-3/4 OMPS NM SDR processing with a new wavelength range from 380 to 439nm	Jan-25	May-25	Various proxy calibration coefficient LUTs for JPSS-03/04 OMPS NMs; various proxy calibration coefficient LUTs for SNPP, NOAA-20 NMs (code compliance)
6	Continuous radiometric data quality stability validation analysis across SNPP/NOAA-20/NOAA-21 OMPS NM and NP instruments: SL correction model standardization/accuracy improvements; wavelength shift gradient impact mitigation	Feb-25	Jul-25	Quality-consistent OMPS SDR radiometric data across NM and NP, SNPP/NOAA-20/NOAA-21; better validation/calibration algorithms applicable for existing and future JPSS missions
7	Establish an off-line OMPS SDR processing package in order to meet new requirements from EDR in retrieving NO2 in future JPSS-03 and JPSS-04 missions (NM wavelength range: from 300-380 nm to 300-430nm)	Feb-25	Aug-25	An off-line OMPS SDR processing package applicable for future JPSS-03 and JPSS-04; ADL code change package for operational processing
8	Complete beta version of JPSS-03 OMPS nadir sensor pre-launch characterization analysis report	Jun-25	Sep-25	JPSS-03 OMPS nadir sensor pre-launch characterization analysis report
9	Continuous radiometric data calibration algorithm accuracy and consistency improvements across SNPP/NOAA-20/NOAA-21 OMPS NM and NP instruments: NM and NP inconsistency in the dichroic, SDR inconsistency across 3 OMPS sensors	Mar-25	Sep-25	Quality-consistent OMPS SDR radiometric data across NM and NP, SNPP/NOAA-20/NOAA-21; better validation/calibration algorithms applicable for existing and future JPSS missions
10	Support CRTM-VLIDORT project for OMPS radiance simulations	Oct-24	Sep-25	Test results
11	Derive and deliver OMPS NM/NP dark and solar calibration tables for SNPP, NOAA-20, and NOAA-21 OMPS SDR data, including recovery activities	Oct-24	Sep-25	Dark, solar SOL LUTs

D	I	C	M	L
Development	Integration &Testing	Calibration & Validation	Maintenance	LTM & Anomaly Resolution

OMPS Ozone (V8Pro, V2Limb & V8TOz)

December 2024

Major Accomplishments / Events over the past year:

- The OMPS Ozone Team has provided EDR performance analysis and evaluation and review presentations and deliveries of codes and tables to bring the NOAA-21 V8Pro, V8TOz, V8TOS and V2Limb EDRs to validated Maturity. This included transitioning new versions of both the Level 1 (SDR) and Level 2 (EDR) Limb Profile codes from NASA to STAR to NCCF.
- We have provide updates to the soft calibration for the NPP and N20 V8Pro in response to improvements to the OMPS NP SDR dark corrections, and are working on further changes as the SDR Team moves to include solar activity and instrument degradation in their bi-weekly table deliveries. The first of these deliveries will require coordination of IDPS and NCCF table updates.
- We supported the rapid return to operations following multiple spacecraft shut downs. The on-going EDR monitoring and validation activities have allowed us to provide validation of the products following restarts and confidence in recommending their return to normal operations.
- The Team provides weekly updates to three tables for the new V2.7Limb codes for both NPP and N21. Team members also generate overpass updates and comparative and statistical monitoring plots.
- The Team provided multiple updates to the operational NTOAST and LTOAST codes for transition to NCCF version. We are working on a further update for LTOAST to use the new V2.7Limb EDRs input. The ARR/ORR is in preparation.
- The Team reprocessed the NPP V8Pro EDR for 2023. We are preparing for a full reprocessing of the NPP and N20 records once the SDR Team generates records for the full mission data using the new dark correction tables.
- We have submitted a draft J-04 Cal/Val Plan including the Limb products and trace gases besides Ozone.
- We provided updates to the Metop-B and -C GOME-2 soft calibration tables and assisted with the transfer of the EV8TOz to NCCF and provided validation results.
- We have provide V8TOS SO2 maps for significant eruptions and are working with OSPO to improve the N21 product use in the alert system given its smaller noisier FOVs.

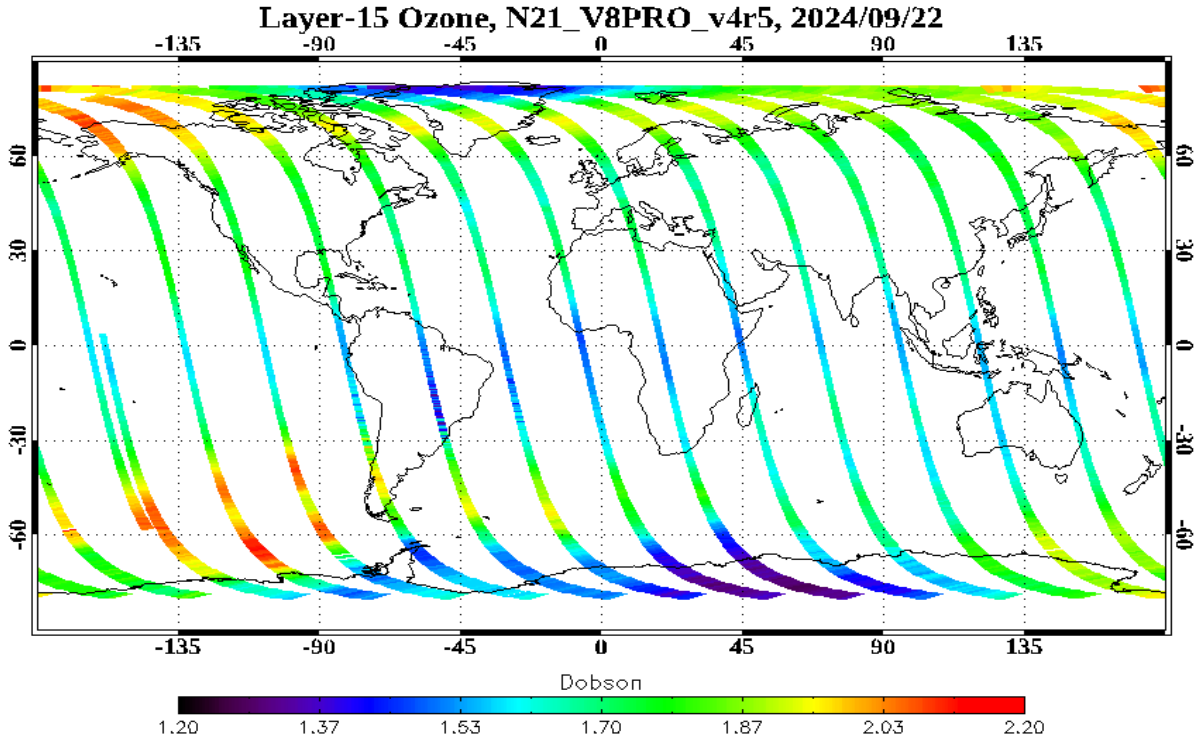
Milestones on the next slide.

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		ProTech Follow-on, SDR instability, Limb Development

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: IMSG ProTech Contract follow-on Is still not in place.



False Color Layer 15 (~1 hPa) Ozone. Orbital Tracks: N21 is on the Right, N20 is on the Left, NPP is in the Middle

Milestones	Original Date	Forecast Date	Actual Completion Date	Notes
Task 1: ***Construct, improve and deliver tables and codes, and perform validation studies. Provide presentation of results to achieve and demonstrate Ozone EDR Maturity.***			V8TOz/V8TOS 9/19/24 V2Limb SDR/EDR 9/19/24 V8Pro 11/19/24	Dates of Fully Validated N21 Product Briefings
Task 2: ***Monitor and validate products by using ground-based assets and time series analysis and comparisons,***			Ongoing support of STAR and OAR websites & analysis. Used in reviews.	
Task 3: ***Maintain, monitor, trouble-shoot all NOAA Nadir Ozone and SO_2 products.***			Multiple consultations with OSPO, ASSISTT and NCCF leading to patches. Responded to spacecraft problems, dates □	N20 2/3/24 N21 6/22/24 NPP 7/9/24 NPP 9/24/24 NPP 11/2/24
Task N: ***Update Limb validation, codes, monitoring and tables as needed.***			Multiple deliveries for NPP & N21 for SDR and EDR.	
Subtask 4.1: ***Provide delta-DAPs as NASA improves Level 1 corrections or makes other tables, corrections or code modifications.***			Multiple deliveries as NASA N21 processing progressed. More to come.	
Subtask 4.2: ***Provide weekly tables deliveries for Darks, Wavelengths and Orbital Definition files***			Provided. Will continue.	
Subtask 4.3: ***Complete NOAA-21 V2Limb validation and move to operations – Support ORR***	*December 2024*		STAR Deliveries are completed as of 12/24.	
Subtask 4.4: ***Support J3/J4 progress and prepare Limb Cal/Val Plans.***			New draft provided 9/25/24.	

Sea Surface Temperature

December 2024

Accomplishments / Events:

- We worked towards updating the ACSPO ATBD to be consistent with the latest version of ACSPO (V3.00). In December we finished all sections, except for the section on thermal fronts, which is still work in progress and planned for completion in time for January 2025 ASSISTT delivery. In addition to the new section on thermal fronts (see figure), the main updates to the ATBD are revised SST retrieval algorithm and clear-sky mask algorithm and validation sections.
- We worked on preparation and testing of the ACSPO V3.00 Delivered Algorithm Package (DAP). This package contains all ACSPO code and 3rd party libraries needed to produce ACSPO V3.00 VIIRS, ABI, AHI, and L3S products. The package also contains scripts to run the code and example input/output data for validation.
- Worked on migration of iQuam IDL code to python. This is necessary because when we attempted to reprocess historical iQuam data we ran into issues with running out of IDL licenses.

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			

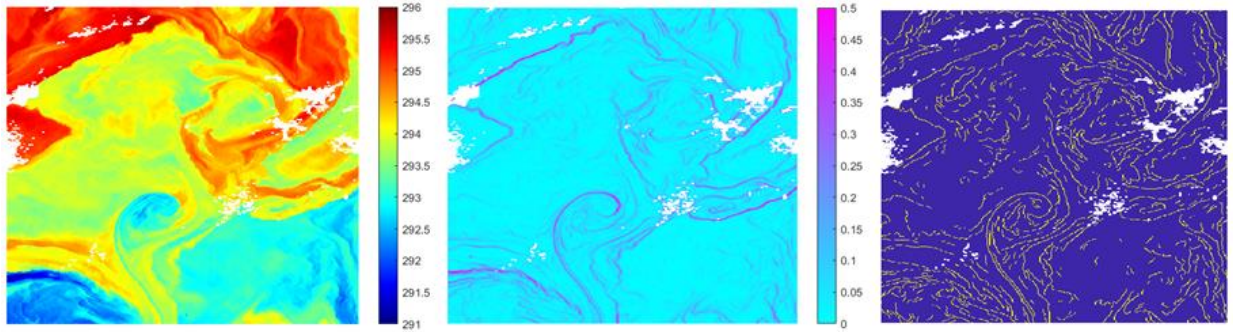
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

Due to degraded Stability of STAR IT infrastructure in the last 6 months, our ACSPO code delivery to ASSISTT is a month behind schedule. The situation is exacerbated by our inability to buy new hardware and uncertain future of cloud migration for STAR science teams.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Promote experimental iQuam updates to live access	Aug-24	Dec-24	Dec-24	
Deliver ACSPO VIIRS V3.00 package to ASSISTT	Jan-25			
Migrate legacy IDL iQuam codebase to python	Jun-25			
Reprocess historical iQuam SST data using iQuam v2.3	Sep-25			
Update CRTM library from v2.3 to 3.0 (needed for inclusion of aerosols in radiance simulations).	Mar-25			
Investigate how inclusion of aerosol information in simulated radiances can be used to improve ACSPO SST and clear-sky mask algorithms.	Aug-25			
Reprocess VIIRS SST using ACSPO V3.00	Dec-25			

***Highlights*: Thermal fronts documentation in ACSPO ATBD**



The figure shows selected images from the ACSPO V3.00 ATBD section describing the ACSPO thermal fronts algorithm. All panels show NPP VIIRS L2P imagery on November 15, 2024 at 17:10Z. The left panel show SST imagery (in kelvin), the center panel shows the corresponding SST gradient magnitude (in kelvin/km), and the right panel shows the ACSPO thermal front locations. The presence of thermal fronts is determined using a Canny edge detector algorithm, described in detail in the latest ACSPO ATBD (document version 2.0).

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 1: Deliver L3S-LEO Daily to ASSISTT/OSPO; contingency on non-JPSS and non-NOAA data inputs	*June 2025 (FY25)*			
Subtask 1.1: Created and test Delivered Algorithm Package (DAP), containing L3S Daily code along with required libraries, ancillary data, and sample files	*May 2025 (FY25)*			
Subtask 1.2: Deliver L3S Daily DAP to ASSISTT and work with ASSISTT on troubleshooting and validation	*June 2025 (FY25)*			
Task 2: Full-mission Reanalysis (RAN) of VIIRS SST data from NPP, N20 & N21 using the latest version of ACSPO (Version 3.00)	*September 2025 (FY25)*			
Subtask 2.1: Recruit and familiarize staff	*October 2024 (FY25)*			
Subtask 2.2: Evaluate long term stability of VIIRS SST and compare with stability of VIIRS thermal bands.	*April 2025 (FY25)*			
Subtask 2.3: Investigate stabilization (de-trending) of long-term SST bias drift to create a maximally stable, long-term VIIRS SST dataset.	*July 2025 (FY25)*			
Subtask 2.4: Perform reprocessing using on-premise NOAA STAR compute hardware	*August 2025 (FY25)*			
Subtask 2.5: Deliver RAN data sets to PODAAC, CoastWatch & NCEI	*September 2025 (FY25)*			
Task 3: Continue improvements, validation of thermal fronts; shore up processing to use fronts to improve the ACSPO clear sky mask	*September 2025 (FY25)*			
Subtask 3.1: Support for using position and strength of thermal fronts to improve ACSPO clear-sky mask will be included in the ACSPO VIIRS 3.00 DAP delivery (see Task 5) to ASSISTT.	December 2024 (FY25)			
Subtask 3.2: Investigate viability of validating accuracy of thermal fronts using in situ SST from Sail Drones.	September 2025 (FY25)			

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 4: Collaborate across NESDIS and NOAA on "next generation SST product suite" , including exploring ACSPO L4	*September 2025*			
Subtask 4.1: Identify best way forward towards creating a STAR L4 SST product that covers the 1981-on era. Two viable approaches are (1) Extend the ACSPO L3S-LEO Daily product to fill in data gaps due to clouds. (2) Use existing Geo-Polar Blended L4 SST algorithm using reprocessed ACSPO SSTs from AVHRR, MODIS, VIIRS, ABI, and AHI sensors.	September 2025			
Subtask 4.2: Perform full-mission reprocessing of all ACSPO SST datasets to improve SST quality and uniformity	September 2025			
Task 5: Continue refining ACSPO Clear Sky Mask to reduce over screening and residual cloud leakages. The overarching goal is improving both quantity (number of clear sky pixels) and quality (accuracy/precision).	*Ongoing; target next update for delivery of ACSPO 3.00 (FY25)*			
Subtask 5.1: Create and test Delivered Algorithm Package (DAP) for ACSPO V3.00 VIIRS. ACSPO version 3.00 contains substantial improvements to the VIIRS clear-sky mask in terms of reduced cloud leakages and improved coverage in dynamic regions.	*November 2024 (FY25)*			
Subtask 5.2: Deliver DAP to ASSISTT and work with ASSISTT on troubleshooting and validation	December 2024 *(FY25)*			

Snowfall Rate

December 2024

Accomplishments / Events:

- The SFR v3r0 was delivered to ASSISTT on Dec 20. The package includes coverage extension to over ocean (open ocean, sea ice, and coast) for all six satellites, preliminary algorithms for MetOp-SG MWS and GOSAT-GW AMSR3, and inter-calibrated algorithms that improve consistency across satellites.
- The development of the precipitation validation system, NPreciSe, web-portal and archive on AWS is completed and fully operational. Data accessible in near real time at: https://precip-val.umd.edu/swath/GPROF-query
- Two oral presentations, two posters, and one NOAA Booth talk were given at AGU

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
SFR delivery including ocean coverage	12/2024	12/2024	12/2024	
Development of NPreciSe web-portal and archive	12/2024	12/2024	12/2024	
Cross calibration for NOAA-21, NOAA-20, S-NPP, Metop-B, Metop-C, and GPM	4/2025	4/2025		
Extending the study to include climatology in NPreciSe	6/2025	6/2025		
Advanced microphysics for NOAA-21, NOAA-20, S-NPP, Metop-B, Metop-C, and GPM	6/2025	6/2025		
2D SFR bias correction for NOAA-21, NOAA-20, S-NPP, Metop-B and Metop-C	6/2025	6/2025		

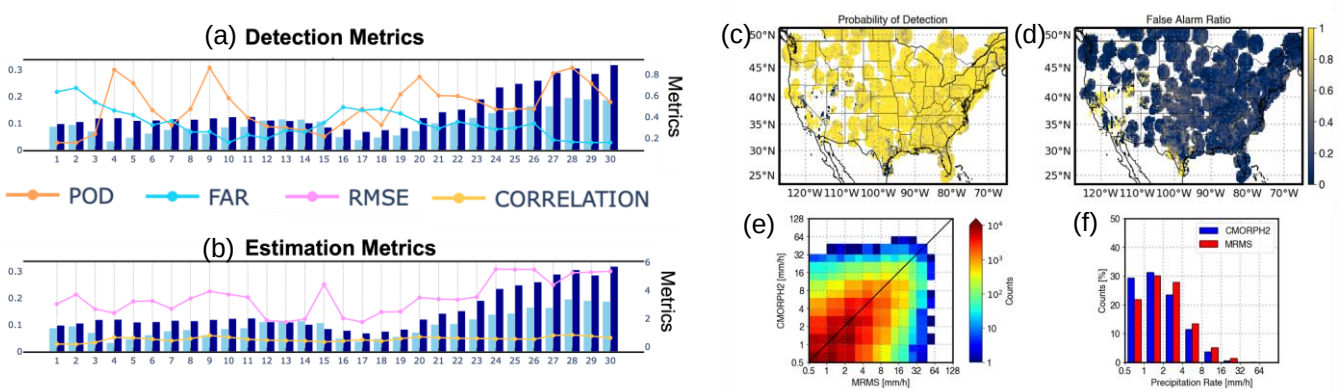
Overall Status:

	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:



NPreciSe: Monthly validation of CMORPH2 (using both MIRS rain rate and SFR) for June 2022. Daily variations of (a) Detection and (b) Estimation metrics. Monthly spatial maps of (a) Probability of Detection and (b) False Alarm Ratio. (c) Density-based scatter plot and (d) Probability Distribution Function

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 1: Advanced microphysics for NOAA-21, NOAA-20, S-NPP, Metop-B, Metop-C, and GPM	*June 2025*			
Subtask 1.1: Study scattering properties of various ice habits and their impact on S-NPP snowfall rate retrieval	*December 2024*			
Subtask 1.2: Develop AI/ML-based optimal combination scheme for multiple ice habits to improve S-NPP SFR 2/2025	*February 2025*			
Subtask 1.3: Develop advanced microphysics for the other satellites	*June 2025*			
Task 2: Cross calibration for NOAA-21, NOAA-20, S-NPP, Metop-B, Metop-C, and GPM	*April 2025*			
Subtask 2.1: Select reference satellite	*October 2024*			
Subtask 2.2: Create collocated datasets for all satellites with the reference satellite	*January 2025*			
Subtask 2.3: Perform cross satellite calibration and derive correction model for each satellite	*April 2025*			
Task 3: 2D SFR bias correction for NOAA-21, NOAA-20, S-NPP, Metop-B and Metop-C	*June 2025*			
Subtask 3.1: Feature analysis and construction of training datasets for 2D ML models	*March 2025*			
Subtask 3.2: Train 2D bias correction models	*June 2025*			
Task 4: Development of NPreciSe web-portal and archive	*December 2024*			
Subtask 4.1: Develop and implement new webpage interface to enable hosting the NPreciSe web portal	*September 2024*			
Subtask 4.2: Migrate the processing and archiving system to a new server	*December 2024*			
Task 5: Extending the study to include climatology	*June 2025*			
Subtask 5.1: Add monthly statistics of detection and estimation errors of the MiRS product to the NPreciSe system	*June 2025*			

Surface Reflectance

December 2024

Accomplishments / Events:

- Keep working on the updated DAP for the next delivery. Perform the long-term test for the validation performance compared with current one, monitoring test the derive the reasonable threshold for alarm.
- Prepare the software, documents and test datasets for the upcoming delivery, test the data consistency between new results and operational ones.
- Maintain the routine SR long term monitoring, fixed the issue found due the storage concern, check the validation results and summarized the whole year's validation performance.
- Cooperate with the SDR team to learn the recalibration method and the evaluation results. Also work with NASA SR team for further comparison between two recalibration datasets.

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			

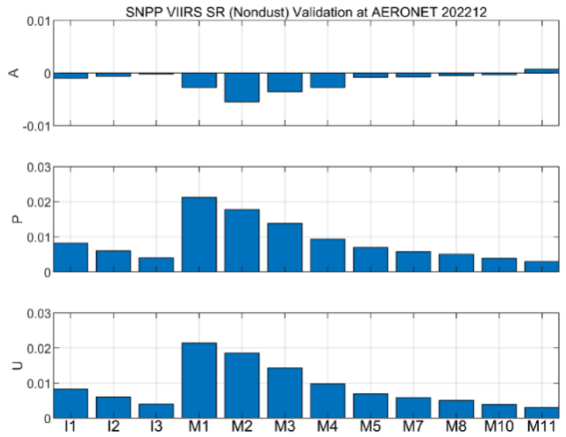
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Operational Readiness Review (ORR) for NDE Migration to NCCF	Aug-24	Aug-24	Nov 13, 2023	Completed ahead of schedule
Develop SR software package using the reprocessed SDR to reduce the inconsistency	Nov-24	Nov-24	Nov 25, 2024	
The reprocessed SR consistency evaluation	Dec-24	Dec-24	Dec 20, 2024	
updated DAP delivery (include the mitigation algorithm)	Mar-25	Mar-25		
SR Algorithm improvement to address the issues found in validation	Jun-25	Jun-25		
SNPP, N20 & N21 monitoring and validation and user feedback & response	Sep-25	Sep-25		

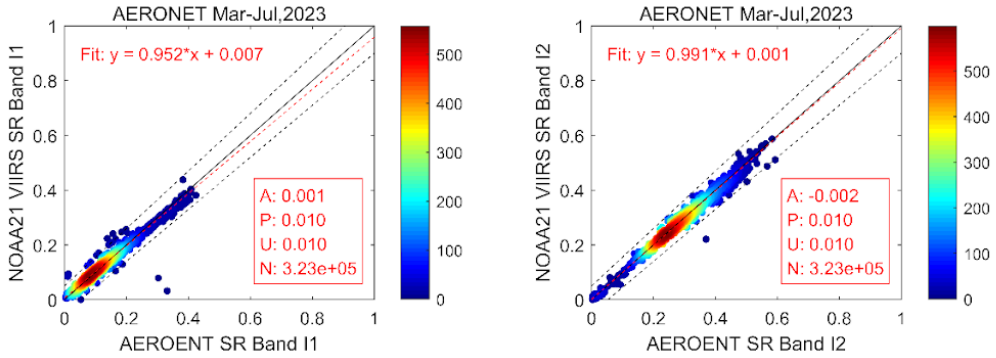
Highlights:

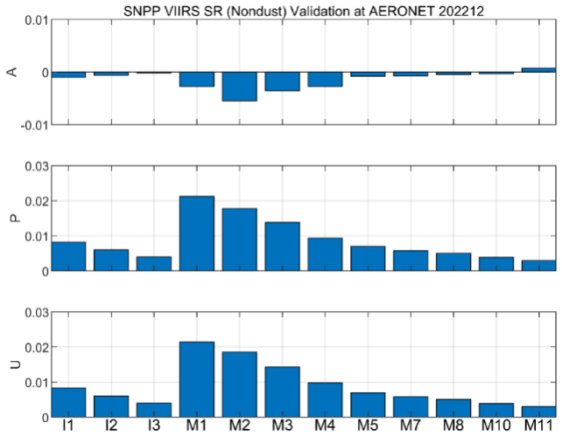


Updated SR algorithm validation test, the new results shows all the 12 bands with consistent and improved bias, particularly for the vegetation bands. The overall precision and uncertainty keep the comparable with current one.

Preparing the updated software package

- Updates of SR software package:
  - Mitigation algorithm to address the misclassified dust aerosol model. Abandon the original dust aerosol model, instead select the best suit model from the rest models.
  - New global attribute/variable for product monitoring. Exclude the low sun pixels and confidently cloudy pixels in the statistic of retrieval quality.
  - Compressed data format to reduce the storage.
  - Reorganize the quality flags to eliminate the redundant flags.





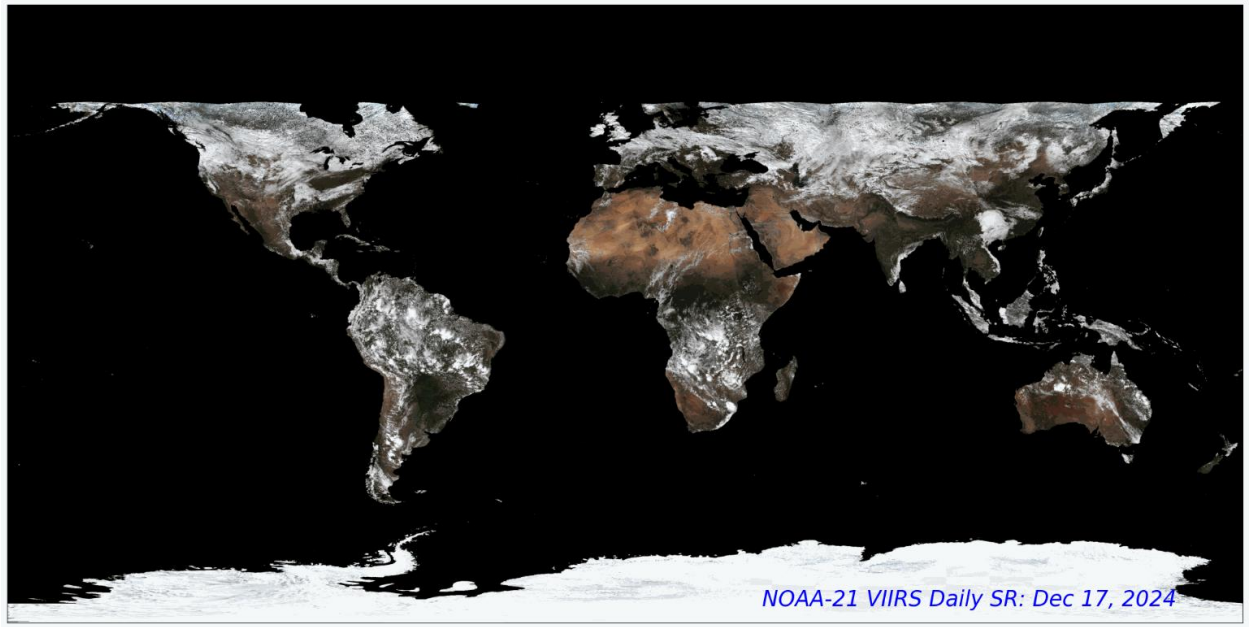
Updated SR validation Statistics

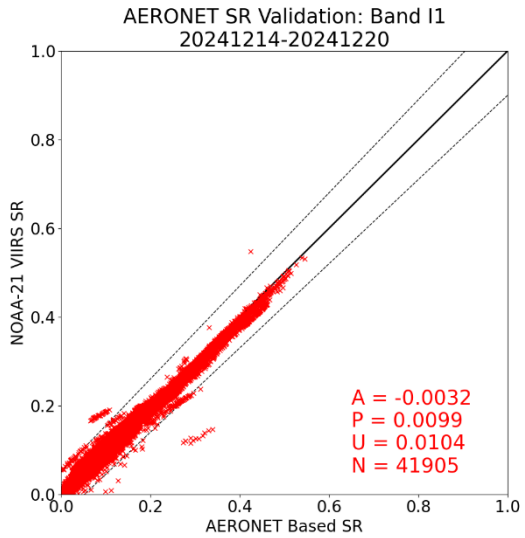
- Attributes and storage
  - The modified attribute (optimal retrieval percentage) could better reflect the product quality, avoid the false alarm in the monitoring.
  - The new output data with 1/3 storage of before.

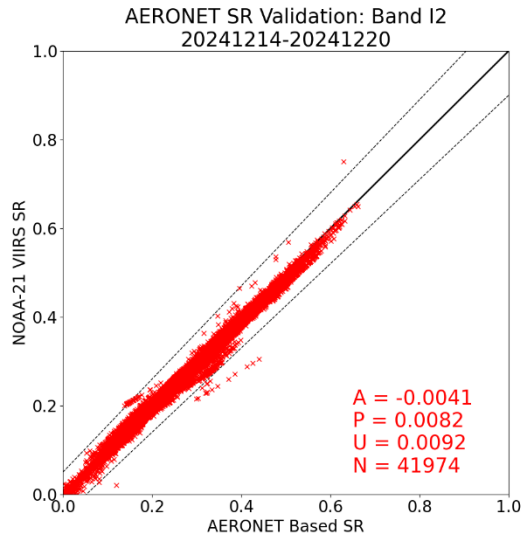
- Delivery package test
  - AERONET data validation for two months data, SNPP, N20 and N21.
  - Monitoring test for four months data, SNPP, N20 and N21.

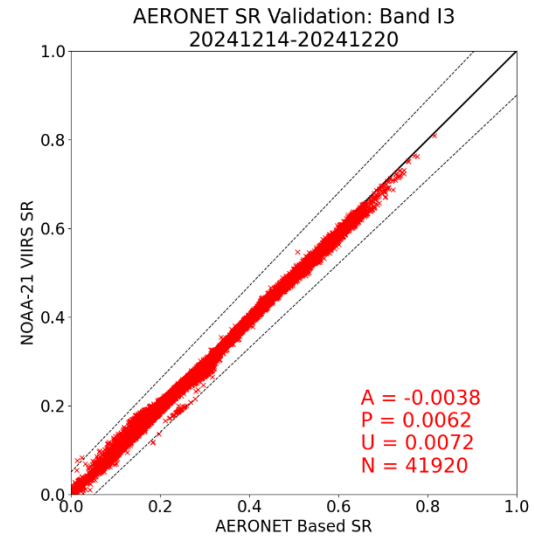
SR Long Term Monitoring Maintenance

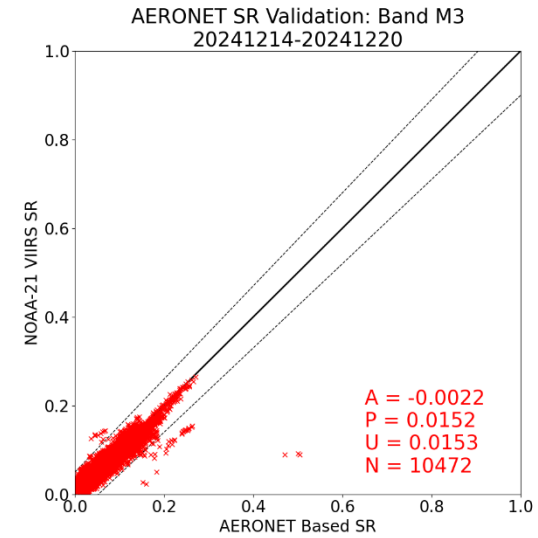
- Daily global true color image
  - Check the local code and storage, dealing with the unexpected interruption.
  - Test the BRDF correction method to improve the global image by reducing the discontinuity between satellite swaths
- Weekly AERONET validation
  - Update the AERONET validation software package, including the aerosol model semi-empirical coefficients update
  - End of year validation summary.











FY25 Milestones/Deliverables

Task/ Description	Start	Finish	Deliverable	Requirement (Dev Only)
Develop SR software package using the reprocessed SDR to reduce the inconsistency.	10/1/2024	12/31/2024	New test datasets	
SR Algorithm improvement to address the issues found in validation.	04/1/2025	06/30/2025	Algorithm test report.	JPSS L1RD requirement
updated DAP delivery (include the mitigation algorithm)	01/01/2025	03/31/2025	mDAP delivery to ASSIST	
The reprocessed SR consistency evaluation	10/1/2024	12/31/2024	Validation report	
SNPP, N20 & N21 monitoring and validation and user feedback & response	7/1/2025	9/30/2025	Analysis reports	

D	I	C	M	L
Development	Integration &Testing	Calibration & Validation	Maintenance	LTM & Anomaly Resolution

SNPP VIIRS EDR Reprocessing

Dec. 2024

- Revised and submitted the manuscript about VIIRS cloud height reprocessed data analysis to the Remote Sensing journal.
- Started to assess the quality of another cloud variable, two years' reprocessed Cloud Optical Depth (COT), against MODIS cloud product and operational VIIRS COT to prepare for long-term VIIRS EDR products' reprocessing.
- Downloaded the MODIS cloud product, MYD06, of August 2018~ July 2019 and started to develop code of collocating MODIS and VIIRS data.
- Started to plan for long-term VIIRS EDR data reprocessing, including server storage, computational capacity, and workflows for on-demand processing.

Table 1. Plan and milestone of SNPP-VIIRS EDR reprocessing project for FY25

Milestones	Original Date	Forecast Date	Variance Explanation
Assess the quality and accuracy of one-year reprocessed cloud base height and cloud top height EDRs	Dec-24	Dec-24	
Making plans for on-demand reprocessing based on GMU supercluster computer, including setting up server environments for testing, computation efficiency comparison for options, cost comparison, etc.	Mar-25		
Assess the quality and accuracy of one-year reprocessed other cloud EDRs (e.g., Cloud layers, cloud phase, cloud optical depth)	Apr-25		
Continue to reprocess SNPP VIIRS EDRs (target: finish ~2.5 years of data), as long as the new on-demand reprocessing is well determined	Sep-25		
Work out a plan for transferring reprocessed VIIRS cloud products to CLASS or a Cloud platform	Sep-25		
Technical analysis and reports per ad hoc request from JPSS and STAR management, including monthly report	Sep-25		

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.*

FY25 VIIRS EDR Reprocessing Milestones/Deliverables

	Milestone	Start	Finish	Deliverable
1	Assess the quality and accuracy of one-year reprocessed cloud base height and cloud top height EDRs	Jun-24	Dec-24	One year of quality-assured SNPP VIIRS cloud base height and cloud top height EDR products; one manuscript draft about the work
2	Making plans for on-demand reprocessing based on GMU supercluster computer, including setting up server environments for testing, computation efficiency comparison for options, cost comparison, etc.	Dec-25	Mar-25	Optical reprocessing plan; well-setting up processing package
3	Assess the quality and accuracy of one-year reprocessed other cloud EDRs (e.g., Cloud layers, cloud phase, cloud optical depth)	Jan-25	Apr-25	One year of quality-assured SNPP VIIRS cloud layers, cloud phase, cloud optical depth EDR products
4	Continue to reprocess SNPP VIIRS EDRs (target: finish ~2.5 years of data), as long as the new on-demand reprocessing is well determined	Mar-25	Sep-25	New SNPP VIIRS cloud reprocessed products
5	Work out a plan for transferring reprocessed VIIRS cloud products to CLASS or a Cloud platform	Aug-25	Sep-25	A plan for transferring reprocessed VIIRS cloud products to CLASS or a Cloud platform
6	Technical analysis and reports per ad hoc request from JPSS and STAR management, including monthly report	Oct-24	Sep-25	Analysis reports

D	I	C	M	L
Development	Integration &Testing	Calibration & Validation	Maintenance	LTM & Anomaly Resolution

Surface Type

December 2024

Accomplishments / Events:

- STAR-UMD VIIRS Surface Type team has downloaded and processed NOAA-21, NOAA-20, and S-NPP VIIRS daily granule surface reflectance data acquired in December of 2024 for the production of AST-2024.
- The surface type team provided a surface type fraction dataset to EMC for diagnosing cold biases in its models:
  - EMC noticed cold biases in some of its new models. They hypothesized that those biases could be due to incorrect representation of vegetation in high latitude regions.
  - However, they discovered that the MODIS vegetation continuous fields (VCF) dataset they intended to use severely underestimated vegetation in those regions.
  - To address this issue, the surface type team synthesized best available high resolution land cover products and generated a product suite that provides subpixel fraction values for 9 major surface types at the 1km spatial resolution(see highlights). This product suite greatly improved the representation of vegetation across the globe, especially over the polar regions.

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.*

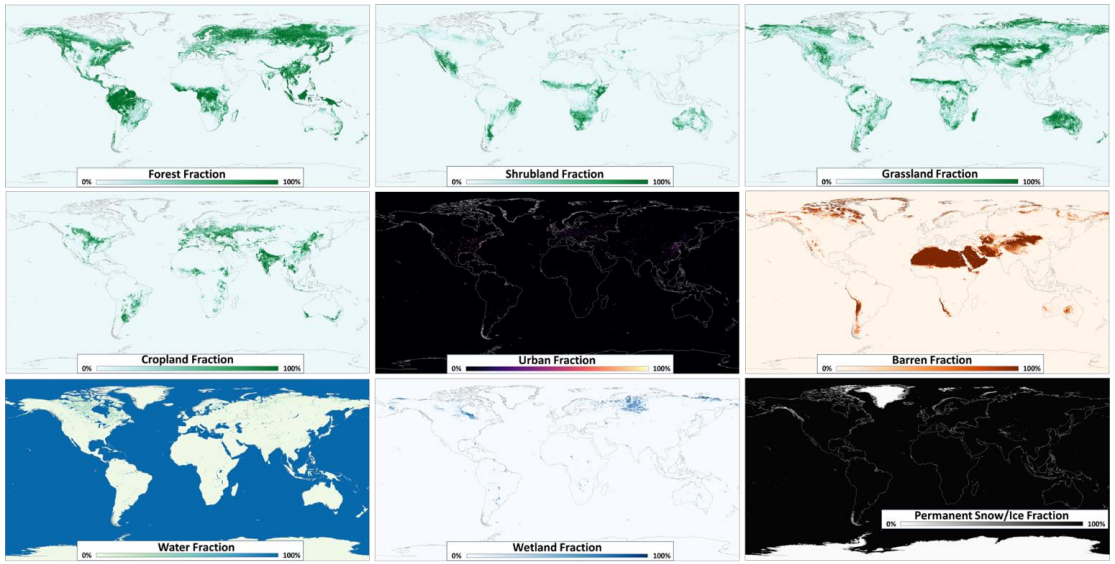
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Monthly update of the 250m global water surface fraction product	Each M.	Each M.		
Complete global monthly composites for each of 2024 months	Feb-25	Feb-25		
Generate global annual classification metrics for 2024	May-25	May-25		
AST24 of IGBP 17 type map	Aug-25	Aug-25		
AST24 for EMC 20 type map	Aug-25	Aug-25		
AST24 Validation Statistics and delivery to JSTAR and users	Sept-25	Sept-25		

Highlights:

Derivation of Global Subpixel Fraction Data for 9 Major Surface Types



High resolution land cover products can provide unprecedented spatial details for calculating surface type fractions at the 1km spatial resolution. However, those high resolution products also have significant data quality issues. The surface type team has developed a suite of global surface type fraction products that greatly reduced the impact of those data quality issues.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 1: Improving and updating the surface type training and validation polygons				
Subtask 1.1: Update training polygons where the surface type label has changed	*Sept-25*			
Subtask 1.2: Add new training polygons where existing training data are not enough	*Sept-25*			
Subtask 1.1: Update validation polygons where the surface type label has changed	*Sept-25*			
Task 2: Processing VIIRS surface reflectance data acquired during this funding year for surface type mapping				
Subtask 2.1: Map VIIRS SR data from satellite swath to the global 1 km grid to create global daily mosaic	*Each day*			
Subtask 2.2: Create cloud free monthly composites from the daily mosaics	*Each month*			
Subtask 2.3: Generate annual classification metrics using the 12 monthly composites of 2024	*Apr-25*			
Task 3: Producing AST24				
Subtask 3.1: Develop the SVM model and use the model to classify the 2024 VIIRS annual metrics	*May-25*			
Subtask 3.2: Post-process the SVM classification to produce the final AST24 product	*Aug-25*			
Subtask 3.3: Validate AST24 to generate accuracy statistics	*Sept-25*			
Subtask 3.4: Deliver AST24, update ATBD and the surface type webpage	*Sept-25*			

Vegetation Health

December 2024

Accomplishments / Events:

- Continued monitoring of vegetation health as indicated by publications of weekly vegetation health products (VHP) from currently operational NOAA-20 VIIRS observations via STAR webpage at https://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/vh_browse.php. Updated scripts to manage the timing between processing the last granule of SDR data and plotting daily map, as well as to add weekly map generation for ongoing weekly data quality checks.
- A poster titled “Analysis of Satellite Vegetation Health Indices for Country-Level Wheat Yield Forecasting” was presented at the AGU 2024 annual meeting.
- Compared VIIRS SDR data from AWS and SCDR for exploring the role of AWS data in real-time VHP processing. Results indicated that VIIRS SDR files from AWS and SCDR have identical data values, and 99% AWS files are available up to 23 minutes earlier than SCDR files based on their timestamps for week 49 of 2024. The team concluded that there is no need to replace AWS data with SCDR data in real-time VHP processing, and AWS can be used as a backup when SCDR experiences severe data delays.
- Completed the quality evaluation of weekly composite data from 2012 to the present. Continued developing a new procedure to evaluate the VIIRS VHP data, including ND, SM and VH files, from 2012 to the present.

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			

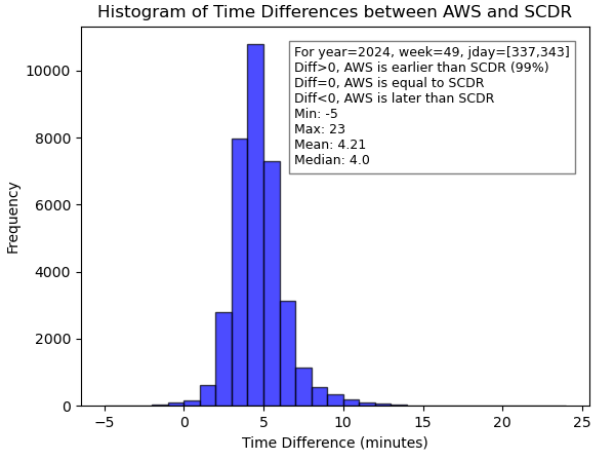
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 Vegetation Health Beta Maturity	Sep-23	Sep-23	Sept-23	
NOAA-21 Vegetation Health Provisional Maturity	Apr-24	Apr-24	Sept-23	Maturity reached before plan
NOAA-21 Vegetation Health Validated Maturity	Apr-24	Apr-24	Sept-23	All VIIRS EDRs declared Validated Maturity

Highlight: *Statistics from the comparison of VIIRS SDR data between AWS and SCDR can provide insights into whether AWS data should be used in real-time VHP processing. The figure on the right shows a histogram of their time difference based on timestamps. It can be seen that almost all AWS files are slightly earlier than SCDR files, within 30 minutes.*



Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 1: Deliver CCAP for VIIRS 500m global Vegetation Health Products	*September 2025*			
Subtask 1.1: Hire staff member to lead work	*March 2025*			
Subtask 1.2: Reconfigure computer code for 500m products using NOAA-20/21 I-bands observations	*June 2025*			
Subtask 1.3: Create and validate CCAP and deliver to ASSISTT	*September 2025*			
Task 2: Develop CCAP for value-added and science-enhanced ASCII and Geotiff data files of regional Vegetation Health Products	*September 2025*			
Subtask 2.1: Confirm staff member to lead the task	*March 2025*			
Subtask 2.2: Restructure compute code/scripts and ancillary data base for the VHP tailored for major crop regions	*June 2025*			
Subtask 2.3: Create and validate CCAP and deliver to ASSIST	*September 2025*			

Vegetation Index and Green Vegetation Fraction

December 2024

Accomplishments / Events:

- Further progress on the combination of NVPS and VHP frameworks.
- Confirm the request details from EMC on Steam-Area-Index (SAI), and prepare climatology SAI data for UFS land model testing.
- Collect feedback on LAI from EMC group and prepare for the LAI ORR next month.
- Work with ASSIST team to procced the 1km global NVPS product integration.

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			

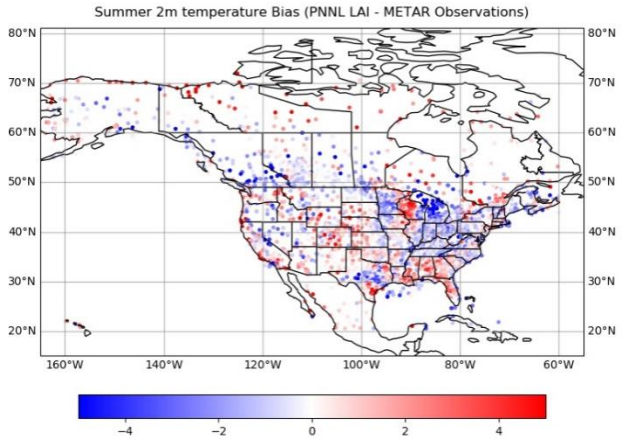
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

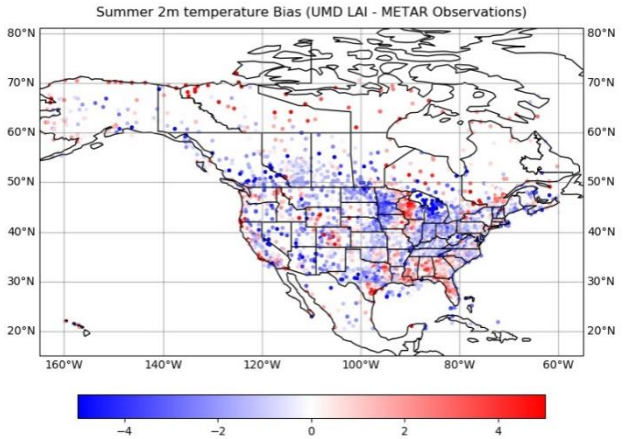
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
1km global VIIRS VI code and documentation ready for delivery	Oct-23	Nov-23	Nov-23	Personnel access to NOAA systems issues
NOAA-21 VI and GVF provisional maturity review	Jan-24	Jan-24	Jan-24	
Higher-resolution regional VI and GVF domain extended to global	Feb-24	Apr-24	Nov-24	Delayed due to PCR review
Experimental data test of blended VI and GVF products	Apr-24	Jul-24	Jul-24	Delays to previous milestone and personnel departure
Support to JPSS-3 Data System Test	Apr-24	Apr-24		No J03 test data will be available this year
Readiness for NCCF migration	Aug-24	Aug-24		
Annual algorithms/ products performance report	Aug-24	Aug-24		
Calibration/ Validation update for SNPP and NOAA20 VI and GVF products,	Sep-24	Sep-24	Oct-24	Comparison with other data sets necessary

Highlights:





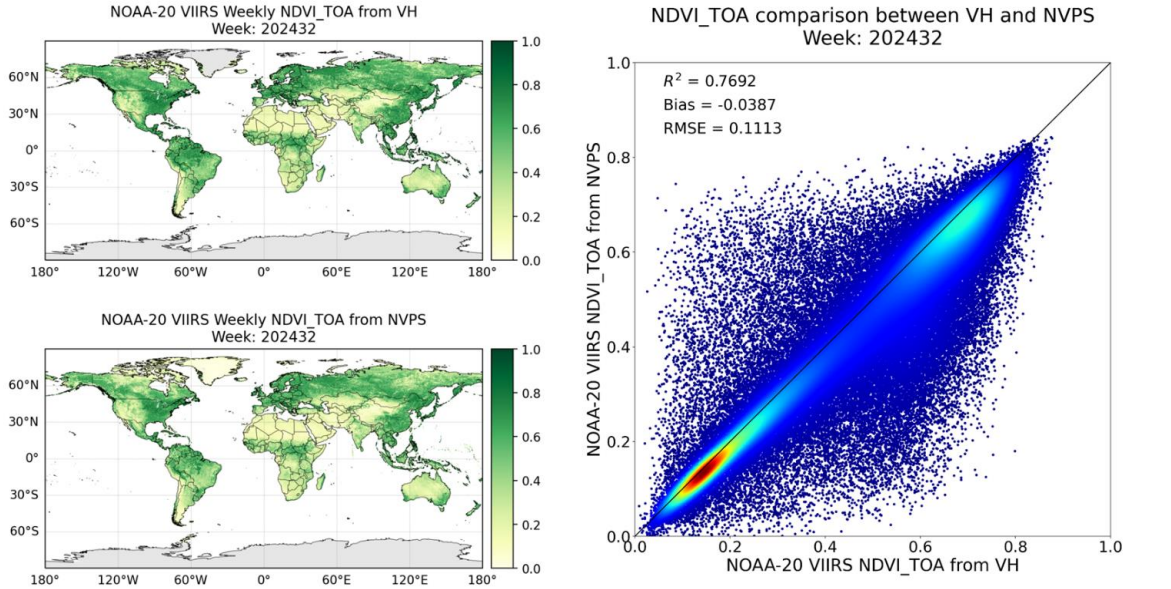
Request of SAI development from NCEP/EMC

- A meeting was held between STAR vegetation group and NCEP/EMC model group, in which EMC proposed the potential of **Stem-Area-Index (SAI)** on improving the UFS land model.
- The **SAI** is a biophysical parameter that quantifies the total one-sided stem area of vegetation per unit ground area. SAI is analogous to the Leaf Area Index (LAI) but focuses on the contribution of stems to the overall vegetation structure and energy balance.
- STAR vegetation group is on the preliminary stage of SAI development and investigating the feasibility of producing operational SAI product using JPSS VIIRS data.

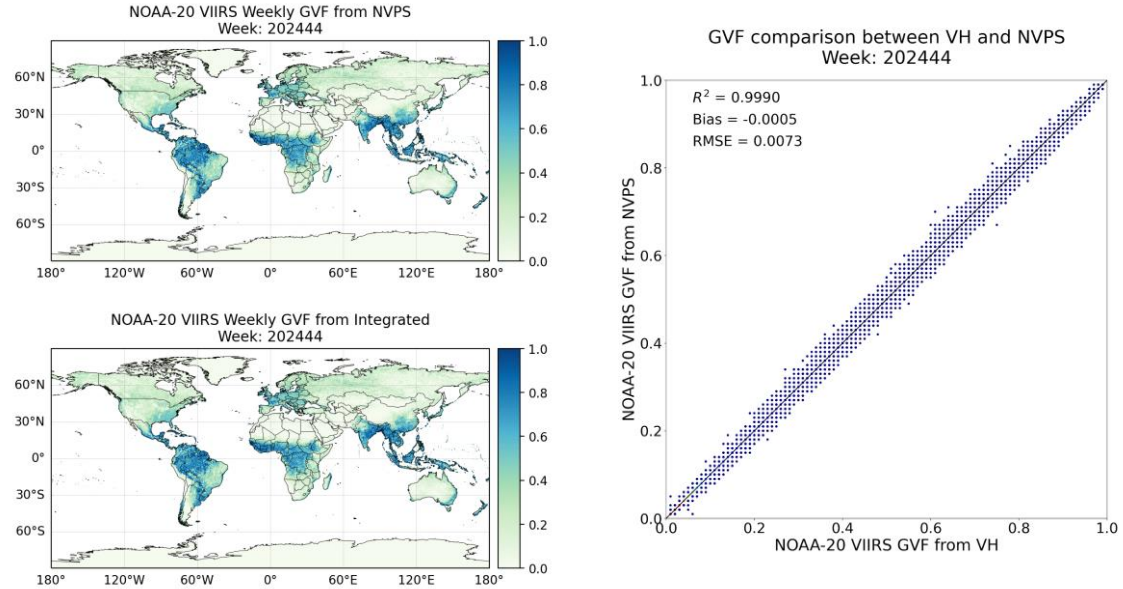
NVPS & VH combination

- Comparisons in VI and GVF between NVPS-generated and those from the integrated framework.
- Results show that the integration of NVPS & VHP framework won't induce significant difference in current VI and GVF product.
- The integration work will continue based on the current plan.

VI comparison

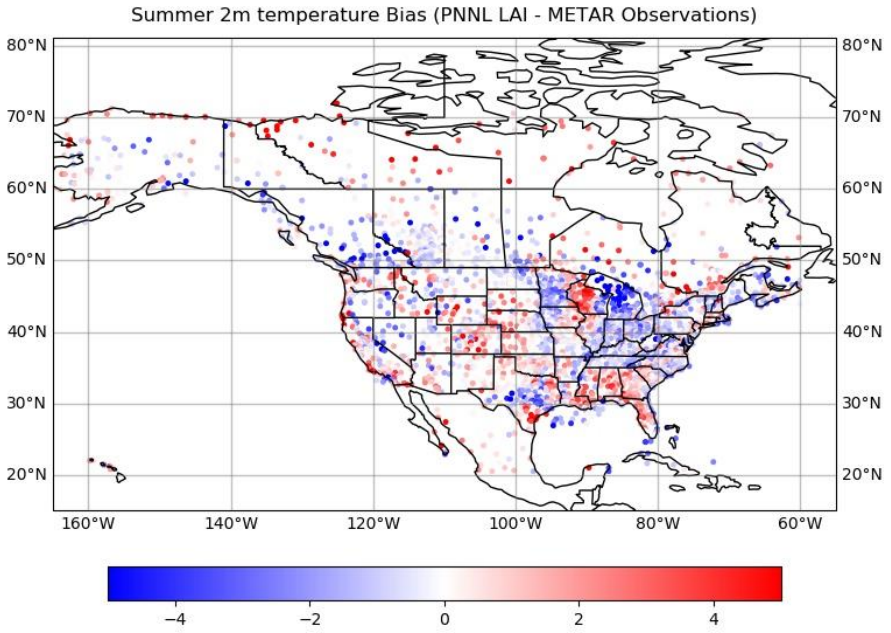


GVF comparison

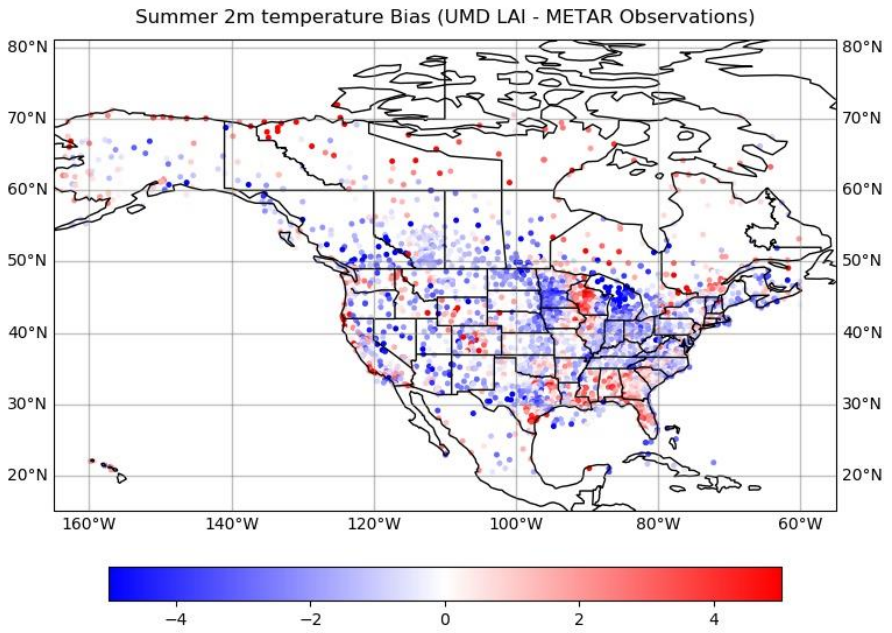


Test of VIIRS LAI on the USF land model

- VIIRS LAI product is tested by EMC for its effectiveness in improving USF land model. It is found better than PNNL LAI.
  - Summer 2m temperature bias
    - Spatial patterns of bias are similar
    - Regional heterogeneity where one data set seems to be better than other is also evident



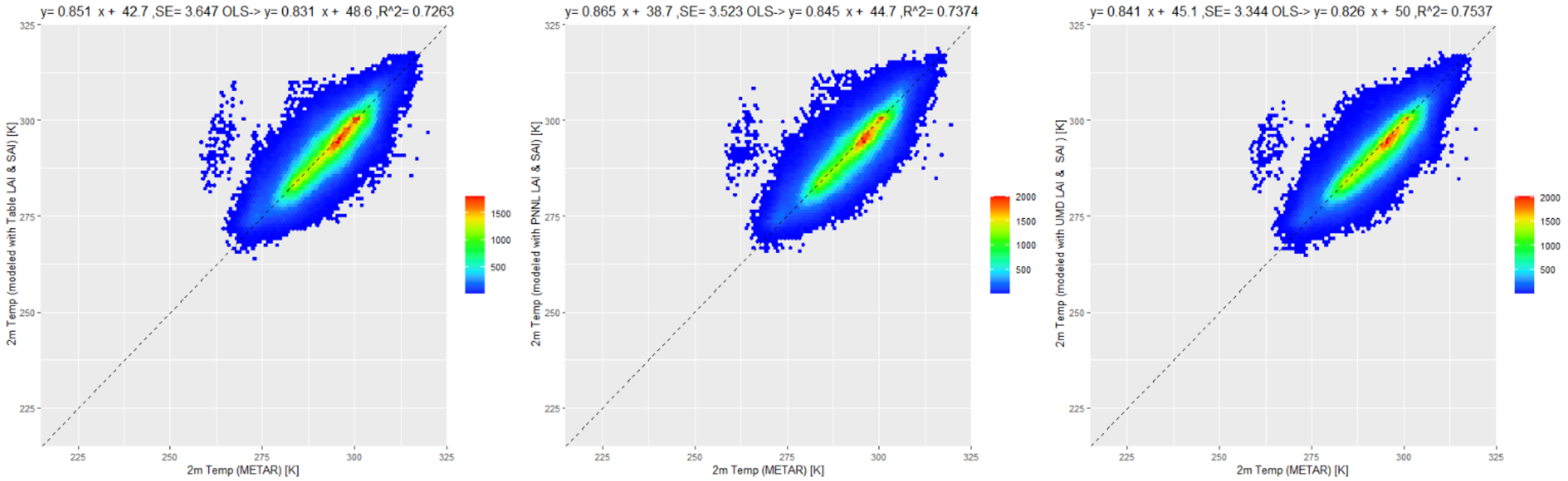
PNNL LAI



VIIRS LAI

Test of VIIRS LAI on the USF land model

- VIIRS LAI product is tested by EMC for its effectiveness in improving USF land model. It is found better than PNNL LAI.
  - Summer 2m temperature bias
    - UMD VIIRS LAI performs best in predicting 2m temperature in the USF land model



FY25 Milestones/Deliverables

	Milestone	Start	Finish	Deliverable	Requirement (Dev Only)
1	Final report of blended VI and GVF products; for suitability of operational production	Oct-24	Jan-25	Code and test data	
2	Reprocessing readiness of SNPP and NOAA-20 VI and GVF data records	Jan-25	May-25	Software readiness	
3	Evaluation of methods for handling data gaps in GVF 15 weeks of historical data	Oct-24	Jan-25		GVF requirements
4	Further development of 20m VI downscaling	Jan-25	Jun-25	Code and examples	VI requirements
5	AI/ML based algorithm development for the vegetation product derivation and validation	Feb-25	Aug-25	Experimental code and test data	GVF requirements
6	Experimental version of VI and GVF production combined with Vegetation Health	Apr-25	Sep-25	Experimental code and test data	VI and GVF requirements

D	I	C	M	L
Development	Integration &Testing	Calibration & Validation	Maintenance	LTM & Anomaly Resolution

VIIRS SDR

December 2024

Accomplishments / Events:

- After converting from the size of 85.35 s to 85.0 s the JPSS-3 VIIRS RDR granules acquired during the satellite TVAC testing on 8/17/2024, processed the RDR files with ADL Mx12 software and demonstrated that the SDR gaps originally created by the 49-scan 85.35-s granules are no longer present
- Presented “Inter-Comparison of NOAA-21/NOAA-20/S-NPP VIIRS Reflective Solar Bands (RSB) with PACE OCI and JPL EMIT Hyperspectral Observations” and "Long-term on-orbit performance of the Visible-Infrared Imaging Radiometer Suite (VIIRS) on Suomi NPP, NOAA-20, and NOAA-21 in reference to partner missions“ at the SPIE Asia Pacific Remote Sensing Conference (Dec. 2-5, 2024)
- Assisted in scheduling and analyzed data from NOAA-21, NOAA-20, and Suomi NPP VIIRS lunar calibration on 12/11/2024: data aligns well with long-term trends and exhibits consistency although is slightly lower than the trends for NOAA-20
- Generated and delivered for deployment in the IDPS operations the updated NOAA-21, NOAA-20 and Suomi NPP VIIRS SDR DNB DN0 and GAIN-RATIOS LUTs that were created based on data acquired during the new moon on 12/1/2024 and 12/30/2024

Overall Status:

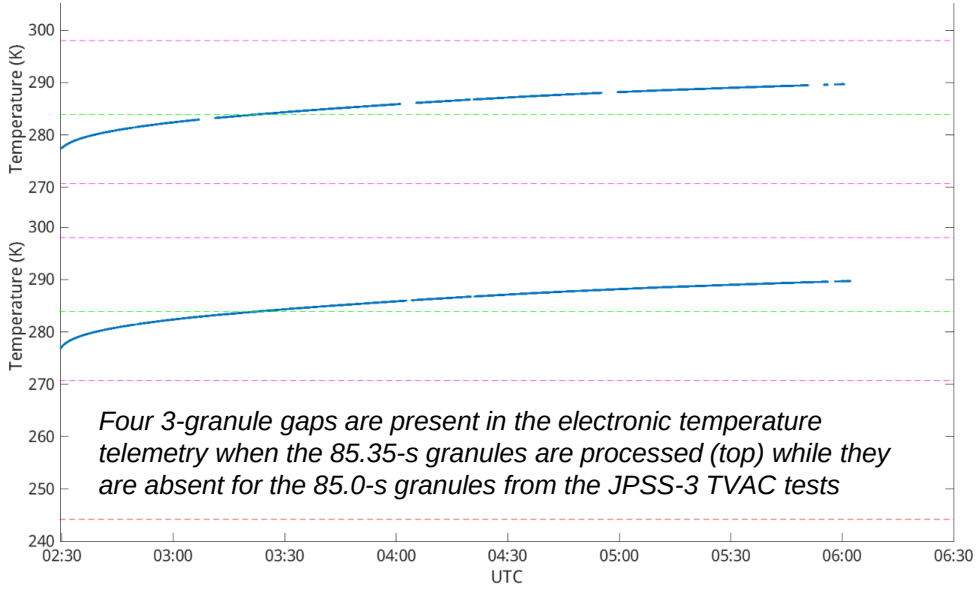
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		x			
Technical / Programmatic		x			
Schedule		x			

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
TSIS-1 solar spectrum application for JPSS-3/-4 VIIRS	Dec-24		11/15/2024	
JPSS-4 VIIRS pre-launch characterization report	Mar-25			
JPSS-3/-4 VIIRS granule size change verification	Mar-25			
VIIRS cross-calibration with hyperspectral measurements	Jun-25			
Suomi NPP and NOAA-20 VIIRS intermediate recalibration	Jun-25			
“Monthly” VIIRS lunar calibration predictions and analyses	Jul-25			
JPSS-3/-4 VIIRS waiver impact studies report	Sep-25			
Cross-calibration and comparison among NOAA-21, NOAA-20, and Suomi NPP VIIRS report	Sep-25			

Highlights:



Four 3-granule gaps are present in the electronic temperature telemetry when the 85.35-s granules are processed (top) while they are absent for the 85.0-s granules from the JPSS-3 TVAC tests

FY25 Milestones/Deliverables (in general)

Task Category	Task/Description	Start	Finish	Deliverable	Requirement(dev. only)
Development (D)	• Impact of polarization sensitivity on VIIRS SDR(waiver) • Cross calibration with hyperspectral measurements from PACE OCI and ISS/EMIT using SNOs and PICS • TSIS solar spectrum application for JPSS-3/4 • Vicarious calibration over sun glint • Cloud-based geolocation validation tool development • Assessment of space weather impact on VIIRS SD reflectance degradation changes • Simulated J4 VIIRS SDR TEB products to assess impacts of RSR differences (waiver) • J3 scan rate change on DNB/M16A HSI (waiver) • J3/J4 SWIR band Radiometric Response Characterization Uncertainty (RRCU) (waiver)	10/2024 10/2024 10/2024 10/2024 10/2024 10/2024 10/2024 10/2024 10/2024	9/2025 9/2025 9/2025 9/2025 9/2025 9/2025 9/2025 9/2025 9/2025	• Analysis report • Inter-Cal report • Application report • Cal. report • Cloud-based tool • Impact report • Impact report from Simulation • HSI Impact report • SWIR RRCU Impact report	• JPSS Mission • JPSS Mission • JPSS mission • JPSS mission • JPSS mission • JPSS mission • JPSS mission • JPSS mission • JPSS mission
Integration & Testing (I)	• Cloud migration of VIIRS Cal/Val tools • Analyze test results for updated versions of IDPS software	10/2024 10/2024	9/2025 9/2025	• Cloud migration • Mx checkout reports	
Calibration & Validation (C)	• J4 prelaunch data analysis, processing parameters • Study of J3/J4 waiver impacts on user applications • Global Regional Validation Site (GReVS) improvement • SNPP, NOAA-20 and NOAA-21 VIIRS preliminary and final recalibration • Offline RSB/DNB/TEB Cal/Val analyses and trending • Cross-calibration and comparison among NOAA-21, NOAA-20, and SNPP VIIRS • NOAA-20 VIIRS as GSICS reference support	10/2024 10/2024 10/2024 10/2024 10/2024 10/2024 10/2024	9/2025 9/2025 9/2025 9/2025 09/205 09/2025 09/2025	• Cal verification report • Impact report • Cloud/Web-based GReVS • Re-calibration coefficients • VIIRS RSB/DNB/TEB performance summary • Cross-Cal report • GSICS support report	

Please document requirements for developmental work.

FY25 Milestones/Deliverables (in general)

Task Category	Task/Description	Start	Finish	Deliverable
Maintenance	• Monthly lunar calibration (precision prediction delivered to flight operations; analysis on acquired lunar data)	10/2024	7/2025	• Lunar roll prediction monthly for lunar (to OSPO)
	• Monthly delivery of VIIRS DNB calibration LUTs;	10/2024	9/2025	• Monthly LUT updates (to OSPO)
	• Delivery of VIIRS RSB and TEB calibration LUTs to mitigate degradation;			• LUT delivery as needed
	• Delivery of VIIRS DNB straylight LUTs;			• LUT delivery as needed
	• Maintain the performance trending at vicarious sites	10/2024	5/2025	• Sustained validation website for the G20+ vicarious sites
	• Geolocation monitoring using CPM (Applicable to SNPP, NOAA-20 and NOAA-21)			• CPM geolocation monitoring (report)
LTM & Anomaly Resolution (L)	• Instrument parameter performance trending	10/2024	09/2025	• Report on instrument parameter performance trending (in collaboration with ICVS)
	• Participate in anomaly investigations	10/2024	09/2025	• Anomaly report

Please document requirements for developmental work.

VIIRS Flood Mapping

September 2024

Accomplishments / Events:

- JPSS Flood monitoring has captured multiple events this month. One example is the downscaled 30 meter resolution VIIRS flood depth estimates on Sept 17th, 2024 after historic rainfall occurred across the Cape Fear Region of southeastern North Carolina from Potential Tropical Cyclone Eight. Gauges and automated radar estimates showed that 12 to 20 inches of rain fell in only two days.
- NOAA Satellites posted the results from the JPSS downscaled flood depth (https://x.com/NOAASatellites/status/1836474846496330162).
- The downscaled product is currently still in development, but pre-operational estimates can be found at the JPSS Flood Proving Ground (http://floods.ssec.wisc.edu/?products=VIIRS-3Dflood).

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:

Volcanic Ash

November, 2024

Accomplishments / Events:

- 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 will continue as needed, including support for ASSISTT/NDE evaluations. VOLCAT is long-term plan.

- VOLCAT VIIRS volcanic ash plume identification and extraction work is an enhancement to the VOLCAT methodology. The most recent research focus has been developing a web-page based tool to manually classify VOLCAT volcanic cloud objects by a science team expert (as yes (containing volcanic ash) or no (not containing volcanic ash)). This will enable a full training database to be generated for ash and non-ash clouds for training the AI/ML methodology, including both detected and missed volcanic clouds by the current VOLCAT algorithm. The science team completed identifying and reprocessing scientifically interesting cases (e.g., volcanic clouds, VOLCAT false alarms, etc.) and are currently classifying these reprocessed cases to be included in the AI/ML training dataset. An example of the tool and recent case is shown in the included figure.
- The VOLCAT science team completed research to support VOLCAT imaging that optionally utilizes VIIRS I-bands.

Overall Status:

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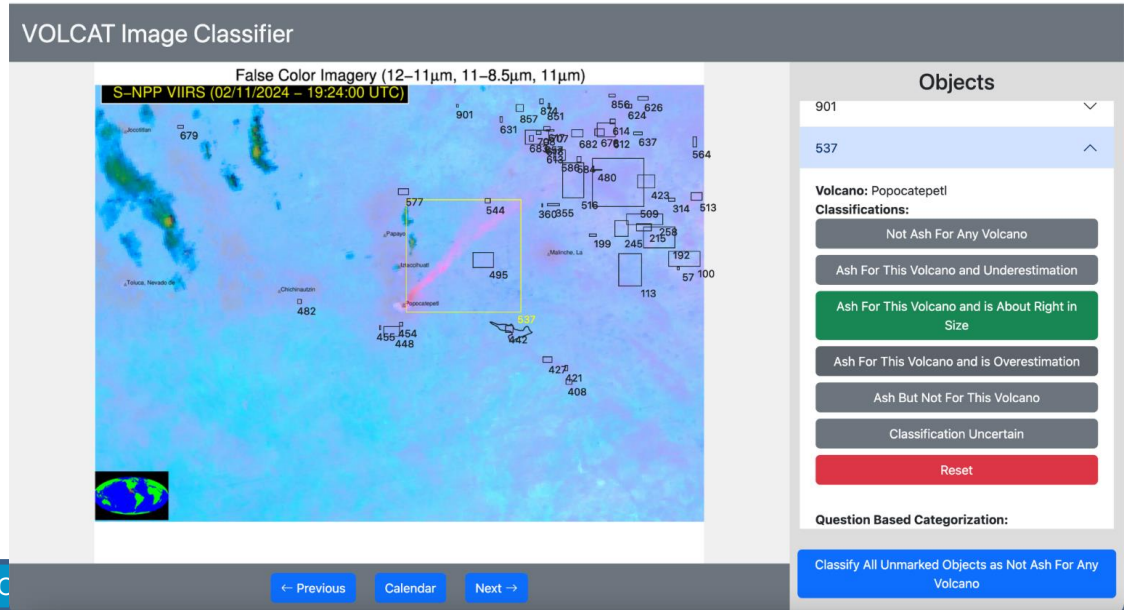
Issues/Risks:

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Develop updated user training material	Jun-25	Jun-25		
Improve VIIRS volcanic ash plume identification and extraction	Mar-25	Mar-25		
Integration of VIIRS I-bands in VOLCAT workflow	May-25	May-25		
Imaging capabilities of VIIRS I-bands in VOLCAT end-user web graphics	Nov-24	Nov-24	Nov-24	
Quantify added value of VIIRS I-bands	Sept-25	Sep-25		
Update VOLCAT code to ingest any JPSS-3 proxy data if becomes available	Sep-25	Sep-25		

Highlights: An example of the reprocessing and classification work done by VOLCAT science team.



Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Task 1: VOLCAT enhancements	*September 2025*			
Subtask 1.1: Fully integrate VIIRS I-band into VOLCAT workflow	*May 2025*			
Subtask 1.2: Assess impact of I-band enhancements	*Sept 2025*			
Subtask 1.3: Implement and test improvements to gridded composites of volcanic cloud properties	*September 2025*			
Task 2: Preparation for JPSS-3/4	*March 2025*			
Subtask 2.1: Initial development for JPSS-3 cal/val plan	*March 2025*			

STAR JPSS Schedule: TTA Milestones