NOAA JPSS Monthly Program Office

AMP/STAR FY24 TTA

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February, 2024

Highlights from the Science Teams (January)

January 2024 Meetings

The January NOAA-21 Monthly Maturity Review meeting was held on January 25. The Review Committee has found that the following products had exceeded the Provisional Maturity that were being reviewed for and had achieved Validated Maturity – the highest level of maturity:

- Sea Surface Temperature
- NUCAPS Soundings and Trace Gases
- The MIRS Suite of products
- VIIRS Surface Reflectance
- VIIRS Land Surface Products (including GVF, LST, Albedo)
- VIIRS Ice Concertation, Polar Winds, and Snow Cover

Several STAR JPSS team members attended the American Meteorological Society Annual Meeting in Baltimore, MD from January 28 – February 1, 2024.

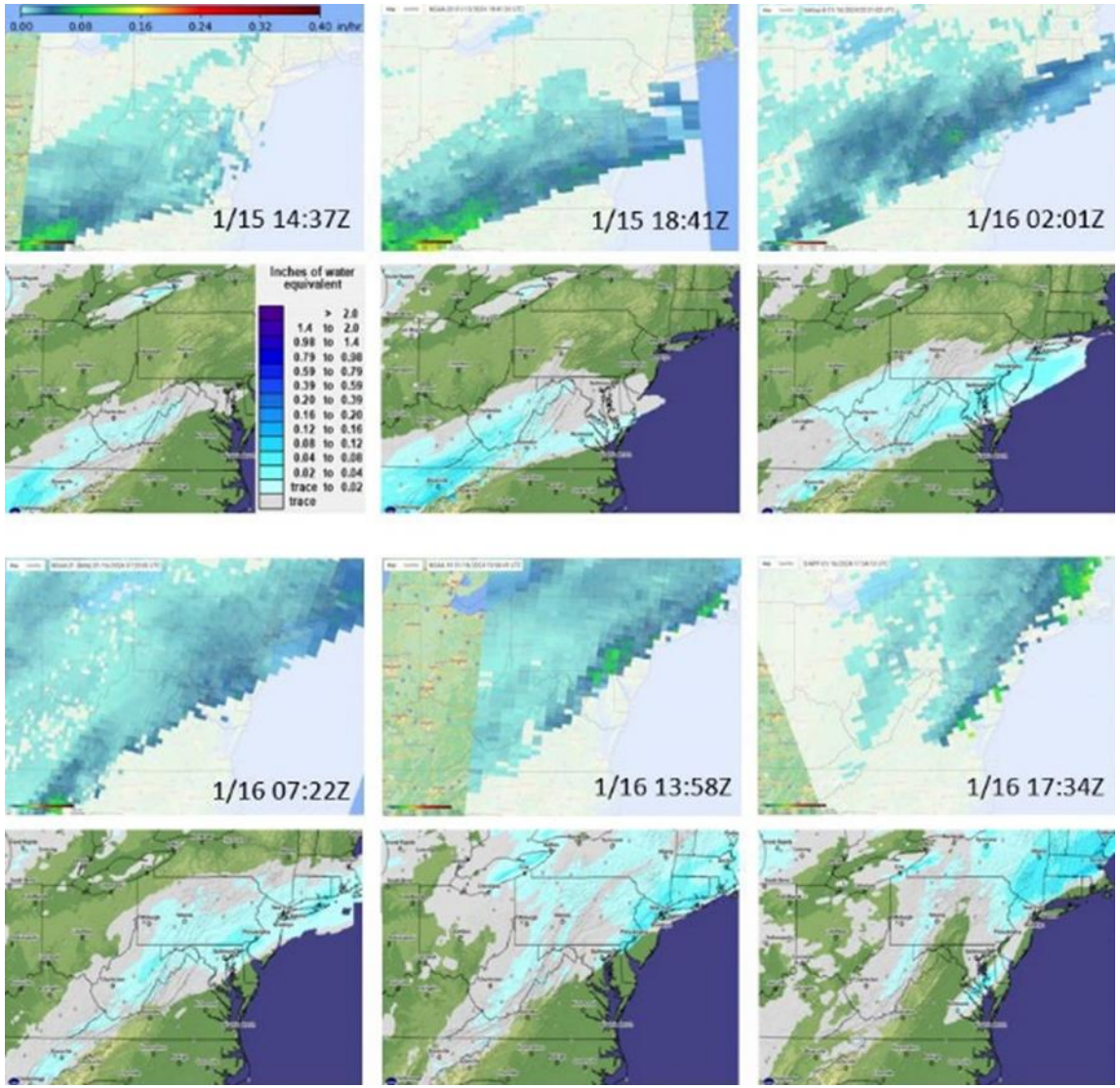
Updated: February 8, 2024

Sensor	Algorithm	Beta	Provisional	Validated	ReadMe
ATMS	ATMS TDR	30-Nov-2022	15-Dec-2022	12-May-2023	Read me
ATMS	ATMS SDR	30-Nov-2022	15-Dec-2022	12-May-2023	Read me
CrIS	CrIS SDR	23-Feb-2023	30-Mar-2023	26-Sep-2023	Read me
VIIRS	VIIRS SDR	23-Feb-2023	30-Mar-2023	23-Jun-2023	Read me
OMPS	OMPS Nadir Mapper SDR	23-Feb-2023	14-Apr-2023	Jan-2024	Read me
OMPS	OMPS Nadir Profiler SDR	23-Feb-2023	14-Apr-2023	Jan-2024	Read me
VIIRS	KPP Imagery EDRs	23-Feb-2023	30-Mar-2023	23-Jun-2023	Read me
VIIRS	non-KPP Imagery EDRs	23-Feb-2023	30-Mar-2023	23-Jun-2023	Read me
VIIRS	Cloud Mask	30-Mar-2023	30-Mar-2023	Mar-2024	Read me
VIIRS	Cloud Phase/Type	30-Mar-2023	30-Mar-2023	Mar-2024	Read me
VIIRS	Cloud Top Properties	30-Mar-2023	30-Mar-2023	Mar-2024	Read me
VIIRS	Cloud Base and Cloud Cover Layers	30-Mar-2023	30-Mar-2023	Mar-2024	Read me
VIIRS	DCOMP and NCOMP	30-Mar-2023	30-Mar-2023	Mar-2024	
VIIRS	Aerosol Optical Depth and Aerosol Particle Size	10-Feb-2023	10-Feb-2023	Jun-2024	Read me
VIIRS	Aerosol Detection	11-Feb-2023	11-Feb-2023	Jun-2024	
VIIRS	Volcanic Ash	30-Mar-2023	30-Mar-2023	Mar-2024	Read me
VIIRS	Ice Surface Temperature and Ice Concentration	01-May-2023	01-May-2023	Feb-2024	Read me
VIIRS	Sea Ice Thickness/Age	01-May-2023	01-May-2023	01-May-2023	Read me
VIIRS	Binary Snow Cover	15-Apr-2023	01-May-2023	01-May-2023	Read me
VIIRS	Fractional Snow Cover	15-Apr-2023	01-May-2023	01-May-2023	Read me
VIIRS	Active Fires	25-May-2023	01-Jun-2023	Jul-2024	Read me
VIIRS	Land Surface Temperature	29-May-2023	23-Jun-2023	23-Jun-2023	Read me
VIIRS	Surface Albedo	02-Aug-2023	30-Aug-2023	30-Aug-2023	Read me
VIIRS	Global Surface Type	Jun-2024	Jun-2024	Sep-2024	
VIIRS	Surface Reflectance	10-Jul-2023	01-Nov-2023	01-Nov-2023	Read me
VIIRS	Green Vegetation Fraction	31-May-2023	23-Jun-2023	23-Jun-2023	Read me
VIIRS	Vegetation Index	31-May-2023	23-Jun-2023	23-Jun-2023	Read me
VIIRS	Vegetation Health	26-Sep-2023	Mar-2024	Apr-2025	Read me
VIIRS	Ocean Color	Nov-2023	Apr-2024	Jul-2025	
VIIRS	Sea Surface Temperature	20-Mar-2023	20-Mar-2023	Aug-2024	Read me
VIIRS	Polar Winds	16-Nov-2023	16-Nov-2023	16-Nov-2023	
VIIRS	VIIRS Flood Mapping	24-Aug-2023	14-Dec-2023	Jan-2025	Read me
CrIS	NUCAPS: AVTP, AVMP, Ozone, OLR	03-Mar-2023	26-Sep-2023	26-Sep-2023	Read me
CrIS	NUCAPS: CO, CO2, CH4	03-Mar-2023	26-Sep-2023	26-Sep-2023	Read me
ATMS	MiRS Products	03-Dec-2022	12-May-2023	Oct-2024	Read me
ATMS	Snow Fall Rate (SFR)	27-Apr-2023	Feb-2024	May-2025	Read me
OMPS	OMPS Ozone EDR: V8Pro	30-Mar-2023	Oct-2023	Jan-2024	Read me
OMPS	OMPS Ozone EDR: V8TOz	30-Mar-2023	14-Sep-2023	Jan-2024	Read me
OMPS	OMPS Limb Profiler (SDR & EDR)	Apr-2024	Apr-2024	Sep-2024	

NOAA-21 launch date: 11/10/2022

Highlights from the Science Teams (January)

Snowfall Rate Product Captures Winter Storm in Mid-Atlantic



The first significant snowstorm in two years brought 3-5 inches of snow to the Mid-Atlantic region on January 15-16. The NESDIS Snowfall Rate (SFR) product captured the event well with a constellation of 6 satellites: NOAA-21 (Beta), NOAA-20, S-NPP, NOAA-19, MetOp-B, and MetOp-C. In the figure the SFR product is compared with the hourly snowfall analysis produced by the National Operational Hydrologic Remote Sensing Center (NOHRSC). Rows 1 & 3 are a series of SFR images and Rows 2 &4 are the corresponding NOHRSC hourly snow accumulation, respectively. Both products may have issues with snowfall detection, e.g. the false alarms However, they exhibit a high degree of agreement both in snowfall patterns and snowfall intensity during most of the snowstorm. The recent enhancement to the SFR algorithms through machine learning has resulted in the consistency that demonstrates the quality of the product.

Highlights from the Science Teams (January)

New Validation sources for SST products

Hourly timeseries for drifting buoys number of unique SST observations (NOBS) for May 2023 on the live iQuam website (top) and development site (bottom). The development site includes FNMOC, ICOADS and CMEMS as input data sources. The live page only includes FNMOC. Overall NOBS are increased in development version and gaps (red circles) are eliminated.

Two new sources of situ SST data have been implemented in an experimental (development) version of the iQuam online system. The two sources are CMEMS (Copernicus Marine Service) and ICOADS (International Comprehensive Ocean-Atmosphere Data Set). Preliminary results show that the number of unique in situ SST observations is increased and data gaps are eliminated (see Figure).

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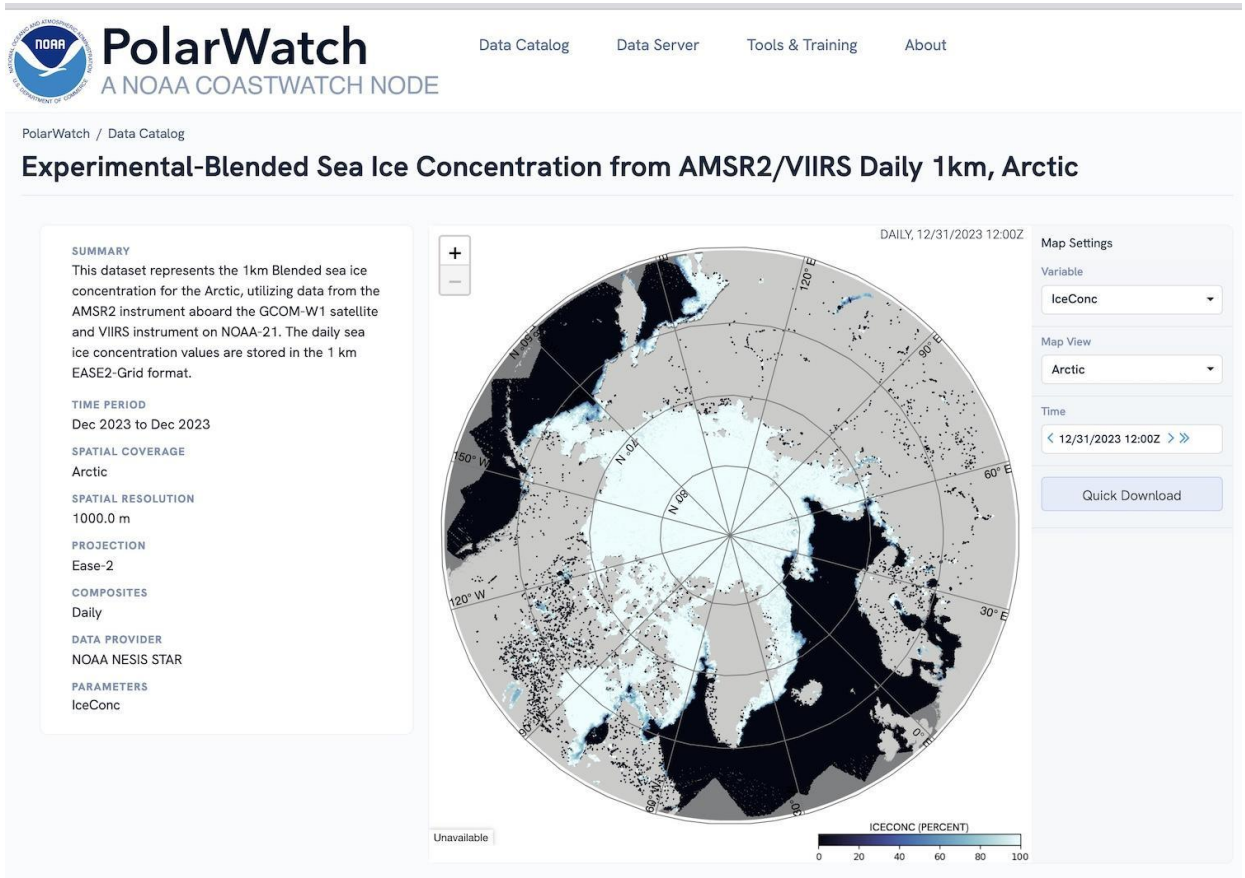
Highlights from the Science Teams (January)

AMSR2-VIIRS Blended Sea Ice Concentration experimental product now in PolarWatch.



An effective blended sea ice concentration product that utilizes the all-weather capabilities of AMSR2 and the high spatial resolution of VIIRS is now being routinely provided to NOAA Polar Watch (https://polarwatch.noaa.gov/catalog/). The dataset is provided as daily composites for both Arctic and Antarctic separately. The data is gridded to a 1-km EASE2 Polar stereographic projection in netCDF format.

Accomplishments

Delivery Date	Delivery Algorithm Packages (DAPs) – Enterprise Products:	Recipient
01/04/2024	v1-1 Patch CCAP Delivery of the Ozone Mapping and Profiler Suite Nadir Profiler (OMPS NP) Version 8 Ozone Profile (V8PRO) v4r4 to NCCF for integration. This patch includes 6 new look-up tables (2 for each satellite SNPP, N20, N21).	NCCF
01/10/2023	Delivery of the JPSS Aerosols Patch CCAP (JPSS-AOD_v1-1) to CSPP Leo. This package includes updated coefficient files for the AOD algorithm. No changes are made to ADP.	NCCF
01/17/2024	Two separate patches for VIIRS ACSPO SST and AVHRR ACSPO SST for integration into the NCCF PG system.	NCCF
01/19/2024	GBBEPx v2 Final Delivery of GBBEPx v5.0 to the NCCF S3 bucket. This version replaces AF M-band inputs with EN-Fires I-band inputs, and adds N21 capability due to the downgrade of SNPP.	NCCF
01/24/2024	Delivery of Ice Concentration v2 CCAP to CSPP Leo machines.	NCCF
01/24/2024	Delivery of Enterprise Flood Mapping v1-3 CCAP to CSPP Leo machines.	NCCF
	NUCAPS NOAA-21 LUTs: Science Team delivered to the ASSISTT	NCCF
01/29/2024	Delivery represents the final delivery of the RAVE v2-1 CCAP to NCCF for integration. This version of RAVE utilizes VIIRS Enterprise Fires products as inputs, whereas the v1 version used VIIRS Active Fires products. Updates to N21 capabilities and handling the redistributed ABI pixel in water near lake coasts.	NCCF
01/30/2024	This is a final delivery of the Vegetation Health CCAP to NCCF. Vegetation Health Products is a NOAA/NESDIS system estimating vegetation health, moisture condition, thermal condition and their products.	NCCF

Accomplishments

Delivery Date	Delivery Algorithm Packages (DAPs) – Enterprise Products:	Recipient
1/31/2024	Preliminary delivery of the GAASP (GCOM) -Preprocessor NDE Migration CCAP for OSPO code review.	NCCF
02/02/2024	Preliminary delivery of the Blended SST Legacy Migration CCAP for OSPO code review.	NCCF
02/07/2024	Preliminary delivery of the GAASP-Precipitation CCAP for OSPO Software Code Review by OPSO.	NCCF
02/07/2024	Preliminary CCAP delivery of GAASP Sea Ice v1 for Software Code Review by OSPO.	NCCF
02/07/2024	Preliminary CCAP delivery of the GAASP Soil Moisture CCAP v1 for Software Code Review by OSPO.	NCCF
02/07/2024	Preliminary CCAP delivery of GAASP Snow CCAP v1 for Software Code Review by OSPO.	NCCF
02/08/2024	PSS CBH CCAP to CSPP Leo machines.	NCCF
02/08/2024	JPSS CCL CCAP to CSPP Leo machines.	NCCF
02/09/2024	ASSISTT delivered EUM & SMM for 10/20/2023 SFR final CCAP delivery	NCCF

Accomplishments – JPSS Cal Val Support

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

S-NPP	Weekly OMPS TC/NP Dark Table Updates	10/3/23, 10/11/23, 10/17/23, 10/24/23, 10/31/23, 11/7/23 11/14/23, 11/21/23, 11/28/23, 12/5/23, 12/12/23, 12/19/23, **01/03/24, 01/10/24, 01/17/24, 01/23/24, 01/30/24, 02/06/24**
NOAA-20	Weekly OMPS TC/NP Dark Table Updates	10/3/23, 10/11/23, 10/17/23, 10/24/23, 10/31/23, 11/7/23, 11/14/23, 11/21/23, 11/28/23**, 12/5/23, 12/12/23, 12/19/23, 01/03/24, 01/10/24, 01/17/24, 01/23/24, 01/30/24, 02/06/24**
NOAA-21	Weekly OMPS TC/NP Dark Table Updates	10/3/23, 10/11/23, 10/17/23, 10/24/23, 10/31/23, 11/7/23, 11/14/23, 11/21/23, 11/28/23, **12/5/23, 12/12/23, 12/19/23, 01/03/24, 01/10/24, 01/17/24, 01/23/24, 01/30/24, 02/06/24**
S-NPP	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	9/12/23, 9/26/23, 10/11/23, 10/24/23, 11/21/23, 12/05/23, 12/19/23, **01/03/24, 01/17/24, 01/30/24,**
NOAA-20	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	10/3/23, 10/17/23, 10/31/23, 11/14/23, 11/28/23, 12/12/23, **01/03/24, 01/10/24, 01/23/24, 02/06/24**
NOAA-21	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	10/3/23, 10/17/23, 10/31/23, 11/14/23, 11/28/23, 12/12/23, **01/04/24, 01/10/24, 01/23/24, 02/06/24**
S-NPP	Monthly VIIRS LUT Update of DNB Offsets and Gains	10/23/23, 11/21/23**,** 12/18/23, **01/22/24**
NOAA-20	Monthly VIIRS LUT Update of DNB Offsets and Gains	10/23/23, 11/21/23**,** 12/18/23, **01/22/24**
NOAA-21	Monthly VIIRS LUT Update of DNB Offsets and Gains	10/23/23, 11/21/23**,** 12/18/23**, 01/22/24**
NOAA-21	Monthly VIIRS DNB Straylight correction update	10/23/23, 11/21/23, 12/18/23**, 01/22/24**

NOAA-21 Cal/Val Maturity Reviews

January 2024 Maturity Reviews			
Product	Maturity Review	Review Date	Review Panel Recommendations
VIIRS Polar Winds	Beta/Provisional	01/25/24	Attained **Validated** status effective November 16, 2023
Cryosphere Products – Sea Ice Thickness/Age, Binary Snow Cover & Fractional Snow Cover	Provisional	01/25/24	Ice Thickness/Age: Attained **Validated** status effective May 1, 2023. Snow Cover & Fraction: Attained **Validated** status effective May 1, 2023.
Land products: LST, Surface Albedo, Surface Reflectance, GVF, VI	Provisional	01/25/24	LST: Attained **Validated** status effective June 23, 2023. Surface Albedo: Attained **Validated** status effective August 30, 2023. Surface Reflectance: Attained Validated status effective Nov. 1, 2023. GVF, VI: Attained **Validated** status effective June 23, 2023.
NUCAPS (all products)	Provisional	01/25/24	Attained **Validated** status effective September 26, 2023

February 2024 Maturity Reviews			
Product	Maturity Review	Review Date	Review Panel Recommendations
Ocean Color	Beta/Provisional	03/07/24	
SnowFall Rate (SFR)	Provisional	03/07/24	
OMPS LP (SDR & EDR)	Provisional	03/07/24	

March 2024 Maturity Reviews			
Product	Maturity Review	Review Date	Review Panel Recommendations
All Cloud Products	Validated	03/28/24	TBC
OMPS SDR (NP & TC), EDR (v8Pro, V8TOz)	Validated	03/28/24	TBC

JSTAR Code/LUT/Product Deliveries

01/16/2024	N21 VIIRS SDR Band M4 Striping Correction for Convective Cloud Images - ADR 10555
02/07/2023	N20 VIIRS SDR RADIOMETRIC-PARAM-V4 LUT Emergency Update - ADR 10683

Date	Remaining J2-Ready DAPs to NCCF
March, 2023 (Delayed to January 2024)	Ancillary data preprocessing • ASSISTT delivered LP preliminary pre-processor CCAP for SCR (Delivered to OSPO) on 9/29. • NDE Migration & J2 Provisional final CCAP for Ancillary Data Preprocessor (miniDAP) is scheduled for February 20, 2024. RDR to L2 CCAP • Science Team Deliveries ○ Science team V2.7LIMB for SNPP was delivered to ASSISTT on December 19, 2023 ○ Science team delivery for NOAA-21 (2.7LIMB N21 delivery to ASSISTT) is expected by the mid to late January 2024. • ASSISTT Deliveries ○ NDE Migration & J2 Provisional RDR to L2 CCAP Preliminary CCAP target date has been pushed to April 1, 2024. ○ Final CCAP target date is set for June 25, 2024

FY24 STAR JPSS Milestones

Algorithm Updates DAPs/CCAPs	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Heap with J2 LUTs	Dec-23	Dec-23	Science team delivered LUTs on Jan 24 after a combined maturity review for all products. ASSISTT Delivery to NCCF: Feb/March	
OMPS-NP (J2 LUT Delivery)	Jan-24	Jan-24	Delivered on January 4, 2024.	
ACSPO SST_v2 release version + patch to CCAP for MetOP	Jan-24	Jan-24	Delivered on January 16, 2024	
GBBEPx (Enterprise Fires I-Band update)	Jan-24	Jan-24	Delivered on January 19, 2024	
RAVE (Science bug fix)	Jan-24	Jan-24	Delivered on January 29, 2024	
Vegetation Health	Jan-24	Jan-24	Delivered on January 30, 2024	
GCOM RDR to ASD Converter (GRAC) - includes JAXA executable (AMSR-3)	Feb-24	Feb-24	Delivered February 02, 2024	
LST EDR J2 Provisional (updates to LSE)	Dec-23	Jan-24	Delivered on February 12, 2024.	
Advanced Dvorak Technique	Feb-24	Feb-24	Expected in February, 2024	
Multi-platform Tropical Cyclone Surface Winds Algorithm (MTCSWA)	Feb-24	Feb-24	Expected in February, 2024	
Cloud Mask (LUT update for J2)	Jan-24	Jan-24	Moved to February, 2024	
LAI Initial Delivery	Feb-24	Feb-24	Moved to April, 2024	
VOLCAT (Phase 1) NCCF implementation	Dec-23	Dec-23	Moved to May 30, 2024	

The above table is based on the ASSISTT CCAP delivery schedule. This table gets updated every month removing the delivered items after a confirmation and adding new items from a long list of ASSISTT schedules available until the end of FY24.

FY24 STAR JPSS Milestones

Milestones (Algorithm Cal/Val and LTM)	Original Date	Forecast Date	Actual Date of Completion	Variance Explanation
JPSS-3/JPSS-4 Data System Event	Jan-24	Jan-24 (early 2024)	JPSS-3 JCT1 Dry Run (11/2/2023); JCT1 Event (01/01/2024)	Science teams are not expected to process or perform analysis on this JPSS-3/JPSS-4 test data made from JPSS-2 (Mary Hunter)
FY24 Program Management Review (all teams)	Jun-24	Jun-24		
GOSAT-GW End to End	Aug-24	Aug-24		
AST-2023 (VIIRS Annual Surface Type)	Sep-24	Sep-24		
Reprocessing and transfer of EDRs to CLASS	Sep-24	Sep-24		
JPSS-3 pre-launch test data review/analyze (SDR teams); JPSS-3/JPSS-4 activities/reviews support	Sep-24	Sep-24	On-schedule and on-going following JPSS-3 and JCT schedules	
Maintain / Update ICVS (develop ICVS modules to support various activities: monitoring, inter-sensor comparison, …)	Sep-24	Sep-24	On-schedule and additional improvements are on-going	ICVS has implemented modules for NRT monitoring of NOAA-21 ATMS. OMPS-NM, OMPS-NP, CrIS, and VIIRS. ICVS demonstrated basic functions for LP using SNPP data as a proxy and is waiting to receive NOAA-21 LP data.
Maintain / Expand (to include JPSS-2 products) JSTAR Mapper	Sep-24	Sep-24	On-schedule and on-going; will be completed based on NOAA-21 EDR Products Provisional Maturity (March-24)	Currently NOAA-21 AF (EFIRE), MiRS, VIIRS I5 and True Color images are in JSTAR Mapper. Some of the NOAA-21 EDRs are unavailable in the SCDR, and once available after Provisional Maturity, JSTAR Mapper will assimilate them
Images of the Month	Monthly	Monthly	On-schedule and on-going	

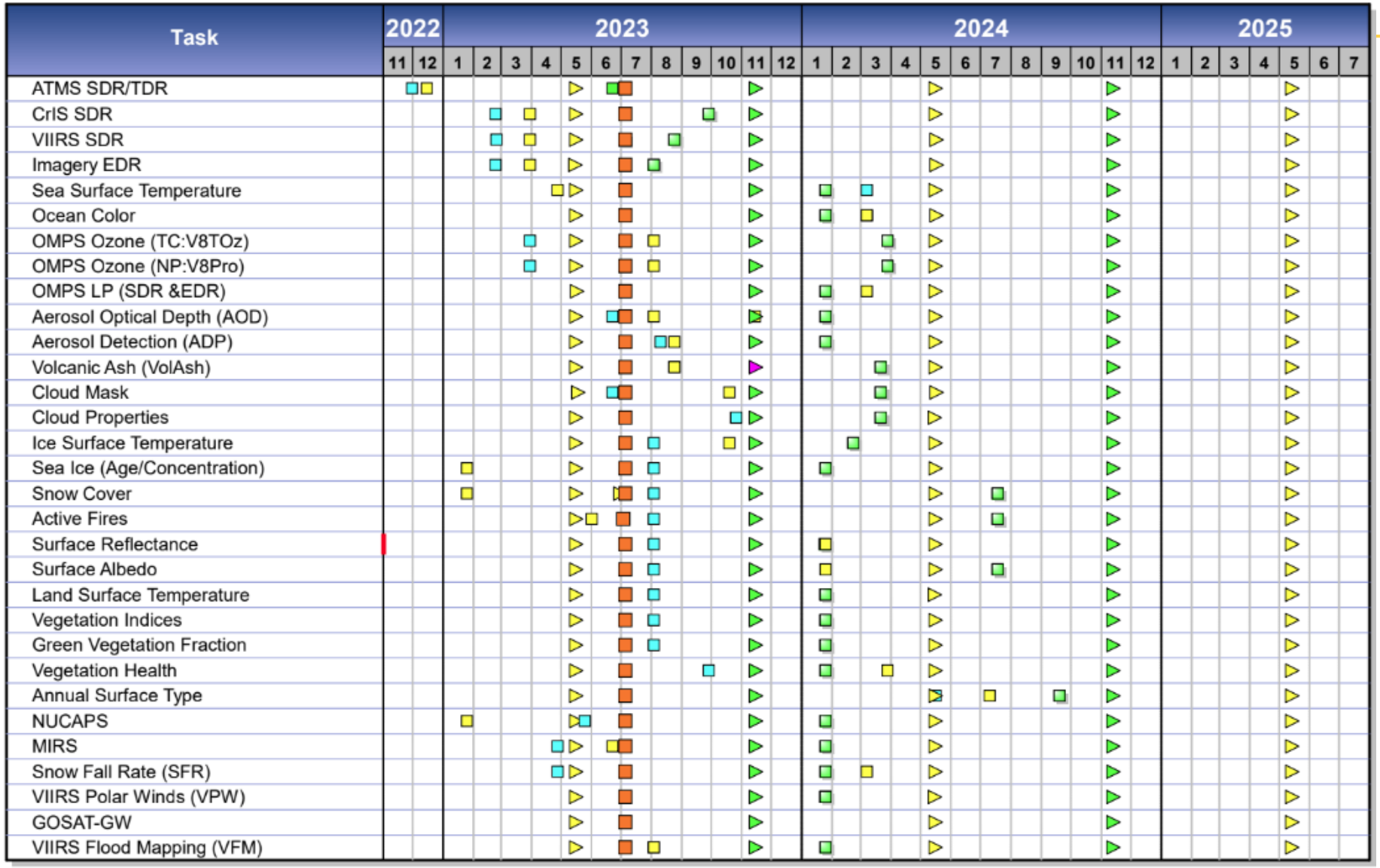
FY24 STAR JPSS Cal/Val Maturity Reviews

Milestones	Original Date	Forecast Date	Actual Date	Variance Explanation
OMPS SDR (NP & TC V:	**Mar-24**	**Mar-24**	**Validated Review planned in March 2024.**	
Clouds (V: Mar-24)	**Mar-24**	**Mar-24**	Provisional Review held (except for DCOMP and NCOMP): October 26, 2023; Attained Provisional effective March 30. **DCOMP and NCOMP Provisional Review occurred virtually on December 4, 2023,** and attained **Validated status** effective March 30.	
Aerosol AOD (V: Jun-24)	**Jun-24**	**Jun-24**	Attained **Validated** status effective March 30, 2023	
Aerosol ADP (V: Jun-24)	**Jun-24**	**Jun-24**	Attained **Validated** status effective March 30, 2023	
Volcanic Ash (V: Mar-24)	**Aug-23**	**Aug-23**	Attained **Validated** status effective March 30, 2023	
Cryosphere (B: May-23; P: Aug-23 for Sea Ice & Binary Snow; V: Feb-24 (SI & Binary Snow); V (other) :Jul-24	**Jul-24**	**Jul-24**	Ice Thickness/Age: Attained **Validated** status effective May 1, 2023. Snow Cover & Fraction: Attained **Validated** status effective May 1, 2023. IST and Ice Concentration: Attained **Validated** status effective May 1, 2023.	
Active Fires (V: Jul-24)	**Jul-24**	**Jul-24**	Attained **Validated** status effective March 30,2023.	
LST/LSA/SR/GVF/VI (P: Jan-24; V: Jul-24 to Jan-25 FY25)	**Sep-24**	**Sep-24**	LST: Attained **Validated** status effective June 23, 2023. Surface Albedo: Attained **Validated** status effective August 30, 2023. Surface Reflectance: Attained Validated status effective Nov. 1, 2023. GVF, VI: Attained **Validated** status effective June 23, 2023.	
Vegetation Health (V: Apr-25 FY-25)	**FY-25**	**FY-25**	Attained **Validated** status effective March 30, 2023	
Ocean Color (B/P: Jan-24; V:Jul-25 FY25)	**Jan-24**	**Sep-23**	**Beta/Provisional Review planned for 03/07/2024**	
SST (V: Aug-24)	**Aug-24**	**Aug-24**	Attained **Validated** status effective March 20, 2023	
VPW (B/P: Jan-24; V: Mar-24)	**Mar-24**	**Mar-24**	**Attained Validated status effective November 16, 2023.**	
VFM (V: Jan-25)	**FY-25**	**FY-25**	Provisional Review held 8/24; Attained **Validated** status December 14, 2023.	
NUCAPS P: Jan-25; V: Mar-Jun-24)	**Jun-24**	**Jun-24**	Attained **Validated** status effective September 26, 2023.	
MiRS (V:Oct-24)	**Oct-24**	**Oct-24**	Attained **Validated** status effective May 12, 2023	
SFR (P: Feb-24; V: May-24)	**May-24**	**May-24**	Attained Beta effective December 3, 2022	
OMPS NP EDR V8Pro & V8TOz & V8TOS (V: Mar-24)	**Mar-24**	**Mar-24**	OMPS NP EDR V8Pro Attained Provisional Effective June 20, 2023. OMPS NP EDR V8Toz Attained Provisional September 19, 2023.	
OMPS LP (B: Jan-24; P: Feb-24; V:Sep-24	**Sep-24**	**Sep-24**	**Beta and Provisional Review Planned for 03/07/2024**	

FY24 STAR JPSS Milestones

Operational/Program Support	Original Date	Forecast Date	Actual Completion Date
S-NPP: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	12/5/23, 12/12/23, 12/19/23, 01/03/24, **01/10/24, 01/17/24, 01/23/24, 01/30/24, 02/06/24**
S-NPP: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	12/05/23, 12/19/23, **01/03/24, 01/17/24, 01/30/24**
S-NPP: Monthly VIIRS LUT update of DNB Offsets and Gains	Monthly	Monthly	12/18/23, **01/22/24**
NOAA-20: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	12/5/23, 12/12/23, 12/19/23, 01/03/24, **01/10/24, 01/17/24, 01/23/24, 01/30/24, 02/06/24**
NOAA-20: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	11/28/23, 12/12/23, **01/03/24, 01/10/24, 01/23/24, 02/06/24**
NOAA-20: Monthly VIIRS LUT update of DNB Offsets and Gains,	Monthly	Monthly	12/18/23, **01/22/24**
NOAA-21: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	12/5/23, 12/12/23, 12/19/23, **01/03/24, 01/10/24, 01/23/24, 02/06/24**
NOAA-21: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	11/28/23, 12/12/23, **01/04/24, 01/10/24, 01/17/24, 01/23/24, 01/30/24, 02/06/24**
NOAA-21: Monthly VIIRS LUT update of DNB Offsets and Gains	Monthly	Monthly	12/18/23, **01/22/24**
Mx builds deploy regression review/checkout (Mx9/MX10)			✔ MX9: STAR submitted I&T Report (1/18); **TTO: 2/8/2024** ✔ Mx10: May 09, 2024

STAR JPSS Schedule: TTA Milestones



Color code:

Green: **Completed Milestones**

Gray: **Ongoing FY24 Milestones**

Active Fires

January 2024

Accomplishments / Events:

- On January 30, Ivan Csiszar presented the talk “The NOAA operational VIIRS active fire product: recent updates and long-term plans” at the 2024 Annual Meeting of the American Meteorological Society
  - The meeting also provided an opportunity for in-person coordination among fire product development teams and interactions with users
- The team analyzed a case of exclusion of fire pixels in the sun glint zone and is evaluating possible updates to the sun glint screening procedure
  - This is an issue similar in nature to the loss of detections due to conservative internal cloud screening

Overall Status:

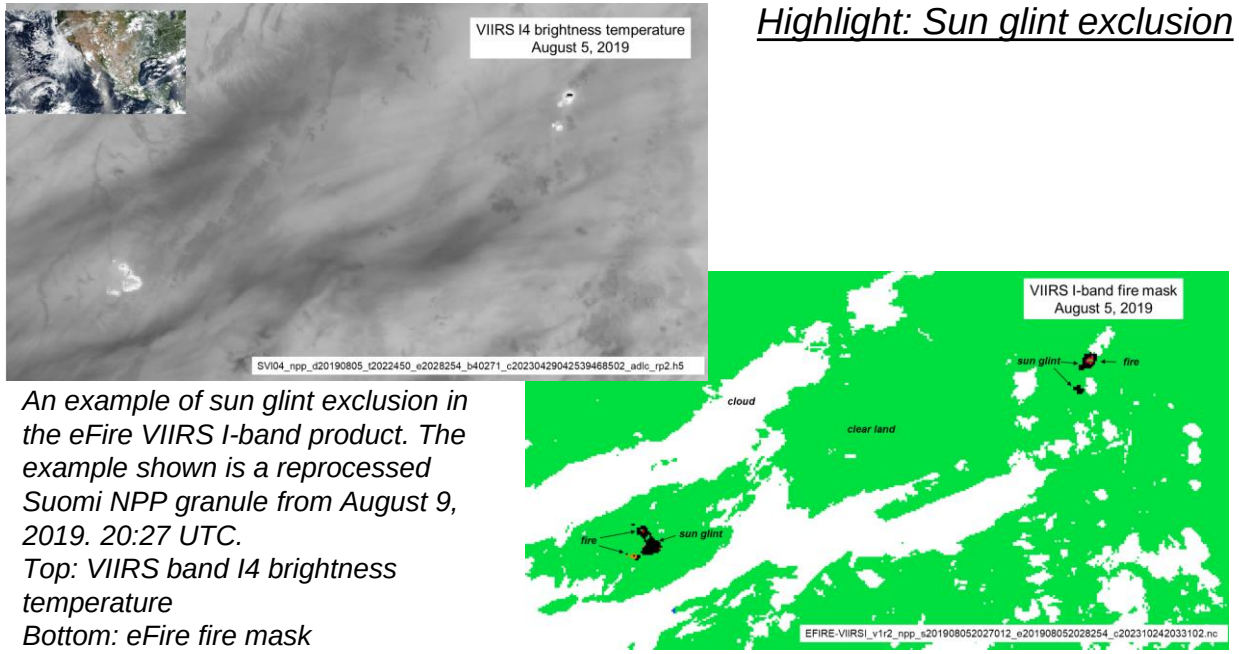
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

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
Baseline / eFire / NGFS cross verification and cal/val	Sep-24	Sep-24		
eFire NOAA-21 validated maturity analysis	Jul-24	Jul-24		
Reactive maintenance of Suomi NPP, NOAA-20 and NOAA-21 I-band NDE and NCCF products	Sep-24	Sep-24		
Suomi NPP / NOAA-20 NOAA-21 data analysis and feedback	Sep-24	Sep-24		

Highlight: Sun glint exclusion



An example of sun glint exclusion in the eFire VIIRS I-band product. The example shown is a reprocessed Suomi NPP granule from August 9, 2019. 20:27 UTC.
Top: VIIRS band I4 brightness temperature
Bottom: eFire fire mask

Aerosol

October 2023

Accomplishments / Events:

- AAC team member Jim Limbacher is developing an experimental over ocean aerosol layer height algorithm using a single VIIRS channel which is an M9. These retrievals are reliable only for aerosol optical depths > 0.5 and potentially have cirrus influence.
- AAC team member developed a new VIIRS and TROPOMI blended aerosol detection algorithm. This enterprise approach allows for smoke and dust retrievals from METImage, TROPOMI, and VIIRS using consistent science across all platforms
- In preparation for Metop-SG launch, EUMETSAT has released new proxy datasets for METImage and UVNS. AAC team downloaded the data for testing of aerosol detection algorithm
- Kondragunta and Cheeseman are drafting a policy paper entitled “Can satellite data drive public policy of fine particle pollution?”
- Kondragunta and Laszlo worked with OCS PPM manager Kari St. Laurent in updating aerosol detection product project plan in preparation for FY24. One of the milestones is for NOAA-21 aerosol detection product to reach provisional maturity level. For aerosol optical depth, complete development and evaluation of new over-land aerosol models for VIIRS is one of the milestones.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation

Overall Status:

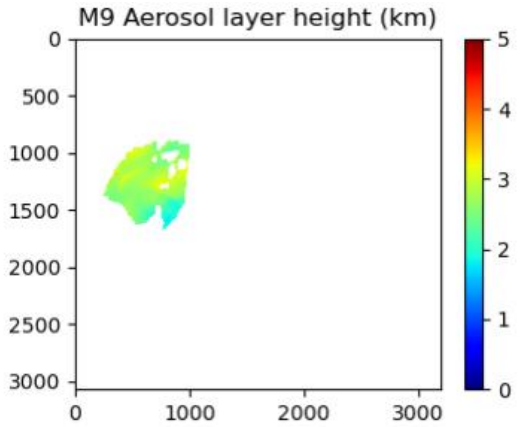
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

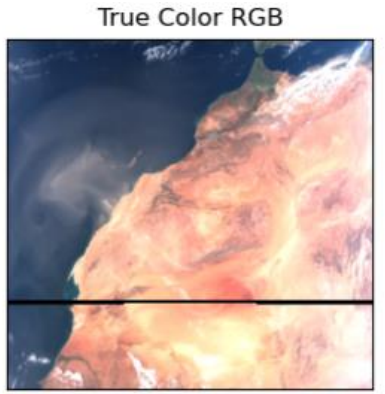
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

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

Highlight:





An experimental aerosol layer height over ocean using VIIRS M9 (1.3 um) for dust transport case. Example retrieval for March 30, 2023

ATMS SDR

January 2024

Accomplishments / Events:

- Attended 104th AMS annual conference in Baltimore. Team members presented oral and poster in various sessions to demonstrate the S-NPP/NOAA-20/NOAA-21 ATMS operational data quality and the latest calibration related science improvements by JPSS ATMS Cal/Val team. The presentations include,
  - Characterization of NPP/JPSS ATMS Science Data Long-Term Inter-Sensor bias (oral) by Ninghai Sun, et.al.
  - Validation of Lunar Microwave Radiative Transfer Model by Using the Calibrated Two-Dimension Moon Scan Observations from NOAA-20 and NOAA-21 ATMS instrument (poster) by Hu Yang, et.al.
  - On the Study of the Absolute On-orbit Calibration Consistency between ATMS Instruments. Shown in Figure 1 is the all on-orbit ATMS SDR scan angle dependent bias comparison indicating a consistency among them (poster) by Hu Yang, et.al.
  - NOAA-21 ATMS Geolocation Performance Post-Launch Validation (poster) by Siena Iacovazzi et.al.
- Started the QuickSounder project related calibration/validation planning to support LEO program activities.
- Successfully tested ADL Mx9 in STAR CentOS9 (RHEL9) server with help from other SDR teams and ASSISTT. Due to the STAR IT security requirements, all STAR linux servers, including Virtual Machines (VMs), will be upgraded directly from CentOS7 to CentOS9. The successful completion of ADL compilation test ensures that ATMS operational calibration algorithm or PCT updates can be performed in the latest CentOS9 servers. Additional test is the EBX function in the new package, which is used to update ATMS PCT and output SDR data format when new calibration algorithm is implemented.

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.*

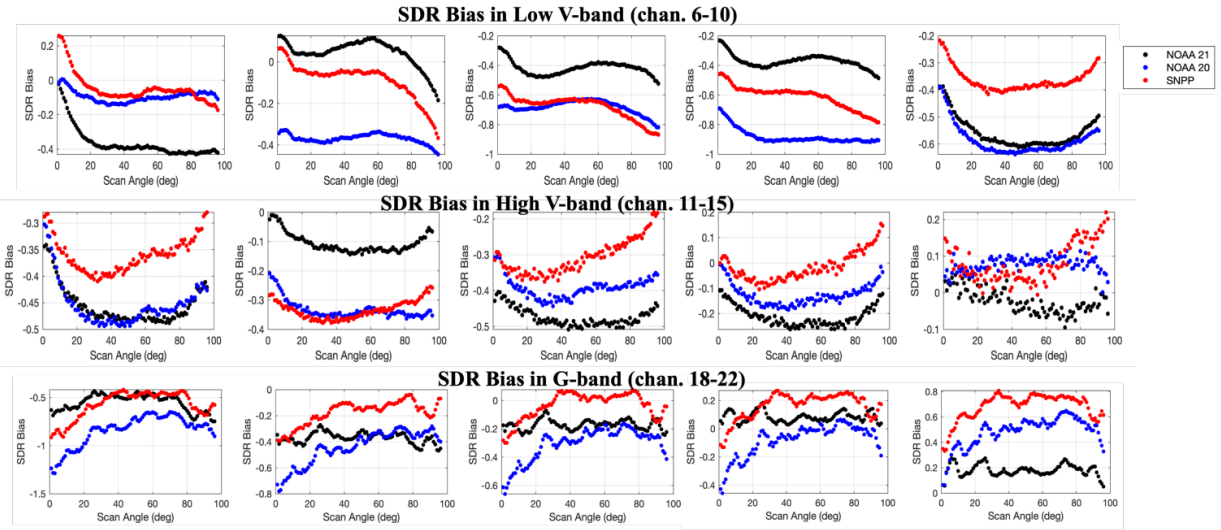
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Date	Variance Explanation
JPSS-3 ATMS preliminary analysis of calibration coefficients	Feb-24	Feb-24		
ATMS Spectral Response Function (SRF) evaluation report and dataset	Mar-24			
ATMS geolocation correction algorithm assessment	May-24			
Improvement for lunar intrusion correction model including LUT update	Jun-24			
ATMS cold bias dynamic correction assessment and algorithms update	Sep-24			
Review/Checkout of IDPS Mx Builds SOL and I&T Deploy Regression data	Sep-24			
Review of JPSS-3/4 ATMS pre-launch data to provide Ground support	Sep-24			
Conduct maintenance including anomaly resolution of on-orbit ATMS sensors	Sep-24			
Provide support to Metop-SG Joint Cal/Val Activities	Sep-24			

Highlights:

Figure 1. S-NPP/JPSS ATMS SDR data scan angle dependent bias comparison at V-band and G-band channels



Clouds

January 2024

Accomplishments / Events:

- The Cloud team is now working on the Readmes for the products for the fully validated algorithms. Full validation was not done with any review, but it is expected that there will be a validation run with downstream algorithms one the new LUT and code is provided..
- Work is ongoing with the replacement of NCOMP with the ACHA Cloud optical depths. Also expecting a new ECM LUT in Early 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:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Integrate new ECM lookup table to allow easier threshold changes	Mar-23	Apr-24		Current LUT works good, but developing new LUT and waiting for integration date.
Validate CCL that was recently delivered, especially convective/supercooled layers as part of CCL Beta review	Jul-23	Dec-24		Ongoing

Highlights:

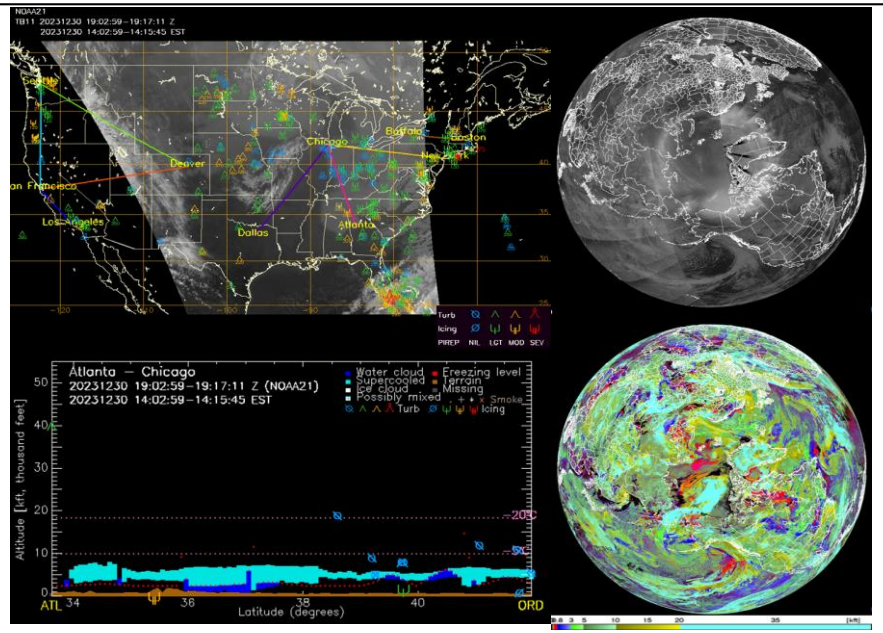


Figure 1.Example of a cloud cross-section from NOAA-21 VIIRS along a flight path between Atlanta and Chicago with 10.7-µm image over CONUS (left: 19:02 UTC - 20:19 UTC on 30 Dec 2023) and Cloud Base Altitude with DNB (right) on CIRA's SLIDER which has been updated with the addition of NOAA-21 VIIRS data

CrIS SDR

January 2024

Accomplishments / Events:

- The return of NOAA-21 CrIS elevated imaginary radiances was observed from mid-January 2024 onwards (**Fig. 1**). A new methodology is proposed to differentiate the NOAA-21 artifact from a lunar intrusion case (**Fig. 2**). The NOAA-21 CrIS beamsplitter temperature is being studied as a proxy of monitoring the NOAA-21 CrIS imaginary radiance observation
- Multiple presentations from the CrIS SDR Team were presented at the 2024 AMS meeting, including on the SNPP Scan Baffle Anomaly resolution and work on the CrIs vs COSMIC-2 RO intercomparisons.
- Radiometric and spectral comparisons between Mx9 I&T CrIS radiance product and Mx8 operational data were performed. The validity of the algorithm code change implemented in Mx9 was confirmed. It has been found (and consequently recommended) that the Mx9 I&T CMO (Correction Matrix Operator) is to be implemented in the operational environment moving forward
- Initial results in preparation for the NOAA-21 CrIS vs COSMIC-2 RO intercomparisons via CRTM were generated (**Fig. 3**) including refinement of the associated Weighting functions used for channel selection for the intercomparison.
- Continued investigation into the CrIS/IASI intercomparison software, extracting more data from available sources and looking at bias on a raster with time and wavelength axis (**Fig. 4**), investigated change in slope of bias temperature with respect to delta time (**Fig. 5**), and investigated other parameters, such as solar zenith angle (**Fig. 6**). Began investigating the role of climatic variables (e.g. total cloud cover) on the intercomparison method, and developing numerous codes
- Documented proposed End of Life (EOL) of SNPP CrIS activities. Presented these proposed activities SNPP CrIS EOL and revised the document based on recommendations.
- On 2024-01-24 between 20:00 and 20:30, a star tracker photo mode calibration was done on NOAA-21 CrIS, resulting in an off-nadir attitude. Rigorous assessments of data quality, radiometric and spectral analyses, geolocation accuracy assessment, CrIS/IASI SNO intercomparisons for 1/24 – 1/26 overpass with MetOpC (**Fig. 7**). All confirms that the SDR data quality is nominal and impact was minimal
- Made advances on the TVAC spectral calibration procedure. The UMBC TVAC software was used to analyze the JPSS CrIS TVAC gas cell data, radiances and compute measure transmittances. Parameters from this data were computed for tests that can be used for further refinement of LBLRTM transmittance simulation. Transmittances were calculated based on gas cell data, but the two different hot blackbody temperature plateaus were calculated separately (**Fig. 8**)
- Continue to monitor the NOAA-21 CrIS instrument (quality flags, CrIS-ABI intercomparisons, NEdN noise monitoring, geolocation accuracy, instrument responsivity, telemetry), along with the other two sensors (NOAA-20 and S-NPP)

Milestones	Category	Original Date	Actual Completion Date	Variance Explanation
New CrIS geolocation accuracy assessment using VIIRS terrain-corrected data	Sustain	Feb-24		
Participated in the JPSS-4 CrIS Pre-Ship Review (PSR)	Sustain	May-24		
Evaluate the long-tern NOAA-21 CrIS spectral reference performance after increasing the calibration interval	Sustain	Jun-24		
Review and analysis of JPSS-3 and JPSS-4 CrIS pre-launch data to provide Flight and Ground support	Sustain	Aug-24		
Perform characterization and mitigation activities on elevated imaginary component of NOAA-21 CrIS radiance products	Sustain	Sep-24		
Review/Checkout of IDPS Mx Builds SOL and I&T Deploy Regression data	Maintain	Sep-24		
Perform the transition of Cal/Val activities to the Cloud environment	Maintain	Sep-24		
Conduct maintenance including investigation and anomaly resolution of on-orbit CrIS sensors	Maintain	Sep-24		
Provide Support to Metop-SG Joint Cal/Val Activities	Maintain	Sep-24		

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	See Issues/Risks
Schedule			X	X	See Issues/Risks

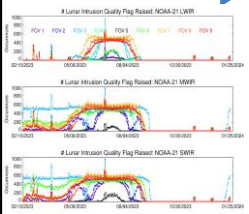
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

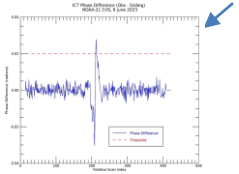
Red: There is a misalignment between the IDPS ground processing environment and NOAA-STAR. The IDPS ground processing will be based on RHEL Centos version 8 (RHEL8) starting with MX9 (TTO Feb 8, 2024). NOAA-STAR currently has RHEL7 (Centos version 7) and will migrate to RHEL9. **The risk is that NOAA-STAR will not be able to run or deliver the ADL code updates based on the IDPS Operational Processing.** Attempts to run the ADL Mx9 on RHEL CENTOS version 9 are in progress.
Yellow: The CrIS Team is still in need of hardware/software resources. Presently, there is only two server dedicated to 6 CrIS Team members. Access to additional servers is still desirable. There is a risk for the CrIS SDR Team to continue on such a single server environment for the operational CrIS Cal/Val activities that include 5 CrIS sensors (SNPP, JPSS-1 to -4). This may affect the timely completion of deliverables and program milestones. The recommendation is to have one additional server as soon as possible (< 2 months) and add another server in the next months. A new MATLAB license is also required. Corresponding hardware/software quotations and SNO have been submitted. Corresponding JSTAR CrIS Risk/Issue on Hardware and Software have been submitted for JSTAR interval review on Jan. 6, 2023.

Highlights:

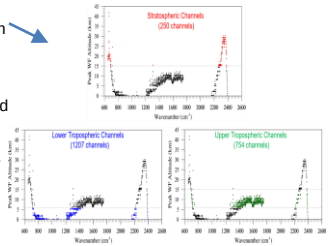
(1) NOAA-21 CrIS lunar intrusion quality flag time series since mission began, including the time series of NOAA-21 CrIS lunar intrusion quality flags impacted by the imaginary radiance anomaly.



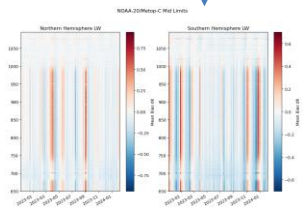
(2) NOAA-21 CrIS MWIR FOV3 ICT phase single scan minus the sliding window (average of 30 scans). Data points above the selected threshold value are part of the NOAA-21 artifact that gives the elevated radiometric noise.



(3) NOAA-21 CrIS channel groups based on the peak weighting function altitude. Stratospheric channels have little impact by cloud conditions. Lower and upper tropospheric channels are suitable for radiometric comparisons in clear-sky conditions.

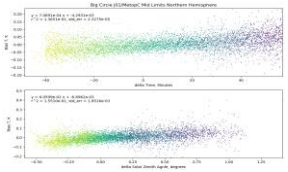


(4) NOAA-20 CrIS vs Metop-C IASI Long-Term Brightness Temperature Bias time series across the LWIR Band vi Big Circle SNO Method.

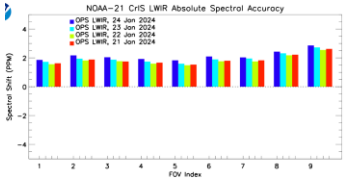


(5) Bias T, NOAA-20 & METOP-C, averaged over the entire band. Note that clear linear dependency with delta time waxes and wanes with seasons.

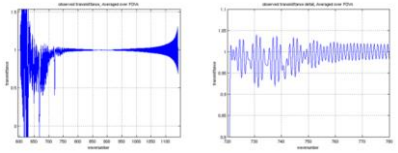
(6) NOAA-20 CrIS & METOP-C, bias T vs parameter. Delta Solar Zenith angle has slightly better correlation, but still not significant.



(7) On the day of the maneuver, the NOAA-21 CrIS spectral accuracy is consistent with the previous three days.



(8) Gas cell transmittances, averaged over FOVs, without self-apodization, fixed laser wavelength, Right: Zoom in to select wavelength channels



Cryosphere and Polar Winds

January, 2024

Accomplishments / Events:

- **JPSS Maturity Reviews for Polar Winds, Ice Thickness, and Snow Cover.** The JPSS Program held a Provisional Maturity review on 25 January 2024 for a variety of VIIRS products. Polar winds, Ice Thickness/Age, and Snow Cover are three of the products in which CIMSS and its NOAA colleagues have developed and were reviewed. The review presentations showed validation results demonstrating that the products meet the mission requirements for accuracy. The JPSS review board noted that the products exceeded the requirements for the Provisional Maturity stage, and recommended that they be declared Validated Maturity, meaning that the products are ready for operational use based on documented validation findings and user feedback.
- **Snow extent anomaly in North America in December 2023 seen in VIIRS and GMASI products.** Warm and dry weather over North America and particularly over the CONUS area in December this year has resulted in record low values of the continental snow cover extent. GMASI automated snow maps as well as daily snow cover maps derived from VIIRS observations present valuable sources of data to explore the development of this anomaly and provide its quantitative assessment. As follows from GMASI data (Figure 1), the snow cover area in North America stayed within 13-14 10^6 km^2 during most of the month of December this year. With the typical continental snow extent of 17 10^6 km^2 in the end of December, the deficit reached ~3.5 10^6 km^2 or around 15% of the mean value.

Task Category	Task/ Description	Start	Finish	Deliverable	Requirement (Dev Only)
Development (D)	Investigate the value added in including I-band product.	10/2023	9/2024	I-band ice products in ops	
Development (D)	Make improvements to blended VIIRS + AMSR2 SIC product in Marginal Ice Zone.	10/2023	9/2024	Daily blended Sea Ice Concentration Product	Same as VIIRS SIC EDR

Highlights:

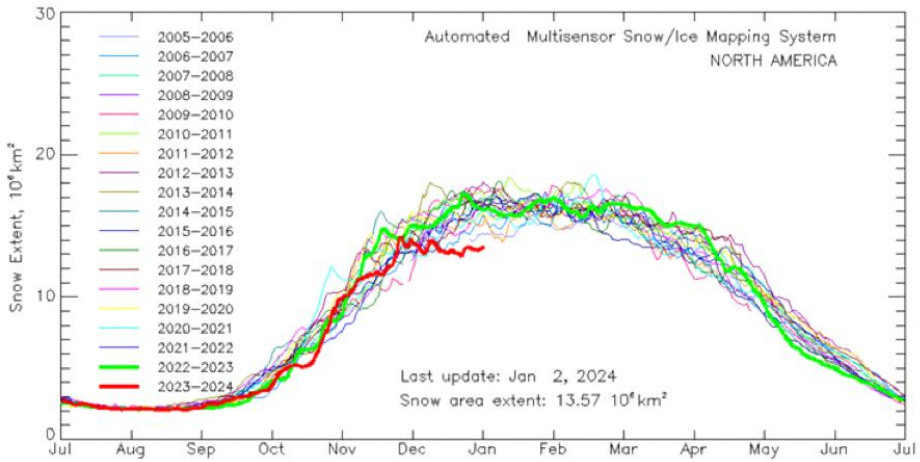


Figure 1. Seasonal snow extent time series inferred from GMASI daily snow and ice cover maps.

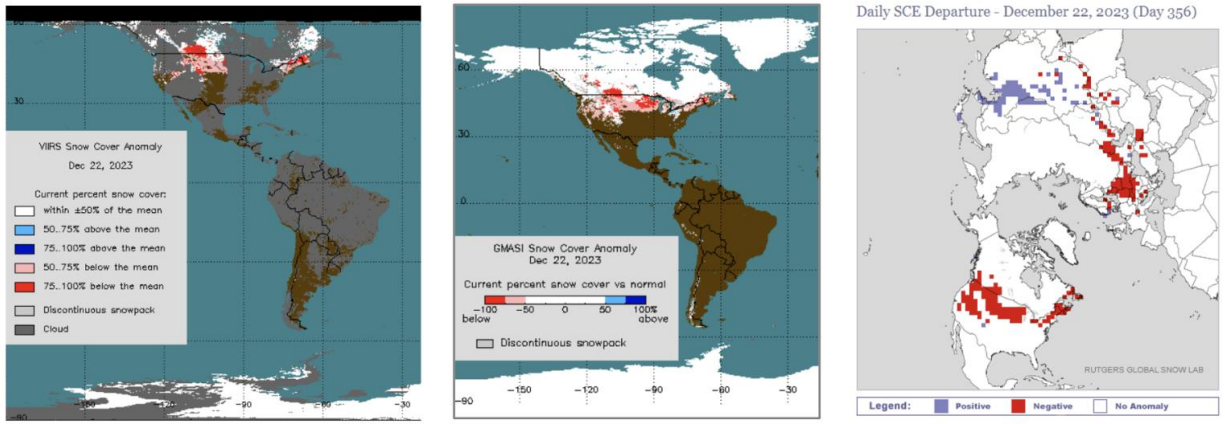


Figure 2: Snow extent anomaly on December 22, 2023 as per VIIRS data (left), GMASI (center) and Rutgers University analysis (right). For VIIRS and GMASI anomalies are calculated versus 1991-2020 means. For the Rutgers product the mean values were calculated using the 1970-2000 time period.

GCOM-W

Accomplishments / Events:

- Participated in the JAXA joint PI AMSR2/AMSR3 meeting conducted on November 6-9, 2023. An update of NOAA's AMSR2 activities and plans for AMSR3 were presented.
- Reviewed AMSR3 manuals provided by JAXA
- Submitted AMSR2 all-weather SST abstract to the AMS Tropical meeting
- Working with ASSISTT on transitioning the AMSR2 all-weather wind speed algorithm, which is currently running in the AMSR2 NRT R&D processing system.
- (S. Alsweiss, Z. Jelenak and P. S. Chang, "Extending the Usability of Radiometer Ocean Surface Wind Measurements to All-Weather Conditions for NOAA Operations: Application to AMSR2," in IEEE Transactions on Geoscience and Remote Sensing, vol. 61, pp. 1-12, 2023, Art no. 5301112, doi: 10.1109/TGRS.2023.3266772.)

Task Category	Task/ Description	Start	Finish	Deliverable	Requirement (Dev Only)
Development (D)	Assessment of all EDR's for AMSR2, initiate changes for AMSR3	Oct 2023	Sept 2024	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 2023	July 2024	Full L2 products from launch through July 2023	
Calibration & Validation (C)	Continue AMSR2 L1 monitoring; develop AMSR3 capabilities	Oct 2023	Sept 2024	Annual cal/val report; AMSR3 prototype off-line system	
Maintenance	Deliver any algorithm updates	Jan 2024	May 2024	Updated code to ASSISTT	

Overall Status:

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

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

Issues/Risks:

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

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

January 2024

Accomplishments / Events:.

- The JSTAR Mapper/STAR Environmental Monitoring System (STEMS) team identified problems with the display of the N21 NUCAPS sounding products and temporarily removed them form the display menu; work continues.
- The NPROVS team generated and presented results in support of NOAA-21 EDR NUCAPS soundings at the NOAA-21 EDR Maturity Review on January 25th. **(HIGHLIGHT)**
- A Statement of Work (SOW) for operating the JPSS Dedicated Radiosonde Program at Department. of Energy (DOE) Atmospheric Radiation Measurement (ARM) sites for FY24/25 was completed and forwarded to NOAA and DOE managers for review.
- NPROVS team member Michael Petty attended the American Meteorological Society Annual Meeting held in Baltimore, Md. (Jan 28 to Feb 2) and presented a poster entitled "*Fifteen Years of Collocated Radiosonde and Satellite Observations from the NOAA Products Validation System"*

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
CPC Morphing (CMORPH) technique transferred from JSTAR Mapper to STEMS	Q2	Q2		
NPROVS Special expanded to integrate advanced GRUAN CFH moisture radiosonde	Q4	Q4		
JPSS Dedicated Radiosonde Programs expanded to include new Bankhead National Forest (BNF) ARM site in northwest Louisiana	Q3	Q3		
NPROVS User Support expanded to integrate new NWS NUCAPS–Forecast Product	Q3	Q3		
NPROVS supports maturity review leading to operational NUCAPS for NOAA-21	Q2	Q2		

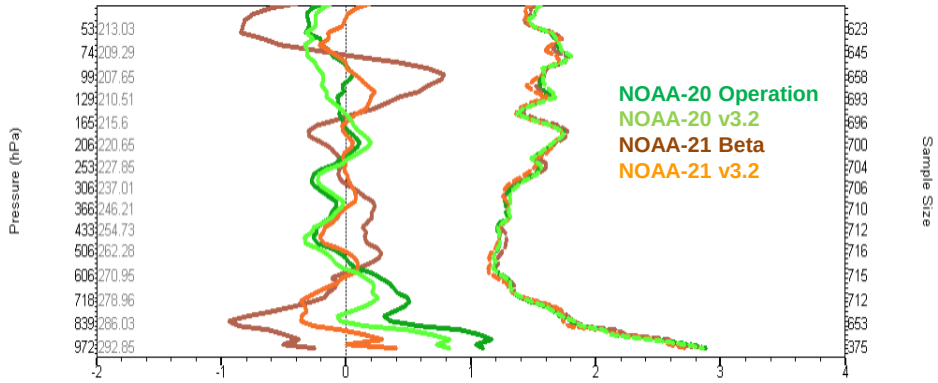
Overall Status:

	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



The above panels show vertical statistics of global "radiosonde minus NUCAPS" temperature Bias (solid) and Standard Deviation (dotted) from the surface to 50 hPa (20km). Results are shown for four independent versions (v) of NUCAPS products; **NOAA-20 operation**, **NOAA-20 v3.2**, **NOAA-21 Beta**, **and NOAA-21 v3.2**. Results are from a single Focus-day on September 21, 2023. It can be seen that among the 4 plots, that the candidate operational v3.2 for both **NOAA-20** and **NOAA-21** have the closest agreement (Bias) particularly in the lower portion of the troposphere. The v3.2 for NOAA20 is planned for implementation later this month and for NOAA-21, which was approved at the NOAA-21 EDR Maturity Review, in April.

ICVS

January 2024

Accomplishments / Events:

- Transitioned upgraded JPSS ATMS SDR data quality NRT inter-sensor comparison monitoring web page from beta site to operational site (https://www.star.nesdis.noaa.gov/icvs/comparison_ATMS.php) to support ATMS operational Cal/Val activities. This newly upgraded web page covers ATMS vs. ATMS and ATMS vs. AMSU/MHS inter-sensor bias trending using multiple evaluation methods.
- Reported NOAA-21 CrIS increased stability anomaly status in LW/MW/SW bands to CrIS SDR team. Similar anomaly pattern was observed in the middle of last year but disappeared around September. It appeared again fro early January 2024. Shown in Figure a is NOAA-21 CrIS LW DS stability plot on 1/1 and 1/31.
- Continue to process data for the trending product generation of OMPS NM deep convective cloud (DCC) inter-sensor comparison against VIIRS M1 band.
- Diagnosed NOAA-21/NOAA-20/S-NPP OMPS NM 32-day running mean inter-sensor bias trending anomaly. Reprocess the NOAA-21 OMPS NM data to re-build the 32-day inter-sensor comparison time series against S-NPP and NOAA-20. Fixed the processing bugs due to the data delay.
- Continued the diagnose of VIIRS vs. ABI inter-sensor comparison package processing error to improve the VIIRS SDR data quality inter-sensor bias vs. ABI monitoring reliability.
- Presented an oral presentation about the OMPS NM DCC inter-sensor comparison results at 2024 AMS.

Milestones	Original Date	Actual Completion Date	Variance Explanation
Promote the new ATMS inter-sensor web page to operational ICVS; Develop the new ICVS web page about NOAA21 NM DCC and NOAA-21 NM against VIIRS M1 and promote it to operational ICVS in support of N21 OMPS final review; support to the OMPS SDR team for verification of the OMPS-CRTM; Update the ICVS for N21 LP SDR monitoring to support the LP EDR provisional review.	Feb-24		
Initialize STAR2Cloud Initiative ICVS package transition discovery and assessment activities (preparation for JPSS ICVS website migration into the cloud environment)	Apr-24		
Develop new modules for monitoring of JPSS SDR data anomaly upon region or latitude	May-24		
Update ICVS vector modules (e.g., NOAA-21 dynamic visualization , data volume to support the cloud transition) and promote the web page to the operational ICVS; develop new modules in support to the J3/J4 testing by using N21 data as proxy data sets	Jun-24		
Promote the new ICVS CrIS and OMPS inter-sensor web page to public-accessible ICVS; Upgrade the ICVS ATMS inter-sensor CRTM double difference modules	Jul-24		
Upgrade ICVS user-friendly anomaly alert modules for more key parameters; update ICVS user manual	Aug-24		
Upgrade the ICVS Anomaly Watch portal with more monitoring analysis results to support OSPO and other users	Sep-24		
Initialize an ICVS core-function prototype in cloud environment	Sep-24		
Develop new ICVS modules to support J3/J4 prelaunch testing	Sep-24		
ICVS maintenance for SNPP/NOAA-20/NOAA-21 (including 3D-ATMD hurricane tool)	Sep-24		

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.*

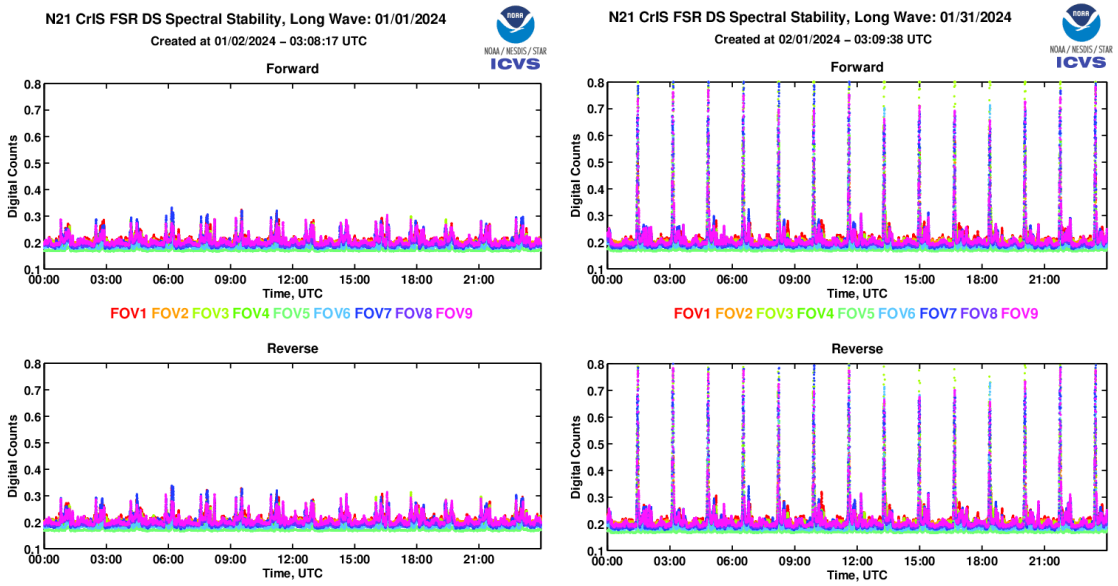
Issues/Risks:

None

Highlights:

Significantly contribute to STAR SDR Teams

(a) NOAA-21 CrIS LW band deep space spectral stability on January 1 (left) and January 31 (right)



VIIRS Imagery

January 2024

Accomplishments / Events:

- Downloaded and reviewed imagery from IDPS Block 2.3 Mx9 I&T, and submitted report.
- Developed a new JPSS CrIS Imagery Quick Guide for users, which can be accessed here.
- McIDAS-V 1.9 was released, and includes upgraded support of VIIRS Imagery EDR processing and display
- AMS Presentations
  - "CrIS Imagery for weather forecasters" - B. Line
  - "JPSS: Training Resources and How to Access the Data Online" - J. Torres
  - "Combining the Best of GOES-R ABI and JPSS VIIRS on Polar SLIDER" - C. Seaman
- Blog Posts with VIIRS Imagery
  - Christmas 2023 Central US Winter Storm
  - Early January 2024 Blowing Dust
  - Mid-Jan 2024 Northern US Plains Blowing Snow as Observed by GOES ABI and JPSS VIIRS Imagery
  - Tracking Widespread Fog with Satellite Imagery on 1/24/2024
- 35 VIIRS Imagery Posts on CIRA Social Media this Month. A few top posts:
  - NCC Imagery of world's largest iceberg (A23a) – 14.4K views
  - Snowmelt RGB reveals wintry precip types across northeast US – 9.5K views
  - Day Fire RGB Imagery of Grindavik, Iceland volcanic eruption – 8.6K 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			

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
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Issues/Risks:

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY25 Program Management Review	Jun-24	Jun-24		
Blowing Dust Climatology Paper Submitted (Includes VIIRS Imagery)	Jul-24	Jul-24		
Prepare and deliver the initial updates for the Imagery Cal/Val plan (updated for JPSS-3), ahead of PStR	Aug-24	Aug-24		
New ASF Tool code and updated NCC LUT – Test for 3 VIIRS	Sep-24	Sep-24		
New Imagery products or product enhancements (display on SLIDER)	Sep-24	Sep-24	continuing	
Realtime Imagery monitoring and display systems (SLIDER, etc.)	Sep-24	Sep-24	continuing	
Interesting VIIRS Imagery to Social Media and Blogs	Sep-24	Sep-24	continuing	
McIDAS-X/V Enhancements for processing/display of VIIRS Imagery	Sep-24	Sep-24	continuing	
Block 2.3 Mx builds deploy regression review/checkout (Mx9, Mx10, …)			Mx9: Jan-2024	

Highlights: Image of the Month

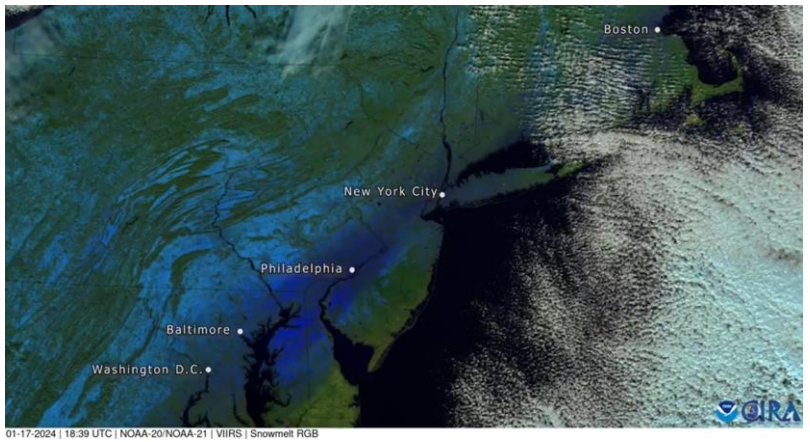

Figure: 17 Jan 2024 VIIRS Snowmelt RGB Imagery captures northeast US wintry precip cover, with fresh snow highlighted as light blue, and a wintry mix as darker blue. High-res Imagery can be found on the CIRA Satellite Library here.

Leaf Area Index

January 2024

Accomplishments / Events:

- Preparing the LAI Algorithm Theoretical Basis Document (ATBD) for the upcoming final delivery.
- Work with ASSIST on the LAI verification datasets preparation.
- Have a meeting with the primary user EMC model to update the product progress, get the feedback about the user requirements.
- Prepared the LAI monthly climatology for the Noah-MP model test.
- Investigated how the LAI works in the Noah-MP model and try to figure out how the fit current LAI product into the model, mainly focus on address the fraction of vegetation component fraction.

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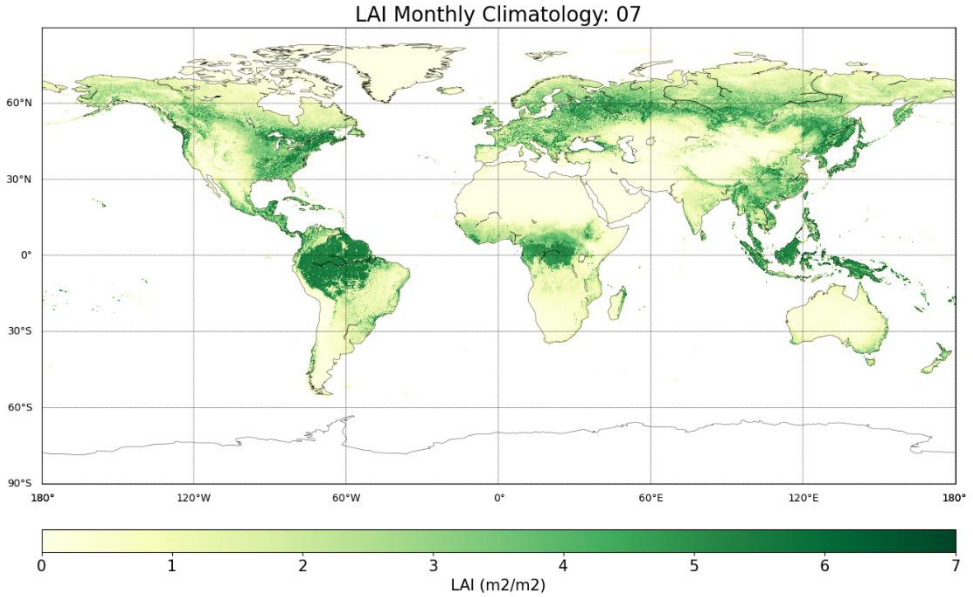
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
CCAP final Delivery	Feb-24	Feb-24		
Incorporate the LAI test data into the LSM model to evaluate the performance in the model	May-24	May-24		
Operational readiness	Jul-24	Jul-24		
Develop LAI routine monitoring and validation tool	Sep-24	Sep-24		

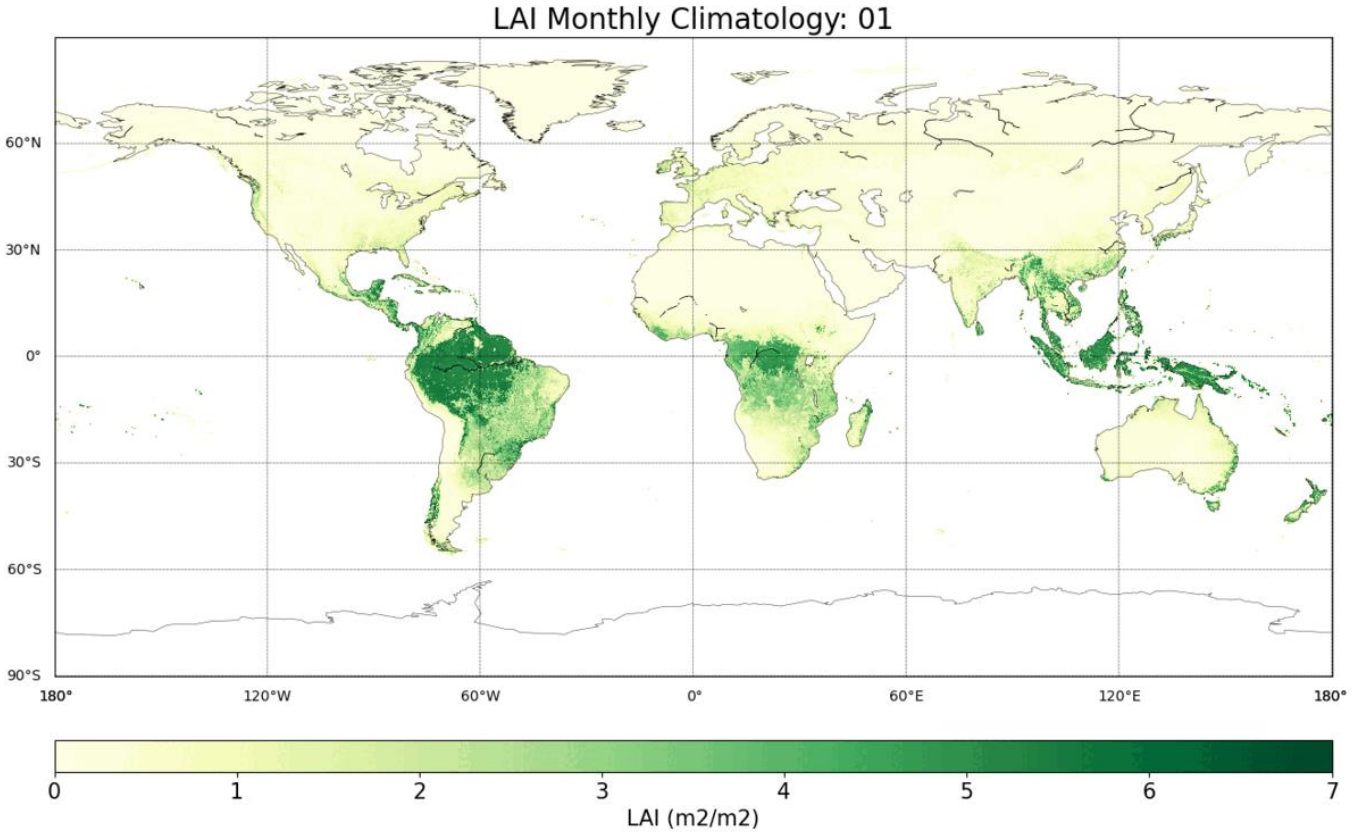
Highlights:



LAI Monthly climatology for the Noah-MP model test. (30 sec resolution)

LAI Climatology for Model Test

- LAI climatology
  - Based on GLASS LAI products, 2012-2021 (10 years data)
  - 8-day interval, at 500m resolution
  - Filled the gap to make it gap free.
  - Monthly climatology at 30 sec resolution for Noah-MP test.



- The GLASS LAI (version 6) is derived from reprocessed the time-series MODIS surface reflectance using the bidirectional long short-term memory (Bi-LSTM) model
- The training datasets fusing MODIS LAI and GEOv2 LAI products.
- The latest 10 years 500m resolution at 8-day interval was used for the climatology.
- Will compared with the climatology derived from reprocessed MODIS LAI.

Fraction of Non-Photosynthesis Vegetation, Bare soil and Green Vegetation

January 2024

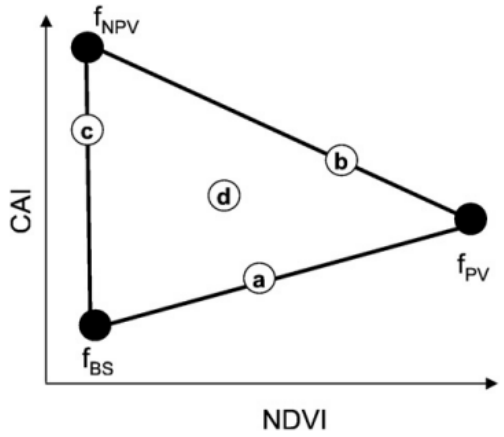
The vegetation fraction (NPV & Green vegetation) is import for LAI application in Noah-MP.

Spectral method:

- CAI is a good indicator for identifying NPV, however, MOIDS/VIIRS do not have equipped with these channels.
- Alternative method is to find other channels with strong relationship with CAI.
- Example: DFI = 100*(1-R2.2/R1.6)*(Red/NIR)

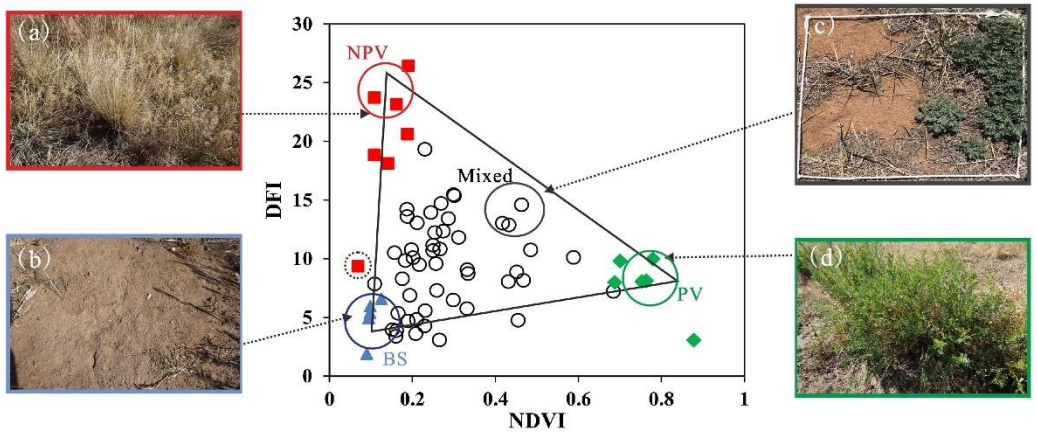
For VIIRS:

- M5, M7, M10, M11 could provide the SR information at 1km resolution.
- A monthly time series of F_npv, F_bs and GVF would be more robust.

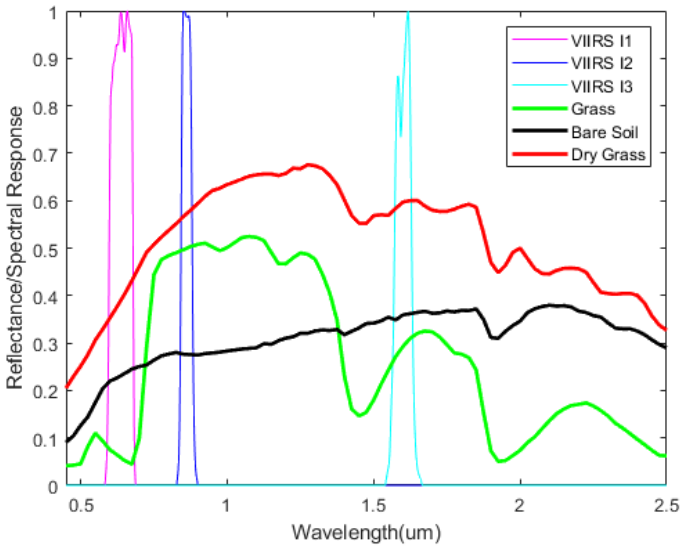


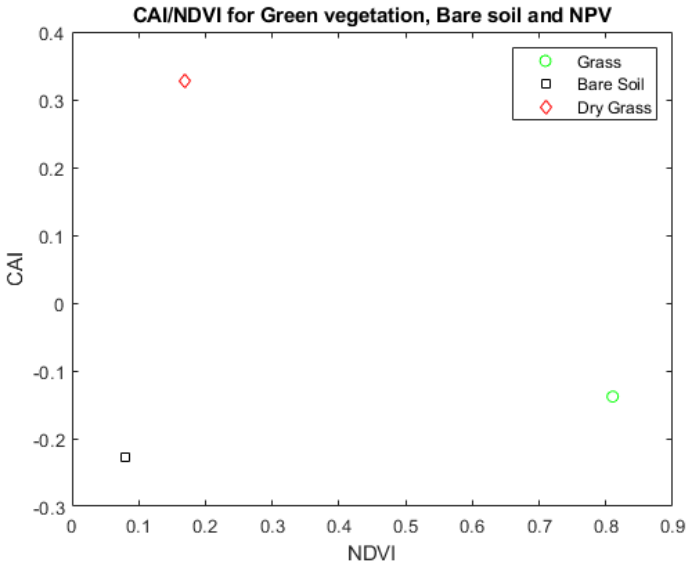
Cellulose Absorption Index (CAI) Triangle
Daughtry et al. 2004 Guerschman et al, 2009

$$CAI = [0.5 \cdot (\rho_{2.0} + \rho_{2.2}) - \rho_{2.1}] \cdot 10$$



DFI/NDVI for NPV, BS unmixing.
Wang, 2019





Surface Albedo

January 2024

Accomplishments / Events:

- Prepared and presented for NOAA-21 albedo Provisional Maturity Review.
- Quantitatively analyzed the impact of input data on albedo performance in cross-comparison
- Evaluated the correlation between HGT anomaly and LST anomaly to detect the temperature-related extreme weather 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			

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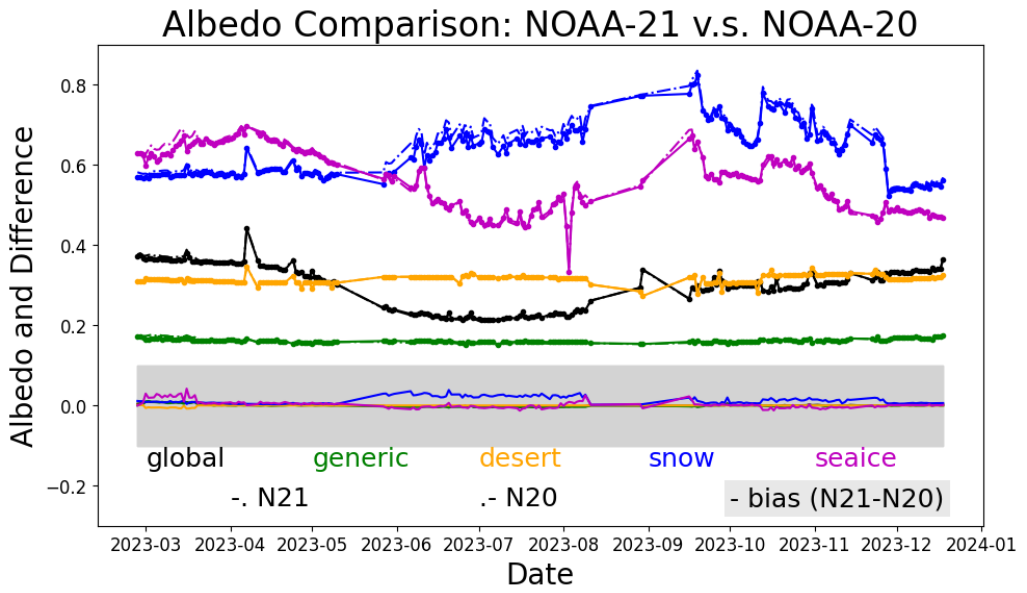
Issues/Risks:

Milestones	Original Date	Forecast Date	Actual Completion	Variance Explanation
Multi-parameter anomaly analysis report	Jan-2024	Jan-2024	Oct-2023	
Provisional maturity of NOAA-21 Albedo	Feb-2024	Jan-2024		
Support to JPSS-3 Data System Test Event in early 2024	Apr-2024	Apr-2024		
VIIRS BRDF/Albedo/NBAR Dataset to User	Oct-2023	May-2024	Oct-2023	
BRDF evaluation (manuscript)	Dec-2023	Jun-2024		
Enterprise Cal/Val Plan Initial Updates	Jun-2024	Jun-2024		
*NCCF Integration of BRDF/BSA/WSA/NBAR	May-2024	Jun-2024		
Enterprise Cal/Val Plan and Algorithm Update Peer Review Meeting	Aug-2028	Aug-2028		
Software package ready of blended SURFALB from all VIIRS sensors	Jun-2024	Aug-2024		
NOAA-21 validated maturity review	May-24	Sep-24		

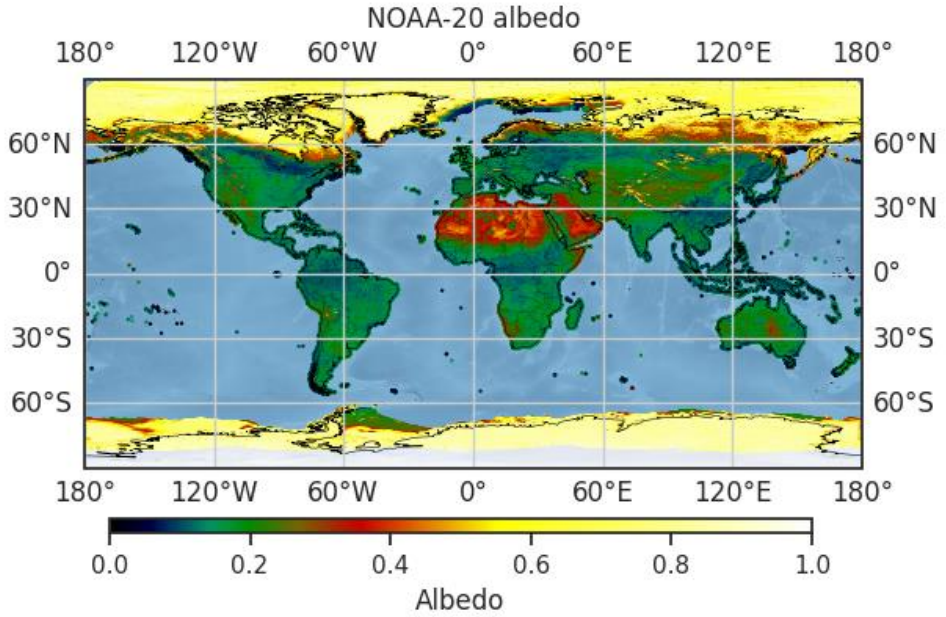
Highlights:

Global Albedo and Mean Difference Time-series



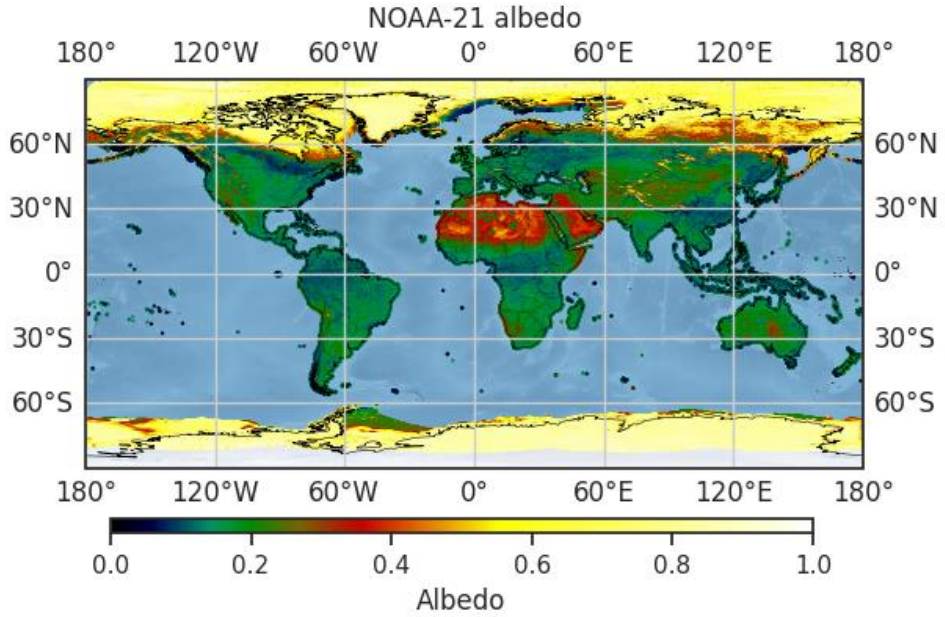
Global Albedo Cross-comparison

- Spring case (Apr 28, 2023)

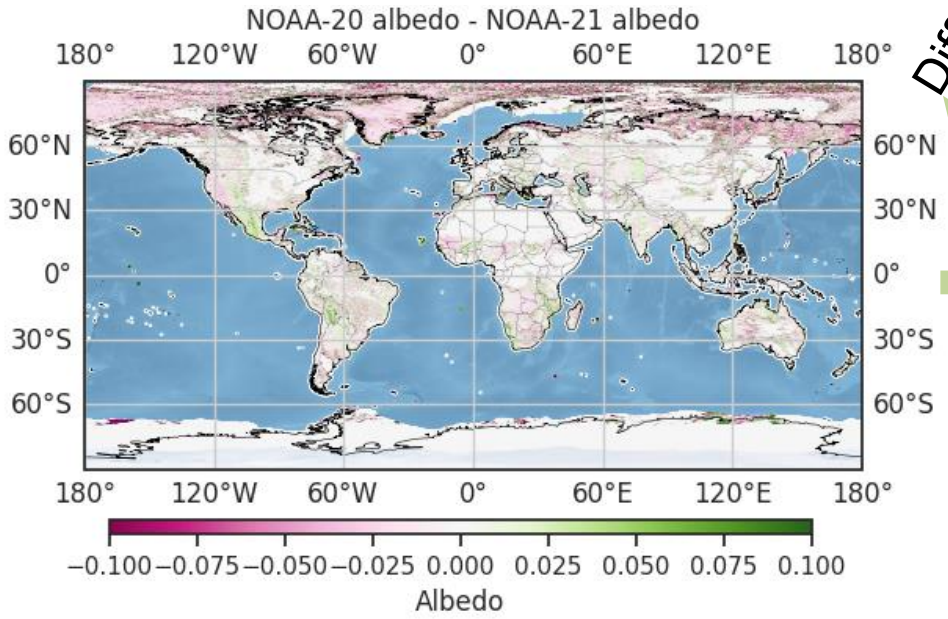


High consistency

NOAA-20 v.s. NOAA-21

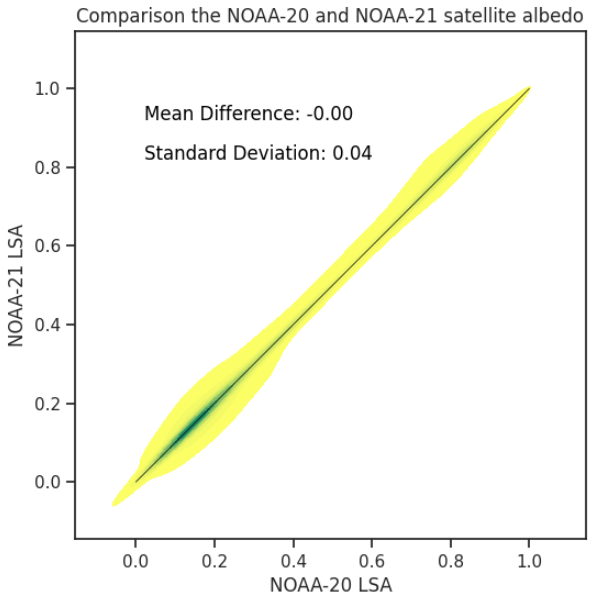


Difference Map



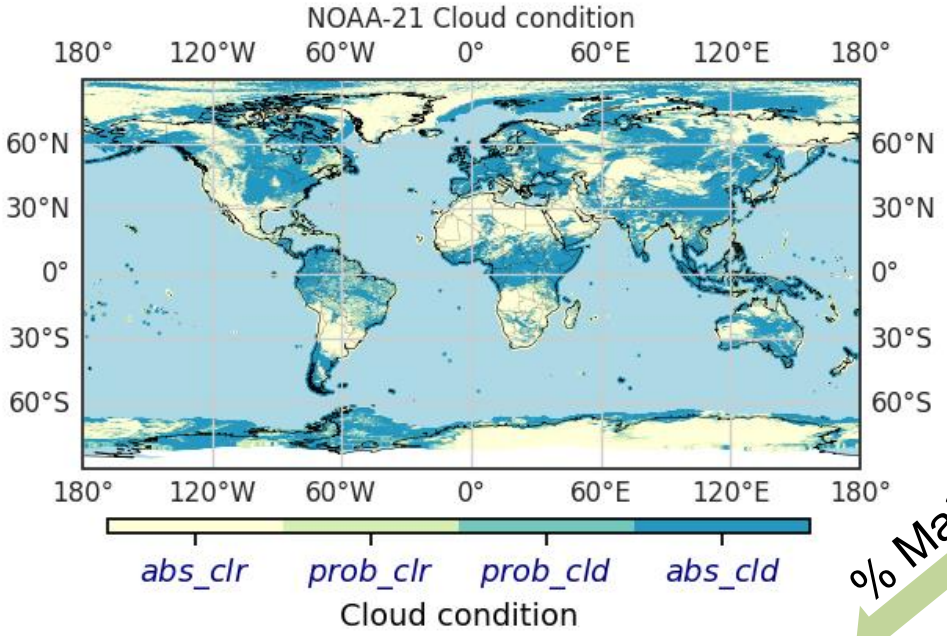
Statistics

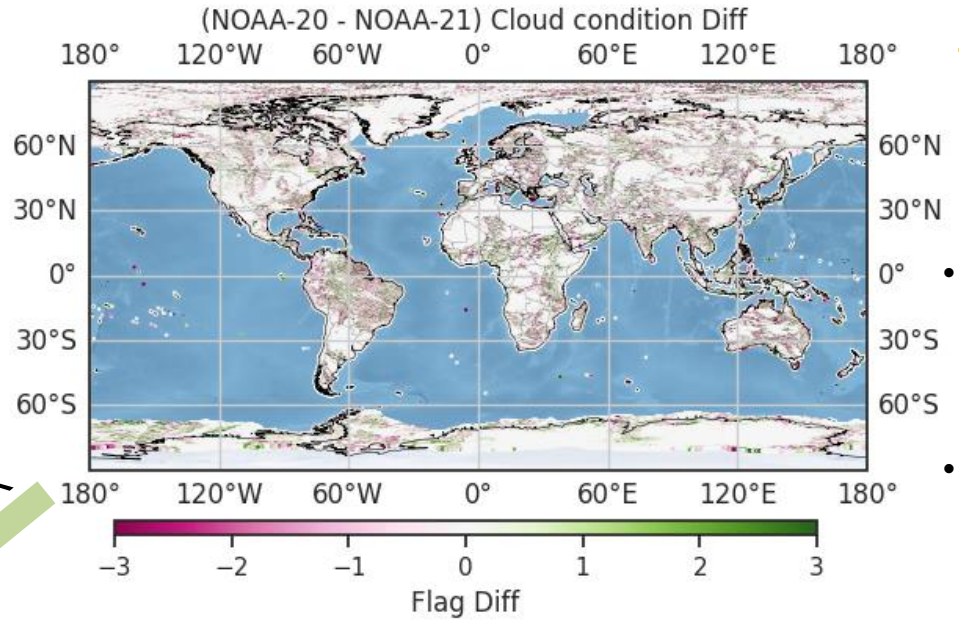
Bias and Std



- Zero bias exists between NOAA-20 and NOAA-21 albedo measurements.
- Some scattered differences are related to cloud conditions and variations in input data.

Global Albedo Cross-comparison and Difference Explanation





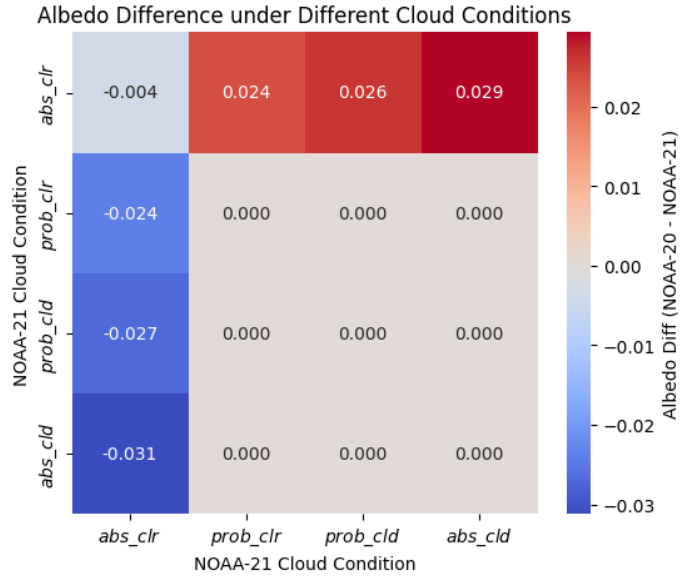
% Matrix

Pixel Percentage (%)		NOAA-21 Cloud Condition			
		Abs_clear	Prob_clear	Prob_cloudy	Abs_cloudy
NOAA-20 Cloud Condition	Abs_clear	38.16	1.77	0.77	3.85
	Prob_clear	1.67	1.7	0.59	1.67
	Prob_cloudy	0.86	0.6	1.1	2.13
	Abs_cloudy	3.91	1.73	1.9	37.59

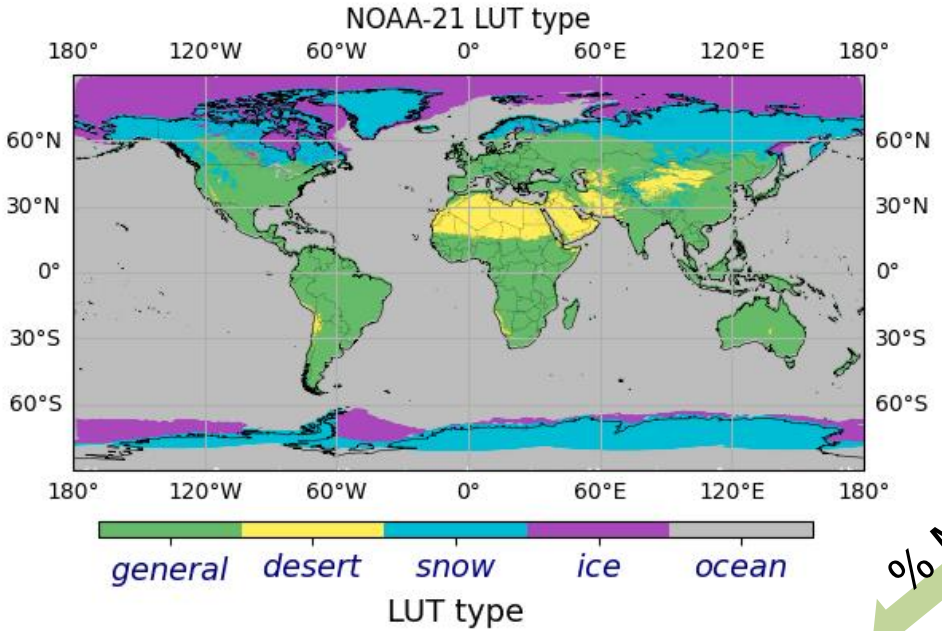
- Differences in cloud conditions between NOAA-20 and NOAA-21 are normal, considering the time elapsed between their observations.
- The albedo retrieval method is different from absolutely_clear to other types of conditions.
- The cloud inconsistency caused retrieval path difference leads to the scattered difference (larger group bias) in albedo

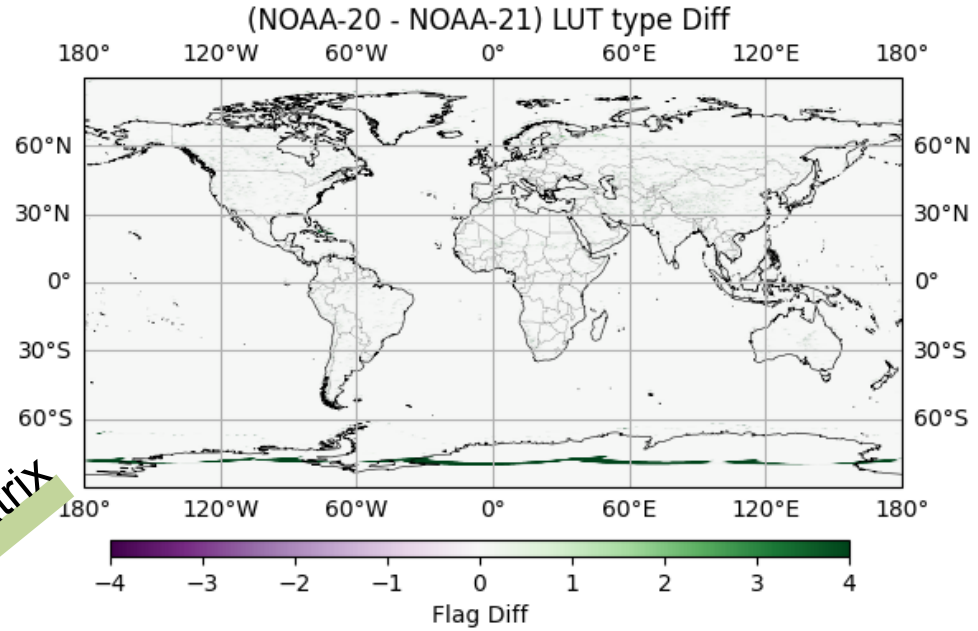
- Spring case (Apr 28, 2023)

Impact on Albedo Diff



Global Albedo Cross-comparison and Difference Explanation





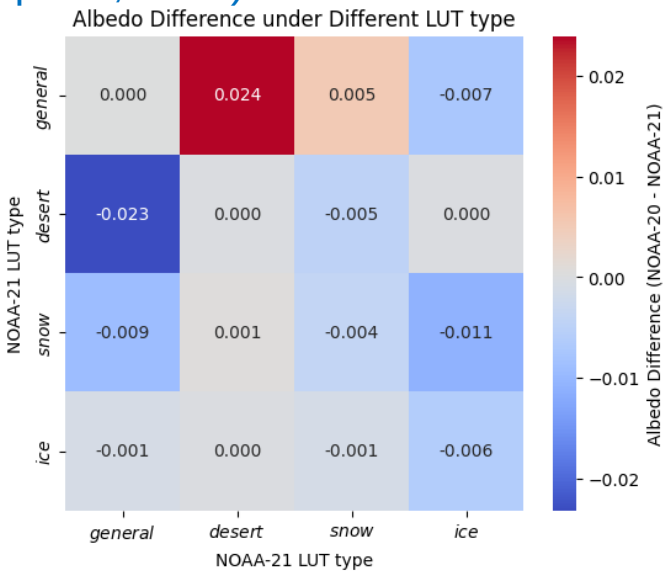
% Matrix

- The differences in surface type are smaller. The largest discrepancy occurs when there is a difference in the recognition of bare soil pixels. Another source of difference is the mapped snow/ice mask data. As they all lead to different LUT type during albedo retrieving.

Pixel Percentage (%)		NOAA-21				
		General	**Desert**	**Snow**	**Ice**	**Ocean**
NOAA-20	**General**	54.52	0.15	0.07	0.0	0.0
	Desert	0.16	11.35	0.01	0.0	0.0
	Snow	0.07	0.01	21.53	0.03	0.0
	Ice	0.0	0.0	0.04	12.06	0.0
	Ocean	0.0	0.0	0.0	0.0	0.0

- Spring case (Apr 28, 2023)

Impact on Albedo Diff



Heat/cold events detection and explanation from HGT anomaly

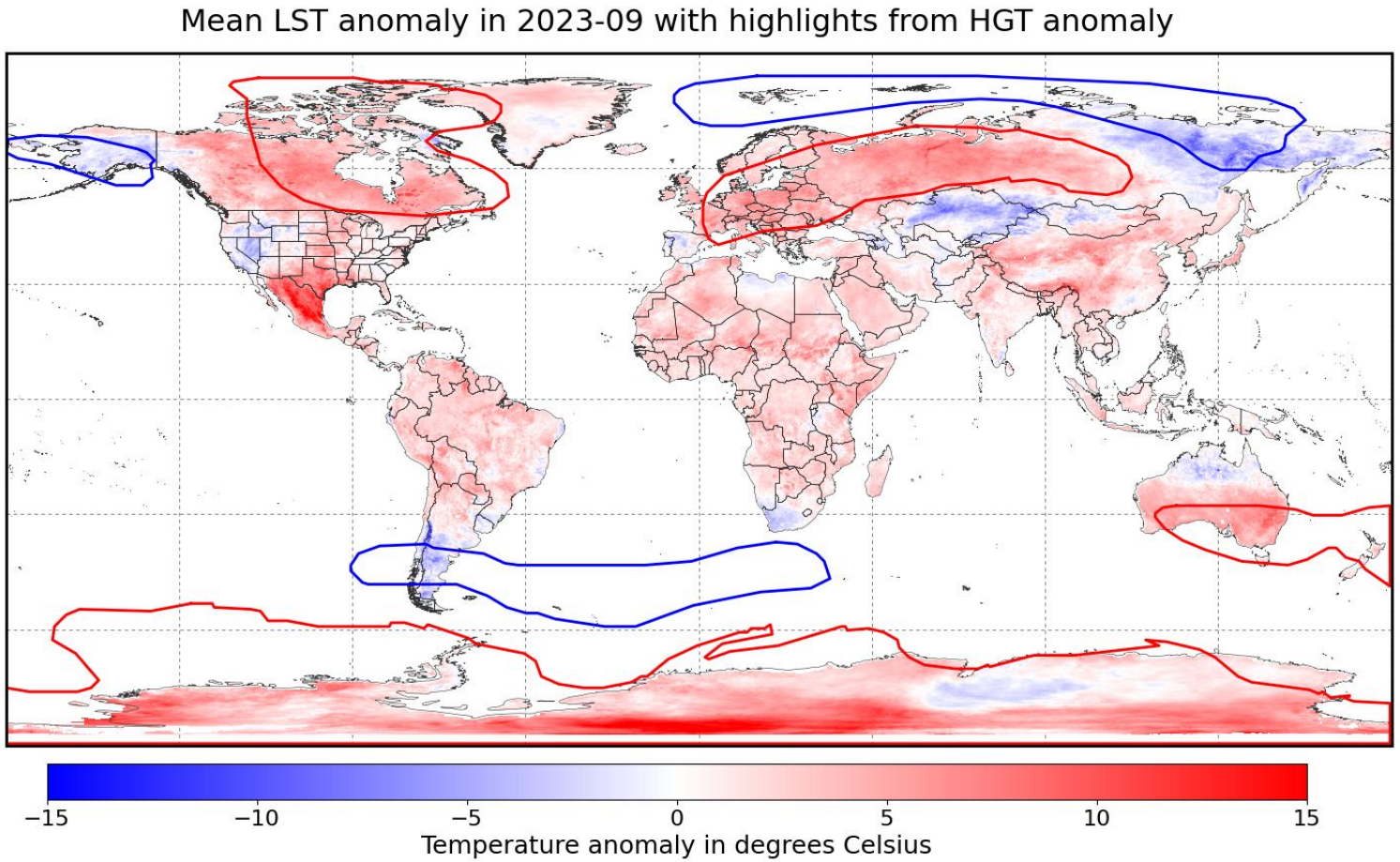


Figure. Mean Land Surface Temperature (LST) monthly anomaly with highlighted areas detected from Geopotential height (HGT) anomaly

The left figure shows a technique we are using to find and make sense of unusual temperature events. We use the HGT monthly changes to mark out areas in red or blue, which are placed on top of the LST monthly changes to track these unusual warm or cool periods.

This technology is automated and offers a feasible substitute for direct LST-based detection, which is significantly more challenging due to the fragmented distribution of LST, its restriction to land, and the difficulty in obtaining complete shapes.

Additionally, this way can help us to understand the reasons behind these extreme temperature events.

Heat/cold events detection and explanation from HGT anomaly

Considering that high geopotential height variations usually go hand in hand with warmer weather, the histogram in Figure 2 shows that the higher than normal LST in areas with these high variations is what we would expect. On the other hand, areas with low geopotential height variations often have cooler weather, and the histogram reflects this with lower than normal LST in these areas.

This indicates that using geopotential height variations to identify and explain changes in LST is effective and can reliably distinguish between higher and lower than normal temperatures with statistical significance.

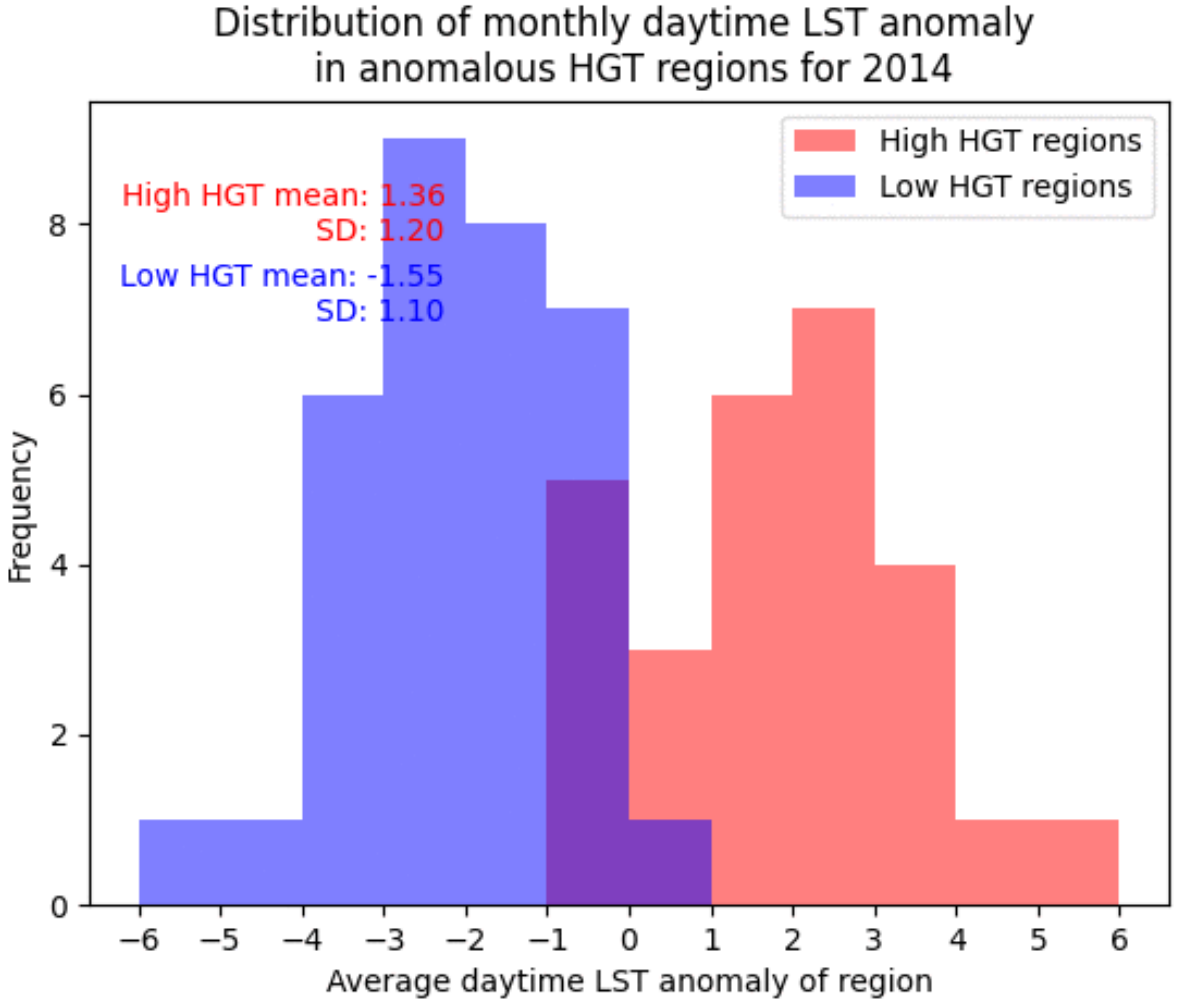


Figure. The histogram compares the distribution of monthly daytime Land Surface Temperature (LST) anomalies in regions with high and low geopotential height (HGT) anomalies, respectively, for the year 2023.

OMPS SDR

January 2024

Accomplishments / Events:

- Derived and delivered OMPS NM/NP weekly dark LUTs for SNPP, NOAA-20 and NOAA-21.
- Derived and delivered SNPP/NOAA-20/NOAA-21 OMPS NP solar bi-weekly LUTs.
- Continued analysis of SNPP, NOAA-20 and NOAA-21 OMPS NP EV360 radiance values including comparing with NASA OMPS EV360 values.
- Presented a new ADR 10682, addressing the OMPS-NP dark over-correction for SNPP, NOAA-20 and NOAA-21.
- Continued analyzing Day-1 and synthetic solar spectra differences among 3 NMs and 3 NPs in support of N21 OMPS day-1 improvements.
- Continued the solar activity analysis for 3 NPs.
- Continued the analysis of NOAA-21 OMPS NM Stray-Light LUT that handles Out-of-Range (OOR) values.
- Continued to routinely monitor NOAA-21 OMPS dark calibration rate performance, gain and non-linearity trending.
- Tested the new NOAA-21 OMPS NP sample LUT to verify the hot pixel within the solar data.
- Conducted analysis of OMPS SDR data using TomRAD simulations.
- Presented 2 oral presentations in the 2024 AMS conferences.

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		

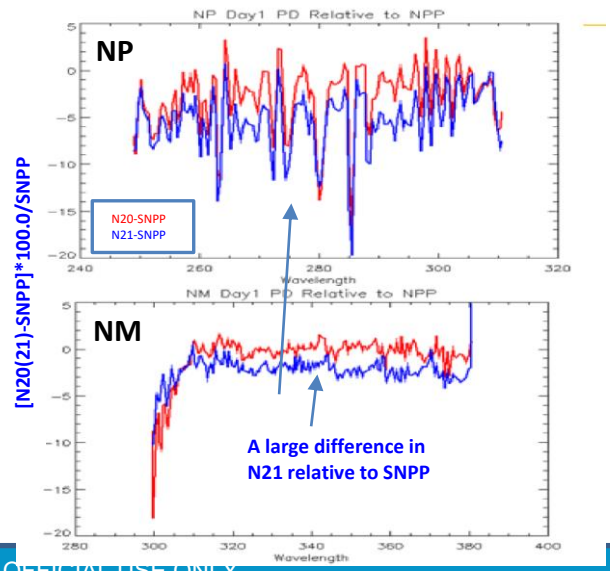
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

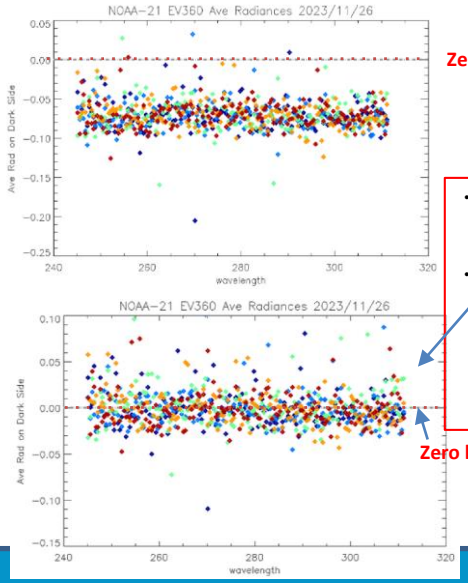
None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 solar day-1 improvement with solar activity impact correction; develop the out-of-range of SL table for N21 NM SDR; update the N21 NP ST LUT; compare with NASA datasets for NOAA-21 OMPS NM and NP SDR data (code is ready)	Jan-24	Feb-24		Day-1 improvement is on-going analysis
Improve latitude dependency of inter-sensor biases; reprocess (limited) N21 OMPS NM/NP SDR data sets (new dark LUTs); assess the consistency of N21 OMPS NM and NP at the dichroic range; conduct the inter-sensor comparison with Tropomi	Feb-24			
Finalize the NOAA-21 solar day-1 towards validated maturity; validate NOAA-21 OMPS SDR data quality using multiple ways (e.g., RTM, DCC, inter-sensor comparison with VIIRS); prepare NOAA-21 OMPS NM/NP SDR validated maturity review	Mar-24			
Reprocess the (SNPP, NOAA-20 and NOAA-21) OMPS NP SDR data by using the new dark, OSOL and SL tables; Initialize the OMPS and GEMS inter-sensor comparison analysis	May-24			
Document the technical reports (e.g., SL correction, solar intrusion correction, solar activity impact correction, NM along-track wavelength shift correction; update OMPS NM/NP SDR ATBD	Jul-24			
Develop new algorithm or code to support J3/J4 prelaunch testing and verification; analyze the pre-launch test data sets for J3 or J4 upon the availability of the data sets	Aug-24			
Pre-launch sensor characterization report upon available pre-launch instrument test data sets; reprocess SNPP, N20, and N21 OMPS NM SDR data using the updated LUTs; OMPS SDR enterprise Cal/Val plan updates	Sep-24			
Develop and deliver dark and OSOL LUTs for SNPP/NOAA-20/NOAA-21	Sep-24			
Maintain SNPP/NOAA-20/NOAA-21 OMPS SDR data quality	Sep-24			

A. Day-1 Solar Flux Differences of N21 and N20 NMs and NPs Relative to SNPP



B. Comparison of Nighttime N21 NP Radiance w/wo Adjusting Dark Table



- Different colors represent different cross-track pixels.
- Nighttime radiance vary around the zero line after the dark table is adjusted, which is supposed to be.

MiRS Products

January 2024

Accomplishments / Events:

- The MiRS team has been investigating the use of machine learning to enhance the value of ATMS imagery products. One area of research, which has now been published in the journal Remote Sensing, is in the area of tropical cyclone (TC) intensity estimation. A U-Net model (which is a specialized form of a convolutional neural network) was trained to predict TC ocean surface wind speed and surface pressure using only ATMS radiance data and geolocation as input. The figure shows results for the case of TC Leslie from the N. Atlantic in 2018. The left side is the map of ERA5 analyzed wind speed, and the right shows the corresponding U-Net estimate. With the exception of the small TC eye region (where lower spatial resolution of ATMS may play a role), the U-Net predicted wind speed in most of the area in and around the storm is in quite good agreement with the ERA5 analysis.
- Further details can be found in the Remote Sensing article. Reference: Liang, Z., Lee, Y.-K., Grassotti, C., Lin, L., and Liu, Q. Machine Learning-Based Estimation of Tropical Cyclone Intensity from Advanced Technology Microwave Sounder Using a U-Net Algorithm (2024). *Remote Sens.*,16, 77. doi: 10.3390/rs16010077.

Overall Status:

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Cost / Budget		x			
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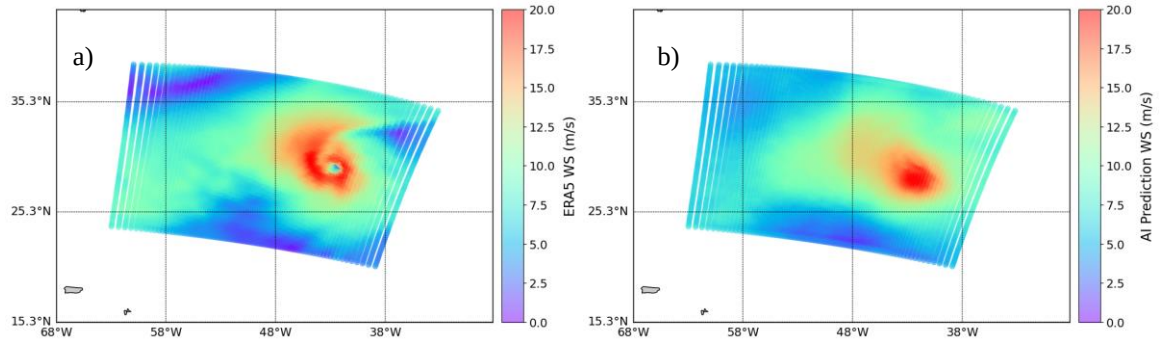
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
MiRS DAP (v11.10): integrate SFR algorithm updates, code/science improvements, final J2 launch delivery	Feb-24	Feb-24		

Highlights:



U-Net prediction and ERA5 surface wind speed maps. (a, b) represent ERA5 and U-Net predicted wind speed, respectively, of case valid on 2018-10-10 at 06 UTC (TC Leslie). Figure taken from Liang et al. (2024). See article for further details.

Vegetation Index and Green Vegetation Fraction

January 2024

Accomplishments / Events:

- NOAA-21 VIIRS VI and GVF provisional maturity review complete.
- Validated the NOAA-21 GVF using high resolution Google Earth satellite images for provisional review. Results showed bias and precision are within the threshold values of the requirement
- Proposed the global mean GVF threshold values for monitoring the operational GVF in NCCF monitoring system
- Finished code update for 1km global GVF
- Produced sample 1km global GVF maps
- Producing Illinois downscaled VI for USDA scientist.

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			

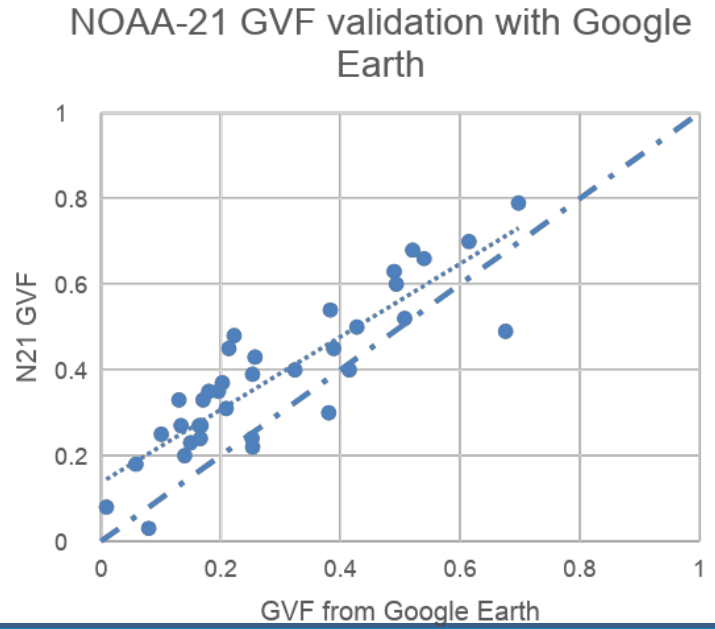
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 VI and GVF provisional maturity review	Jan-24	Jan-24	Jan-24	
1km global VIIRS GVF code and documentation ready for delivery	Feb-24	Mar-24		Refinements to processing alert indicators needed
Experimental data test of blended VI and GVF products	Apr-24	Apr-24		
Support to JPSS-3 Data System Test	Apr-24	Apr-24		
Operational 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		

Highlights:



- Overall, N21 VIIRS GVF is consistent with the GVF derived from Google Earth images
- The N21 VIIRS GVF has relatively low bias (0.093), precision (0.089), and small uncertainty (0.128), that are within the threshold values of the requirement.

Overall Error Budget for Provisional Review - VI

Attribute Analyzed	Requirement / Threshold	Pre-Launch Performance	On-orbit Performance		Meet Requirement?	Additional Comments
			NOAA-21 vs NOAA-20	NOAA-21 vs. SNPP		
Accuracy (TOA NDVI)	0.05	NA	0.00753	0.00983	Yes	NA
Precision (TOA NDVI)	0.04	NA	0.0248	0.0271	Yes	NA
Accuracy (TOC NDVI)	0.05	NA	0.00355	0.00373	Yes	NA
Precision (TOC NDVI)	0.04	NA	0.0251	0.0304	Yes	NA
Uncertainty (TOC EVI)	0.11	NA	0.0274	0.0321	Yes	NA

VI errors are mean values across all available data from 20230614-20230809 and 20231014-20231213. Comparisons are between NOAA-21 and NOAA-20, and between NOAA-21 and SNPP, as no independent comparisons are possible due to the nature of the VI variable.

Overall Error Budget for Provisional Review - GVF

Attribute Analyzed	Requirement / Threshold	Pre-Launch Performance	On-orbit Performance			Meet Requirement?	Additional Comments
			NOAA-21 vs NOAA-20	NOAA-21 vs. SNPP	NOAA-21 vs. Google Earth		
Accuracy	12%	NA	0.19%	0.69%	9.3%	Yes	NA
Precision	15%	NA	4.87%	5.04%	8.9%	Yes	NA

GVF errors are mean values across all available data from 20230614-20230809 and 20231014-20231213. Comparisons are between NOAA-21 and NOAA-20, between NOAA-21 and SNPP, and between NOAA-21 and Google Earth data.

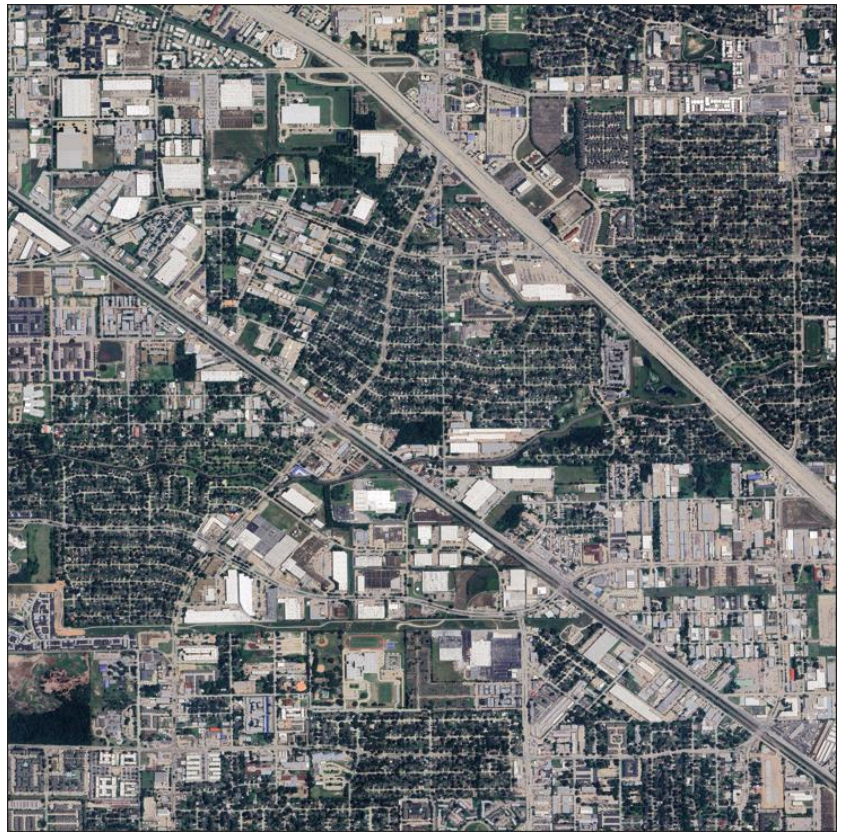
GVF derived from high resolution Google Earth image: Houston

High resolution Google Earth image:

(6912×6912) pixels

Image location:
Houston, TX
(29.824°, -95.505°)

High resolution (~1-m) RBG images with imagery dates are available on Google Earth Google Earth images over VIIRS GVF pixels, areas of 0.036° by 0.036°, were downloaded from Google Earth Green pixels on the high resolution Google Earth images were extracted by using a Green Color index (GCI)



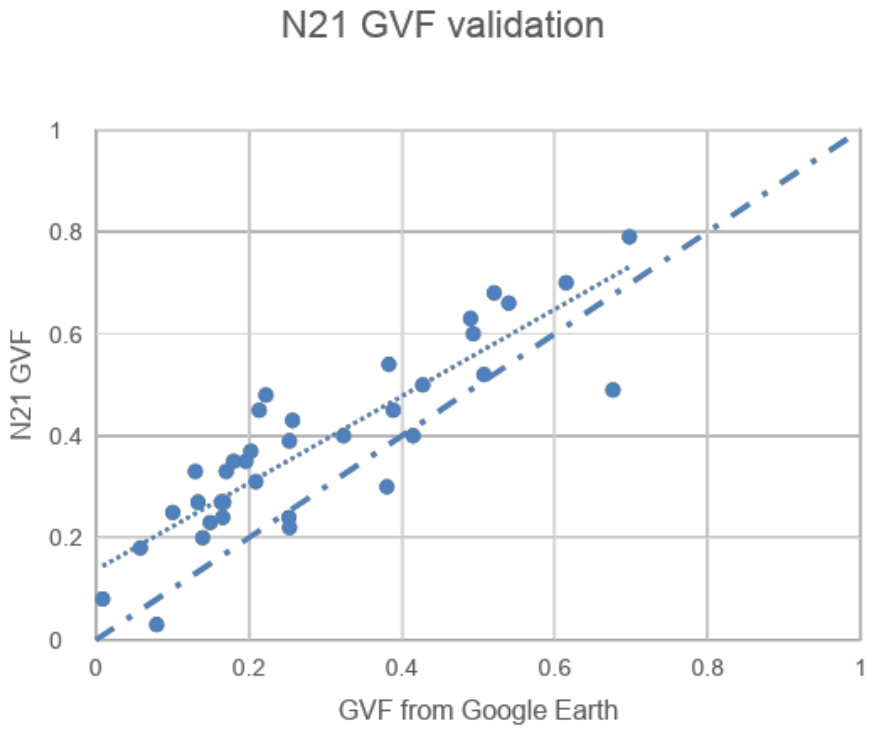
Google Earth image over a 0.036-degree VIIRS GVF pixel

(5/30/2023)

Classified image (vegetation pixel: green)

Google Earth GVF=0.253
N21 VIIRS GVF=0.220

NOAA-21 VIIRS GVF validation using GVF derived from Google Earth



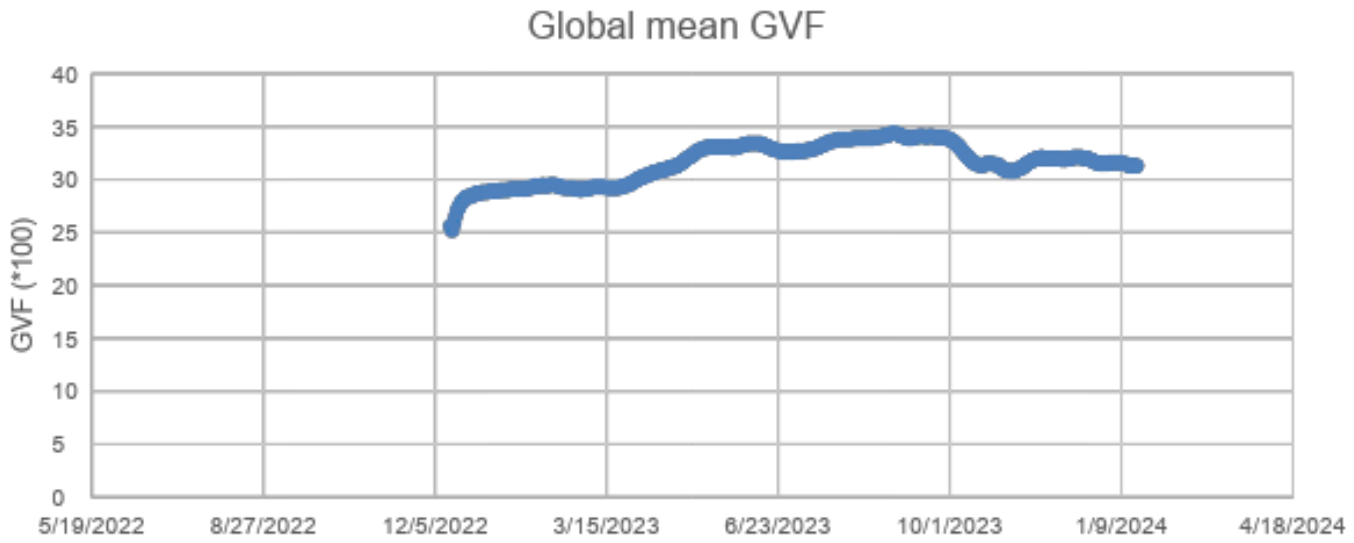
- Overall, N21 VIIRS GVF is consistent with the GVF derived from Google Earth images
- The N21 VIIRS GVF has relatively low bias (0.093), precision (0.089), and small uncertainty (0.128), that are within the threshold values of the requirement.
- There is a positive bias between N21 GVF and that from Google Earth

	Accuracy	Precision	Uncertainty
NOAA-21 GVF	0.093	0.089	0.128
Requirement	0.12	0.15	0.17

Global mean GVF threshold values for monitoring GVF

Proposed the global mean GVF threshold values for monitoring the operational GVF in NCCF production monitoring system

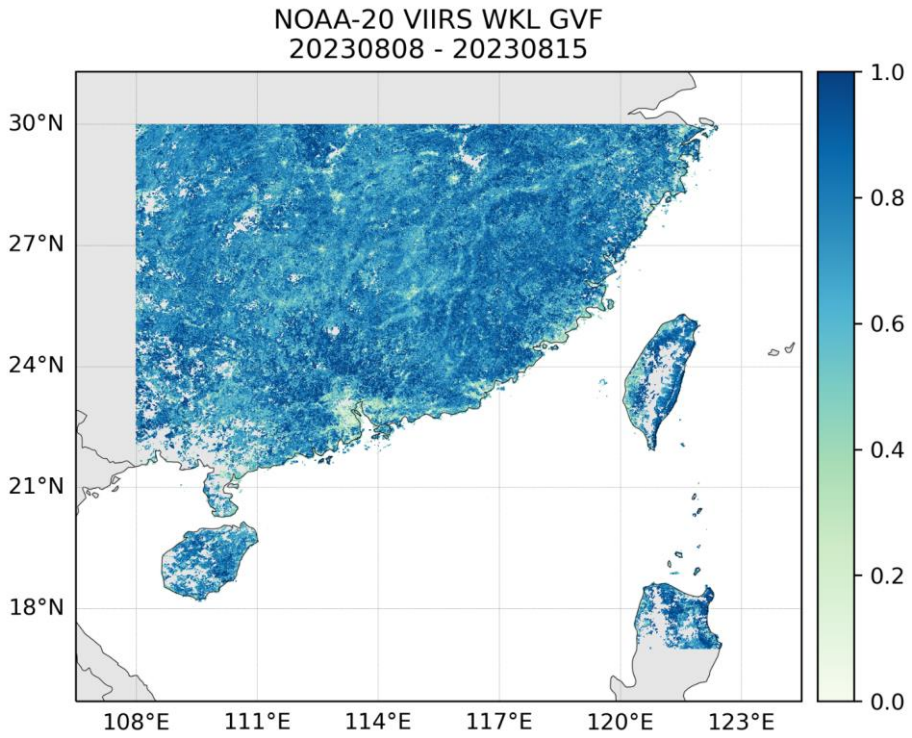
- The GVF/VI are in the process to be implemented in NCCF. OSPO need suggestions from us on determining the threshold values of the GVF in the NCCF production monitoring system.
- A year of global mean GVF values from the GVF statistics file were extracted
- Time series of the global mean GVF were plotted
- The normal global mean GVF value varied between 0.28 and 0.35 if we ignore the first week when no historical data are available.
- We suggest when the global mean GVF value is greater than 0.35 or less than 0.28, the yellow alert will occur
- We suggest when the global mean GVF value is greater than 0.38 or less than 0.25, the red alert will occur



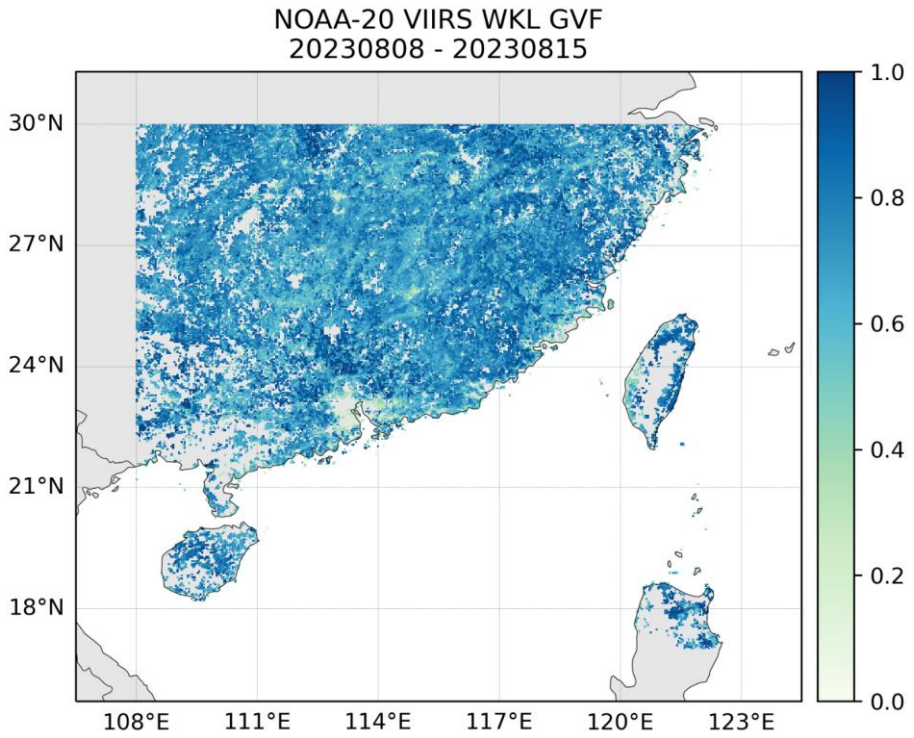
1km global GVF subset example

- Comparisons between 1km and 4km GVF data
  - East Asia, 20230808 ~ 20230815
  - Significantly less missing data at 1km than at 4km scale

1k



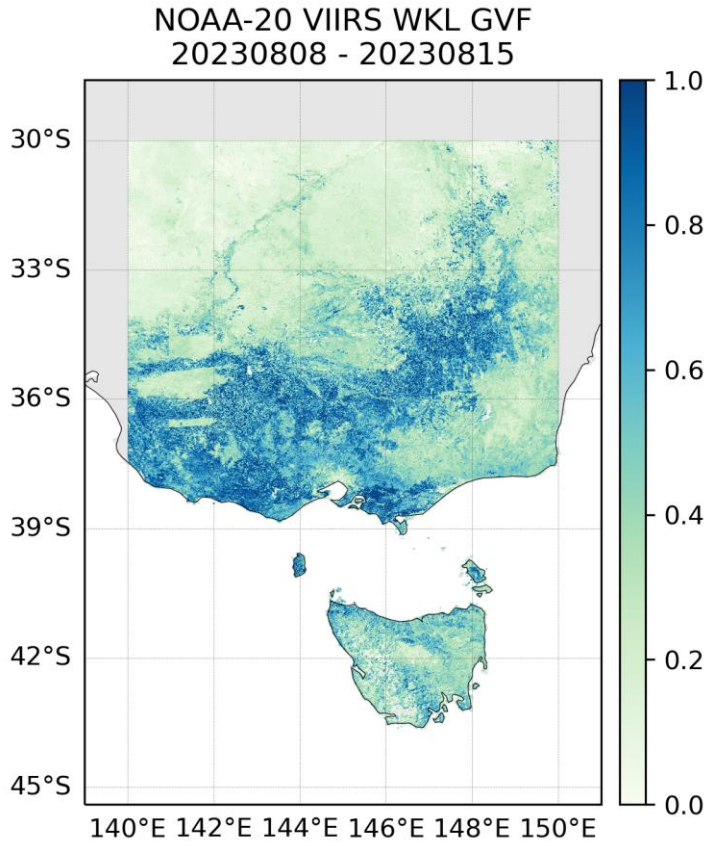
4k



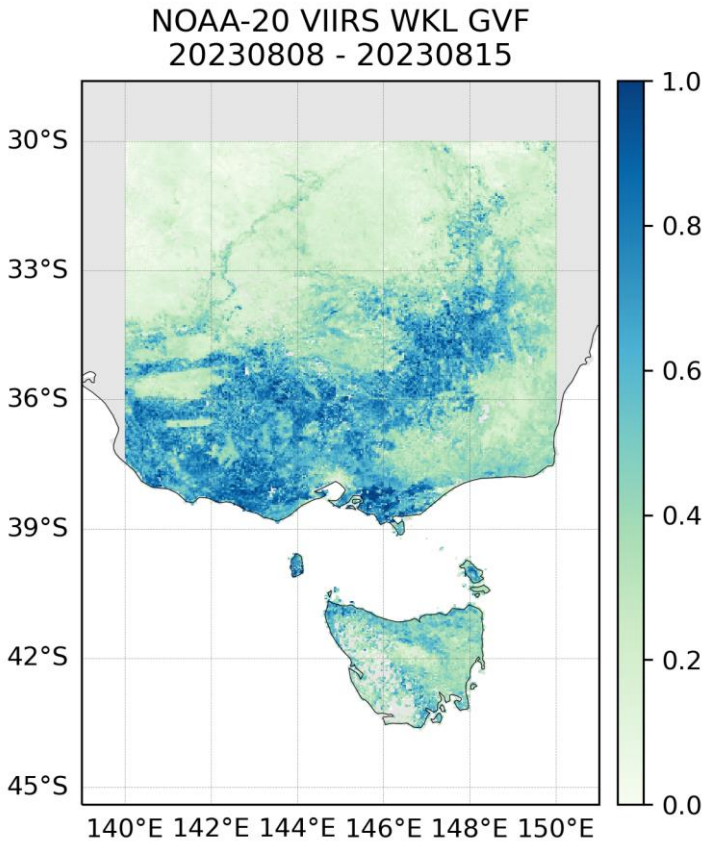
1km global GVF subset example

- Comparisons between 1km and 4km GVF data
  - East Australia, 20230808 ~ 20230815
  - More detail visible at 1km than at 4km scale

1km



4km



Surface Reflectance

January 2024

Accomplishments / Events:

- The NOAA21 Surface Reflectance provisional review was performed, the related slides and documents are archived.
- Evaluated the v1r3 SR product and compared with the previous version (v1r2), analyzed the difference.
- Investigating the OSPO SR monitoring issue caused by the newly updated LUT, the product quality was evaluated, and the monitoring threshold has been adjusted to reduce the warning.
- Complete the SR routinely subset and evaluation transition from the NOAA SCDR to AWS, continue the validation at AERONET.
- Keep working on the consistency evaluation between SNPP, N20 ad N21 using the reprocessed SDR.

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			

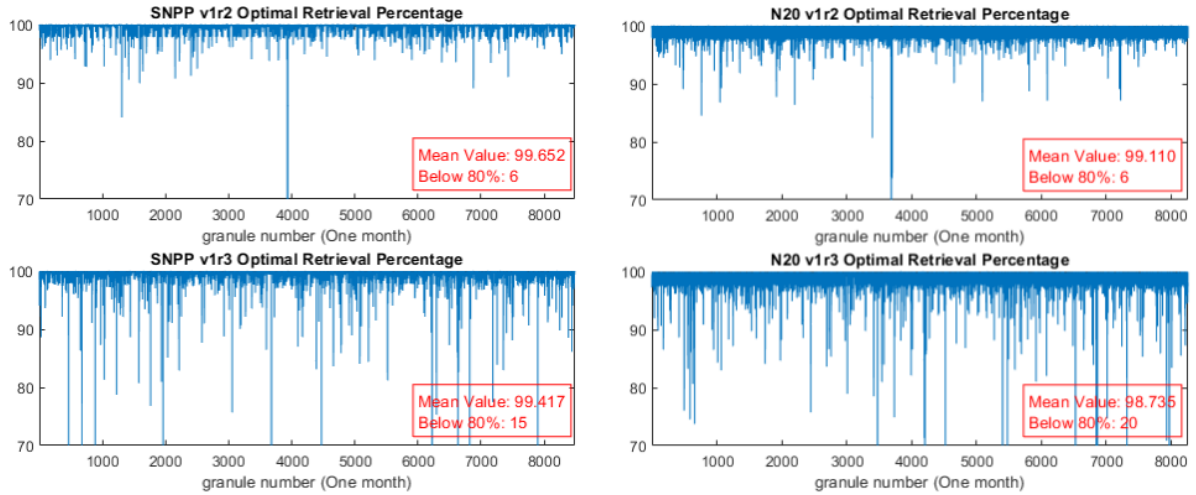
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Provional Maturity of NOAA-21	Feb-24	Feb-24	Jan 25, 2024	
The JPSS (SNPP, N20, N21) SR consistency evaluation and correction	Mar-24	Mar-24		
GOES-R enterprise SR algorithm development and experimental product	Jun-24	Jun-24		
Operational Readiness Review (ORR) for NDE Migration to NCCF	Aug-24	Aug-24		

Highlights:



V1r2 and v1r3 monitoring results, metrics: optimal retrieval percentage for the non-low-sun granules.

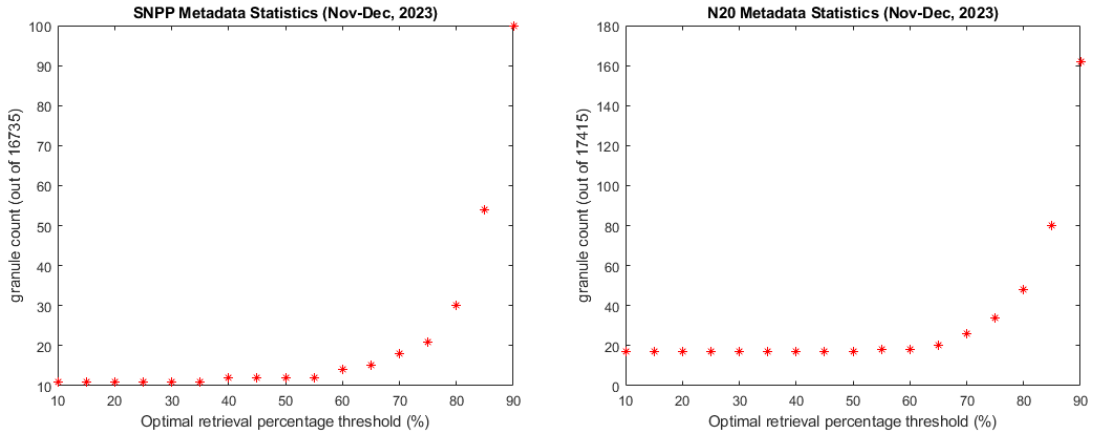
NOAA 21 Provisional Review

- Cal/Val results summary:
  - Team recommends algorithm provisional maturity
    - The SR value and QFs are performed as expected, no obvious issue is found, v1r3 with cirrus QFs updated along with the cloud mask data.
    - The AERONET validation shows the SR with good quality could meet the requirements, and v1r3 fixed issues found in v1r2.
    - Good consistence with SNPP, NOAA20 product.
    - The reprocess SDR is under tested, close monitoring for shortwave IR band (M8, M10 and M11) which are reported with degradation issue according to SDR team.
    - Users and downstream products have not found significant issues for NOAA21 SR.
    - Effective date: VIIRS SR reach Provisional Review (01/25/2024)

- Lessons learned for NOAA-21 Cal/Val
  - Independent in-situ measurements are limited. SDR data uncertainty or inconsistency could not be detected by AERONET validation.
- Planned improvements
  - Integrating the mitigation algorithm to reduce the uncertainty caused by the misclassified dust aerosol model.
  - Use reprocessed SDR to generate SR for better consistence between JPSS satellites.
- Future Cal/Val activities / milestones
  - Inter-comparison with NASA VJ2-09 product (once available)
  - Inconsistency between JPSS satellites analysis and impact evaluation.
  - Long term and routinely validation at AERONET and update on website.
  - Collect more high-quality in-situ surface reflectance for the validation.
  - Further collaboration with the vegetation team to evaluate the performance

Surface Reflectance Monitoring Issue

- **Issue**
  - Compared with v1r2, v1r3 do have more granules with optimal retrieval percentage < 80% (15-20 granules per month).
- **Reason**
  - The reason is due to more pixels with out-of-range (< -0.01) SR for M1 band (blue band, 0.412um), v1r3 is more sensitive to heavy AOD.
  - To be noted, this is not the problem of algorithm or inputs, heavy AOD is a common situation, and M1 band is hard to retrieval with high aerosol loading. These data are unusable.
- **Solution**
  - **Final solution**: A more rational monitoring parameter is needed for the monitoring. We will discuss with NASA science team to figure out a reliable solution and plan to implement in next delivery.
  - **Temporal mitigation method**: adjust the threshold from 80% to 70%. (will reduce the yellow flag by half)



Two months data test, the warning granules count vary with the optimal retrieval percentage threshold (low sun percentage == 0). Left: SNPP, right: N20

- Bad Retrieval (Non optimal)
  - Solar zenith angle >= 85 (night)
  - SDR Filled value (Need monitoring)
  - GEO Filled value (Need monitoring)
  - AOD or GFS (tpw, p0, o3) out of range. (Need monitoring)
  - Band M1 Results out of range (-0.01, 1.6) (Need monitoring)
    - High AOD (most common reason), v1r3 is more sensitive to the high AOD.
  - Moon in the sight (very rare case)

NUCAPS Products

January, 2024

Accomplishments / Events

- NUCAPS NOAA-21 products (AVTP, AVMP, O_3, CO, CH_4, and CO_2) have attained "Validated" maturity status effective September 26, 2023 (coincides with the validated CrIS SDR). The presentation included the results from NUCAPS v3.2 with updated NOAA-21 LUTS for (1) cloudy and clear regression, (2) CrIS and ATMS radiance bias tuning, and (3) New CH4 a-priori to account for recent CH4 trends. The data validation methodology included
  - Numerical Model comparisons (ECMWF), satellite sounder intercomparisons (TROPOMI, OCO2, NOAA-20 NUCAPS, Suomi-NPP NUCAPS), conventional PTU/O3 Sonde Matchup Assessments (global RAOB), Dedicated/Reference PTU/O3 Sonde Matchup Assessments (NOAA-GML) and showed requirements were met for NOAA-21 Temperature, Moisture and Ozone profiles.
  - Numerical Model comparisons (ECMWF), satellite sounder EDR intercomparisons (TROPOMI, OCO2, NOAA-20 NUCAPS, Suomi-NPP NUCAPS), Surface-based Network Matchup Assessments (Total Carbon Column Observing Network) showed requirements were met for NOAA-21 Carbon Trace Gases.
  - Comparisons with NOAA-20 NUCAPS, NOAA-20 CERES OLR, Aqua CERES OLR and Aqua AIRS OLR show requirements were met for NOAA-21 OLR.
- NUCAPS team participated and presented at the AMS-2024 conference held January 28 - February 1, 2024, in Baltimore, MD. Presentations by the NUCAPS team included one oral presentation, and three poster presentations covering various facets of the NUCAPS system, NOAA-21 system updates of regression and tuning LUTs, and the OLR applications.

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			

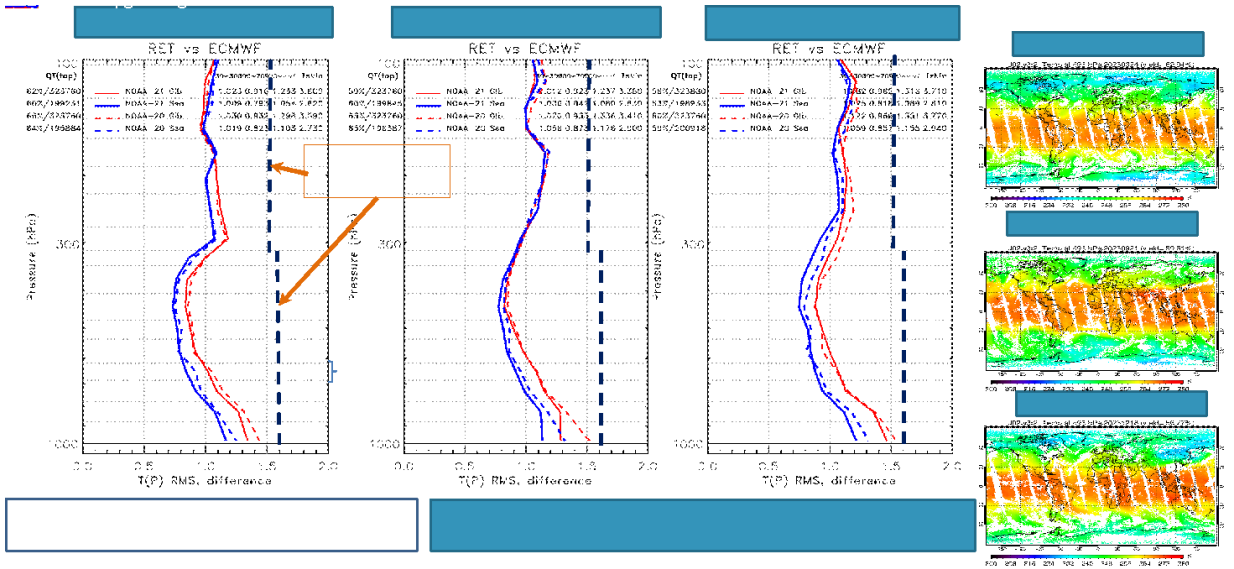
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 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
Addition of CAMEL emissivity database for the emissivity first guess	Mar-24	Apr-24	On-schedule	
Mission-long reprocessing of NOAA-21 NUCAPS products: Reprocessing version and evaluation of reprocessed products	Jun-24	Jun-24	On-schedule	

Excerpts from NOAA-21 Validated Maturity Review: NOAA-21 and NOAA-20 Atmospheric Vertical Temperature Profile Retrieval RMS Difference with ECMWF for three Focus Days: 24 Mar 2023; 21 Sep 2023; 18 Dec 2023



OMPS Ozone (V8Pro, V2Limb & V8TOz)

November 2023

Accomplishments / Events:

- The Ozone Team provide rapid evaluation and validation of products to allow timely decisions on restoring distribution of NPP V8TOz, V2Limb and V8Pro EDRs following the spacecraft shutdown.
- Z. Zhang developed soft calibration adjustments for NPP, N20 and N21 V8pro following changes by the SDR Team.
- R. Lindsay revised the NetCDF output from the V2.6 Level 2 to match the current V2.5 Level 2 content as well as possible. He is preparing deliveries for December. New sample products were provide to the reformatter toolkit team.
- L. Flynn presented the validation results at the successful MetOp-B & -C GOME-2 EV8TOz NCCF ORR with support from the team.
- J. Niu helped to resolve complications with the NCCF V8TOS implementation.
- E. Beach continued to work on the monitoring figures for NOAA-21, delivering overpass data to OAR, and transferring the weekly ancillary files we need to process the S-NPP and NOAA-21 OMPS Limb Profilers. He is capturing the NOAA-21 OMPS data and NCCF test data as they arrive at SCDR.
- J. Wild prepared two posters on OMPS for presentations at the AGU and AMS meetings..

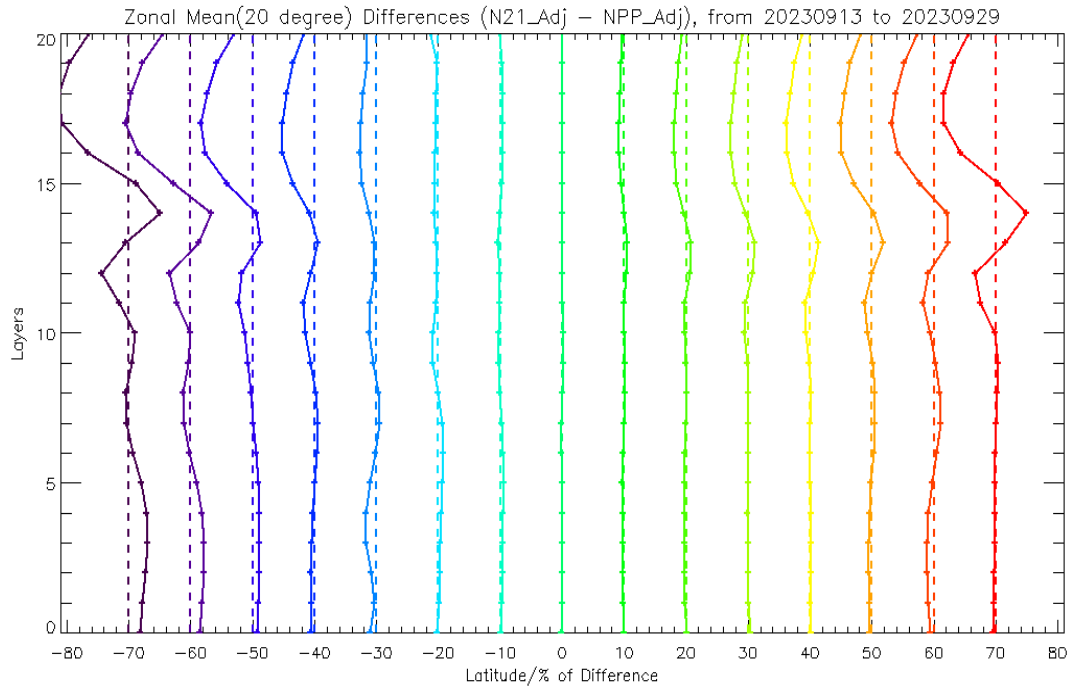
Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation

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		CAC Badge renewals, 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 must be in place next month.



Zonal Mean differences after soft calibration adjustments for NPP, N20 and N21 V8pro following changes by the SDR Team

Land Surface Temperature

January 2024

Accomplishments / Events:

- Prepared the NOAA-21 LST provisional maturity review material, including presentation slides and a readme file. The review was successfully held on Jan. 25, 2024.
- Prepared the poster for AMS 2024 and revised it following review comments.(slide 2)
- Fulfilled the request from ASSISTT team on LST and LSE verification and summarized the findings into a report. (slide 3)
- Ordered the SDR brightness temperature data from CLASS, reprocessed the ground LST validation by adding matchup SDR data, and updated the R-based LST validation with BSRN.
- Conducted statistical analysis of the R-based validation with SURFRAD and ARM(slide 4-5)
- Conducted software testing for all weather LST. No issues were identified in the module test. The global all weather LST for daytime and nighttime were displayed in Highlights.
- Updated the cross-comparison among L3 NOAA-21, MYD11A1 and VNP21A1 LST for daytime and nighttime, respectively, by taking into account the differences in view angle between them. (slide 6)
- Summarized the stations information used in the NOAA-21 LST validation and plotted the station map.

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.*

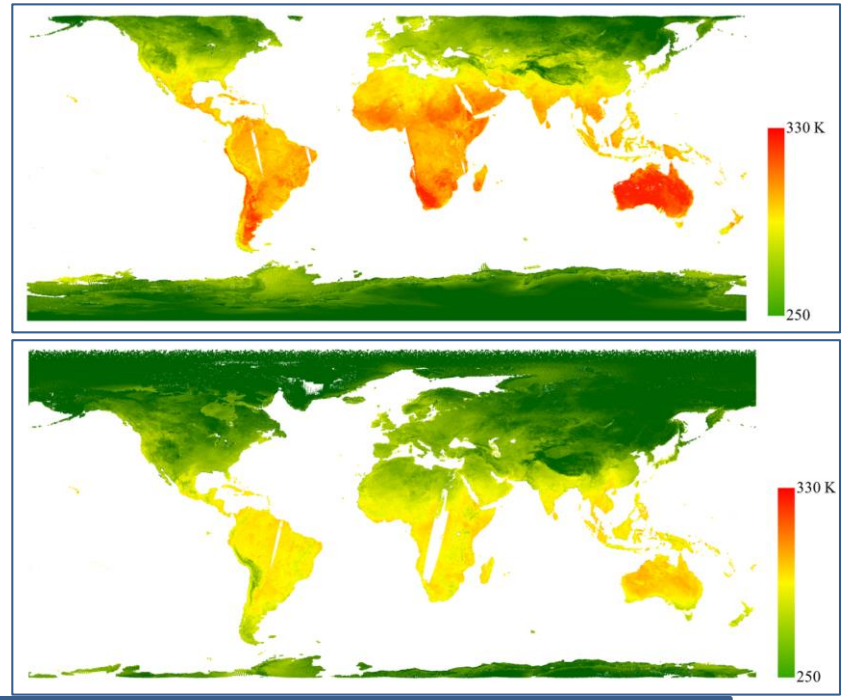
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
NOAA-21 data monitoring, evaluation and provisional maturity review	**Oct-23**	**Jan-24**	**Jan-24**	
CCAP Initial Delivery - All weather LST	**Oct-23**	**Feb-24**		
SDR and EDR Support to JPSS-3 Data System Test Event in early 2024	**Feb-24**	**Apr-24**		
Experimental Development of high spatial resolution LST	**Oct-23**	**May-24**		
SDR and EDR Enterprise Cal/Val Plan Initial Updates	**Apr-24**	**Jun 28-24**		
CCAP final delivery-All weather LST	**Jan-24**	**Jul-24**		
SDR and EDR Enterprise Cal/Val Plan and Algorithm Update Peer Review Meeting	**Apr-24**	**Aug 30-24**		
Monitoring and Anomaly watch, analysis and report	**Oct-23**	**Sep-24**		

Highlights:

Global Daily Gridded All weather LST for daytime (top) and nighttime(bottom) on Jan. 1, 2020



Towards Routine Radiance-Based Validation of VIIRS LST Using GDAS Profiles

Yuling Liu[1] , Yunyue Yu[2], Peng Yu[1]
1. ESSIC/CISESS, University of Maryland, College Park, MD.; 2. NOAA/NESDIS/STAR, College Park, MD

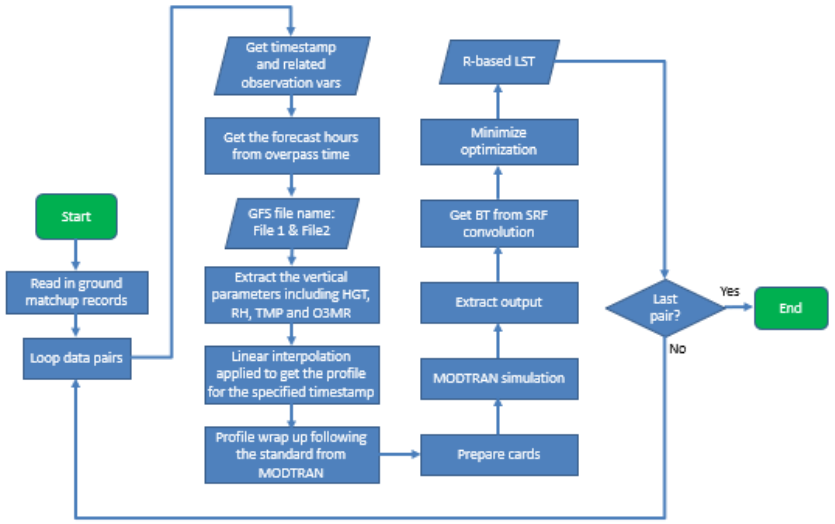
Overview

Land Surface Temperature (LST) plays a pivotal role in various Earth science applications, including climate monitoring, urban heat island analysis, water management, and agricultural assessments. Accurate validation of LST is crucial to ensure the reliability of remotely sensed data products. In this pursuit, radiance-based validation method has emerged as an important component. The advantage of such method lies in their ability to directly relate satellite measured radiance to atmospheric and surface temperature profiles, enabling more robust and comprehensive validation procedures.

This study aims to advance the validation of VIIRS (Visible Infrared Imaging Radiometer Suite) LST products through the implementation of a routine radiance-based validation approach. We proposed a robust framework that integrates radiative transfer modeling, optimization methods, with atmospheric and surface temperature profiles from GDAS (Global Data Assimilation System) to access the accuracy of VIIRS LST retrievals. GDAS, operated by National Centers for Environmental Prediction (NCEP), is a sophisticated meteorological and atmospheric modeling system that provides vertical profiles of atmospheric variables at global coverage. This framework demonstrates the potential of an automated validation process using cloud-available data sources, showcasing its adaptability to various satellite LST products and offering a pathway towards improved LST retrievals and a deep understanding of Earth's surface temperature dynamics.

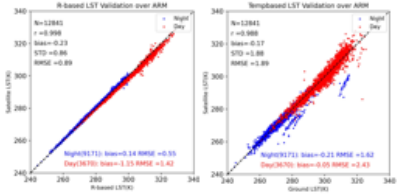
The framework begins with the data matchup pairs obtained from temperature-based LST validation. Utilizing the time information, the GDAS time stamp is calculated and used as a query to automatically retrieve data from cloud. Subsequently, profile information is extracted from GDAS and the simulation cards are prepared for forward radiative transfer simulation using MODerate resolution atmospheric TRANsmission (MODTRAN). An optimization algorithm then adjusts the satellite LST value by optimizing a cost function defined using the VIIRS band M15 brightness temperature difference between the satellite observations and simulations. The solution with the lowest cost is adopted as the satellite LST obtained from the radiance-based simulation. In this study, ground matchups from Surface Radiation Budget (SURFRAD), Baseline Surface Radiation Network (BSRN), and Atmospheric Radiation Measurement (ARM) have been utilized in the r-based validation and the results have been compared with the t-based LST validation. The comparison results indicate a generally smaller standard deviation compared to the temperature based LST validation. Moreover, the r-based validation results are analyzed with respect to sensor zenith angle and total precipitable water vapor. Additional ground network will be incorporated in the future.

Methodology



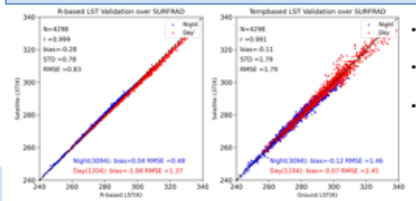
- Radiative transfer model: MODTRAN 5.2
- Profile data source: GDAS 0.25° model forecast obtained from AWS platform
- Emissivity data source: NOAA emissivity product
- Optimization method: Nelder-mead; cost Function:$(BT_{11} - BT_{11_{obs}})^2$

R-based Validation Results over ARM Stations



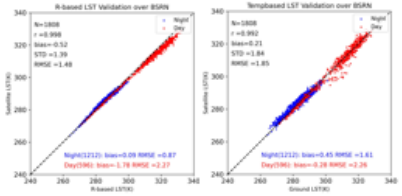
- R-based SNPP VIIRS LST validation over ARM stations for time period from January 1, 2020 to September 30, 2023
- Left figure shows the r-based validation results and the right figure displays the temp-based LST validation results.
- The large deviation from T-based LST validation is attributed to error in the ground observations.
- Overall a better precision achieved for r-based LST validation than t-based validation
- Nighttime with smaller bias and RMSE; daytime with a negative bias about 1.15 K.

R-based Validation Results over SURFRAD Stations



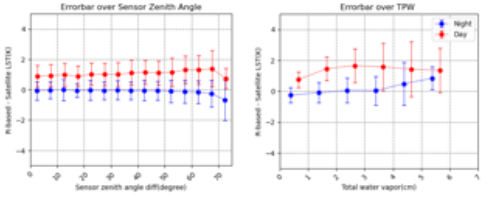
- R-based SNPP VIIRS LST validation over SURFRAD stations for the time period from June 1, 2019 to October 30, 2023
- Left figure displays the r-based validation results, and the right figure shows the t-based LST validation results.
- Overall, a better precision achieved for r-based LST validation compared to T-based validation, with nighttime exhibiting a smaller bias and RMSE, while daytime shows a negative bias over 1K

R-based Validation Results over BSRN Stations



- R-based SNPP VIIRS LST validation over BSRN stations for the time period from January 1, 2018 to December 31, 2022
- The left figure displays the r-based validation results, and the right figure shows the temp-based LST validation results.
- Overall a better agreement is achieved for r-based LST validation than for temperature based validation
- Nighttime exhibits a smaller bias and root mean square error, while daytime shows a negative bias of about 1.78 K

Result Analysis



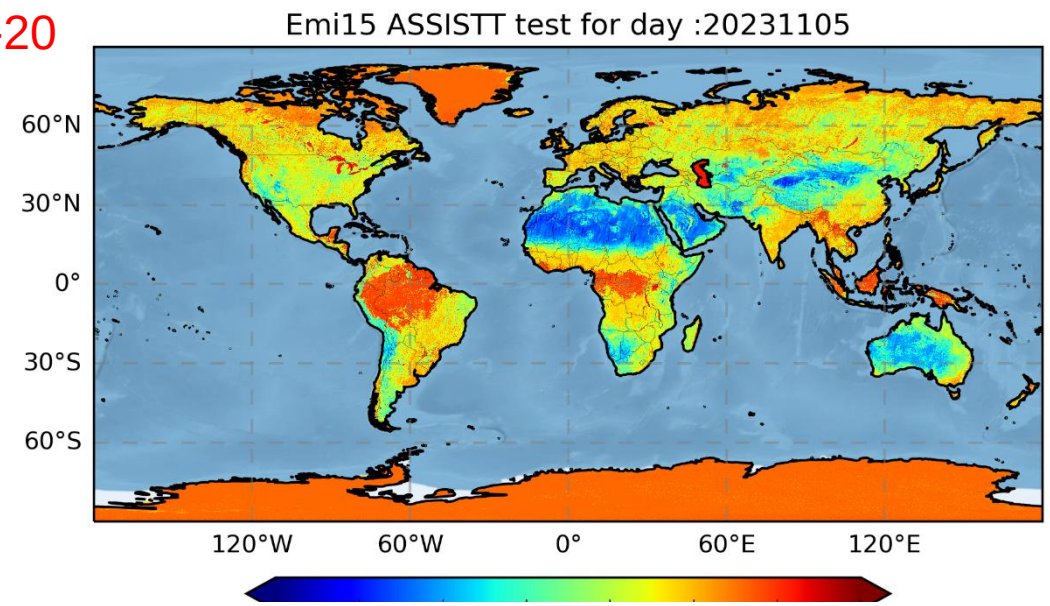
- The criteria for atmospheric profiles quality assurance is the split window temperature difference, which should be less than 0.5 K between satellite observed and simulated values.
- The left figure indicates the LST error over the sensor zenith angle. The result indicates that for daytime, satellite-derived LST is lower than r-based LST, and both the bias and std slightly increase with the sensor zenith angle. For nighttime, the bias remains around zero before reaching 65 degree and above. The STD shows a tiny increase with angle. Over 70 degrees, both daytime and nighttime bias shows a sharp downward change.
- The right figure displays the LST error over total precipitable water vapor (TPW). The result generally indicates an increase of bias and STD with TPW for both daytime and nighttime. For nighttime, the bias is negative when TPW is less than 1.0 g/cm and turns to positive for TPW greater than 4 g/cm. For daytime, there is a slight decrease in bias for TPW greater than 4 g/cm.

Summary

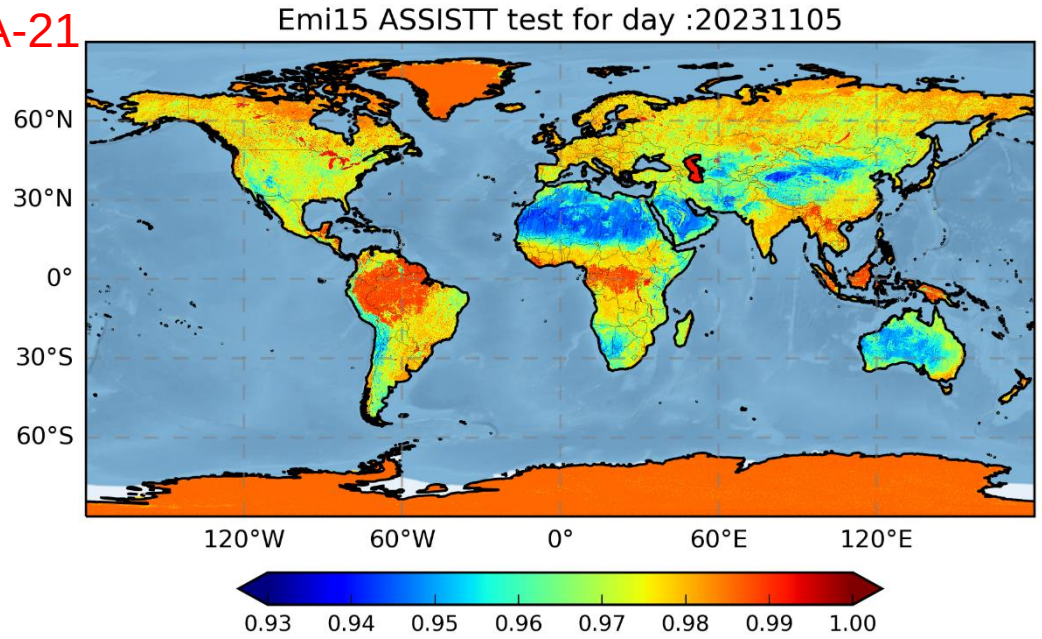
- A framework has been proposed and developed for routine radiance based LST validation. It has undergone testing across multiple ground network stations including SURFRAD, ARM, and BSRN, and has been compared with the t-based LST validation. The validation results indicate a successful implementation of this method.
- This approach serves as a complementary evaluation method, characterized by its independence from surface heterogeneity. Its applicability extends to diverse geophysical locations.
- The result generally indicate a good precision for both daytime and nighttime; a negligible bias for nighttime; and a significant negative bias for daytime.
- The r-based validation results are analyzed with respect to sensor zenith angle and total precipitable water vapor (TPW). The result indicates some differences in features for daytime and nighttime LST. Both the bias and std slightly increase with the sensor zenith angle and TPW for daytime. For nighttime, the bias increases only when reaching large sensor angle over 70 degree or under moist atmospheres with TPW over 4 g/cm.

LSE Evaluation

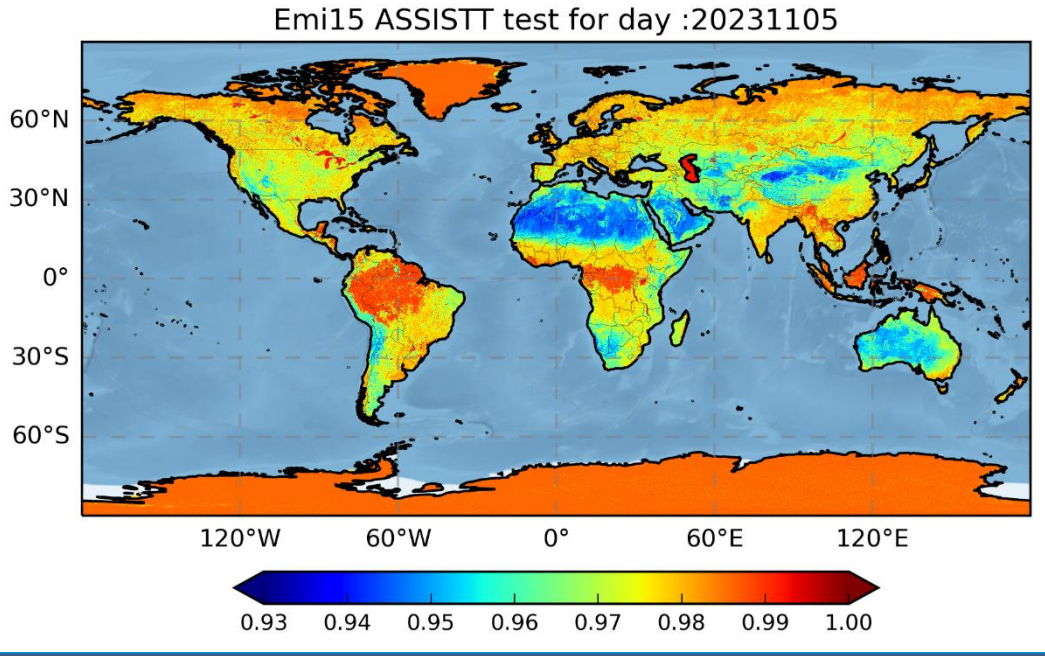
NOAA-20



NOAA-21

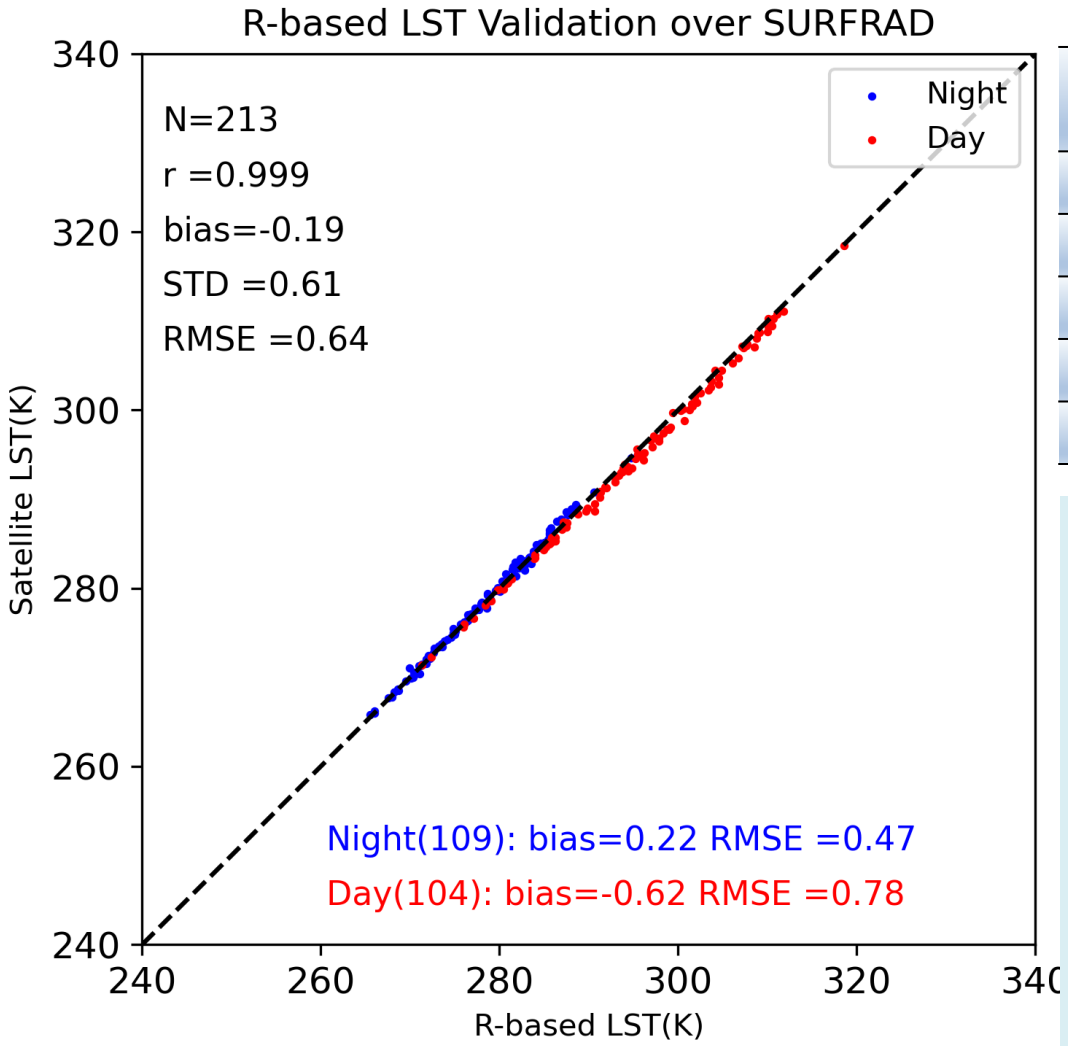


SNPP



- This slide shows LSE data from three satellites: NOAA-20(top left), S-NPP(bottom left), and NOAA-21(top right)
- The LSE data is overall consistent among the three satellites.
- Differences are mainly observed over snow covered area, which is expected due to the differences in the snow input. However, the impact on LST is statistically insignificant.
- It agrees well in non-snow areas.

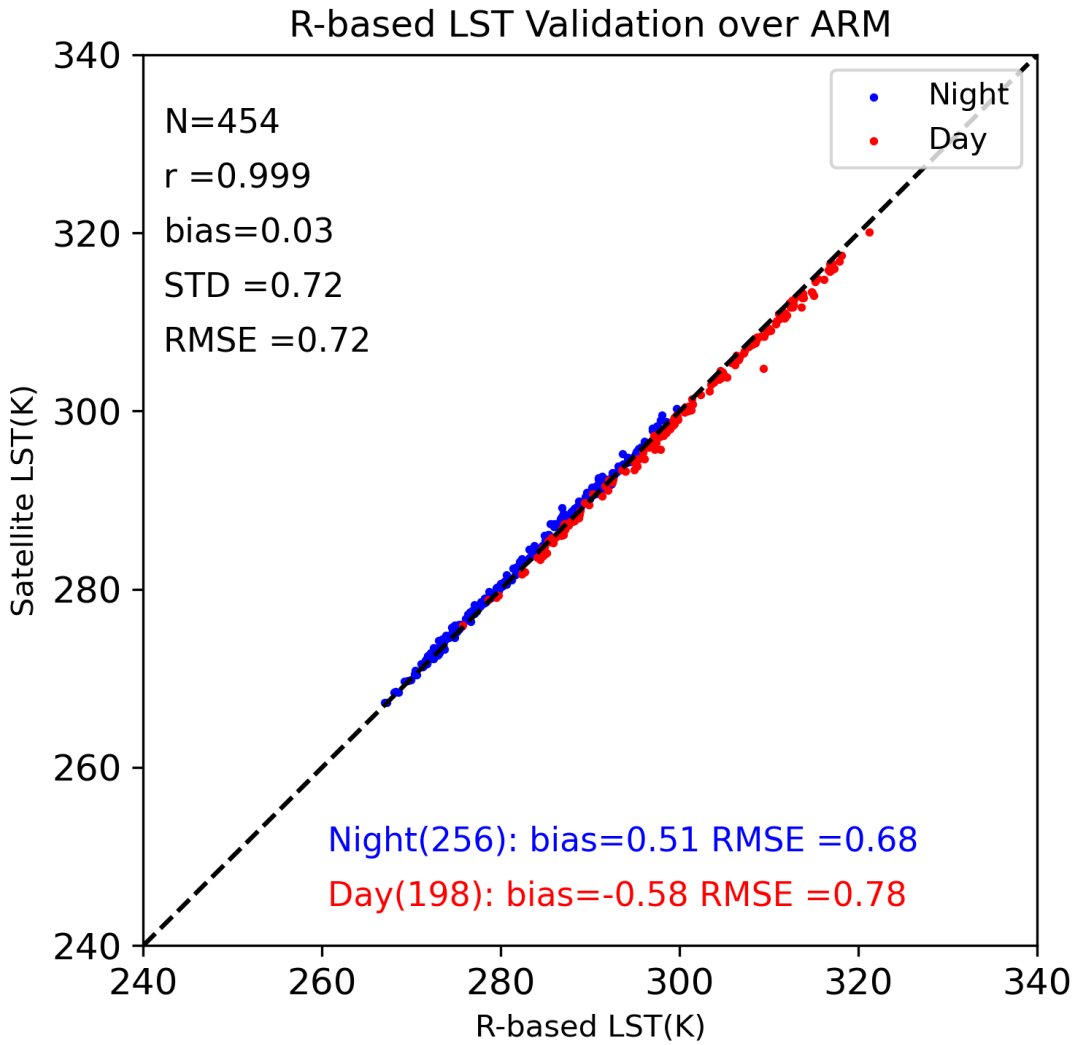
R-based LST Validation over SURFRAD Stations



Station Name	Total	Bias	STD	Sample (N)	Bias (N)	STD (N)	Sample (D)	Bias (D)	STD (D)
BND	54	-0.27	0.77	27	0.23	0.65	27	-0.77	0.5
TBL	63	-0.11	0.36	37	0.12	0.2	26	-0.43	0.28
FPK	37	-0.25	0.69	15	0.42	0.34	22	-0.7	0.46
PSU	15	-0.21	0.43	7	0.1	0.19	8	-0.48	0.39
SXF	44	-0.16	0.64	23	0.28	0.35	21	-0.64	0.53

- R-based NOAA-21 VIIRS LST validation was conducted over SURFRAD stations for the time period from May 29, 2023 to December 10, 2023.
- The left figure displays the combined results from five SURFRAD stations, revealing an overall bias of -0.2 K and a STD of 0.6 K.
- The sitewide results indicates a positive bias during nighttime, ranging from 0.1 to 0.4 K, with STD values below 0.7 K. A negative bias is observed during daytime, ranging from -0.77 K to -0.43 K with STD values below 0.5 K

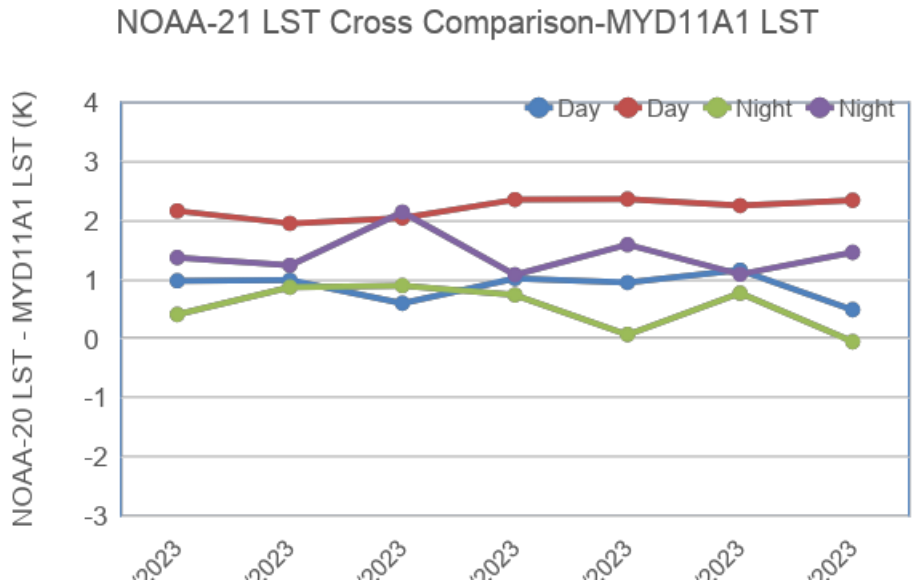
R-based LST validation over ARM Stations



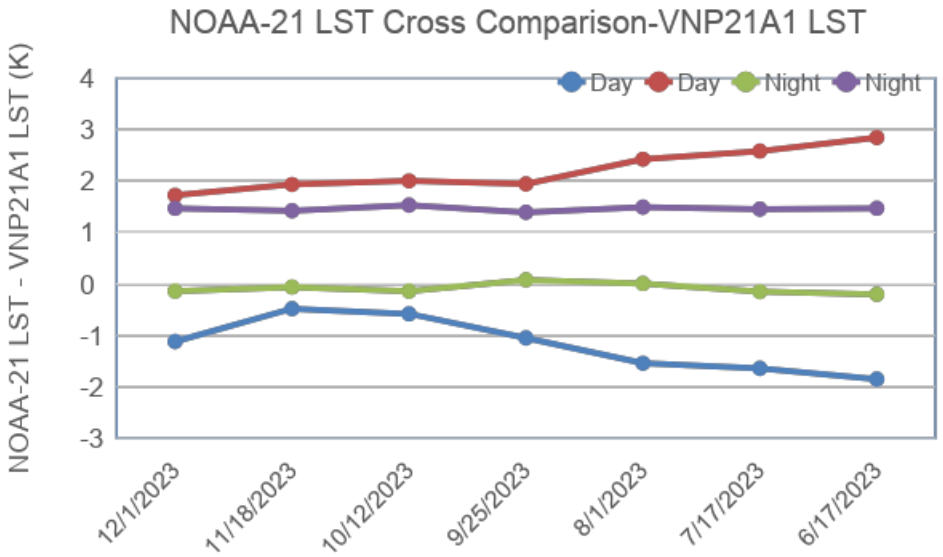
Station Name	Samples	Bias	RMSE	Sample (N)	Bias (N)	STD (N)	Sample (D)	Bias (D)	STD (D)
sgpsirsE11	7	0.48	0.99	5	1.03	0.56	2	-0.9	--
sgpsirsE12	81	-0.02	0.69	46	0.47	0.45	35	-0.66	0.33
sgpsirsE13	82	-0.1	0.64	44	0.34	0.41	38	-0.62	0.43
sgpsirsE15	11	-0.14	0.72	6	0.34	0.66	5	-0.71	0.12
sgpsirsE32	74	0.16	0.59	44	0.53	0.39	30	-0.39	0.36
sgpsirsE33	63	-0.03	0.64	33	0.44	0.4	30	-0.55	0.4
sgpsirsE34	12	-0.09	1.57	8	0.78	0.34	4	-1.83	1.62
sgpsirsE35	8	0.46	0.59	6	0.69	0.51	2	-0.22	--
sgpsirsE36	11	0.1	0.78	7	0.59	0.48	4	-0.76	0.29
sgpsirsE37	83	0.07	0.67	43	0.56	0.35	40	-0.47	0.49
sgpsirsE40	8	0.65	0.81	6	0.95	0.71	2	-0.24	--
sgpsirsE9	14	-0.12	0.85	8	0.44	0.51	6	-0.87	0.61

- R-based validation of NOAA-21 VIIRS LST was conducted over ARM stations for the time period from May 29, 2023 to December 10, 2023.
- The left figure displays the combined results from thirteen ARM stations, revealing an overall bias of 0.03 K and a STD of 0.7 K.
- The sitewide results show a positive bias during nighttime, ranging from 0.34 K to 1.03 K, with STD below 0.7 K. A negative bias is observed during daytime, ranging from -1.83 K to -0.22 K with STD values below 1.6 K. It is essential to note that the site wide statistics are not considered significant due to the small sample size.

Cross comparison with MYD11A1 and VNP21A1



- Spatial coverage: global
- Temporal coverage : on day in each month from June to December, 2023
- Day/night: both included
- MODIS Product selection: MYD11A1, L3 daily Aqua MODIS LST latest version in 061 was selected for the cross comparison.
- VNP21A1 LST Product, L3 daily SNPP VIIRS LST, was also used for the comparison
- Comparison criteria: both cloud clear, MODIS/VNP high quality, absolute viewing angle difference less than 10 degree; temporal difference less than 12 minutes for MYD11A1; while it is 24 minutes for VNP21A1 due to the distinct orbit colocation with NOAA-21.



- Overall the comparison results indicate more variations in both bias and STD in comparison with MYD11A1, compared to that with VNP21A1.
- During the daytime, NOAA-21 LST tends to be higher than MYD11A1 LST, but lower than VNP21A1 LST.
- At nighttime, NOAA-21 LST closely aligns with VNP21A1 LST, while NOAA-21 LST is higher than MYD11A1 LST.
- NOAA-21 LST falls between the two reference LSTs for both daytime and nighttime.
- This cross compassion result is influenced by various factors, including LST retrieval algorithm, composition method, temporal variations, impact of cloud residues.

EDR Reprocessing

January 2024

Accomplishments / Events:

- The RWG is currently reprocessing Cloud EDRs for Aug. 2018~Jul. 2019 on 12 nodes of the Bamboo cluster. At the time of this report, around 170 days of results have been completed and transferred from Bamboo cluster to NOAA STAR server.

- Due to the tighten of firewall rules of the University of Maryland (UMD) for security concerns, the RWG members outside of UMD can no longer access ESSIC servers including Bamboo clusters from the NOAA network. The reprocessing procedure will be restored after the firewall rule changes are resolved by UMD IT department.

- The RWG is developing software tools for reprocessing results analysis. Currently, the reprocessed cloud products such as cloud base height, cloud phase and cloud height are being compared with operational data for the same scanning time. Visual results for the comparison maybe available in the report period.

- The RWG will further quantitatively assess the reprocessing results when more data are produced.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Complete VIIRS EDR reprocessing for Clouds, polar wind, Ice Concentration; Ice Thickness; Snow Cover; and Ice Surface Temperature	02/2023	06/2024		1 month

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic			X		Execution delay is expected due to issues in STAR servers and UMD Bamboo system
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:

The VIIRS EDR reprocessing is now relying on the UMD Bamboo system. The system may not have sufficient disk storage to support the reprocessing. The RWG is currently doing the testing.

Sea Surface Temperature

January 2024

Accomplishments / Events:

- We worked with the NOAA SDR team to test N21 VIIRS SDR data that was reprocessed using revised calibration algorithm (https://doi.org/10.3390/rs13030448) aimed at addressing biases in emissive bands during with warmup-cooldown exercises. Wenhui Wang with the NOAA SDR team provided us with reprocessed N21 VIIRS SDR data during the March 10-13 and 16-19 WUCD exercises. We processed SST data for the March 8-20 time period and found that bias in ACSPO SST has been successfully mitigated using the revised SDRs (see Figure in the lower right).
- PODAAC officially released the ACSPO L3S-LEO-PM V2.81 dataset which combines ACSPO SSTs from afternoon 'PM' orbit satellites (NPP-, N20- and N21-VIIRS and Aqua-MODIS) into a super collated (L3S) SST reported daily, separately for day and night. This dataset succeeds version 2.80, which only contained data from NPP- and N20-VIIRS. The inclusion of MODIS Aqua extends the dataset back from Feb'2012 (earliest NPP VIIRS SST) to Jul'2002 (earliest Aqua MODIS SST). See the PODAAC release announcement here and the dataset landing page here.

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			

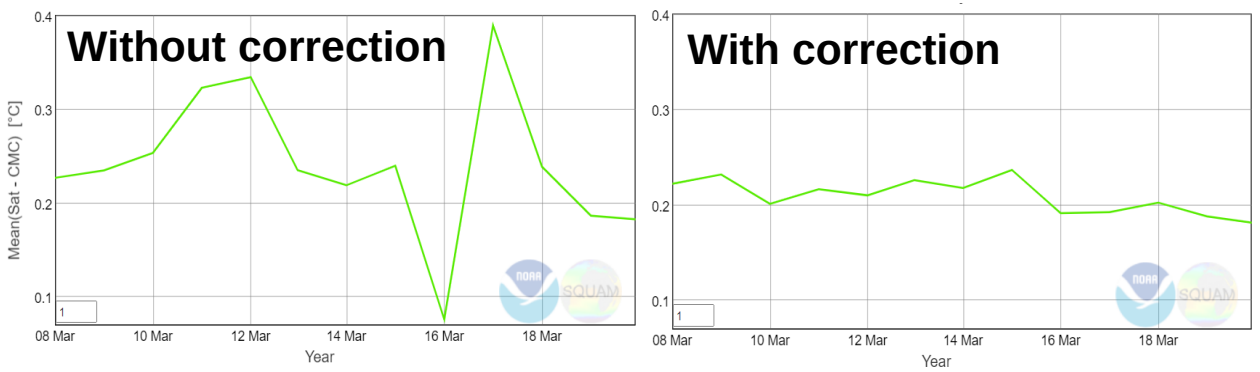
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

iQuam source of drifting buoys SST data (FNMOC) has become less reliable

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
SST EDR support to SDR team on Warm up - Cool down anomalies	Feb-24	Feb-24	Jan-22	
SST EDR Support to JPSS-3 Data System Test Event *(Dependency on JPSS)*	Apr-24	Apr-24		
SST EDR Enterprise Cal/Val and ACSPO Algorithm "Agency Report" Presentation to GHRSST science community	Jun-24	Jun-24		
SST EDR Enterprise Cal/Val Plan Initial Updates	Jul-24	Jul-24		
Promote experimental iQuam updates to live access	Aug-24	Aug-24		
SST EDR Validated Maturity Review	22-Aug-24	22-Aug-24		

Highlights*: *Warmu-cooldown related biases successfully mitigated



24-hour aggregated time series of N21 VIIRS daytime SST global mean bias vs CMC L4 foundation SST analysis for the March 8-20 2023 time period. Two warmup-cooldown (WUCD) exercises were performed during this time period (March 10-13 and 16-18). Left panel shows results using original L1b data. Right panel shows results using SDRs that are corrected for WUCD calibration artifacts. From the right panel it is evident that the WUCD bias correction successfully stabilizes the N21 VIIRS daytime SST timeseries.

Snowfall Rate

January 2024

Accomplishments / Events:

- Enhanced the machine learning snowfall detection model using NOAA-21 observations; enhanced the ML models for 1DVAR initialization and SFR bias correction using N21 obs.
- The SFR team developed a prototype machine learning bias correction model for orographic snowfall. It demonstrates significant potential in improving SFR performance for the challenging mode of snowfall. Research is ongoing to further refine the algorithm.
- The standalone SFR system started to run in the OSPO I&T system. It produces SFR for NOAA-20, NOAA-21 (Beta), S-NPP, Metop-B, and Metop-C.
- OSPO will hold ARR/ORR for the standalone SFR on Feb 15th. The SFR team conducted a validation study for the review and will present the validation results as part of the ARR/ORR.
- The SFR team gave 3 oral presentations (one invited) and a NOAA Booth talk at the AMS Annual Meeting.
- Continue to collaborate with NWS TOWR-S, NASA SPoRT, and GINA to support SFR assessment and applications at NWS WFOs. Continue to collect forecaster feedback on SFR and the merged radar-satellite snowfall rate product, mSFR.

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			

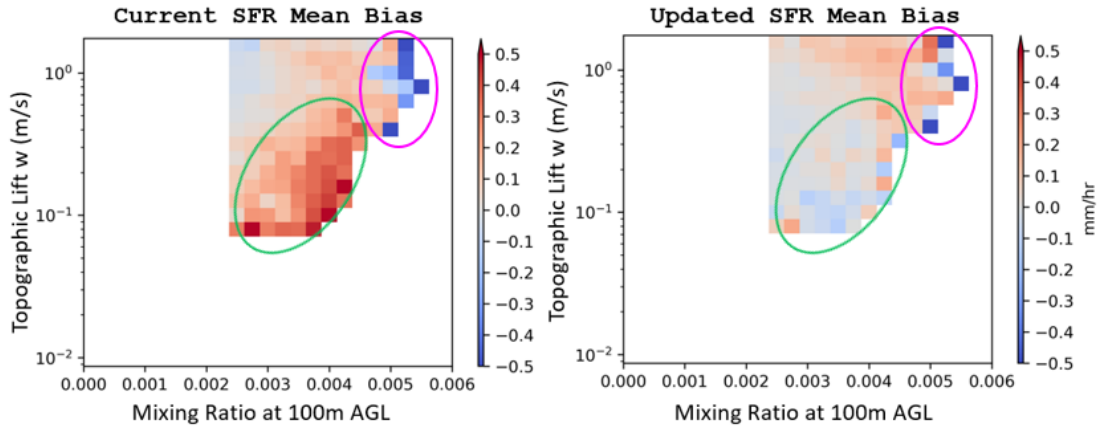
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Enhance the machine learning snowfall detection model using N21 observations	Jan-24	Jan-24	Jan-24	
Enhance the machine learning models for 1DVAR initialization and SFR bias correction using N21 observations	Jan-24	Jan-24	Jan-24	
Validation of NOAA-21 snowfall detection and rate estimation algorithms	Feb-24	Feb-24		
NOAA-21 SFR provisional maturity review	Feb-24	Feb-24		
Enterprise SFR science code delivery to ASSISTT including N21 provisional maturity SFR	Feb-24	Feb-24		
Cross validation among NOAA-21, NOAA-20, and S-NPP SFR products	April-24	April-24		

Highlights: NOAA-21 SFR Captures Intense Snowfall Event



Left: Current NOAA-20 SFR mean bias; Right: NOAA-20 SFR mean bias after applying the ML bias correction model for orographic snowfall. The overestimation in the green oval has significantly improved, while the underestimation with the intense orographic snowfall indicated by the magenta oval also shows notable improvement.

Surface Type

January 2024

Accomplishments / Events:

- STAR-UMD VIIRS Surface Type team has downloaded and processed S-NPP and NOAA-20 VIIRS daily granule surface reflectance data acquired in January of 2024 for the production of AST-2024.
- The team has processed all VIIRS surface reflectance data acquired in 2023 and produced cloud free monthly composites for all 12 months of the year.
- The team continues to update the training points based on high resolution images acquired in 2023. These training points will be used to train the classification model for producing the AST23 product.
- The team has generated a monthly update to the 250 m global water surface fraction (WSF) product for January 2024, which revealed large increases in surface inundation in northern California and western Louisiana (see highlights).

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:

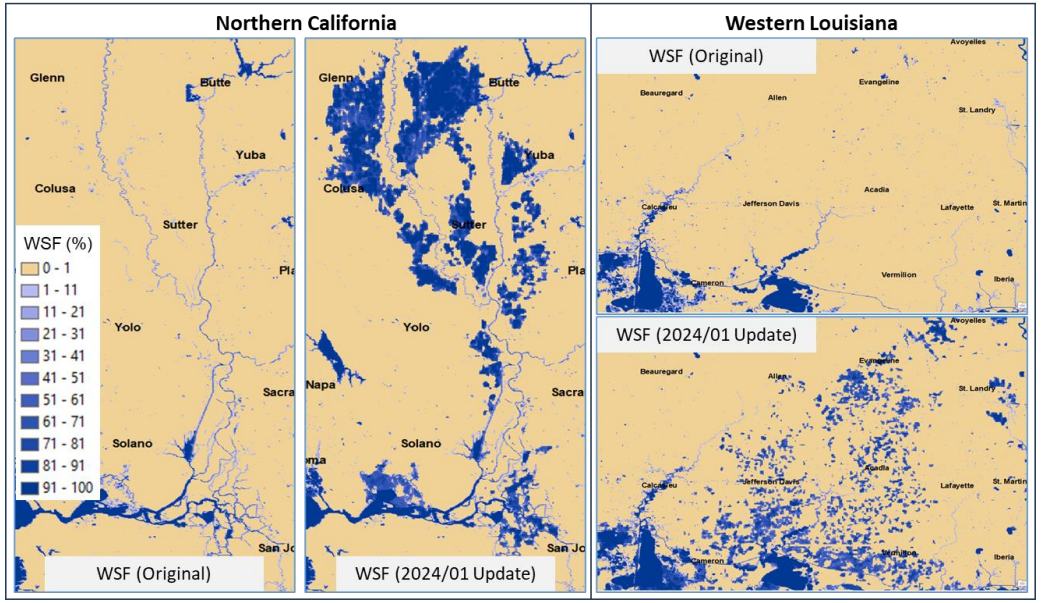
None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation

Highlights:

Heavy rainfalls in January 2024 caused large scale flooding in northern California (left) and western Louisiana (right). The latest update of the high-resolution water surface fraction (WSF) product revealed that the Californian counties that had the most agricultural lands inundated included Glenn, Colusa, Butte, Yuba, and Sutter, while in western Louisiana the Evangeline, Acadia, Jefferson Davis, and Vermilion Parishes had the most monthly surface inundation increase.

Hotspots of Surface Inundation Surge in the United States in January 2024



VIIRS SDR

Jan 2024

Accomplishments / Events:

- Presented at the American Meteorological Society (AMS) meeting in Baltimore
- Verified that S-NPP VIIRS SDR calibration was not affected by the SMD transmission anomaly (data gap) on Jan. 30-31, 2024
- Completed checkout of the IDPS Block 2.3 Release Mx9 software deployed on DP-TE: compared VIIRS SDR products from Mx9 and Mx8 without detecting any significant differences
- Delivered for deployment in the IDPS operations the 11th (out of 12) NOAA-21 (N21) VIIRS SDR DNB STRAY-LIGHT-CORRECTION LUT as well as the updated N21, NOAA-20 (N20) and NPP VIIRS SDR DNB DN0 and GAIN-RATIOS LUTs that were created based on data acquired around the new moon on 1/11/2024; also delivered the N21 DELTA-C and F-PREDICTED LUTs that reduce striping in band M4 images of convective clouds as well as the N21 EMISSIVE-V2 LUT that applies the TEB calibration correction during the WUCD tests
- After receiving DRAT approval for implementing in IDPS the JPSS-3/JPSS-4 VIIRS RDR/SDR granule temporal extent change to exactly 85.0 s, made the first RDR files with the new granule size, and then successfully processed those files to VIIRS SDR using a revised ADL code
- Assisted in scheduling and analyzed data from N20, N21, and NPP VIIRS lunar calibration on 1/21/2024

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.*

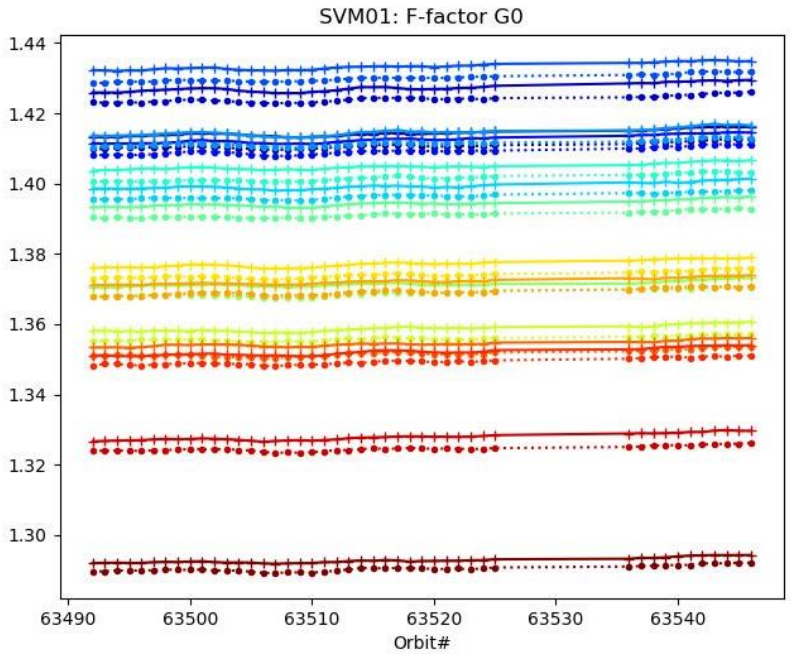
Issues/Risks:

J3/J4 VIIRS granule size change

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
SNPP and NOAA-20 VIIRS intermediate recalibration	Sep-24	Sep-24		
JPSS-3 VIIRS pre-launch characterization report	Apr-24	Apr-24		
JPSS-3 VIIRS SDR initial pre-launch LUTs	Jun-24	Jun-24		
Monthly lunar calibration (predictions and analyses)	Jul-24	Jul-24		
Monthly delivery of VIIRS DNB calibration LUTs	Sep-24	Sep-24		
Monthly delivery of N21 VIIRS DNB straylight LUTs	May-24	May-24		
Geolocation monitoring using CPM (NPP, N20, N21)	Sep-24	Sep-24		
N21 on-orbit calibration LUT development	Sep-24	Sep-24		
Delivery of VIIRS SDR RSB and TEB calibration LUTs to mitigate degradation	Sep-24	Sep-24		

Highlights:

Suomi NPP VIIRS SDR RSB calibration scaling (F) factors before and after the SMD transmission anomaly on Jan. 30-31, 2024: band M1 High-Gain for both HAM sides is shown as an example



Vegetation Health

Nov 2023

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
- Team has started an effort on Vegetation Health Indices-based yield modeling. Wheat yield forecasting is tested with correlation and regression analysis for five selected countries (see Highlights in the lower right quad). Wheat yield data from FAO and Vegetation Health Indices data from the STAR VH website have been used for testing.

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 Provisional Maturity	Apr-24	Apr-24	Sept-23	Maturity reached before plan
NOAA-21 Vegetation Health Validated Maturity	Apr-24	Apr-24		

Highlight:

Correlation statistics for wheat yields of five countries and global VIIRS vegetation health product are summarized below: Optimal week correlation between listed VH indices and wheat yield (improved)

Country	Planting and Harvest months	Sampling method			VCI vs. Wheat		TCI vs. Wheat		VHI vs. Wheat	
		*DY	**TP	One year lag for week> 26?	***OW	****CC	OW	CC	OW	CC
Australia	P 5-7 H 10-1	1961-2021	1982-2021	Yes	**50**	**0.629**	**41**	**0.704**	**41**	**0.707**
India	P 10-12 H 3-5	1961-2021	1982-2021	Yes	44	0.186	**34**	**0.507**	42	0.099
Mongolia	P 4-6 H 8-9	1961-2021	1982-2021	No	30	0.373	27	0.477	28	0.466
Russia	PW 9-10; PS 4-5 HW 7-8; HS 8-9	1992-2021	1992-2021	No	52	0.344	**23**	**0.578**	**23**	**0.538**
Ukraine	PW 9-10; PS 4-5 HW 7-8; HS 8-9	1992-2021	1992-2021	No	6	0.339	**24**	**0.563**	**25**	**0.565**

Volcanic Ash

January, 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 and JPSS-2 will continue as needed, including support for ASSISTT/NDE evaluations. VOLCAT is long-term plan.
- The Volcanic Ash science team continues to collect and analyze volcanic ash emissions as nature allows in preparation for the full maturity review, currently scheduled for March 2024. The science team will now move from collecting and analyzing cases to preparing material for the upcoming full maturity review.
- The science team leveraged the selection of SO2-free days for the VIIRS+CrIS background spectra generation and utilized IASI data for the same SO2-free days to calculate IASI SO2-free background spectra. The included figure shows a comparison of CrIS and IASI VOLCAT SO2 retrievals for the Raikoke SO2 cloud from June 24 2019. Additional comparisons are also being made and pending favorable results, work will begin on including the AVHRR+IASI capability into the VOLCAT Fortran code.
- VOLCAT VIIRS volcanic ash plume identification and extraction work is an enhancement to the VOLCAT methodology. This work will continue through much of FY24. Most recent progress toward this goal is the needed VOLCAT modifications have been made to enable output of VOLCAT metrics for missed detections and non-ash clouds. 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.

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		VOLCAT enhancement (improved detection was deprioritized for validation work) will continue into much of FY24)

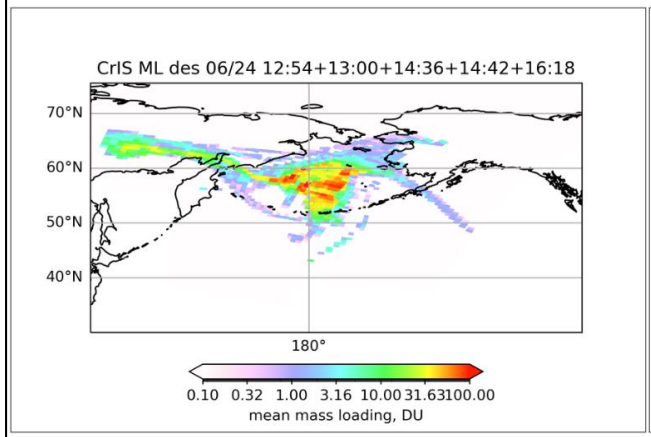
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

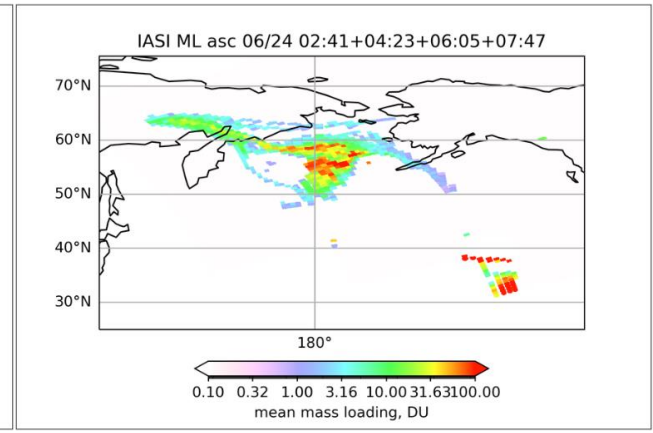
Issues/Risks:

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Improve VIIRS volcanic ash plume identification and extraction	Jun-23	Sep-24		
NOAA-21 Volcanic Ash Full Maturity	Mar-24	Mar-24		

Highlights:

VOLCAT SO2 mass retrievals using CrIS (left) and IASI (right) for June 24 2019 Raikoke eruption. The IASI results are using the newly created IASI-based background spectra. The IASI results compare very favorably with the CrIS results and lend confidence in the quality of the newly created background data.





Ocean Color

January 2024

Accomplishments / Events:

- PAR (PPFD) measurements on a relatively stable coastal water buoy for VIIRS product validation (completed by the ocean color calibration/validation team from University of South Florida.
- There are a few sources of offshore PAR observations available for satellite validation, and the uncertainty associated with such measurements can be significantly greater than error specifications of a sensor. We integrated PAR (PPFD) sensors into the data logging system of a relatively-stable spar buoy being constructed at USF and intended for deployment in coastal waters. A 3-year test deployment of the buoy suggests that PAR sensors (with weatherproofing) are able to provide consistent estimates of PPFD for at least several months. The SUBGEO buoy remains nearly vertical despite the presence of strong currents and severe weather conditions. If PAR sensor orientation and calibration are stable on such a buoy, not only will significant sources of uncertainty be constrained, but additional uncertainty from sensor fouling may be reduced by identifying prolonged periods when the in situ PPFD is substantially less than model derived estimates. Deployment of the SUBGEO buoys Eastern Gulf of Mexico waters should occur in the spring of 2024, and provide reliable in situ measurements of PAR in coastal waters for the validation of satellite PAR estimates.

Task/Milestone	Planned Completion Date	Fiscal Quarter	Comments
NOAA-21 OC data processing			
NOAA-21 Provisional maturity for OC EDR	Feb-24 (or 12 months after NOAA-21 Provisional SDR)	Q2 FY24	NOAA-21 OC data
NOAA-21 OC EDR vicarious calibration using MOBY data	Jan-24 (or dependent on available of MOBY data)	Q2 FY24	NOAA-21 OC data
VIIRS calibration/validation			
Continue VIIRS Cal/Val data analysis (SNPP, NOAA-20, and NOAA-21)	Sep-24	Q4 FY24	Cal/Val
Cal/Val team complete the 9th VIIRS ocean color dedicated cruise	Jul-24	Q3 FY24	Cal/Val
In situ data collections from OC Cal/Val team including NOAA dedicated cruise and other opportunities, particularly for NOAA-21 OC validation	Aug-24	Q4 FY24	Cal/Val
VIIRS algorithm refinement (Maintenance DAP)			
Improvement of the OCView tool for OC products monitoring	Aug-24	Q4 FY24	
Producing consistent VIIRS ocean color products	Aug-24	Q4 FY24	
Continue working on improvement of the ocean color data processing system (MSL12), particularly over global coastal and inland water regions	Sep-24	Q4 FY24	
VIIRS OC data processing/reprocessing			
Continue producing consistent VIIRS SNPP-NOAA-20 OC products and start to work on NOAA-21 OC data consistency with other two VIIRS sensors	Sep-24	Q4 FY24	
Updated DAP (MSL12) to CoastWatch, if needed	Sep-24	Q3 FY24	

Highlights:

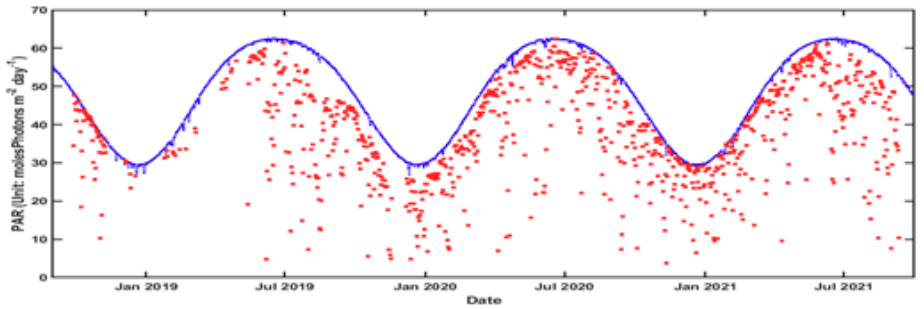


Figure 3 The daily PAR estimate derived from the SUBGEO-1 buoy measurements are shown as red dots and the estimate from an irradiance model is shown as a blue line

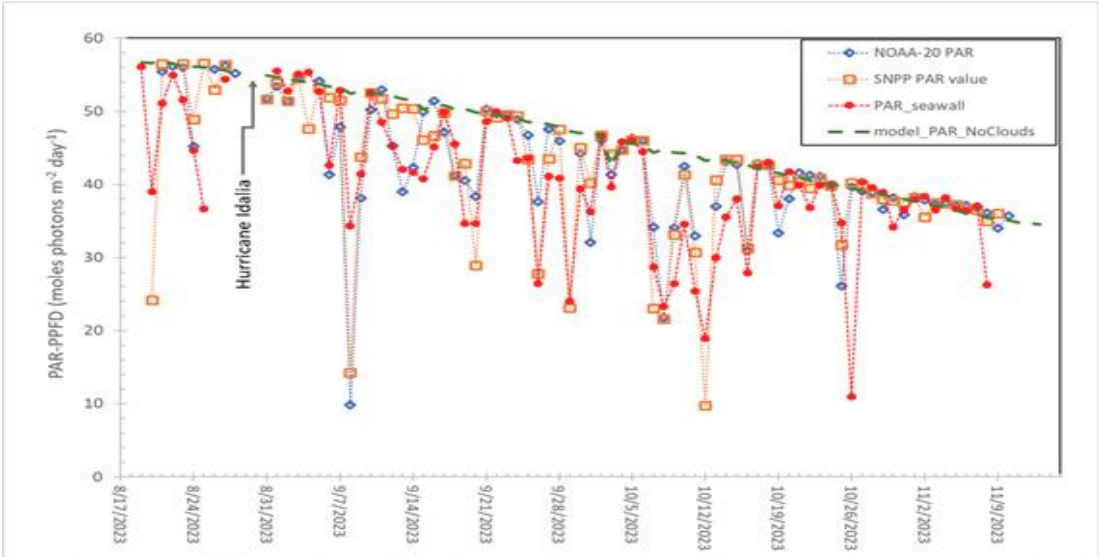


Figure 4 Estimates of daily PAR obtained from the seawall-mounted SUBGEO sensor, VIIRS SNPP, VIIRS on NOAA-20, and estimated from modeled irradiance for mid-August thru mid-October 2023. The daily PAR values derived from the sensor on the seawall SUBGEO tower test shown as red dots, VIIRS-SNPP values as open orange squares, VIIRS-NOAA20 as open blue diamonds, and irradiance model estimates as a dashed green line.