



## NOAA JPSS Monthly Program Office

# AMP/STAR FY24 TTA

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December, 2023

## S-NPP CDP reset recovery evaluation support

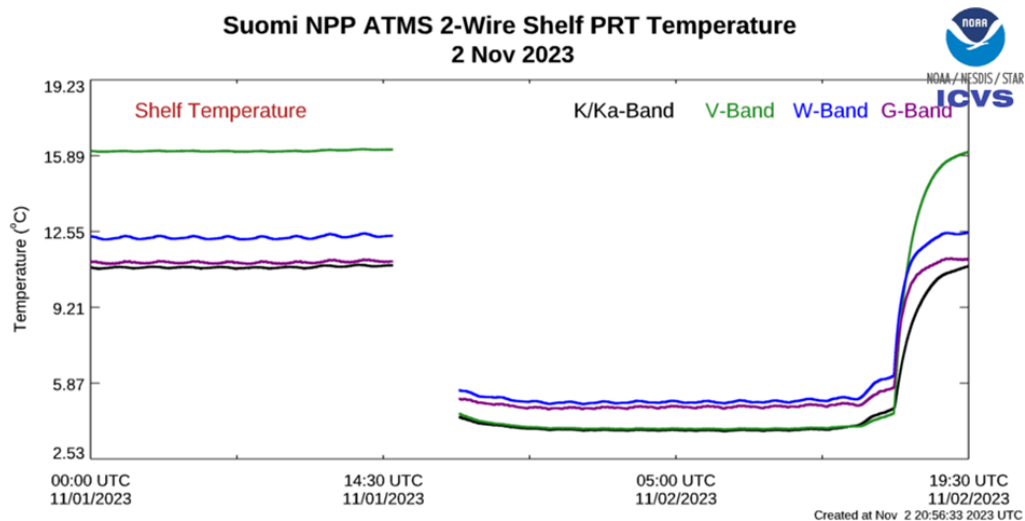
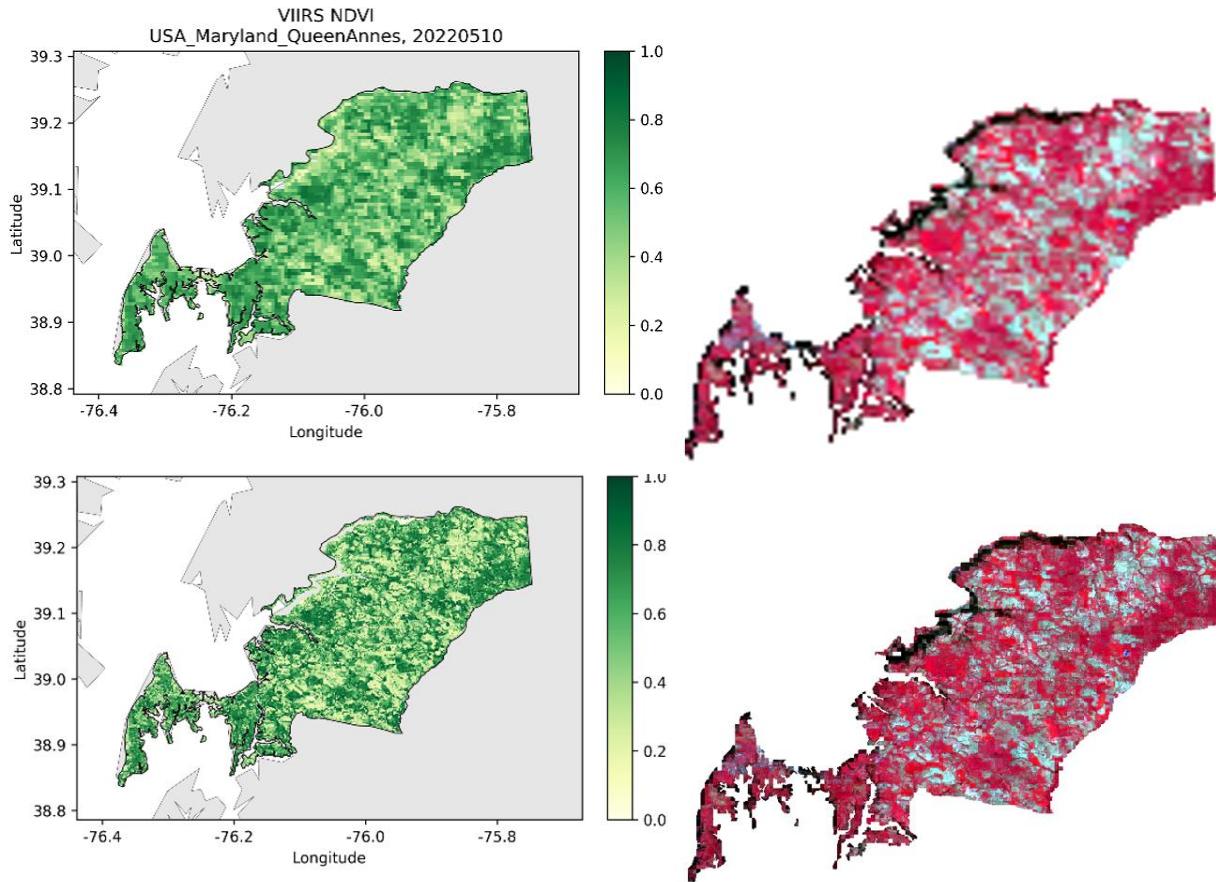


Figure. SNPP ATMS band dependent shelf temperatures before and after the CDP reset event

The SNPP spacecraft experienced a CDP reset event around 14:56:37 UTC on Nov 1, 2023. During this event, ATMS was put to SAFE\_HOLD mode to protect the instrument. S-NPP spacecraft was back to operational mode around 18:15:57 UTC on Nov 1, 2023. ATMS was set back to OPS mode until 15:47:01 UTC on November 2, 2023. Based on the ICVS monitoring products, ATMS showed a regular SAFE\_HOLD mode status with lower instrument temperatures. After returning back to operational mode, monitoring products indicate a nominal recovery trend, including increasing instrument temperatures and calibration parameters. Further assessment is still on-going as this report is prepared. The other SDR teams had similar efforts which also found a recovery as expected.

## Development of high resolution VIIRS Vegetation Index products



The existing operational VIIRS Vegetation Index (VI) products currently possess a spatial resolution of 4 km globally and 1 km in the CONUS region. While this resolution is adequate for delineating broad global vegetation patterns and monitoring changes, its applicability in agricultural contexts is limited due to the coarse pixel size, which fails to capture spectral information in small-scale croplands. Consequently, the need arises to downscale the original VIIRS VI product to a significantly higher spatial resolution to enhance its utility in various agricultural applications.

The availability of Sentinel-2 satellite data, offering observations at a finer 20 m resolution, facilitates the establishment of a quantitative relationship in spectral signals between coarse pixels and corresponding subpixels. This forms the theoretical foundation for downscaling the VIIRS 4 km/1 km VI product to a 20 m resolution. This can be seen in the figure

Figure. NOAA-20 VIIRS a) 1 km NDVI product and b) false-color (NIR-R-G) image and 20 m downscaled NDVI and d) false-color (NIR-R-G) image in Queen Anne's county, Maryland on May 10, 2022

## S-NPP CDP reset recovery evaluation support

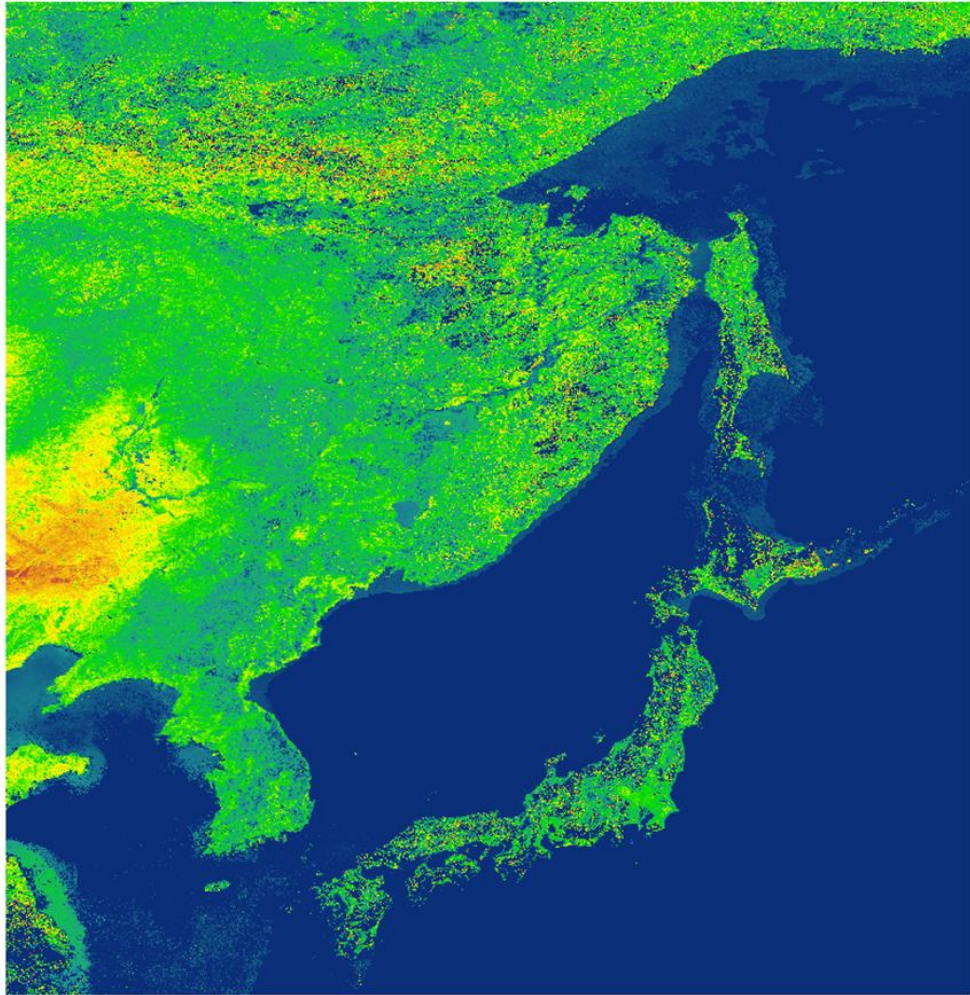


Figure. Regional soil albedo map over part of northeast Asia and Far East, show great details.

The LPD team has achieved expected outcome in developing high-resolution (500 m) satellite soil albedo. Traditionally, soil albedo has been treated with fixed values in two spectral broadbands, VIS and NIR, with a notable spectral discontinuity at 700 nm. The Community Land Model (CLM, a land model for the Community Earth System Model developed by National Center for Atmospheric Research) approaches the determination of soil background albedo through optimization methods, known as “soil colors”, to mimic remote sensing observations of snow-free surface albedo at local noon. However, this method might conceal compensating errors.

Our new soil albedo map from satellite data have some key advantages. It provides high resolution details globally. Also, compared to previous soil albedo maps used in land surface models, this new map considers the impact of the solar zenith angle (SZA), NPV, and water. Additionally, we have plans to extend the production of Visible/Near-infrared/Shortwave BSA/WSA soil maps, and upon request, spectral soil albedo maps corresponding to MODIS bands 1 - 7 can be provided.



# Accomplishments

| Delivery Date | Delivery Algorithm Packages (DAPs) – Enterprise Products:   | Recipient |
|---------------|---|-----------|
| 11/03/23      | Final CCAP delivery for Ocean Color v1 for J2 capability.   | NCCF      |
| 11/07/23      | NUCAPS Production rules and documentation update  | NCCF      |
| 11/13/23      | JPSS Aerosol Optical Depth (AOD) CCAP patch delivery with the updated coefficient files for the AOD algorithm.  | NCCF      |
| 11/17/23      | Final delivery of the Regional hourly Advanced Baseline Imager and Visible Imaging Radiometer Suite Emissions (RAVE) North America Final CCAP v2 to NCCF for integration which uses Enterprise Fires I-band as inputs rather than Active Fires M-band from NDE. | NCCF      |
| 11/20/23      | Final delivery of the V8TOz J2 Provisional Final CCAP to CSPP LEO for integration.  | NCCF      |
| 11/30/23      | 11/30/2023 ASSISTT delivered V8PRO v4r3 CCAP v1 EUM & SMM   | NCCF      |
| 12/05/23      | An update to the AWIPS Patch CCAP has been re-uploaded to the original S3 Bucket locations. The change address an issue with the SAT_AHI intermediate file timestamps.  | NCCF      |
| 12/08/23      | The v3 eTRAP delivery which includes J2 capability and the ASSISTT Interface Module (AIM).  | NCCF      |
| 12/08/23      | Patch CCAP delivery of ALPW (Advection Layer Precipitable Water). The output files of the Remap MiRS unit are no longer being zipped (the PR document has been updated to reflect this), and n21 capability has been added.                                     | NCCF      |
| 12/13/23      | SnowFall Rate (SFR) CCAP Patch Delivery to the Cloud (v1-1)   | NCCF      |

## 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, <b>11/7/23</b><br><b>11/14/23, 11/21/23, 11/28/23, 12/5/23</b>   |
| NOAA-20 | Weekly OMPS TC/NP Dark Table Updates              | 10/3/23, 10/11/23, 10/17/23, 10/24/23, 10/31/23, <b>11/7/23</b> ,<br><b>11/14/23, 11/21/23, 11/28/23, 12/5/23</b> |
| NOAA-21 | Weekly OMPS TC/NP Dark Table Updates              | 10/3/23, 10/11/23, 10/17/23, 10/24/23, 10/31/23, <b>11/7/23</b> ,<br><b>11/14/23, 11/21/23, 11/28/23, 12/5/23</b> |
| S-NPP   | Bi-Weekly OMPS NP Wavelength & Solar Flux Update  | 9/12/23, 9/26/23, 10/11/23, <b>10/24/23, 11/21/23</b> ,<br><b>12/05/23</b>  |
| NOAA-20 | Bi-Weekly OMPS NP Wavelength & Solar Flux Update  | 10/3/23, 10/17/23, <b>10/31/23, 11/14/23, 11/28/23</b>  |
| NOAA-21 | Bi-Weekly OMPS NP Wavelength & Solar Flux Update  | 10/3/23, 10/17/23, <b>10/31/23, 11/14/23, 11/28/23</b>  |
| S-NPP   | Monthly VIIRS LUT Update of DNB Offsets and Gains | 10/23/23, <b>11/21/23</b>   |
| NOAA-20 | Monthly VIIRS LUT Update of DNB Offsets and Gains | 10/23/23, <b>11/21/23</b>   |
| NOAA-21 | Monthly VIIRS LUT Update of DNB Offsets and Gains | 10/23/23, <b>11/21/23</b>   |
| NOAA-21 | Monthly VIIRS DNB Straylight correction update    | 10/23/23, <b>11/21/23</b>   |



# NOAA-21 Cal/Val Maturity Reviews

## November 2023 Maturity Reviews

|                          |             |  |
|--------------------------|-------------|--|
| Clouds – DCOMP and NCOMP | Provisional | Review occurred virtually on December 4 <sup>th</sup> , attained Provisional effective March 30. |
|--------------------------|-------------|--|

## December 2023 Maturity Reviews

|  |  |   |
|--|--|---|
|  |  | Maturity reviews moved to January due to year-end holiday schedules and leave plans |
|--|--|---|

## January 2024 Maturity Reviews

|   |                  |                      |
|---|------------------|----------------------|
| Ocean Color   | Beta/Provisional | Postponed until 2/29 |
| VIIRS Polar Winds   | Beta/Provisional | Planned for 1/25     |
| Cryosphere Products – Sea Ice Thickness/Age, Binary Snow Cover & Fractional Snow Cover                                    | Provisional      | Planned for 1/25     |
| Land products: Land Surface Temperature, Surface Albedo, Surface Reflectance, Green Vegetation Fraction, Vegetation Index | Provisional      | Planned for 1/25     |
| NUCAPS (all products)   | Provisional      | Planned for 1/25     |
| OMPS LP (SDR & EDR)   | Beta             | Planned for 1/25     |

# JSTAR Code/LUT/Product Deliveries

|            |   |
|------------|---|
| 11/6/2023  | ADR-10550/CCR-6767 NOAA -21 OMPS NP Solar intrusion stray light correction - fast track               |
| 11/14/2023 | ADR-10550/CCR-6767 NOAA -21 OMPS NP Solar intrusion stray light correction - fast track (Redelivered) |

| Date                                     | Remaining J2-Ready DAPs to NCCF   |
|--|---|
| March, 2023<br>(Delayed to January 2024) | ASSISTT delivered LP pre-processor CCAP for SCR on 9/29.<br>Science team plan to deliver the full package (Level-1/2 and J2 LUTs) to ASSISTT by December 2023<br>ASSISTT Delivery to NCCF : February, <b>2024</b> . |





# FY24 STAR JPSS Milestones

| Algorithm Updates DAPs/CCAPs  | Original Date | Forecast Date | Actual Completion Date          | Variance Explanation |
|---|---------------|---------------|---------------------------------|----------------------|
| ALPW (Advection Layer Precipitable Water from MiRS)                   | Oct-23        | Oct-23        | Delivered on 10/27              |                      |
| Ocean Color final CCAP  | Nov-23        | Nov-23        | Delivered on 11/03              |                      |
| Aerosols (update to VIIRS AOD coefficient files)                      | Nov-23        | Nov-23        | Delivered on 11/13              |                      |
| RAVE (Regional Hourly ABI and VIIRS Suite Emissions) update to eFires | Nov-23        | Nov-23        | Delivered on 11/17              |                      |
| eTRAP (Enterprise Tropical Rainfall Potential)                        | Nov-23        | Nov-23        | Delivered on 12/08              |                      |
| Snowfall Rate (add additional log-files)                              | Dec-23        | Dec-23        | Delivered 12/13                 |                      |
| Blended Global Biomass Burning Emissions Product (GBBEPx)             | Dec-23        | Dec-23        | <b>Moved to January (01/19)</b> |                      |
| VOLCAT (Phase 1) NCCF implementation                                  | Dec-23        | Dec-23        | <b>Moved to January (01/12)</b> |                      |
| Heap with J2 LUTs   | Dec-23        | Dec-23        |                                 |                      |
| LST EDR J2 Provisional (updated to LSE)                               | Dec-23        | Dec-23        |                                 |                      |
| ACSPO SST_v2 release version + patch to CCAP for MetOP                | Jan-24        | Jan-24        |                                 |                      |
| Cloud Mask (LUT update for J2)  | Jan-24        | Jan-24        |                                 |                      |
| OMPS-NP (J2 LUT Delivery)   | Jan-24        | Jan-24        |                                 |                      |
| RAVE (Science bug fix)  | Jan-24        | Jan-24        |                                 |                      |
| Vegetation Health   | Jan-24        | Jan-24        |                                 |                      |
| GBBEPx (Enterprise Fires I-Band update)                               | Jan-24        | Jan-24        |                                 |                      |
| LAI Initial Delivery  | Feb-23        | Feb-24        |                                 |                      |

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<br>(early 2024) | JPSS-3 JCT1 Dry Run<br>(11/2/2023); JCT1<br>Event (01/01/2024)  |  |
| 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 |
|---|---------------|---------------|---|----------------------|
| Clouds (V: Mar-24)  | Mar-24        | Mar-24        | Provisional Review held (except for DCOMP and NCOMP): October 26, 2023; Attained Provisional effective March 30. <b>DCOMP and NCOMP Provisional Review occurred virtually on December 4, 2023, and attained Provisional effective March 30.</b> |                      |
| Aerosol AOD (V: Jun-24)   | Jun-24        | Jun-24        | Attained Beta Provisional effective February 10, 2023   |                      |
| Aerosol ADP (V: Jun-24)   | Jun-24        | Jun-24        | Attained Provisional effective February 10, 2023  |                      |
| Volcanic Ash (V: Mar-24)  | Aug-23        | Aug-23        | Attained Provisional 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        | Attained Beta effective May 1, 2023. Ice Temperature and Ice Concentration Attained Provisional effective May 1, 2023.  |                      |
| Active Fires (V: Jul-24)  | Jul-24        | Jul-24        | Attained Provisional effective March 30,2023.   |                      |
| LST/LSA/SR/GVF/VI (P: Jan-24; V: Jul-24 to Jan-25 FY25)   | Sep-24        | Sep-24        | Attained Beta effective March 29, 2023  |                      |
| Vegetation Health (V: Apr-25 FY-25)   | FY-25         | FY-25         | Attained Provisional effective March 30, 2023   |                      |
| Ocean Color (B/P: Jan-24; V:Jul-25 FY25)  | Jan-24        | Sep-23        | <b>Beta/Provisional Planned for February 2024</b>   |                      |
| SST (V: Aug-24)   | Aug-24        | Aug-24        | Attained Provisional effective March 20, 2023   |                      |
| VPW (B/P: Jan-24; V: Mar-24)  | Mar-24        | Mar-24        | <b>Beta/Provisional Planned for January 2024.</b>   |                      |
| VFM (V: Jan-25)   | FY-25         | FY-25         | Provisional Review held 8/24; Effective date will be upon successful integration of v1.1 to be delivered in September 2023.   |                      |
| NUCAPS P: Jan-25; V: Mar-Jun-24)  | Jun-24        | Jun-24        | Attained Beta effective 3/23, Provisional Planned: January 2024   |                      |
| MiRS (V:Oct-24)   | Oct-24        | Oct-24        | Attained Provisional 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        | <b>Beta and Provisional Planned 1/25/24</b>   |                      |

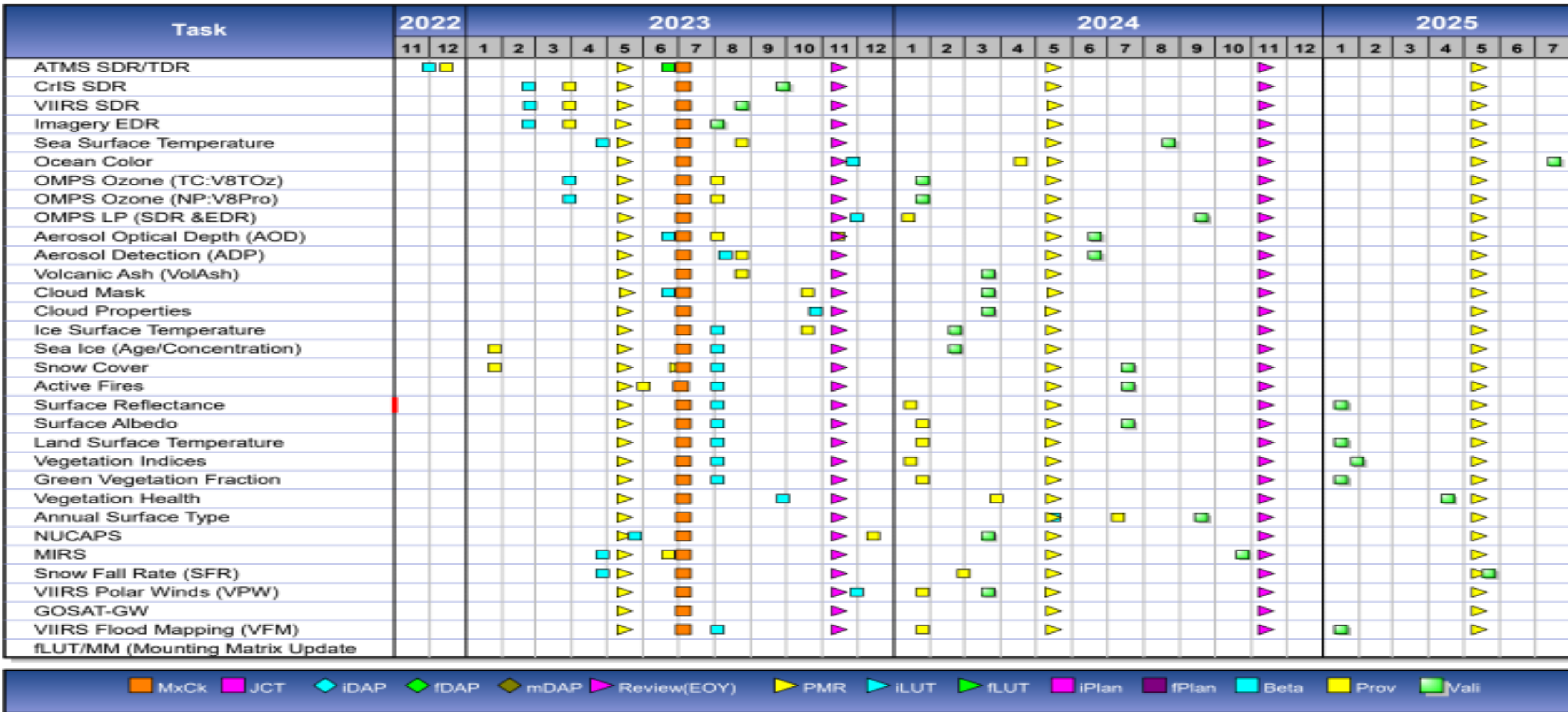


# FY24 STAR JPSS Milestones

| Operational/Program Support                                 | Original Date | Forecast Date | Actual Completion Date                                    |
|---|---------------|---------------|---|
| S-NPP: Weekly OMPS TC/NP Dark Table Updates                 | Weekly        | Weekly        | 11/7/23, 11/14/23, 11/21/23, 11/28/23, 12/5/23            |
| S-NPP: Bi-Weekly OMPS NP Wavelength & Solar Flux            | Bi-Weekly     | Bi-Weekly     | 10/24/23, 11/21/23, 12/05/23                              |
| S-NPP: Monthly VIIRS LUT update of DNB Offsets and Gains    | Monthly       | Monthly       | 11/21/23  |
| NOAA-20: Weekly OMPS TC/NP Dark Table Updates               | Weekly        | Weekly        | 11/7/23, 11/14/23, 11/21/23, 11/28/23, 12/5/23            |
| NOAA-20: Bi-Weekly OMPS NP Wavelength & Solar Flux          | Bi-Weekly     | Bi-Weekly     | 10/31/23, 11/14/23, 11/28/23                              |
| NOAA-20: Monthly VIIRS LUT update of DNB Offsets and Gains, | Monthly       | Monthly       | 11/21/23  |
| NOAA-21: Weekly OMPS TC/NP Dark Table Updates               | Weekly        | Weekly        | 11/7/23, 11/14/23, 11/21/23, 11/28/23, 12/5/23            |
| NOAA-21: Bi-Weekly OMPS NP Wavelength & Solar Flux          | Bi-Weekly     | Bi-Weekly     | 10/31/23, 11/14/23, 11/28/23                              |
| NOAA-21: Monthly VIIRS LUT update of DNB Offsets and Gains  | Monthly       | Monthly       | 11/21/23  |
| Mx builds deploy regression review/checkout (Mx9/MX10)      |               |               | ✓ Tentative dates: Mx9: Jan. 12, 2024 Mx10: Apr. 16, 2024 |



## STAR JPSS Schedule: TTA Milestones



■ MxCk 
 ■ JCT 
 ■ IDAP 
 ■ IDAP 
 ■ mDAP 
 ▼ Review(EOY) 
 ▼ PMR 
 ▼ iLUT 
 ▼ fLUT 
 ▼ iPlan 
 ▼ fPlan 
 ■ Beta 
 ■ Prov 
 ■ Vali

**Color code:**

**Green:** Completed Milestones

**Gray:** Ongoing FY24 Milestones

## Accomplishments / Events:

- Ivan Csiszar attended the Global Observations of Forest and Landcover Dynamics Fire Implementation Team meeting (11/14-15) and Day 1 of the WildFireSat Stakeholder meeting (11/16-17) at the Canadian Space Agency in Montréal.
  - He presented on NESDIS's fire mapping and monitoring activities, including the status of the VIIRS fire product
- The team started investigating improvements to the processing algorithm to successfully handle corrupt input VIIRS SDR data (see example below)
  - Additional empirical tests for pre- and post-screening for bad scans
  - Cases so far found only in early years of the reprocessed SNPP data record
  - Low impact on operational product; additional quality assurance

## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

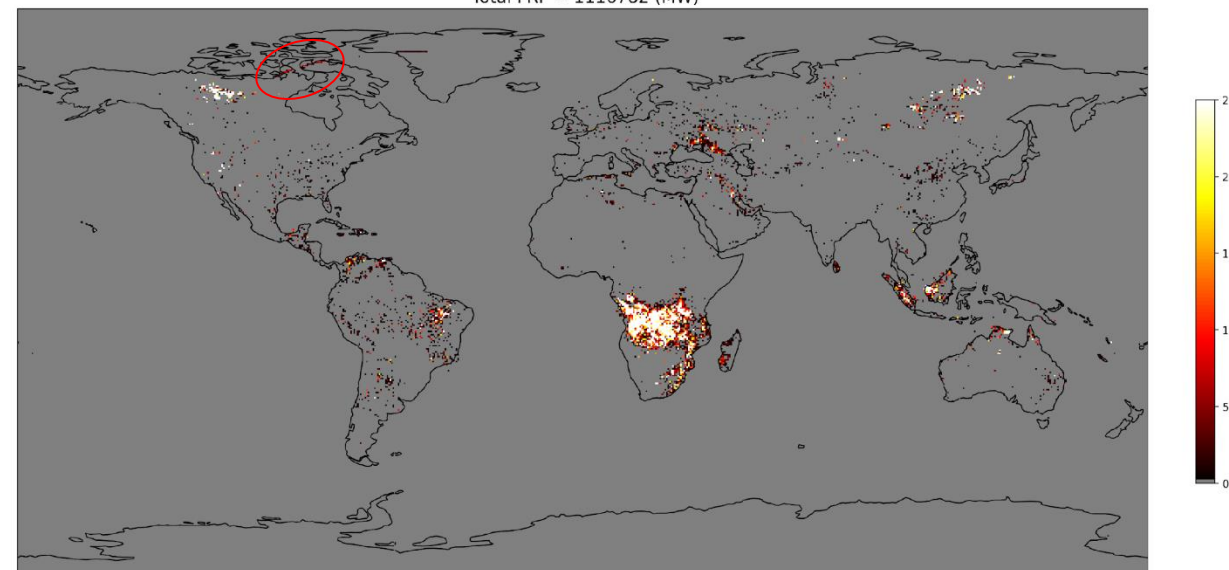
- Project has completed.
- Project is within budget, scope and on schedule.
- Project has deviated slightly from the plan but should recover.
- Project has fallen significantly behind schedule, and/or significantly over budget.

## Issues/Risks:

| Task Category                | Task/Description  | Start     | Finish     | Deliverable                    | Requirement (Dev Only)             |
|------------------------------|---|-----------|------------|--------------------------------|------------------------------------|
| Development (D)              | Baseline / eFire / NGFS cross verification and cal/val                              | 10/1/2023 | 9/30/2024  | Documentation                  | NESDIS Wildland Fire Program goals |
|                              | eFire NOAA-21 validated maturity analysis   | 10/1/2023 | 7/31/2024  | Maturity review, Readme        | NOAA-21 maturity schedule          |
| Integration & Testing (I)    | ASSIST, NCCF and DB I&T support   | 10/1/2023 | 12/31/2024 | Science code updates           |                                    |
| Maintenance                  | Reactive maintenance of Suomi NPP, NOAA-20 and NOAA-21 I-band NDE and NCCF products | 10/1/2023 | 9/30/2024  | Documentation and code updates |                                    |
| LTM & Anomaly Resolution (L) | Suomi NPP / NOAA-20 NOAA-21 data analysis and feedback                              | 10/1/2023 | 9/30/2024  | Analysis reports               |                                    |

## Highlight: Removing spurious detections from EFIRE output

(npp) VIIRS AF IBands 2014-07-24  
Total FRP = 1116782 (MW)



Suomi NPP Enterprise Fire VIIRS I-band FRP, 7/24/2014, using reprocessed SDR input

## 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 |
|--|---------------|---------------|------------------------|----------------------|
| Update to a faster version AI-based surface-reflectance-relationship algorithm (ML-SFRA) | Jun-23        | Sep-23        | TBD                    | developer left       |
|  |               |               |                        |                      |

## Overall Status:

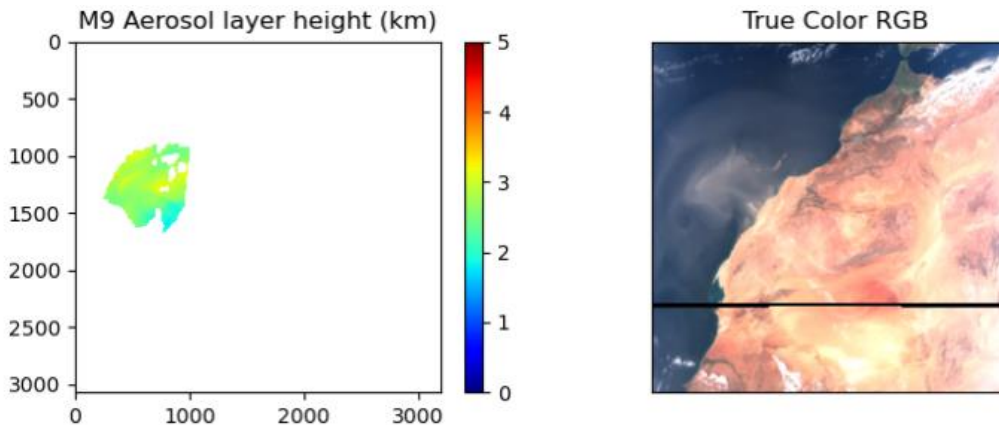
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| 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



### Accomplishments / Events:

- Participated S-NPP Command Data Processor (CDP) reset recovery activities host by OSPO. Provided S-NPP ATMS near real time instrument status, performance, and science data quality evaluation reports after the recovery. The short-term monitoring and long-term trending products indicate that S-NPP ATMS instrument performance returned back to its nominal level within 3 days after it was placed back to the operational mode at 17:56Z on Nov 2, 2023. No significant abnormalities were observed in science data after the recovery. Based on STAR ATMS SDR team's recommendations, S-NPP ATMS SDR data products operational dissemination was enabled at 20:30 UTC, Nov 3, 2023. Shown in **Figure 1** is the S-NPP ATMS channel dependent orbital mean NEDT from Oct 26 to Nov 24, 2023. No changes are observed before and after the CDP reset event.
- Attended the JPSS-3 ATMS SN305 instrument regression thermal vacuum (TVAC) activities. Analyzed the Coldplate (CP)-Mid, CP-Mid with compensator motor off, CP-Low, and CP-High measurements to characterize the instrument performance after the rework. Discussed some unique features observed in the CP-Mid with compensator motor off TVAC data. Illustrated in **Figure 2** is the all JPSS ATMS CP-Mid Redundant Configuration (RC)-1 NEdT comparison chart. The noise comparison indicates that the NEdT of JPSS-3 ATMS all channel meet the specification with margins, but V-band channels slightly increased after the rework. Instrument level TVAC data are also used to derive key calibration coefficients for IDPS operational calibration algorithm, such as reflector emissivity and non-linearity correction coefficients. STAR ATMS team will perform additional analysis for the delivery of JPSS-3 ATMS pre-launch processing coefficients table (PCT) to support IDPS JPSS-3 ATMS pre-launch activities.

### Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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

### Issues/Risks:

None

| Task Category                | Task/Description   | Start   | Finish   | Deliverable                     |
|------------------------------|--|---|--|---------------------------------|
| Development (D)              | <ol style="list-style-type: none"> <li>Dynamic cold calibration bias correction algorithm &amp; coefficients updates</li> <li>Satellite near field contamination correction algorithm and coefficients update</li> <li>2 dimensional lunar model development to improve lunar intrusion correction quality</li> <li>Analyze N21 ATMS SRF data</li> </ol> | <ol style="list-style-type: none"> <li>October, 2023</li> <li>January, 2024</li> <li>April, 2024</li> <li>July, 2024</li> </ol> | <ol style="list-style-type: none"> <li>December, 2023</li> <li>March, 2024</li> <li>June, 2024</li> <li>September, 2024</li> </ol> | IDPS code & PCT update & Report |
| Integration & Testing (I)    | IDPS I&T string data checkout & verification   | October, 2023   | September, 2024  | Report                          |
| Calibration & Validation (C) | <ul style="list-style-type: none"> <li>JPSS-3 ATMS observatory TVAC data analysis</li> <li>JPSS-4 ATMS SRF data analysis</li> </ul>  | November, 2023  | April, 2024  | Report                          |
| Maintenance (M)              | Band dependent satellite zenith angle outputs  | July, 2024  | September, 2024  | IDPS code update                |
| LTM & Anomaly Resolution (L) | SNPP, NOAA-20 and NOAA-21 instrument health status, performance, and science data quality monitoring and anomaly troubleshooting   | October, 2023   | September, 2024  | Report                          |

### Highlights:

Figure 1. S-NPP ATMS channel dependent orbital mean NEdT between 10/26/2023 and 11/24/2023

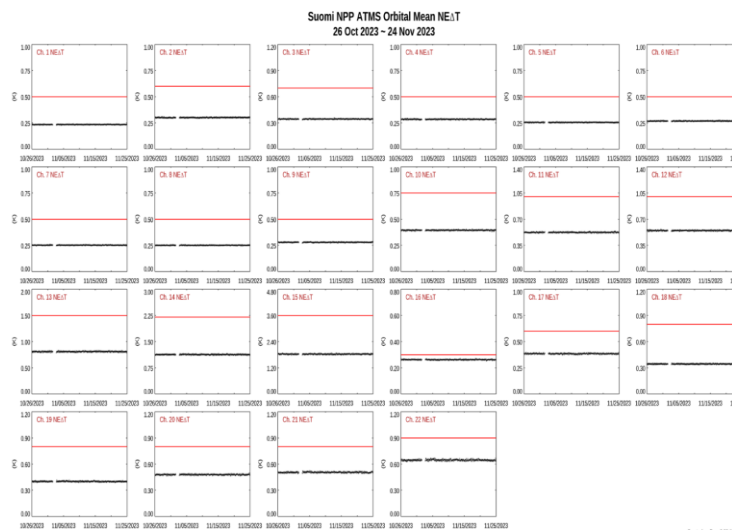
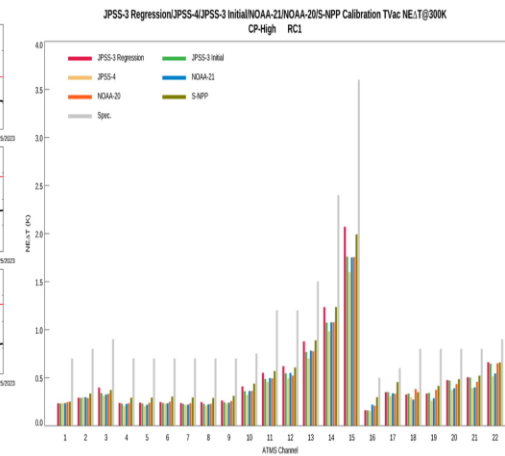


Figure 2. All JPSS ATMS instrument TVAC CP-Mid RC1 channel NEdT comparison



## Accomplishments / Events:

- DCOMP and NCOMP presented the Provisional review materials at the end of November. An issue is being investigated with the **visible** nighttime optical properties (NLCOMP). This will not affect Provisional maturity (See figure for an example) as NLCOMP is not an official product. The review board is still determining the state of the review
- 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 <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   |                                    | X                                |                                | See Events bullet    |
| 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-23        |                        | Ongoing  |
| NOAA-21 Cloud Products Beta Maturity  | Jul-23        | Nov-23        |                        | COMP at end of Nov. Others Prov  |
| NOAA-21 Cloud Products Provisional Maturity   | Aug-23        | Nov-23        |                        | COMP at end of Nov. Others Prov  |

## Highlights:

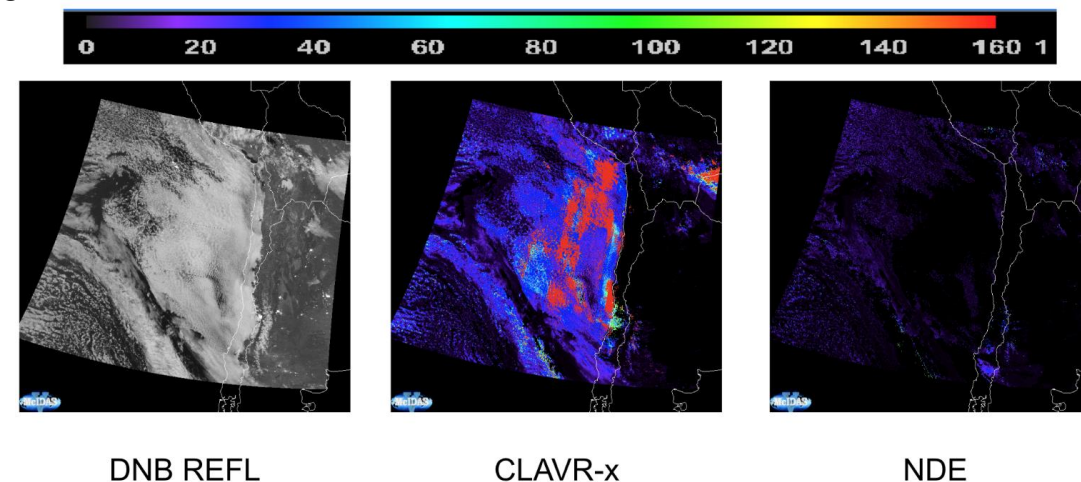


Figure 1. Example of NLCOMP on 1 October 2023 from 0608 - 0613 UTC showing the DNB reflectance (Left), CLAVR-X NLCOMP (middle) and SAPF NLCOMP (right). This difference is being investigated by ASSISTT and the cloud team

## Accomplishments / Events:

- An SNPP CrIS CDP reset anomaly occurred on November 2, 2023. The team worked on initial preparations of the report template and the first report of the SNPP CrIS recovery after the CDP reset anomaly, as well as making adjustments to the CrIS telemetry toolbox in preparation for recovery assessment. There was still no SDR data flowing from SNPP CrIS as of November 31. (Recovery Cal/Val Efforts Start in December)
- LBLRTM and LNFL tools were installed and configured for the spectral calibration. Created initial LBLRTM simulation for the transmittance for US Standard Atmosphere in the CrIS spectral region (Fig. 1). Transmittance lines match well with the BT absorption lines. Also, computed and created a technical memo on the calculation of the effective atmosphere layer and depth for LBLRTM simulation for TVAC spectral assessment that emulates a TVAC gas cell.
- Expanded matching criteria for SNO intercomparisons and compared 30 days of intercomparisons between N20 and MetOpB with original and expanded limits to test both options. One thing that was discovered was that, when averaging across the entire band (SW, LW or MW), the standard deviation is significantly worse for all regions except SW south pole regions in winter with expanded limits (Fig. 2). Thus, it may be better to limit use of wider windows to that region.
- Monitored the lunar intrusion flag of NOAA-21 CrIS observations and found the impact of the imaginary radiance observation which has disappeared since early September. Attempted to correlate this with the past drag make-up maneuver (DMU) in April and August (Fig. 3).
- NOAA-21 has a band of high imaginary parts, which is being investigated. The short period perturbation corresponds to the coming-out-of-eclipse time. The fact that the ICT magnitude has a trough indicates some form of stray light contamination (Fig. 4)
- Identified one SDR granule with the most significant imaginary radiances in orbit# 3837 on August 7, 2023. Compared the real part of SDR radiances processed with nominal calibration window size and those radiances processed by single scan calibration method (Fig. 5). Investigated the ICT/DS spectra in the sliding window for processing the identified SDR granule (Fig. 6). The short temporal perturbations of the ICT and DS spectra were observed.
- Preliminary simulation transmittance spectral data were obtained using different Hitran online tools (Figs. 7, 8)
- Continue to monitor the NOAA-21 CrIS instrument (quality flags, CrIS-ABI intercomparisons, NEdN noise monitoring, geolocation accuracy, instrument responsiveness, 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-term 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        |                        |                      |

## Overall Status:

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

- Project has completed.
- Project is within budget, scope and on schedule.
- Project has deviated slightly from the plan but should recover.
- 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 Jan 25, 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.**

**Yellow:** The CrIS Team got a 100TB storage on STAR servers (data638 and data645) in May 2022. However, the CrIS Team is still in need of hardware/software resources. Presently, there is only two server dedicated to 6 CrIS Team members, and **these servers have shown to have issues (as exemplified by the rhw1304 and rhw1377 failures during the 9/30/23 weekend)**. We have received access to new servers, but these are shared with other STAR teams, and additional dedicated servers is still desirable. There is a risk for the CrIS SDR Team to continue on such a single server environment for the operational CrIS Cal/Val activities that include 5 CrIS sensors (SNPP, JPSS-1 to -4). This may affect the timely completion of deliverables and program milestones. The recommendation is to have one additional server/storage as soon as possible (< 2 months) and add another server/storage in the next months. A new MATLAB license is also required. Corresponding hardware/software quotations and SNO have been submitted. Corresponding JSTAR CrIS Risk/Issue on Hardware and Software have been submitted for JSTAR interval review on Jan. 6, 2023.

## Highlights:

(1) Transmittance for US Standard Atmosphere (100 km Upwelling at Nadir) in the CrIS Spectral Region, generated using LBLRTM Compared to Normalized Brightness Temperature

(2) NOAA-20 CrIS vs MetOpB IASI SNO intercomparisons.

(3) Time series of the NOAA-21 lunar intrusion quality flags

(4) NOAA-21 ICT magnitude and phase during the coming-out-of-eclipse period (dashed lines)

(5) A NOAA-21 CrIS SDR granule processed by ADL with (a) nominal calibration window size, and (b) single scan calibration method.

(6) NOAA-21 CrIS Deep Space raw measurements for FOV3 and LWIR ~900 cm<sup>-1</sup> channel in the sliding window for processing (a) the first scan and (b) the fourth scan of the selected granule.

(7) Comparison of the CO2 transmittance spectra simulated with one of Hitran online tools and the observed CO2 transmittance results from TVAC tests

(8) Consistent simulated CO2 transmittance spectra obtained from two Hitran online tools, in which the simulation tool from SpectraCalc is specifically used for gas cell simulation.

## Accomplishments / Events:

### Status of NWP Center Assimilation Tests of Updated VIIRS Polar Winds (VPW):

NCEP and NRL are in the process on setting up assimilation experiments involving the test S-NPP and NOAA-20 VPW product data derived from the updated enterprise cloud and wind algorithms. These updated algorithms are planned to be implemented in the operational NCCF after NWP Centers have assessed these winds and completed their assimilation tests.

### VIIRS Shortwave Infrared Winds Performance:

The capability to derive winds using the VIIRS Shortwave IR 2.2um band via the enterprise winds algorithm and the ASSISTT framework has been developed. These VIIRS SWIR winds are routinely being generated at CIMSS and collocated against available rawinsonde wind observations. The performance of the S-NPP VIIRS SWIR winds as determined from comparisons to collocated rawinsonde winds observations over the Arctic over the period June-Sep 2023 is shown in Figure 1 and Table 1 shown on the right. These comparisons indicate the VIIRS SWIR winds are of high quality and meet the accuracy (7.5 m/s) and precision (4.2 m/s) specifications. The goal is to transition the SWIR winds to the suite of operational VIIRS winds in 2025.

## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(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

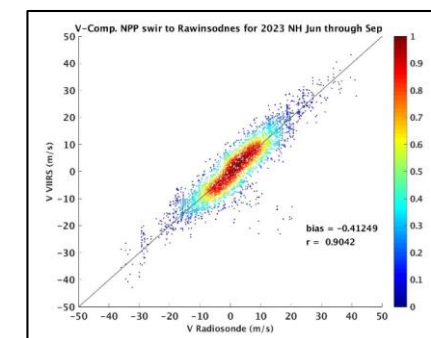
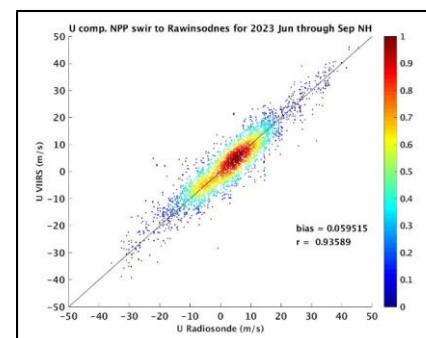


Figure 1: S-NPP/VIIRS SWIR AMV scatter density plots of u-comp. (left) and v-comp. (right) compared to co-located rawinsonde observations over the Arctic for the period June – Sep 2023.

| Layer      | Accuracy | Precision | Bias | Mean Speed | Samples |
|------------|----------|-----------|------|------------|---------|
| 100-400 mb | 5.49     | 4.25      | 0.00 | 19.18      | 1749    |
| 400-700mb  | 5.03     | 3.26      | 0.60 | 12.88      | 1706    |
| > 700mb    | 4.87     | 3.20      | 0.84 | 9.91       | 2057    |
| ALL Layers | 5.11     | 3.39      | 0.50 | 13.96      | 5512    |

Table 1: S-NPP VIIRS SWIR AMVs vs collocated rawinsonde wind comparison statistics over the Arctic over the period June – Sep 2023.

| Milestones                       | Original Date | Forecast Date | Actual Completion Date | Variance Explanation                              |
|----------------------------------|---------------|---------------|------------------------|---|
| NOAA-21 VPW Beta Maturity        | Nov-2023      | Jan 25, 2024  |                        | Joint Beta/Provisional Maturity Review to be held |
| NOAA-21 VPW Provisional Maturity | Jan-2024      | Jan 25-2024   |                        |   |
| NIOAA-21 VPW Validated Maturity  | Mar-2024      | Mar-2024      |                        |   |
|                                  |               |               |                        |   |



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. Alswiss, 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 <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

1. Project has completed.
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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

## Accomplishments / Events:

- The JSTAR Mapper/STAR Environmental Monitoring System (STEMS) team continue to add NOAA-21 AOD, ADP, and EFIREs image products and to fix bugs related to the inclusion of NOAA-21 products (**Highlight**)
- The NPROVS team continued routine near-real-time ingest and validation of emerging NUCAPS NOAA-21 (Beta) sounding products for v3, v3.1 and latest v3.1b candidate for Provisional maturity.
- NPROVS began attending preparation meetings for an upcoming NOAA AEROSE campaign in the South Atlantic basin during February and march, 2024
- The re-processing (back to 2013) of NPROVS Special radiosondes and respective collocations with selected satellite and weather forecast product using the latest version(s) of Global Climate Observing System (GCOS) Reference Upper Air Network (GRUAN) Radiosondes since 2013
- Planning was initiated for the purchase and deployment of Radiosondes for the FY24 JPSS/Department of Energy (DOE) Dedicated Radiosonde Program Targeting NOAA-21, including a new ARM site at Bankhead National Forest in northwest Alabama.

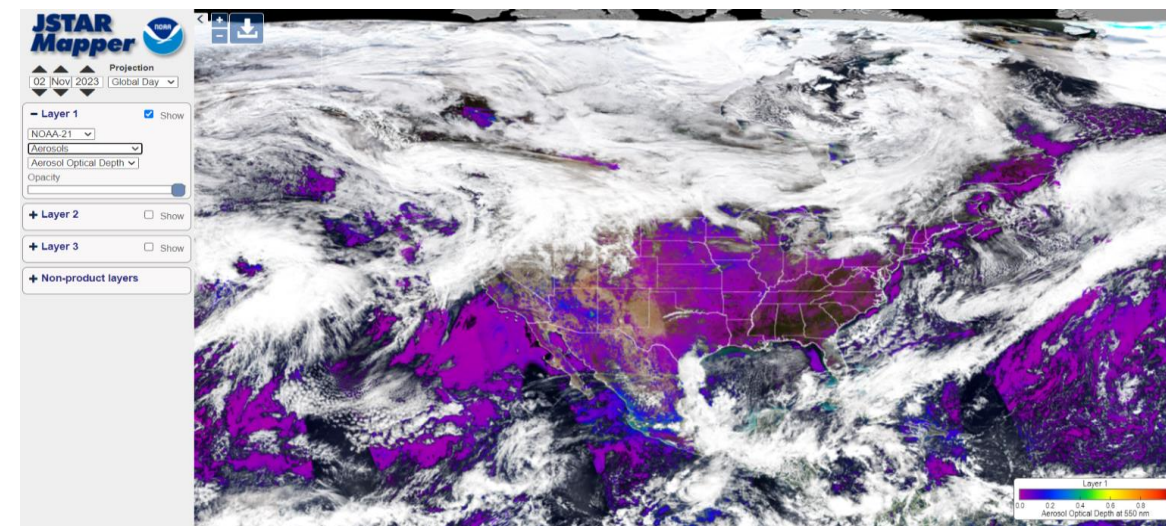
## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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**Issues/Risks:** None

## Highlights



The JSTAR Mapper team continues to add NOAA-21 products to the operational site as they become available from NCCF. Shown above are clouds (white) and Aerosol Optical Depth (colors) centered over the Continental US (CONUS) from VIIRS on November 2, 2023.

| Milestones   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|--|---------------|---------------|------------------------|----------------------|
| Maintain/expand JSTAR Mapper, STEMS and associated web sites   | Sep-23        | Sep-24        |                        |                      |
| NPROVS: Maintain /expand NPROVS Sounding Radiosonde/EDR/SDR and provide assessments                                  | Sep-23        | Sep-24        |                        |                      |
| JPSS Dedicated Radiosonde Programs: Maintain programs for polar satellite synchronized radiosondes Targeting NOAA-21 | Sep-23        | Sep-24        |                        |                      |
| User Support:: Coordinate with Users (NWS, NESDIS) wrt NUCAPS/MiRS assessments, case studies and impacts             | Sep-23        | Sep-24        |                        |                      |
| 1 Publication  | Sep-23        | Sep-24        |                        |                      |

Accomplishments / Events:

- Support the S-NPP Command Data Processor (CDP) reset recovery activities by providing near real time instrument health status, performance, and science data quality monitoring products in ICVS LTM web site. Provided instrument status report in daily meeting between OSPO and STAR instrument cal/val teams. The provided reports and information are used to help OSPO determine the right time to resume the operational data dissemination.
- Reprocess the NOAA-21 OMPS NP and NM data to build the 32-day inter-sensor comparison time series against S-NPP and NOAA-20. Analyze the S-NPP OMPS NM deep convective cloud (DCC) reflectance variation pattern w.r.t. the view zenith angle to improve the trending accuracy.
- Soft launch the newly designed ATMS inter-sensor comparison web page in ICVS operational website to collect user's feedback. Fix several display bugs and upgrade the option combinations to deliver ATMS science data quality trending products through a more user friendly manner.
- Start the estimation of ICVS LTM VIIRS module data storage and computation cost in AWS to support the upcoming ICVS LTM module Cloud transition activities.
- Finalize the ICVS team FY24 deliverables and milestones to support STAR JPSS program

Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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Issues/Risks:

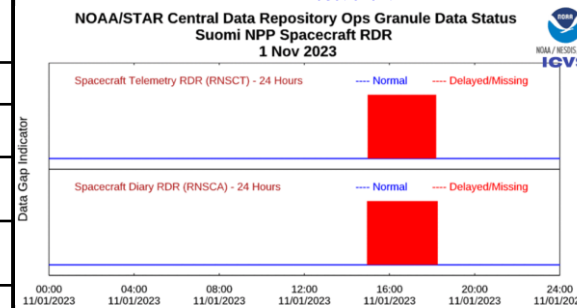
None

| Task/Description   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|--|---------------|---------------|------------------------|----------------------|
| Upgrade the 3D ATMS hurricane animation imagery package from Matlab to Python; initialize modules about NOAA21 NM DCC and comparison with VIIRS M1; Update the ICVS for N21 LP SDR monitoring to support the N21 LP EDR review | Dec-23        |               |                        |                      |
| Promote the new ATMS and OMPS inter-sensor web pages to operational ICVS   | Feb.-24       |               |                        |                      |
| Develop new modules for monitoring JPSS SDR data anomaly upon region or latitude   | Mar-24        |               |                        |                      |
| Initialize STAR2Cloud Initiative ICVS package transition discovery and assessment activities (preparation for JPSS ICVS website migration into the cloud environment)  | Apr-24        |               |                        |                      |
| Develop the new ICVS web page about NOAA21 NM DCC and NOAA-21 OMPS NM against VIIRS M1 and promote it to the operational ICVS in support of N21 OMPS final review  | 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   | Jun-24        |               |                        |                      |
| Promote the new ICVS CrIS inter-sensor web page to public-accessible ICVS  | Jul-24        |               |                        |                      |
| Upgrade ICVS user-friendly anomaly alert modules for more key parameters   | Aug-24        |               |                        |                      |
| Upgrade the ICVS Anomaly Watch portal with more monitoring analysis results  | 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-ATMS hurricane tool)   | Sep-24        |               |                        |                      |

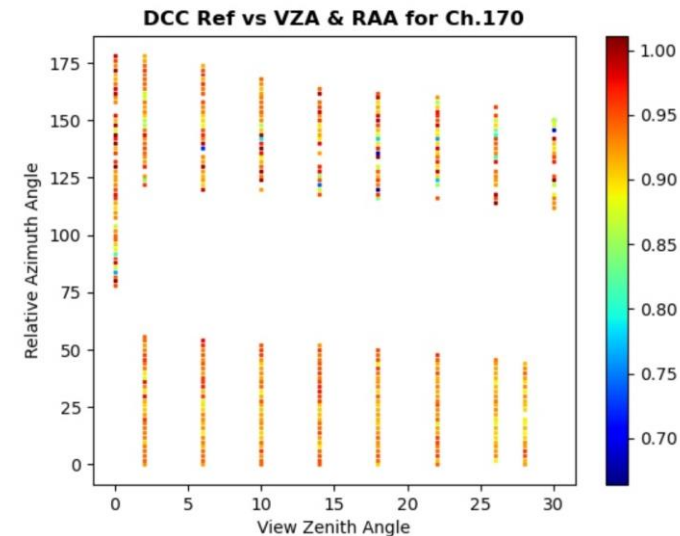
Highlights:

**Significantly contribute to STAR SDR Teams**

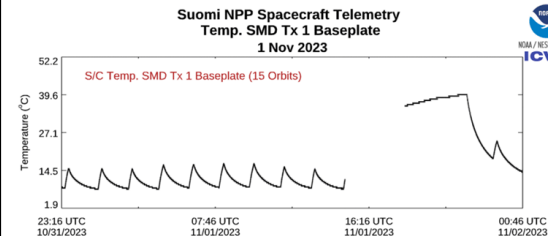
(a) S-NPP spacecraft RDR operational data gap during the CDP reset event



(c) S-NPP OMPS NM DCC reflectance w.r.t. RAA and VZA based on two years of data



(b) S-NPP SMD baseplate temperature before and after the CDP reset





## Accomplishments / Events:

- VIIRS Imagery is being populated alongside GOES on the [CIRA Satellite Library](#), providing high quality imagery, notably for comms offices, the media, and educators.
  - To view VIIRS only, select “Archive” tab, select “Filter by Instrument” tab, select “VIIRS”
- Generated VIIRS Imagery for LEO comms to be used in placemats at AGU and AMS NOAA booth.
- Recent VIIRS Imagery Presentations
  - DANA Dust Webinar (60+ attendees): [Satellite-Based Blowing Dust Detection Products and Climatology for Operational Weather Forecasters](#)
- Recent VIIRS Imagery Blog Posts
  - [2023 Central Australia Wildfires](#)
  - [Lake Effect Snowfall – Late Nov 2023](#)
- 18 VIIRS Imagery Posts on CIRA Social Media this Month. A few top posts:
  - [NCC Imagery of ice movement off Greenland coast – 10.7K views](#)
  - [NCC Imagery shows overnight snow cover across central US – 15.8K views](#)
  - [NCC Imagery of Aurora Borealis around the Arctic – 28.2K Views](#)

## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

1. Project has completed.
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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, ...)                                   |               |               |                        |                      |

## Highlights: Image of the Month

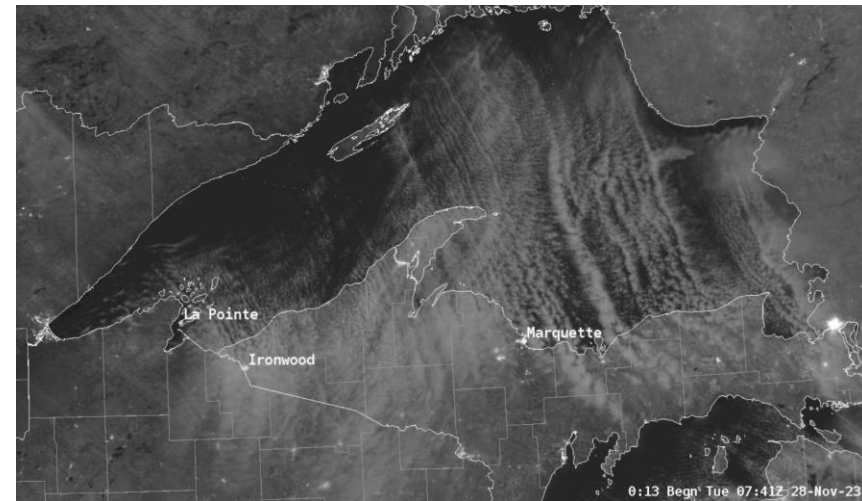


Figure: 28 Nov 2023 overnight VIIRS NCC Imagery over lake Superior, detailing lake effect snow bands.

## Accomplishments / Events:

- Verified the LAI IP & final test data generated by the updated code, preparing for the upcoming final DAP delivery to OSPO.
- Updated the LAI product validation and verification plan, coordinate with ASSIST team about the strategy of verification and evaluation, clarify the datasets will be used in the verification.
- Preparing the datasets needed for the LAI verification and validation, routinely archive the daily gridded SR for the long-term post process usage.
- Keep working on the LAI in-situ validation using the GBOV datasets and the inter-comparison with GLASS, VNP15 and GEOv2 LAI, complete the preliminary evaluation.

## Overall Status:

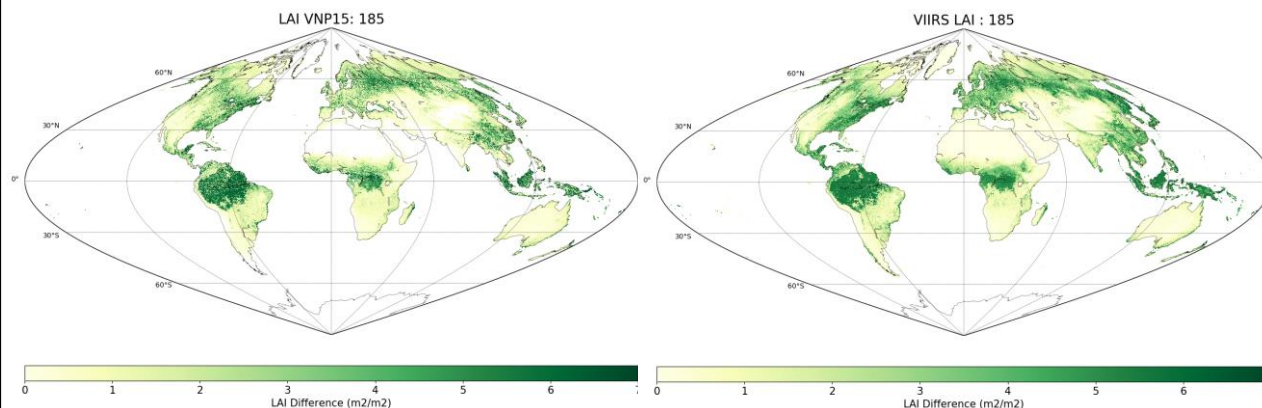
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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

## Issues/Risks:

None

## Highlights:



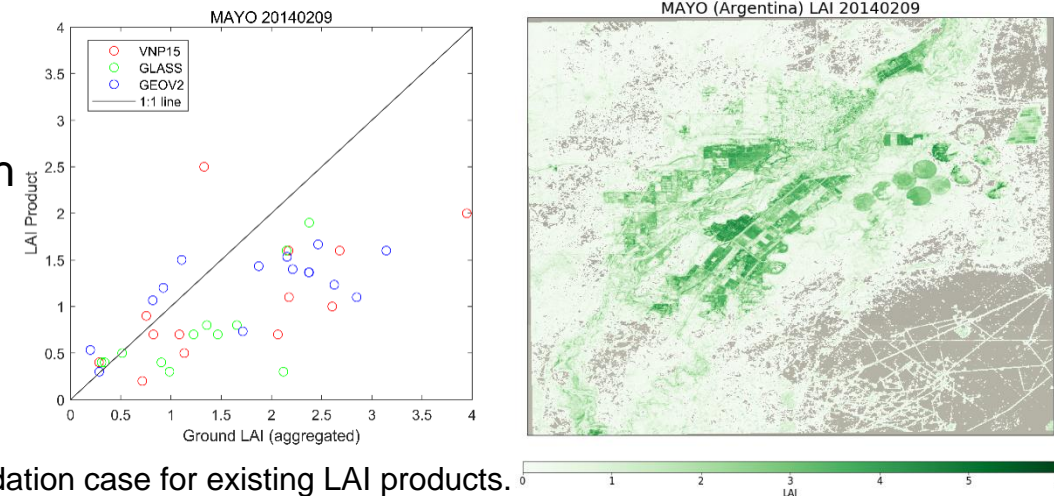
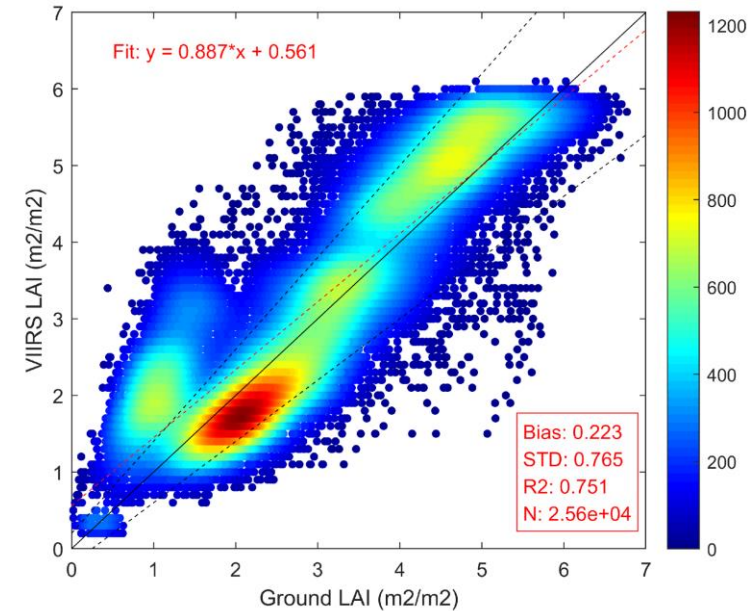
LAI product inter-comparison with VNP15, whole global data comparison, product shows good agreement on magnitude and distribution.

| Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| LAI product preliminary in-situ validation and inter-comparison                           | Nov-23        | Nov-23        | Nov 25, 2023           |                      |
| 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        |                        |                      |

- Input Data Verification:
  - The code could deal with the data missing (spatial or temporal) scenarios, however, the verification of daily SR coverage (up to 314 tiles) and previous (latest 14 8-day period) 8-day LAI is good for the final product quality.
  - Since the 15 weeks (8-days) verification need massive amount data, for NOAA21, only available one will be used, while for SNPP and N20, at least 90 days data will be involved.
  - This verification process is to be carried out at NCCF.
  
- Process status monitoring:
  - runtime error messages for error tracking and trouble shooting.
  - A log file should be produced for each production run.
  - IP files and output files shall be monitored. Final LAI is the main monitoring target while the IP data for diagnose.
  
- LAI monitoring at OSPO:
  - For the LAI product monitoring, the attribute of 'percentage\_bad\_retrievals' would be used, and a threshold of 20% would be suggested to apply.
  - Global LAI visualization (data range, distribution)
  
- LAI monitoring at science team:
  - Local LAI monitoring tool includes the routinely global data visualization and update on the website.
  - Time series monitoring at sites along with the LAI climatology for reference.



- Copernicus GBOV LAI (<https://gbov.acri.fr/>)
  - Digital hemispherical photography (DHP) Measurement at sites
  - Upscaling process using high resolution satellite data (L8, S2)
  - Aggregation to 500m for validation
- Validation performance
  - The agreement is good with  $R^2$  of 0.75, while  $RMSE < 0.8$  for all the available sites
  - Should be noted a positive bias is observed, which is similar as the PROBA-V validation (Copernicus validation report, 2019)
  - Other network data will be used for validation once the historical data reprocessed.
- To mitigate the risk of single data source, alternative data
  - ImagineS campaign data with 14 sites ( 12 in Europe, 2 in south america)
  - Measurements by DHP or LAI2000, upscaling using high resolution satellite data.
  - Historical data (2013-2015), need reprocessed SR & LAI, which could be available in AWS in the near future.



Accomplishments / Events:

- Evaluated the blended albedo data through quality checking and comparison with single-satellite albedo
- Collecting the N21 matchups with in-situ measurements to prepare for the provisional review
- Summarizing the soil albedo study progress to prepare to release to users.

Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

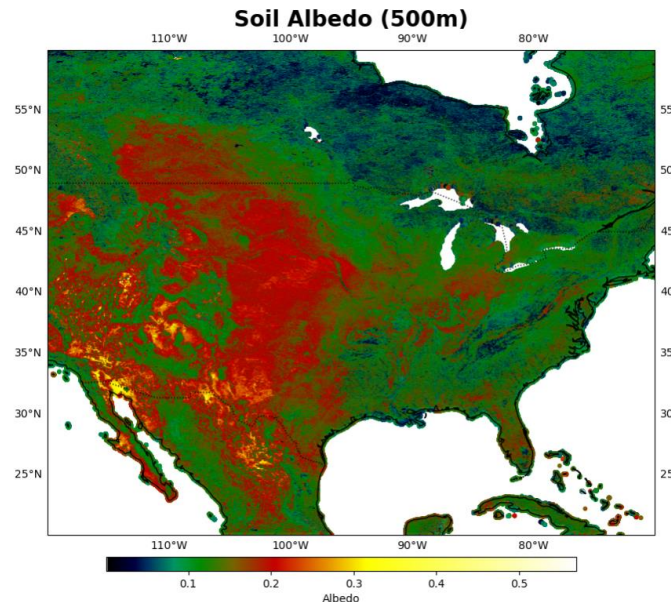
1. Project has completed.
2. Project is within budget, scope and on schedule.
3. Project has deviated slightly from the plan but should recover.
4. Project has fallen significantly behind schedule, and/or significantly over budget.

Issues/Risks:

| Milestones   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|--|---------------|---------------|------------------------|----------------------|
| Share the soil albedo dataset with model users                                   | Dec-2023      | Dec-2023      |                        |                      |
| Provisional maturity of NOAA-21 Albedo   | Feb-2024      |               |                        |                      |
| *NCCF Integration of BRDF/BSA/WSA/NBAR to Gridded BRDF-L3: operational readiness | May-2024      |               |                        |                      |
| Software package ready of blended SURFALB from all VIIRS sensors                 | Jun-2024      |               |                        |                      |

Highlights:

500-m spatial resolution soil albedo data



- The soil albedo values across the landmass vary, with red indicating areas of higher reflectivity and green to blue indicating lower reflectivity.
- There is a noticeable variation in soil albedo within different regions, suggesting different soil types, vegetation cover, or land use practices that affect soil reflectivity.

# Enhanced Continuity and Clear-Sky Fraction in Blended Satellite Albedo Measurements

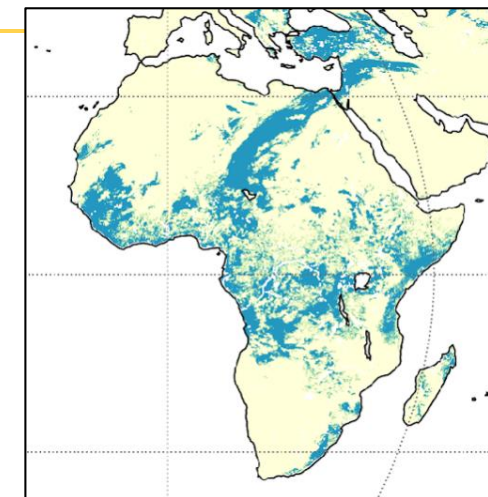
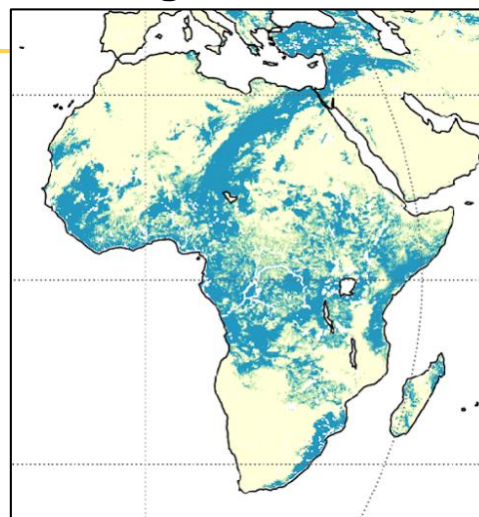
Blending satellite data leads to a more coherent albedo representation and improved inclusion of clear-sky pixels, which results in a more accurate and continuous understanding of the observed region's surface characteristics.

The top two panels display cloud flags from a single satellite (N21 single-satellite cloud flag) and a blended result (Less cloud in blended result). The blended result depicts significantly less cloud coverage.

The bottom two panels compare the albedo measurements between the single-satellite and blended results. The right panel (blended albedo) presents the blended albedo appears to have smoother transitions and more consistent values across the region, particularly noticeable within the circled area.

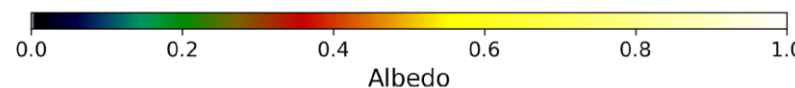
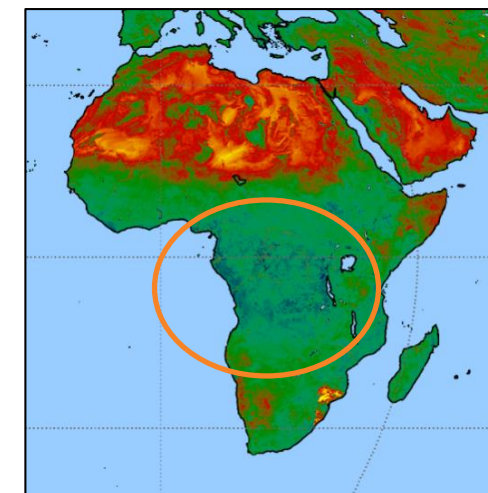
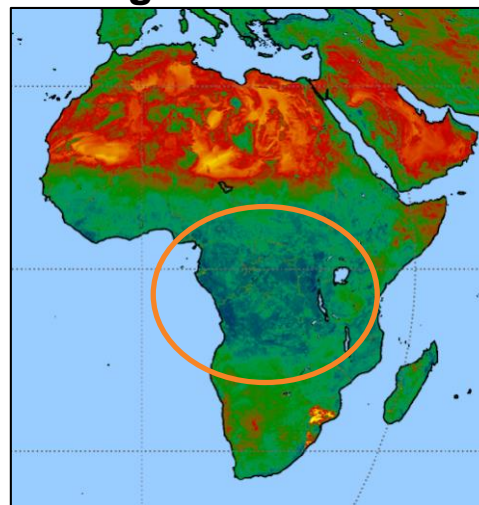
N21 single-satellite cloud flag

Less cloud in blended result



N21 single-satellite albedo

blended albedo

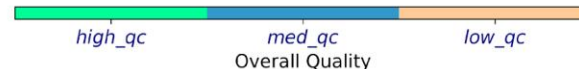
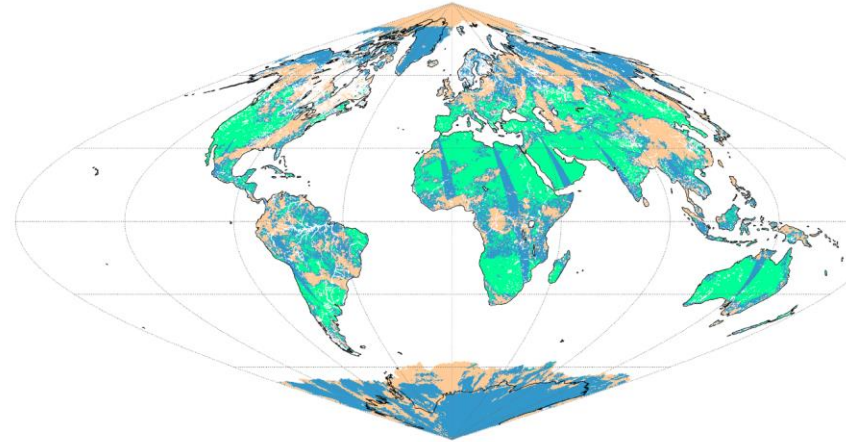




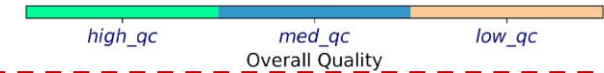
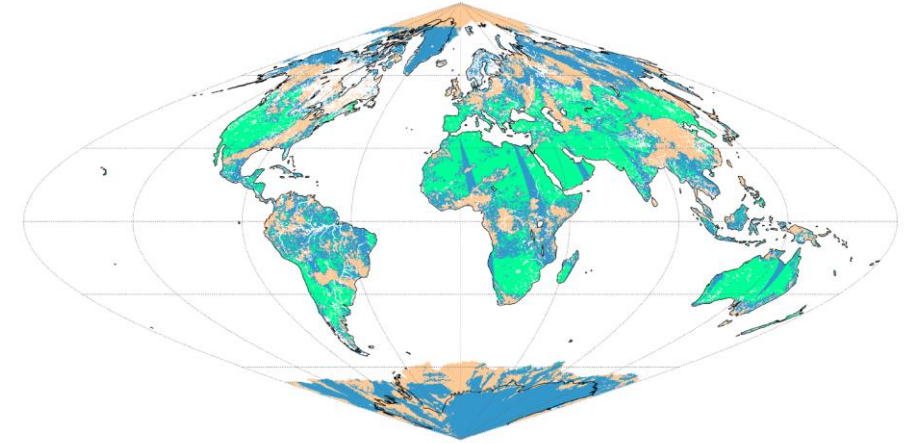
# Blended albedo includes a higher number of quality retrievals

The blended albedo product display a greater number of high- or medium-quality pixels, because blending usually enhances data quality by reducing the influence of high view-zenith-angle observations.

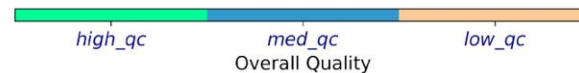
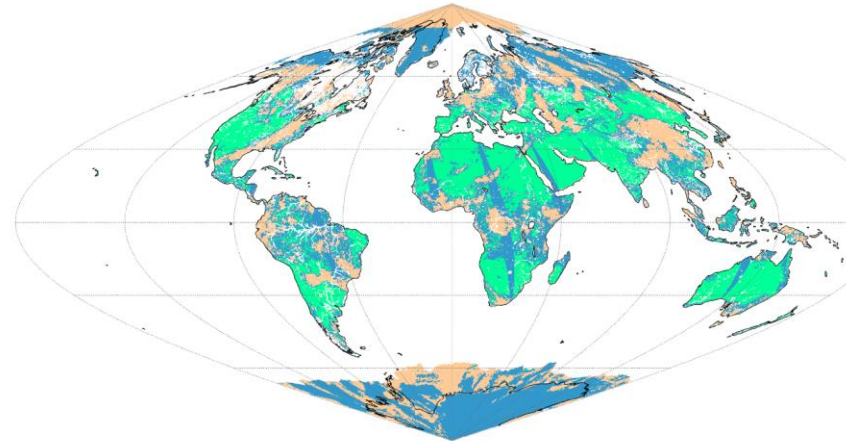
N21 VIIRS Global Albedo Overall Quality: Oct 05 2023



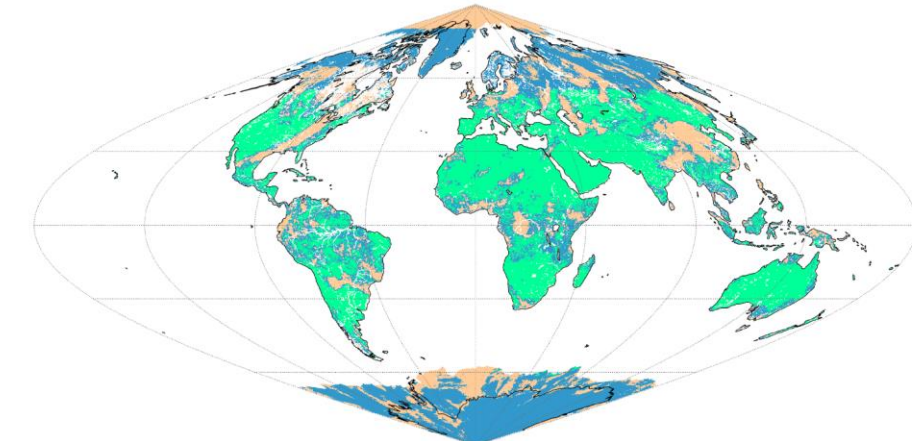
N20 VIIRS Global Albedo Overall Quality: Oct 05 2023



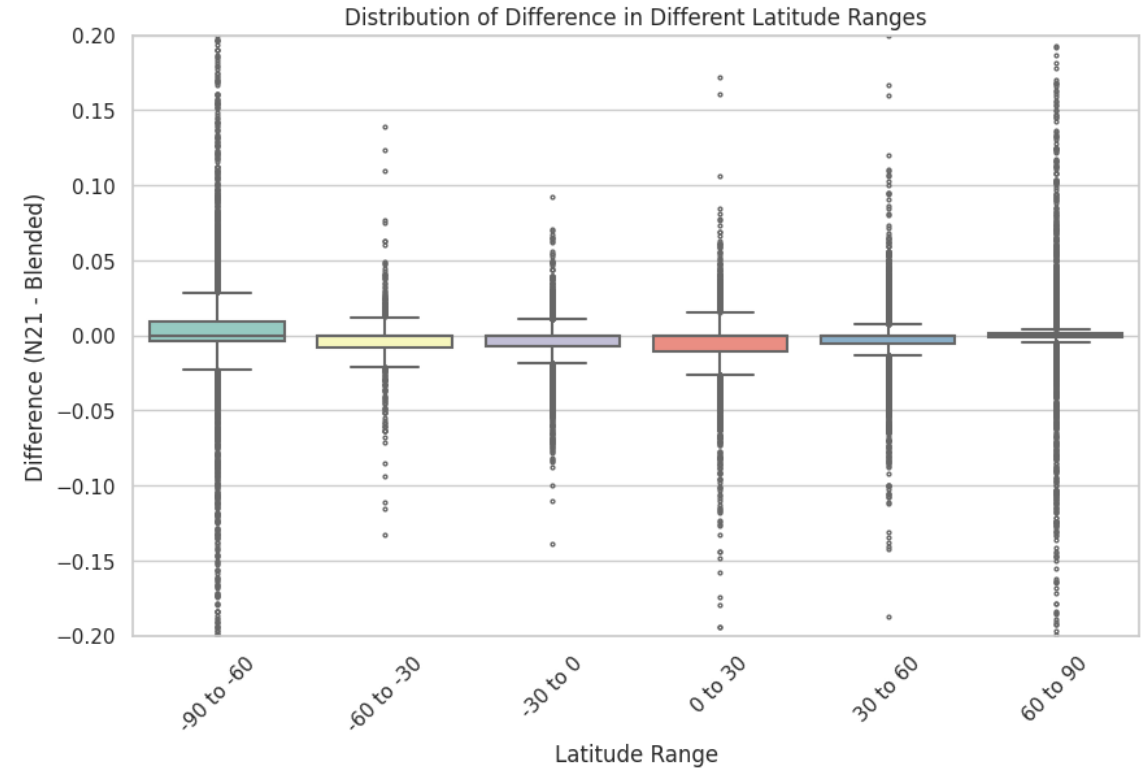
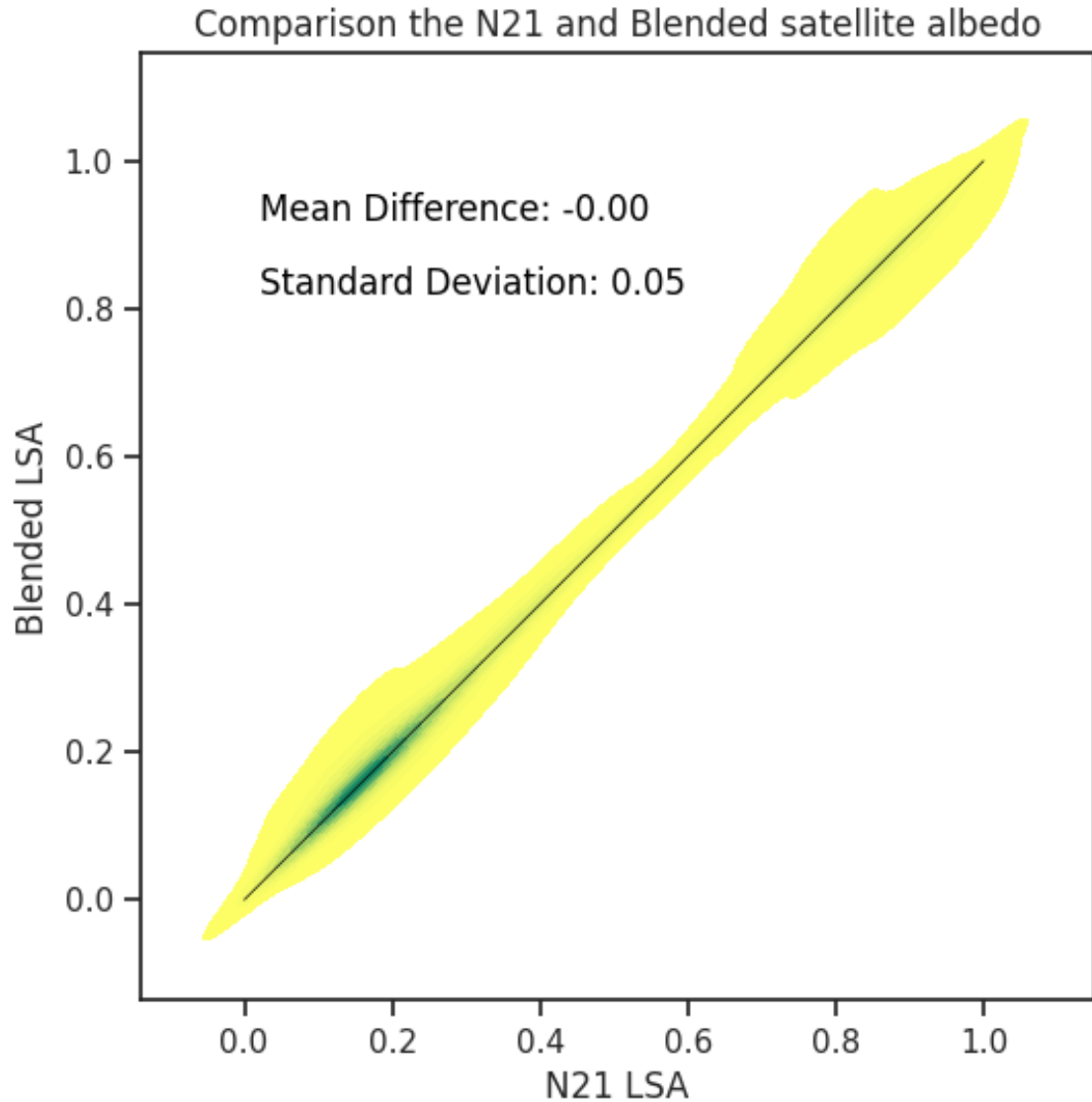
NPP VIIRS Global Albedo Overall Quality: Oct 05 2023



NPPN20N21 VIIRS Global Albedo Overall Quality: Oct 05 2023



# LSA comparison (Blended vs. N21)



The zero difference between the single-N21 albedo and the blended albedo indicates consistency between satellite measurements. A standard deviation of 0.05 points to enhancements in regional areas. Specifically, single-sat result tends to underestimate albedo in low-latitude areas due to cloud cover, and overestimate albedo in high-latitude regions as a result of the large view-zenith angle. These discrepancies are mitigated in the blended albedo product.

# Benefit of Blended Product through statistics

## Improvement in Overall Quality flag

|                    | Blended:Overall=High | Blended:Overall=Medium | Blended:Overall=Low |
|--------------------|----------------------|------------------------|---------------------|
| N21:Overall=High   | 28.64                | 0.00                   | 0.00                |
| N21:Overall=Medium | <b>3.42</b>          | 11.89                  | 0.00                |
| N21:Overall=Low    | <b>6.35</b>          | <b>3.92</b>            | 45.78               |

## Improvement in Cloud Condition flag

The highlighted numbers demonstrate the improved percentage in blended albedo rather than single-satellite albedo

|                                 | Blended:Cloud condition=Abs_clear | Blended:Cloud condition=Prob_clear | Blended:Cloud condition=Prob_cloudy | Blended:Cloud condition=Abs_cloudy |
|---------------------------------|-----------------------------------|------------------------------------|-------------------------------------|------------------------------------|
| N21:Cloud condition=Abs_clear   | <b>44.34</b>                      | 0.00                               | 0.00                                | 0.00                               |
| N21:Cloud condition=Prob_clear  | <b>2.51</b>                       | 1.76                               | 0.36                                | 0.97                               |
| N21:Cloud condition=Prob_cloudy | <b>1.08</b>                       | 0.45                               | 0.82                                | 1.25                               |
| N21:Cloud condition=Abs_cloudy  | <b>6.86</b>                       | 1.29                               | 1.31                                | 36.64                              |



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.
- Completed the assessment for the N21 OMPS SDR recovery, along with the 2<sup>nd</sup> delivery of the new dark LUTs.
- Completed the delivery and test of the NOAA-21 OMPS J02 solar intrusion fast track LUT DR10550 (The new LUT was in the operational IDPS on Nov. 9, 2023)
- Continued comparing operational SNPP and NOAA-20 OMPS NP data with both operational and reprocessed NOAA-21 OMPS NP data to assess the performance of new LUTs.
- Conducted N21 OMPS hot pixel threshold sensitivity tests for NM and NP dark LUTs.
- Continued analyzing solar activity impacts on SNPP OMPS NP data and degradation. Mg-II index values were calculated to locate dates of solar rotational maxima and minima.
- Continued the DR10553 that addresses a NOAA-21 OMPS NP transient (hot) pixel, with a few ADL tests, which involves in the changes of five calibration tables.
- Started to investigate the negative EV360 radiance and dark overcorrection problem for OMPS NM and NP.

Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(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 |
|--|---------------|---------------|------------------------|----------------------|
| Solar intrusion impact correction on NOAA-21 OMPS NP; OMPS solar activity impact analysis  | Nov-23        |               | Nov                    | On-going             |
| NOAA-21 solar day-1 improvement; improve CRTM performance for NP simulation;   | Dec-23        |               |                        |                      |
| Update the ST LUTs; consistency improvement of J2 OMPS NM and NP at the dichroic range; NOAA-21 OMPS SDR data quality validations using CRTM (global and LTM); | Jan-24        |               |                        |                      |
| NOAA-21 OMPS SDR data quality validations in comparison with NOAA-20 and SNPP; polarization impact assessment; OMPS and GEMS inter-sensor comparison           | Feb-24        |               |                        |                      |
| Finalize the NOAA-21 solar day-1; prepare NOAA-21 OMPS SDR validated maturity review   | Apr-24        |               |                        |                      |
| Document the technical reports, e.g., SL correction solar intrusion correction, solar activity impact correction; update OMPS NM/NP SDR ATBD                   | May-24        |               |                        |                      |
| Develop new algorithm or code to support J3/J4 prelaunch testing and verification  | Jun-24        |               |                        |                      |
| Initialize the OMPS solar flux calibration algorithm from radiometric counts to flux   | Aug-24        |               |                        |                      |
| Prepare all LUTs for the NOAA-21 OMPS NM/NP SDR reprocessing: e.g., all dark LUTs, updated NP/NM OSOL and wavelength LUTs, updated SL LUTs                     | Sep-24        |               |                        |                      |
| NOAA-21 OMPS calibration algorithm integration with SNPP/NOAA-20   | Sep-24        |               |                        |                      |
| Develop and deliver dark and OSOL LUTs for SNPP/NOAA-20/NOAA-21 OMPS   | Sep-24        |               |                        |                      |
| Maintain SNPP/NOAA-20/NOAA-21 OMPS SDR data quality  | Oct-23        |               |                        |                      |

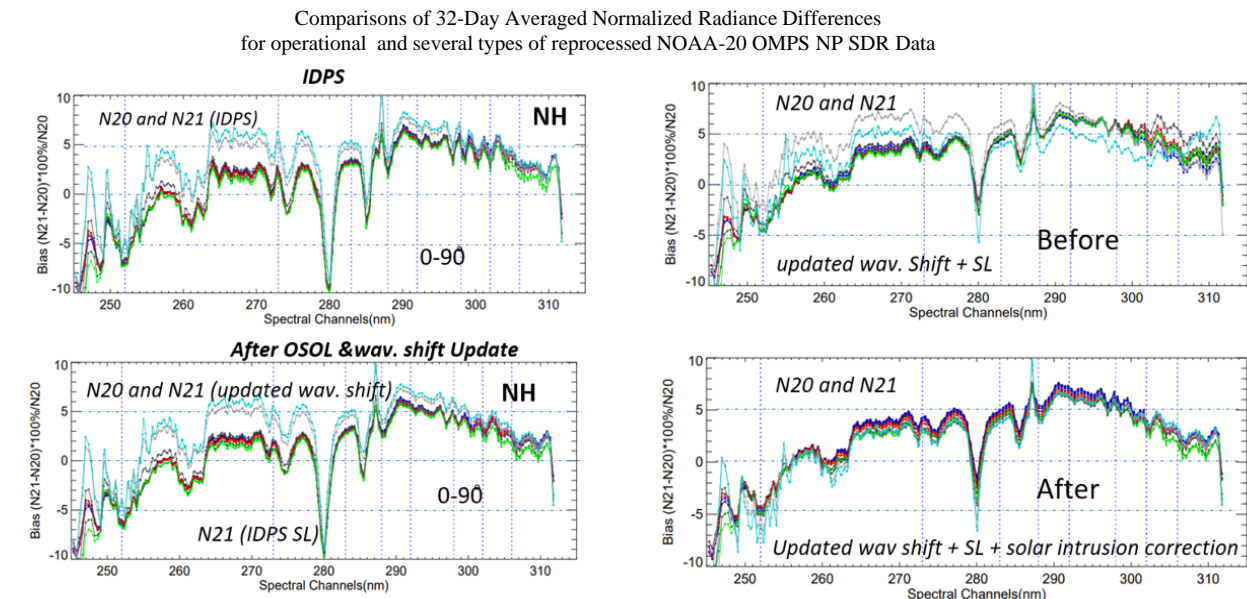


Figure : Comparisons between operational NOAA-20 OMPS NP data and several versions

## Accomplishments / Events:

- The MiRS team continues to evaluate various machine learning approaches to improving the operational precipitation rate (PR) product. Assessments of 3 different models based on the U-Net convolutional neural network architecture were made during the CONUS warm seasons (May 1 – September 30) of 2022 and 2023. The three models (Unet-PR, Unet-Hydro, Unet-PR-Hydro ) differ only in terms of input features. Common input features include latitude, longitude, and MiRS TPW. Unet-PR adds MiRS precipitation rate as input. Unet-Hydro adds CLW, GWP, and RWP and all from MiRS. Unet-PR-Hydro includes all the input features from the previous two experiments. Training was done with independent data using the MRMS ground-based analysis as the reference. Preliminary results for 2022 are shown in the highlights. Two different regions are highlighted with very different bias characteristics, the central region, where a large positive bias is seen, and the southeast region, where the bias is slightly negative.
- The results show that for this time period the U-Net model which used only the MiRS hydrological variables (TPW and RWP, GWP) but not precipitation rate showed the best performance. Notably the operational product has a much higher false alarm rate and mean bias in the central region than in the southeast.
- This work helps set the foundation for diagnosing the sources of regional performance differences, and adapting the MiRS algorithm accordingly.

## Overall Status:

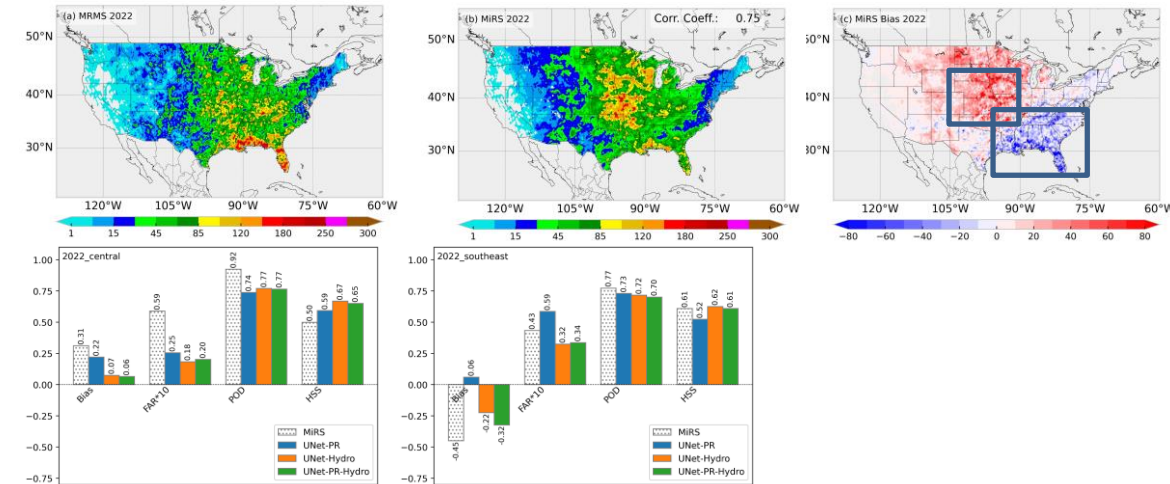
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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

## Issues/Risks:

None

## Highlights:



Total accumulated precipitation (mm) during May 1 – September 30, 2022 from MRMS (top left), MiRS operational algorithm (top center), and MiRS-MRMS difference (top right). Bias, False Alarm Rate, Probability of Detection, and Heidke Skill Score corresponding to MiRS operational and 3 different U-Net models, that used MiRS retrieval data as input. Bottom row shows statistical performance of MiRS and the 3 models in the central and southeast regions, respectively.

| 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        |                        |                      |

## Accomplishments / Events:

- Finished code and documentation for 1km global VI, including validation against MODIS.
- Produced higher resolution VIIRS GVF data (0.003-degree resolution) for USDA users
- Continued to validate VIIRS GVF using high resolution Google Earth RGB images
- Produced zoomed in 1km VIIRS VI data to better illustrate detail in 1km VI.
- Generated September and October VI climatologies and September 2023 and October 2023 VI anomalies
- Working on 1km GVF code.
- Working towards VIIRS VI and GVF validated maturity review
- Continued 20km VI development

## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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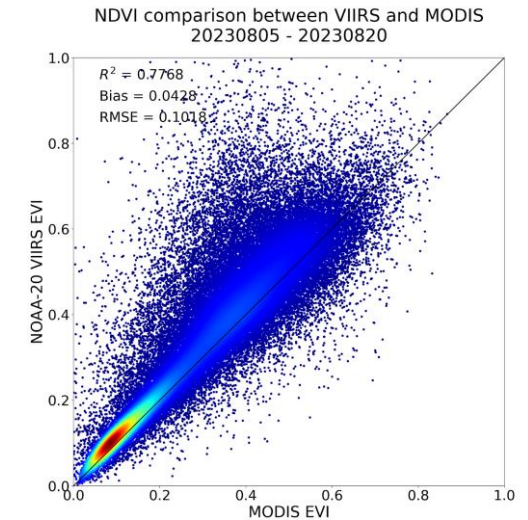
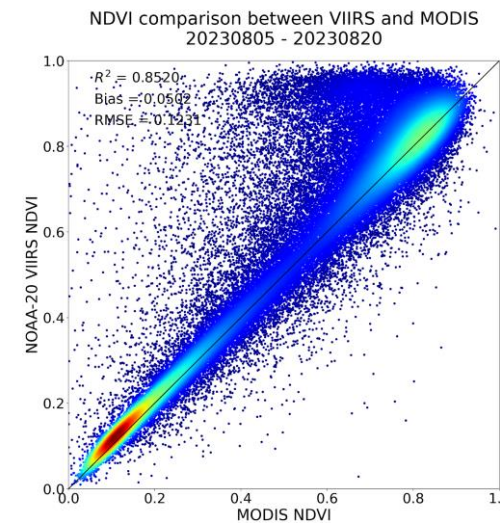
## Issues/Risks:

None

| Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| NOAA-21 VI and GVF provisional maturity review                          | Jan-24        | Jan-24        |                        |                      |
| 1km global VIIRS GVF code and documentation ready for delivery          | Feb-24        | Feb-24        |                        |                      |
| Experimental data test of blended VI and GVF products                   | 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:

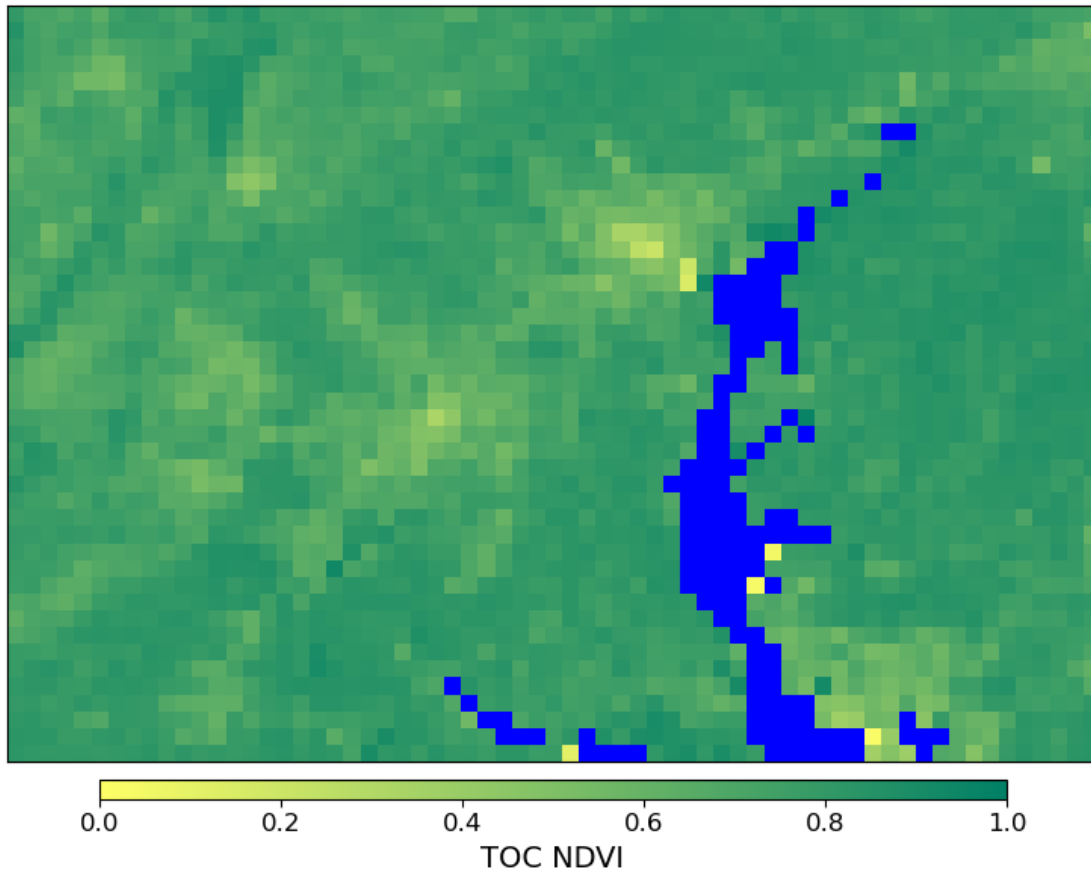
1km global NDVI (left) and EVI (right) show good correlations with equivalent MODIS VI



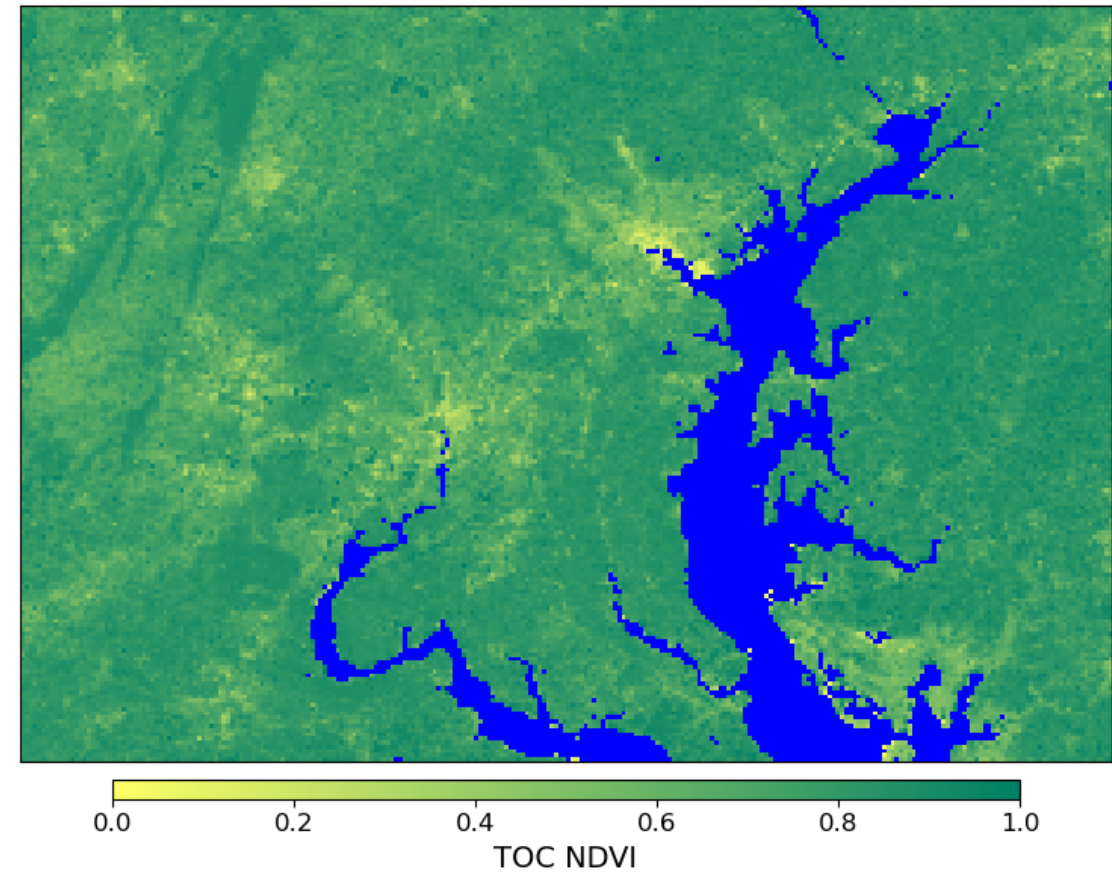
# TOC NDVI at 4km and 1km resolution, showing Washington, DC/ Baltimore region

Note additional detail visible in 1km compared to 4km data. Coastlines and urban areas are more clearly delineated.

4 km



1 km

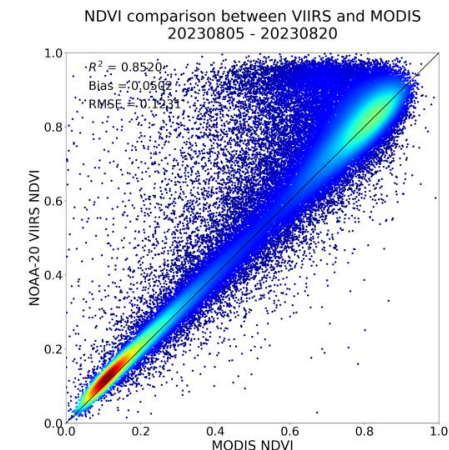
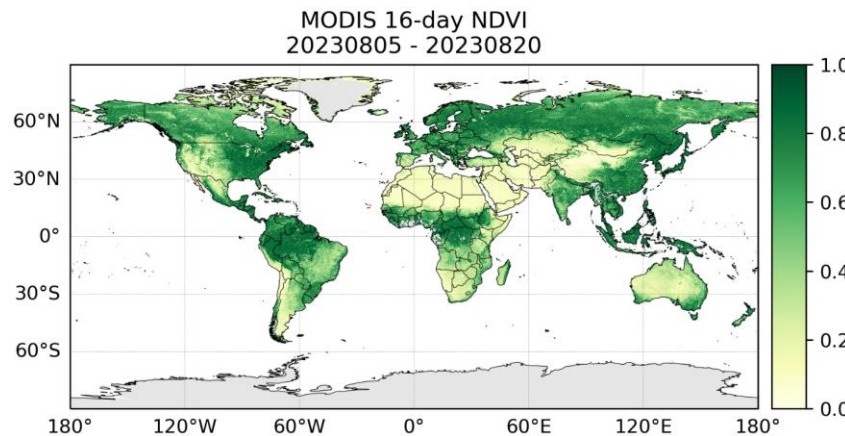
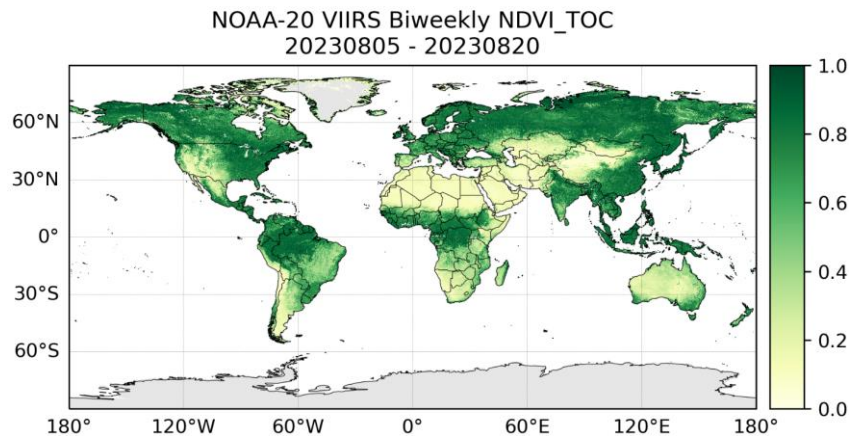




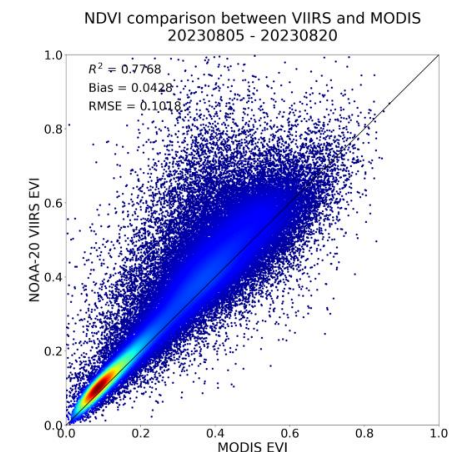
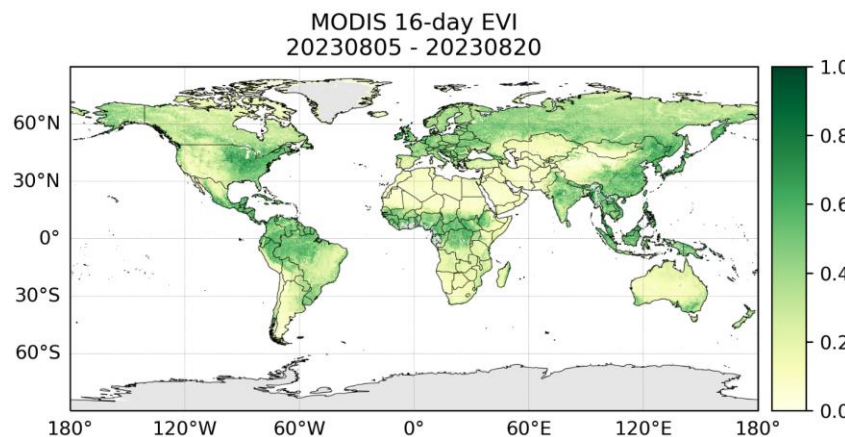
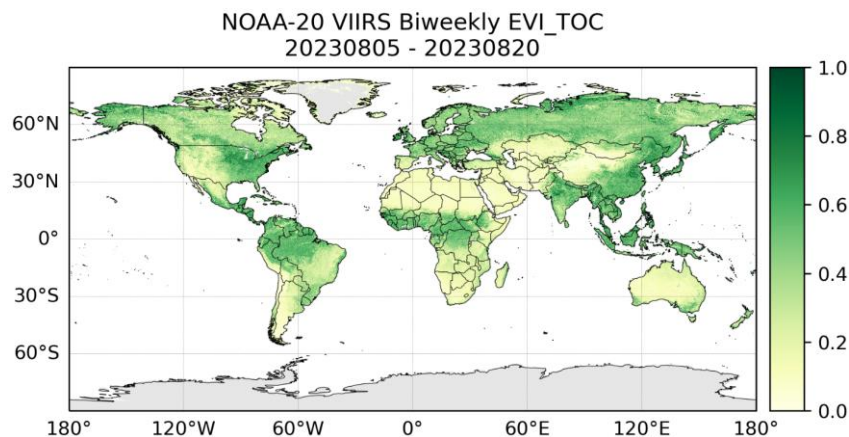
# 1km global VI

- Inter-comparison with MODIS 1km 16-day VI products (MxD13A2)
  - ✓ Global, 20230805~20230820

NDVI



EVI

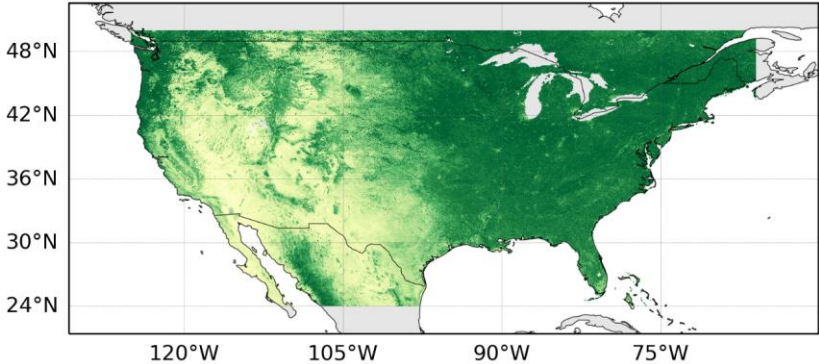


# 1km global VI

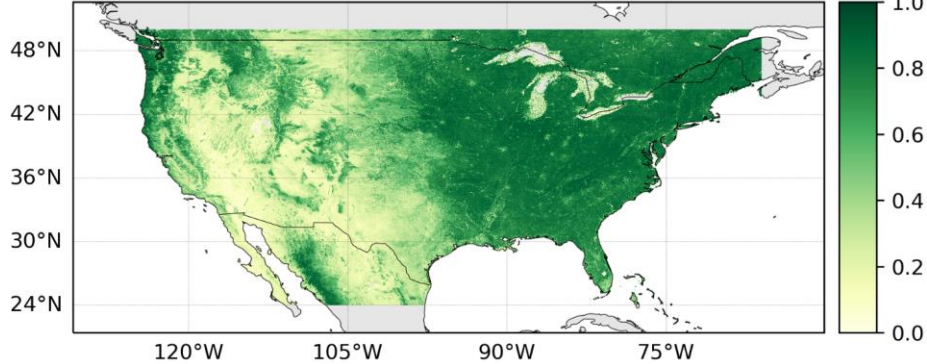
- Inter-comparison with MODIS 1km 16-day VI products (MxD13A2)
  - ✓ CONUS, 20230805~20230820

NDVI

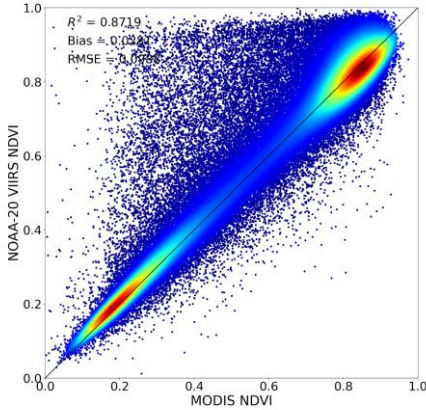
NOAA-20 VIIRS Biweekly NDVI\_TOC  
20230805 - 20230820



MODIS 16-day NDVI  
20230805 - 20230820

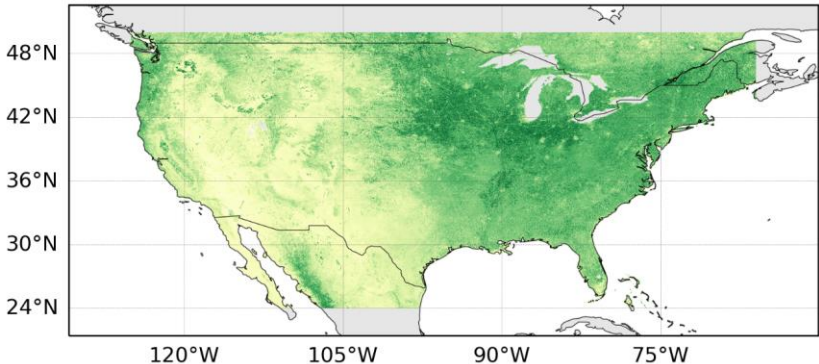


NDVI comparison between VIIRS and MODIS  
20230805 - 20230820

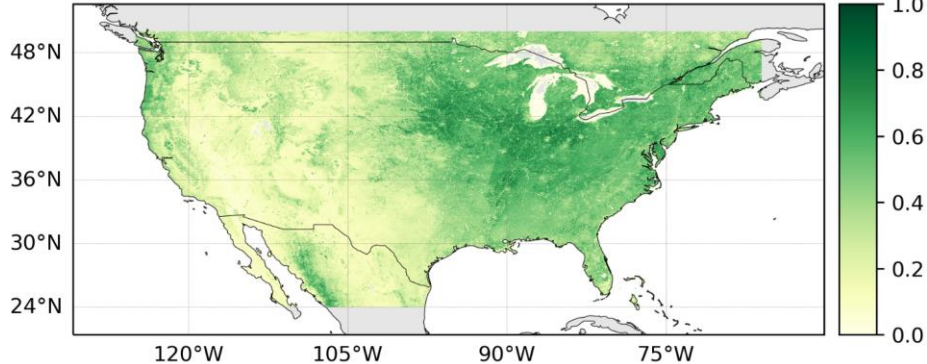


EVI

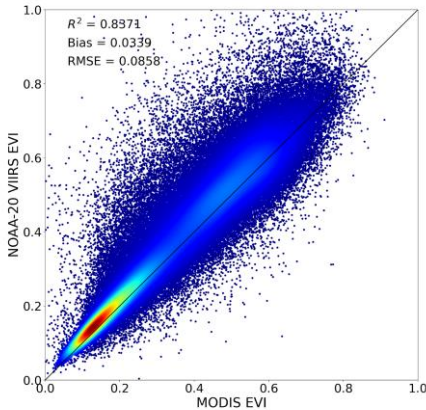
NOAA-20 VIIRS Biweekly EVI\_TOC  
20230805 - 20230820



MODIS 16-day EVI  
20230805 - 20230820



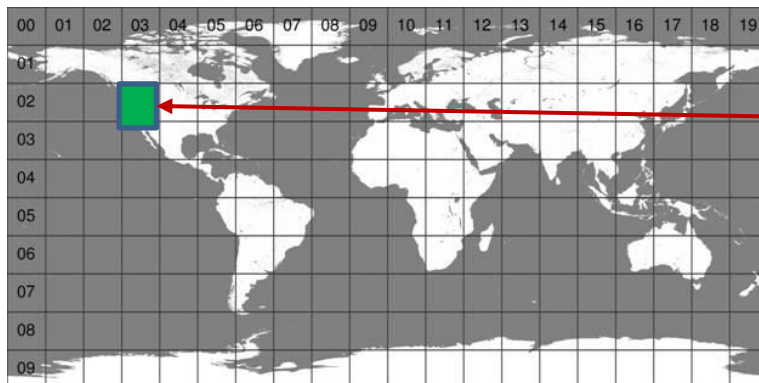
EVI comparison between VIIRS and MODIS  
20230805 - 20230820



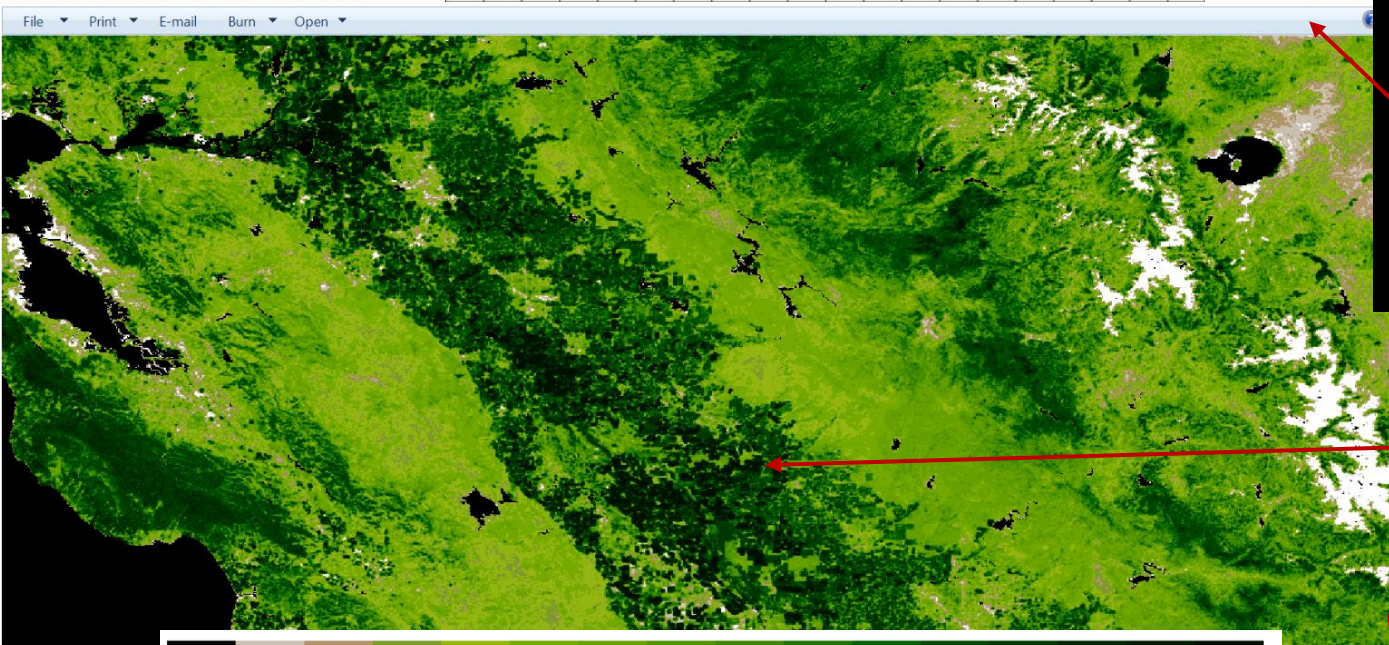


# VIIRS GVF data at 0.003° resolution

- In each tile, there are 6000x6000 pixels at 0.003° resolution to preserve the original VIIRS I band resolution (375m)

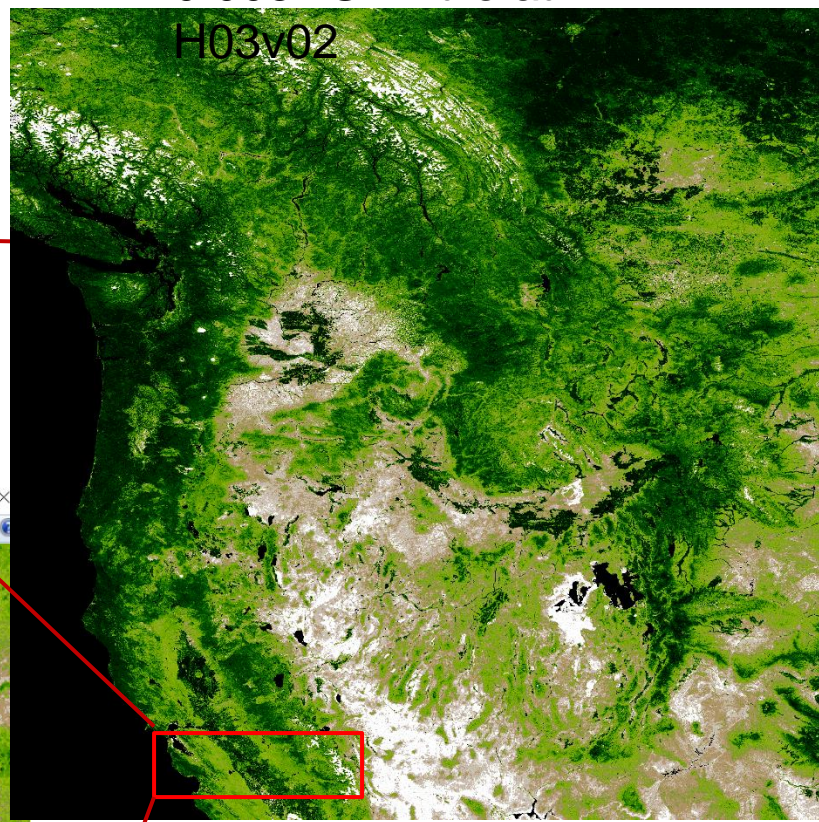


GVF-J01\_e20230806\_h03v02 - Windows Photo Viewer



GVF Zoom

0.003° GVF tile at H03v02

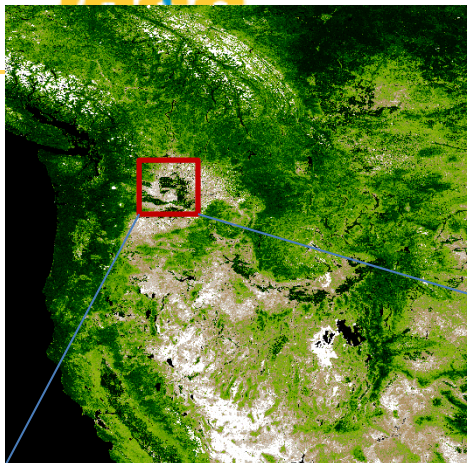


1. High resolution GVF provided more spatial details of vegetation
2. High GVF values showed in the California agriculture area

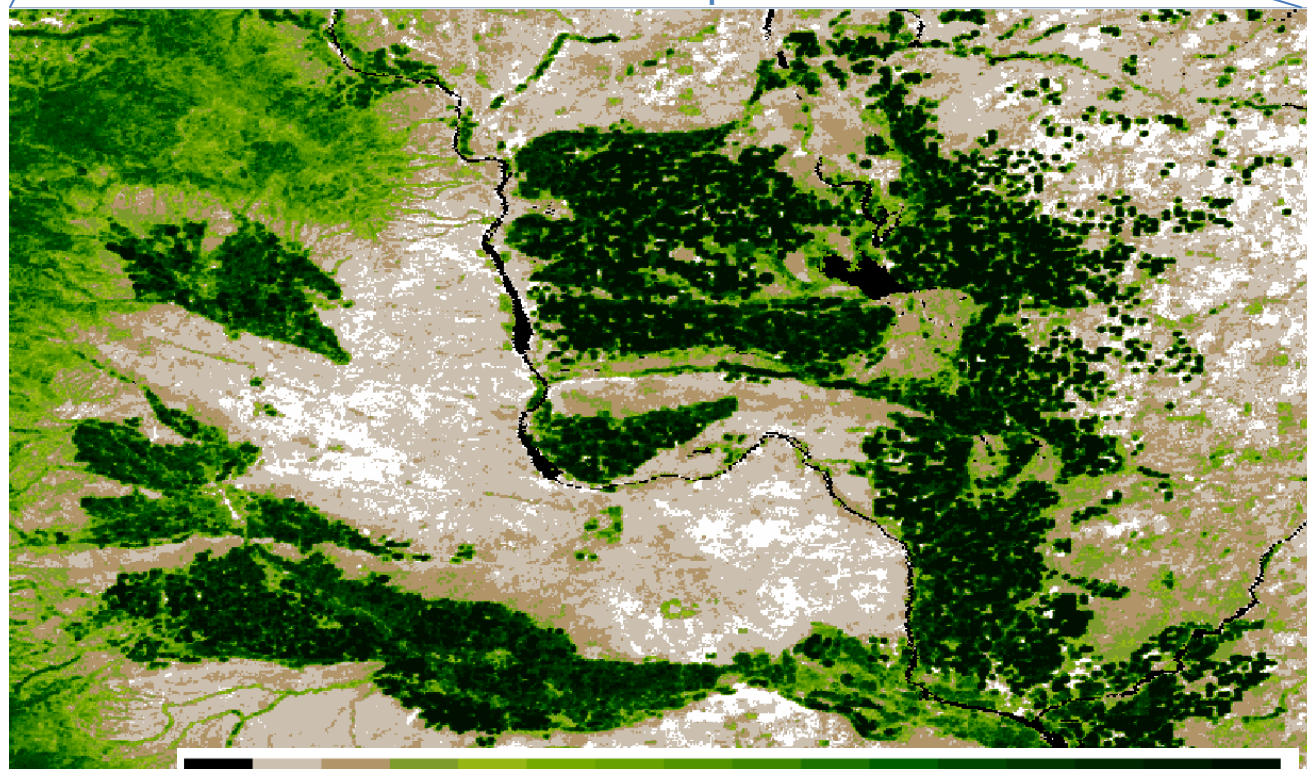


# Agriculture areas showed on GVF map

- Produced higher resolution VIIRS GVF data (0.003-degree resolution) for USDA users
- The operational global GVF data at 4km resolution is not designed for monitoring agriculture areas because of the coarse resolution.
- Higher resolution GVF is more desirable for agriculture applications
- GVF data at 0.003-degree resolution were produced per request from USDA users
- Agriculture fields can be shown clearly on the 0.003-degree resolution GVF map
- The GVF data can be useful to monitor crop status



GVF map



Water 0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.6 0.7 0.8 0.9 1.0

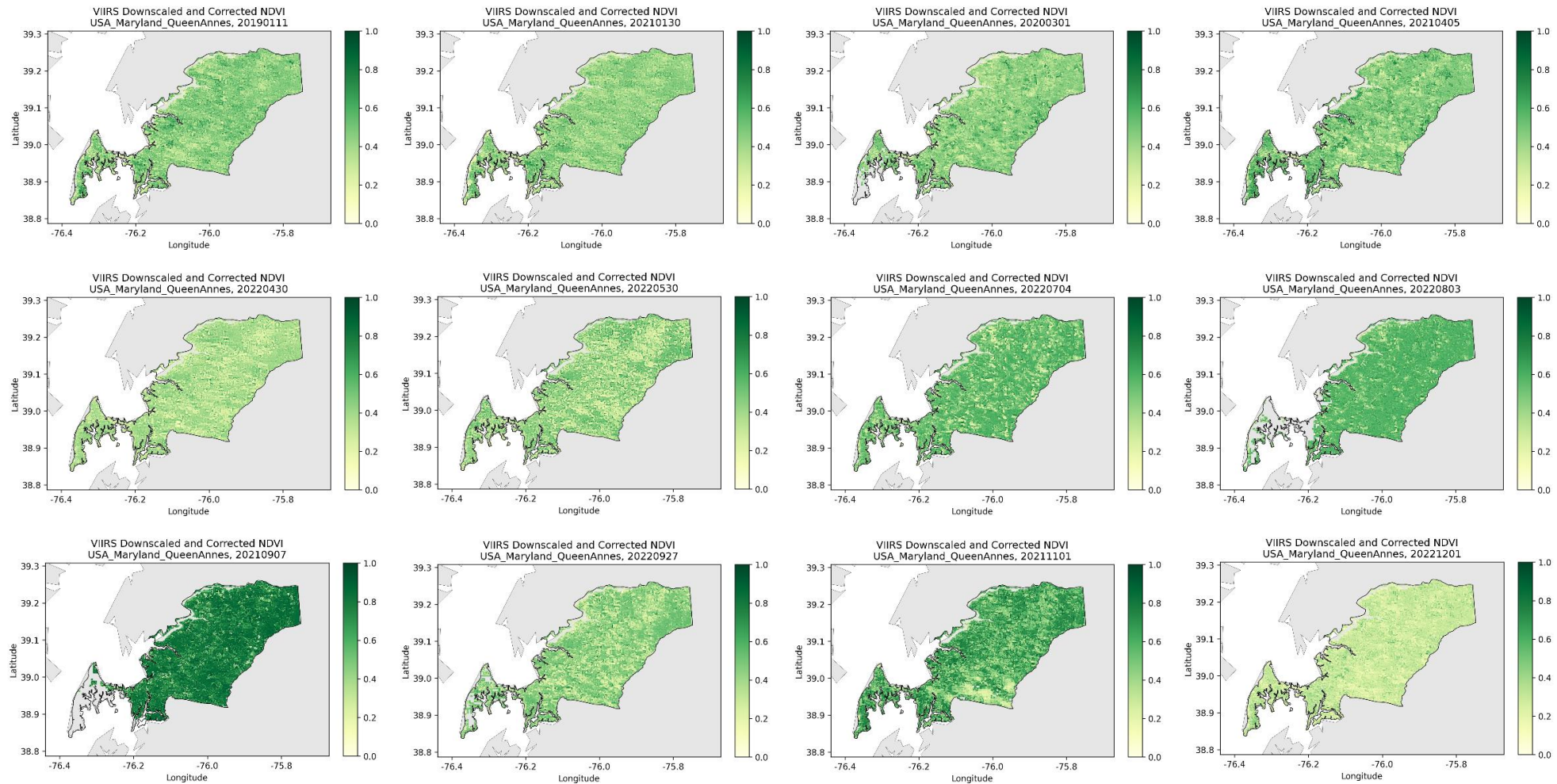
Google map





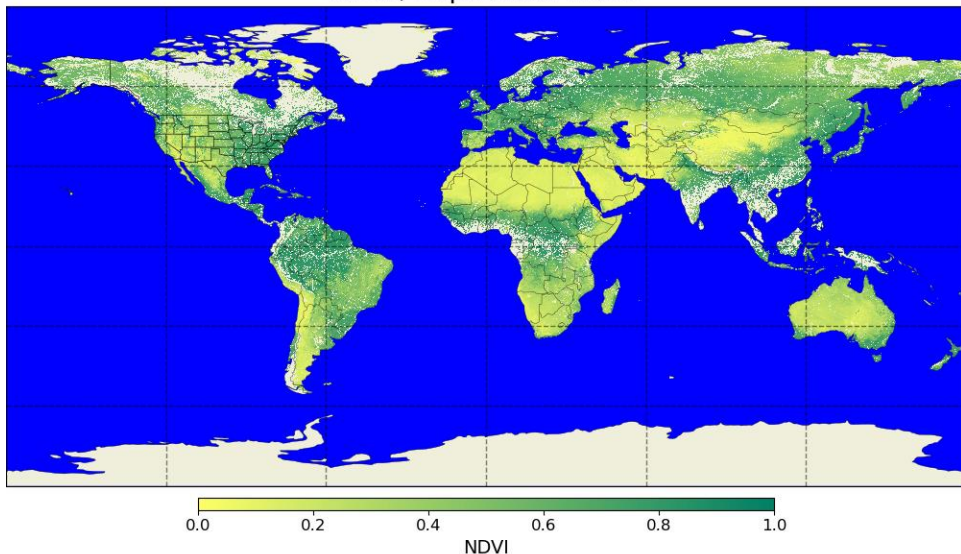
# 20m VI development

- VIIRS downscaled NDVI timeseries in Queen Anne's county, MD (approximately one for each month for examples)

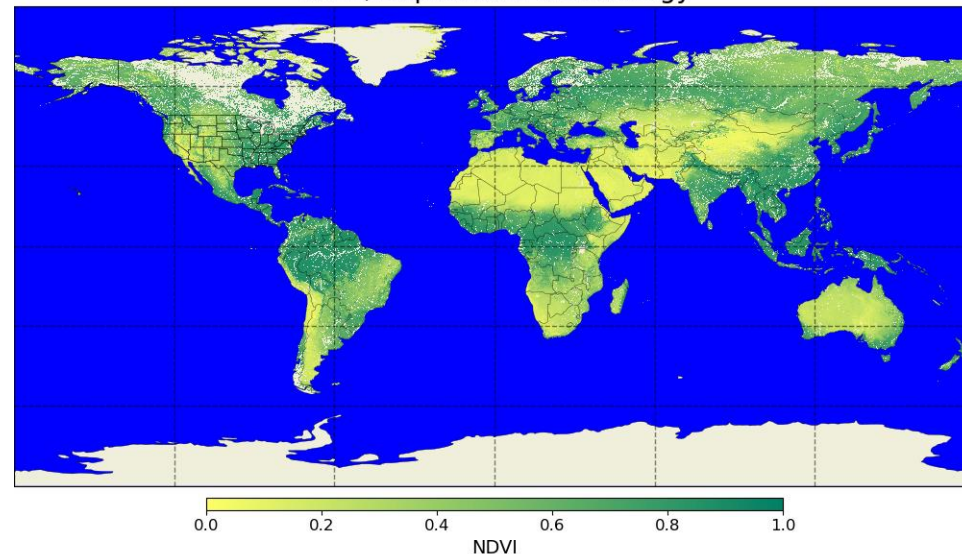


# September NDVI climatology and September 2023 NDVI anomalies

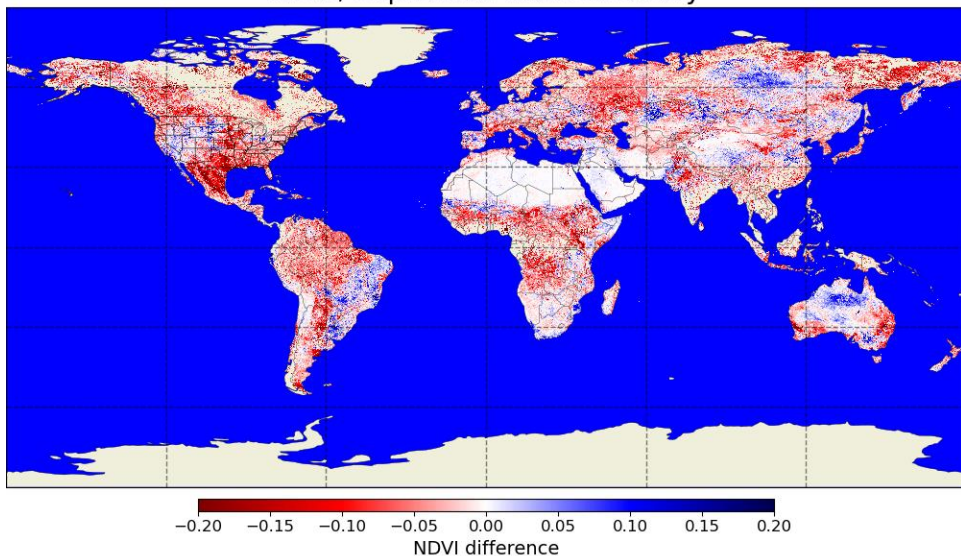
NDVI, September 2023



NDVI, September climatology



NDVI, September 2023 anomaly

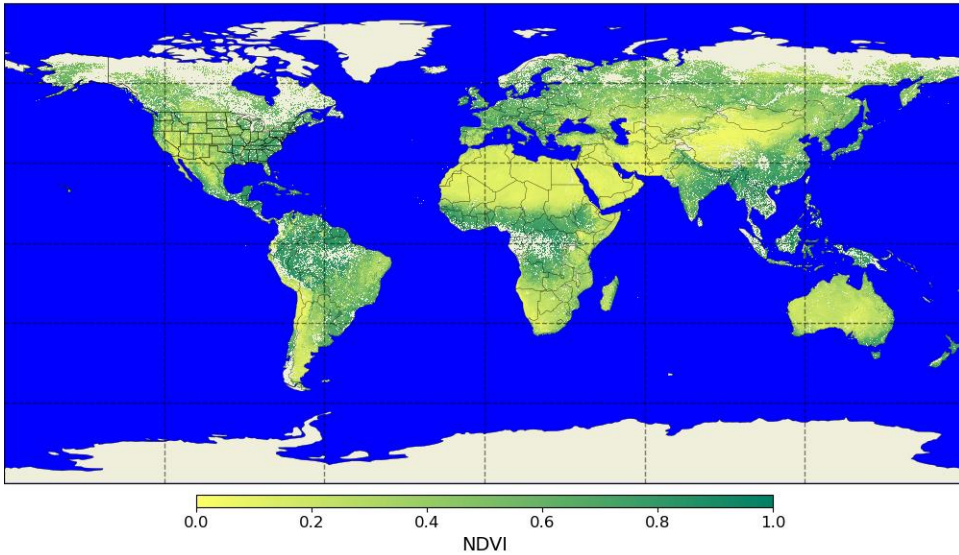


- Global pattern of negative NDVI anomalies
- Exceptions: western US, central Russia, eastern South America, central Australia

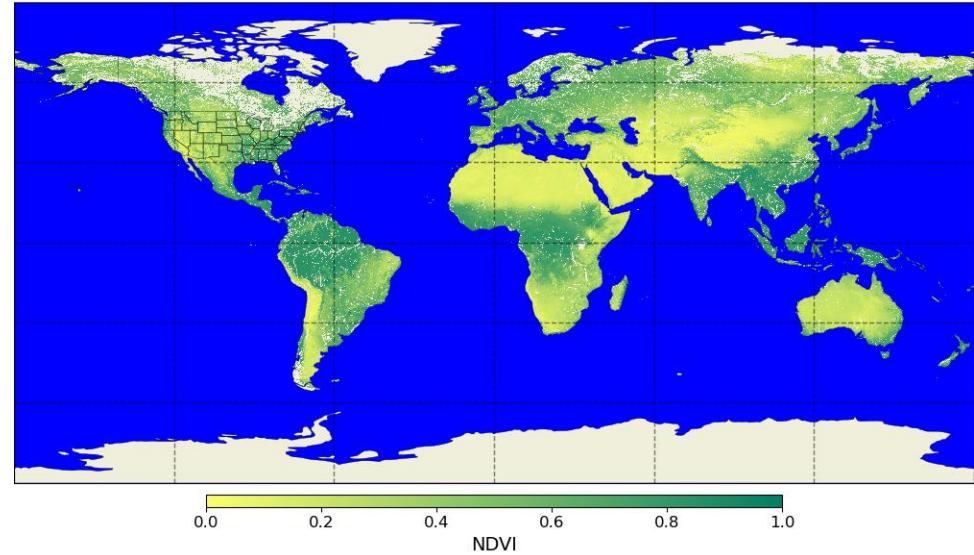


# October NDVI climatology and October 2023 NDVI anomalies

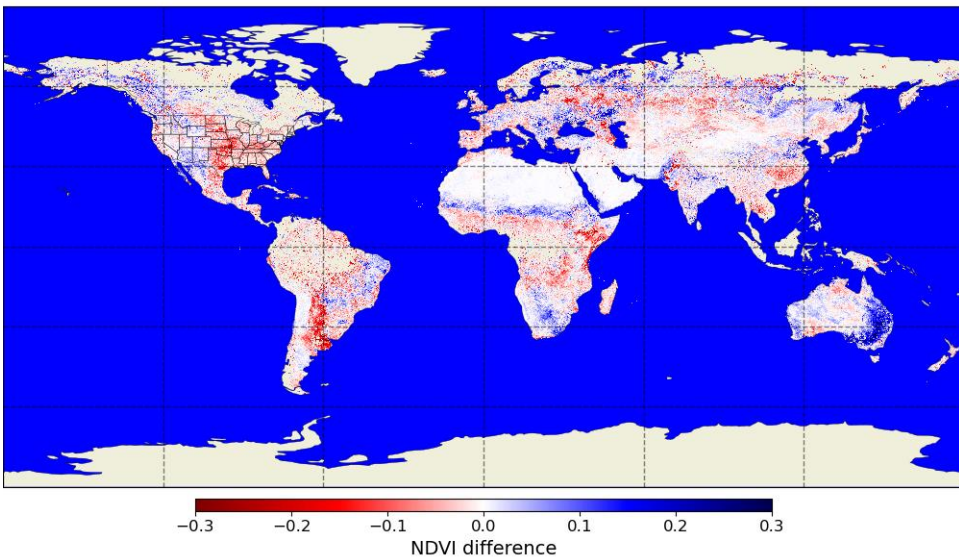
NDVI, October 2023



NDVI, October climatology



NDVI, October 2023 anomaly



- Global pattern of negative NDVI anomalies becomes less pronounced
- High negative anomalies in eastern US, southern South America, eastern China
- Positive anomalies in western US, Sahel, parts of Asia, eastern Australia



## Accomplishments / Events:

- Prepare for the upcoming NOAA21 Surface Reflectance provisional review, collecting the AERONET data and matched VIIRS SDR/GEO/SR subset data for evaluation.
- Since most VIIRS SDR/EDR data are available in AWS, transfer the AERONET subset tool from NOAA SCDR to AWS, prepared the software package for the SR reprocess.
- Keep working on the reprocess SDR evaluation, investigated the improvement and impact of using the reprocessed SDR in SR product.
- Keep working on the SR product monitoring, made some adjustment since NOAA21 released in NOAA SCDR.

## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

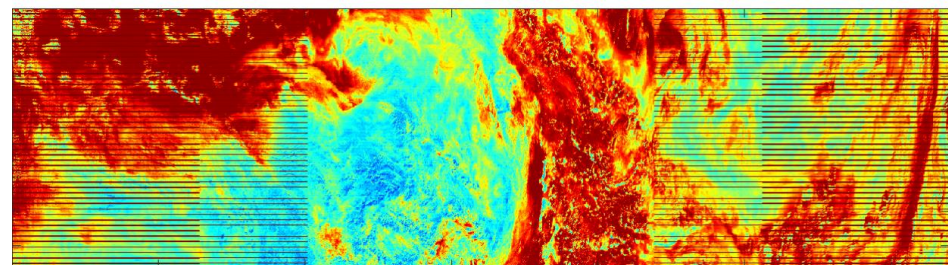
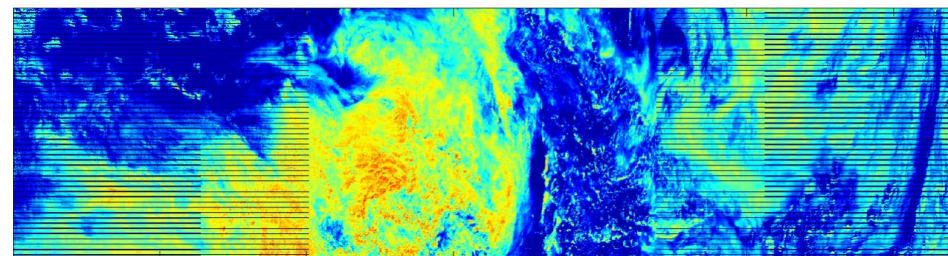
- Project has completed.
- Project is within budget, scope and on schedule.
- Project has deviated slightly from the plan but should recover.
- Project has fallen significantly behind schedule, and/or significantly over budget.

## Issues/Risks:

None

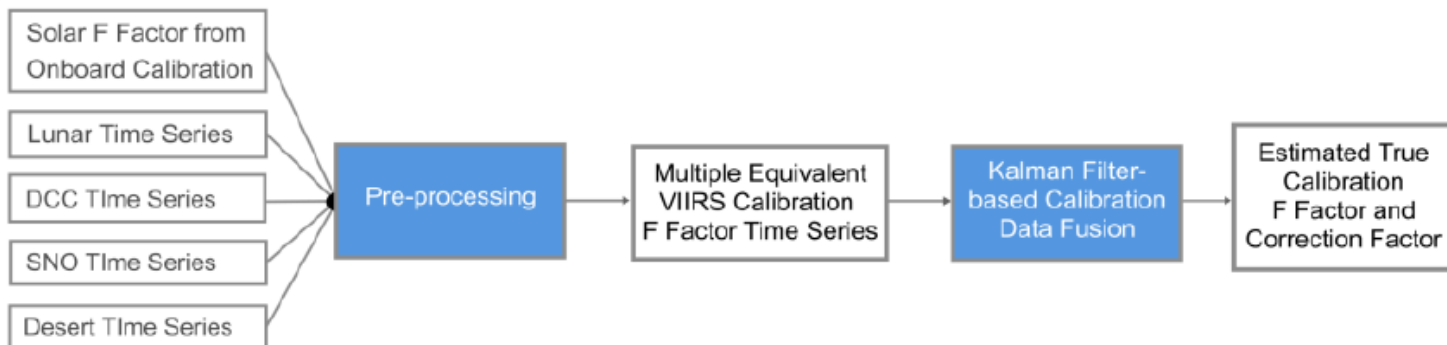
| Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| Mitigation algorithm development for the dust aerosol model         | Dec-23        | Dec-23        |                        |                      |
| Provisional Maturity of NOAA-21                                     | Feb-24        | Feb-24        |                        |                      |
| 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:

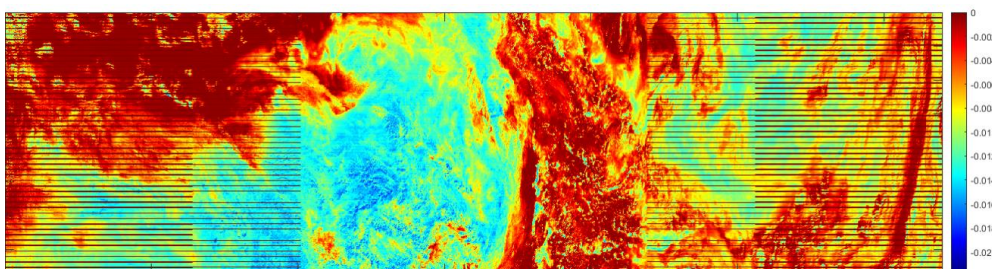
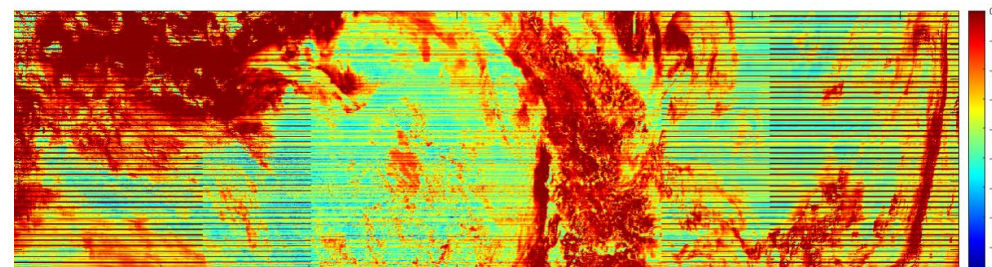
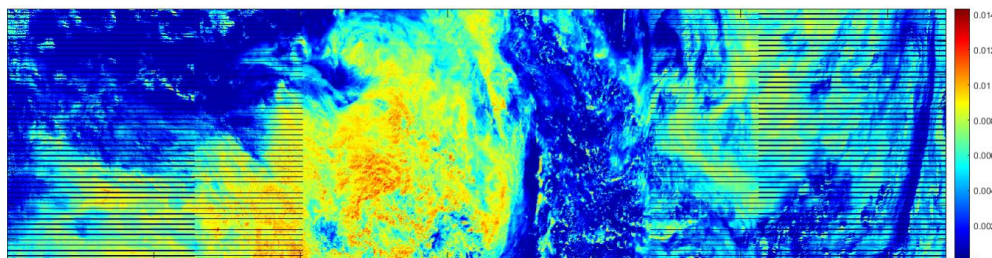


Reprocessed SNPP SDR compared with current operational SDR (VIIRS I1 (upper) and I2 (bottom)).

- Reprocess SDR Method (Wang, 2020, Cao, 2021)

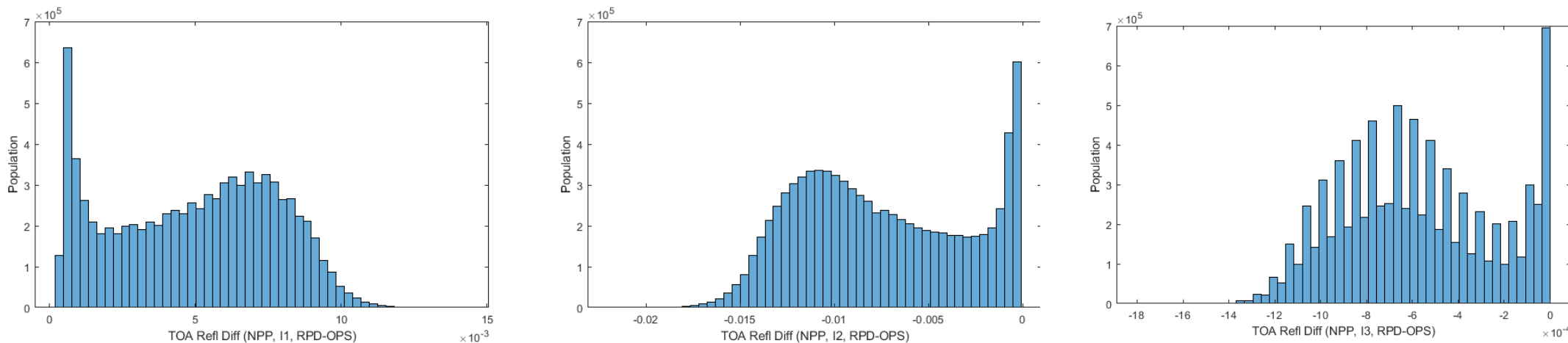


- Status (in AWS)
  - SNPP (2014/04-2020/04)
  - N20 (2018/01-2022/12)
  - N21 (Not available yet)

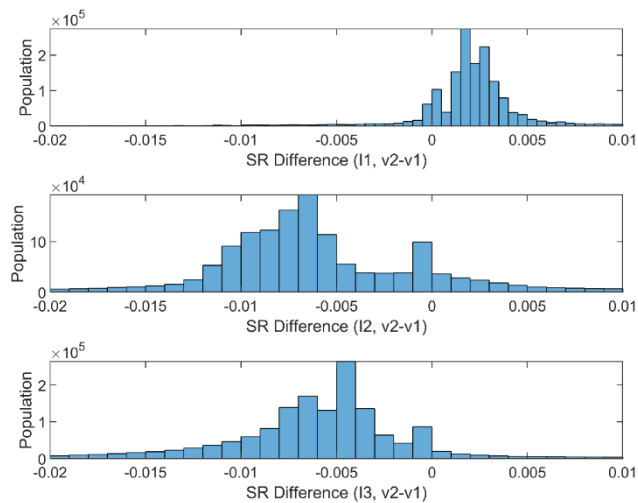
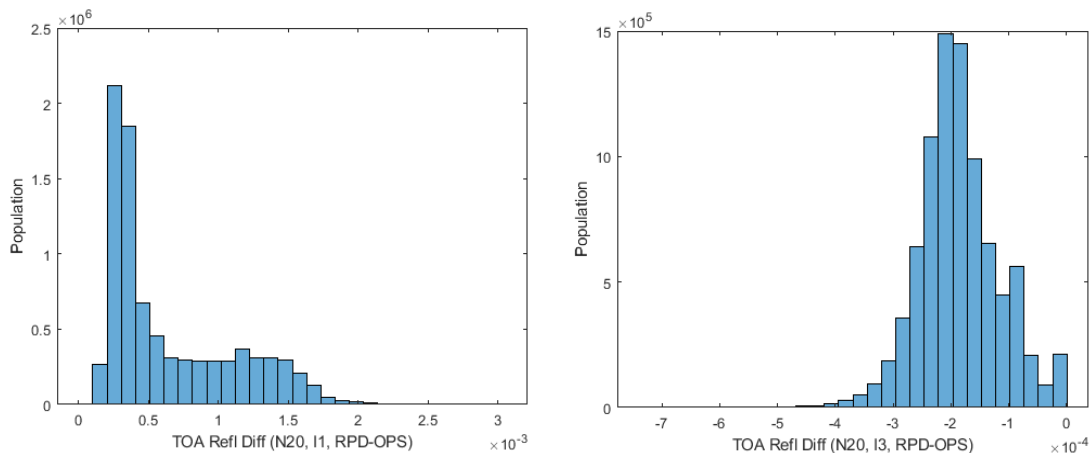


TOA Reflectance Difference (Reprocessed – Operational)  
For VIIRS I1, I2, and I3 bands)

- SNPP SDR Difference Histogram (and compared with VNP09 update, at right bottom)

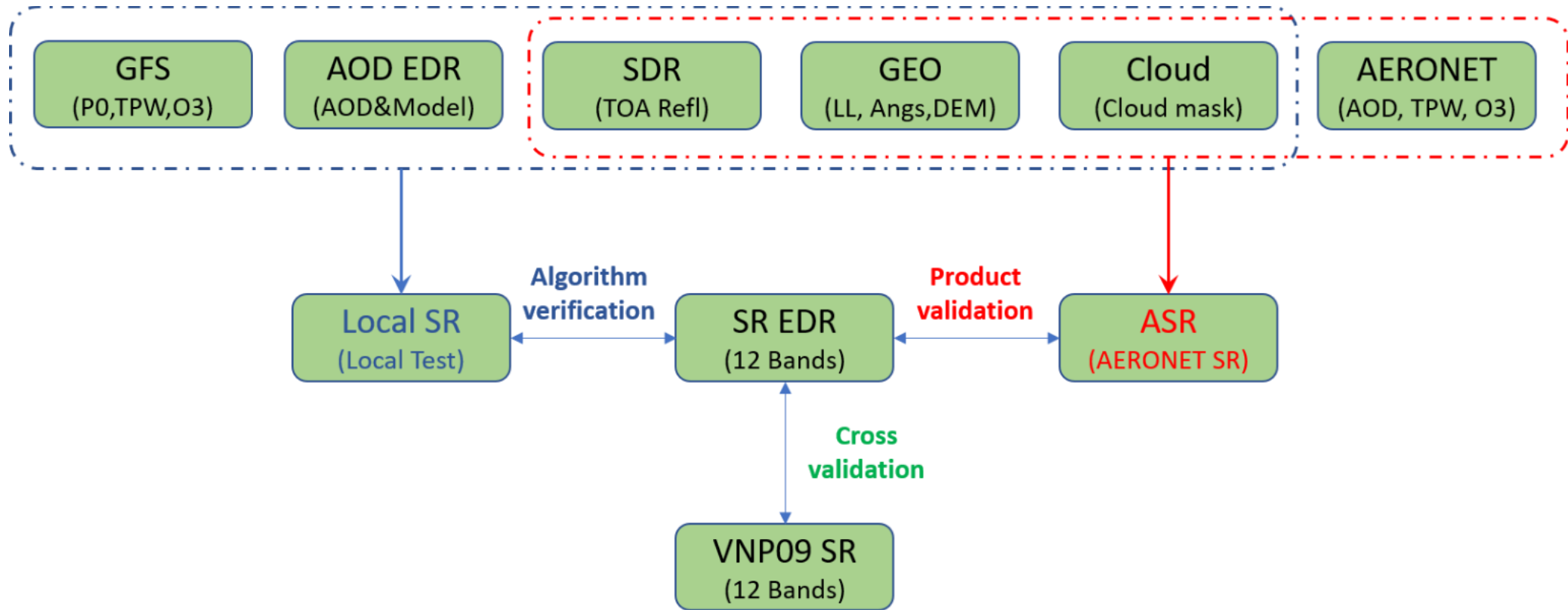


- NOAA20 SDR Difference Histogram (No change for I2 band)



- VIIRS SR difference between VNP09GA (v2 – v1), where v2 is re-calibrated one)
- NOAA reprocessed SDR show consistent difference refer to VNP09, with positive bias for I1 band and negative ones for I2 & I3.





Transfer the subset tool from NOAA SCDR to AWS.

- SDR/GEO:
  - Operational: 2022/08-
  - Reprocessed: SNPP (2014/04-2020/04),N20 (2018/01-2020/12),N21 (Not available yet)
- GFS:
- AOD: 2022/10-
- Cloud: 20231113- (N20)

## Accomplishments / Events

- Continued efforts towards the NOAA-21 NUCAPS product provisional maturity. Completed, (a) NOAA-21 ATMS and CrIS radiance tuning, (b) cloudy and clear regression LUT updates, (c) ATMS and CrIS noise file updates, and (d) A-priori update to account for the increased rate of CH<sub>4</sub>, and analysis of 2<sup>nd</sup> and 3<sup>rd</sup> degree polynomial fit to select the right fit to account for the trends. All these updates have been incorporated to create a NOAA-21 ready NUCAPS version. Currently validating the NOAA-21 ready version with matched ECMWF, TROPOMI, and OCO for the focus-day verifications, validations with VALAR (for AVTP, AVMP), O3SNDs (Ozone), and TCCON (CO, CH<sub>4</sub>, and CO<sub>2</sub>) truth data sets. Continued monthly OLR product validations with NOAA-21 CERES broad-band OLR products.
- Preparing the NOAA-21 ready NUCAPS algorithm and LUTs delivery for an initial check-out by the ASSISTT team, and eventual NCCF operations.
- Prepared and presented EPS-SG NUCAPS algorithm augmentation plans and product portfolio review held on November 8. The presentation included a project summary, background, tasks and sub-tasks, deliverables and milestones with estimated completion dates.
- The NUCAPS all-hands meeting was held on November 8 for an exchange of ideas and coordination efforts.
- NUCAPS team attended and provided inputs to the AWIPS technical meeting held on November 16. Recommendations resulted from this meeting are: (1) AWIPS WFO users want multiple NUCAPS products for better temporal/spatial coverage; (2) Allow NUCAPS products from multiple LEO orbits into AWIPS: (a) Both NOAA-20 and NOAA-21 from the afternoon orbits, and (b) two from late morning orbit, MetOp-C and future EPS-SG.

## Overall Status:

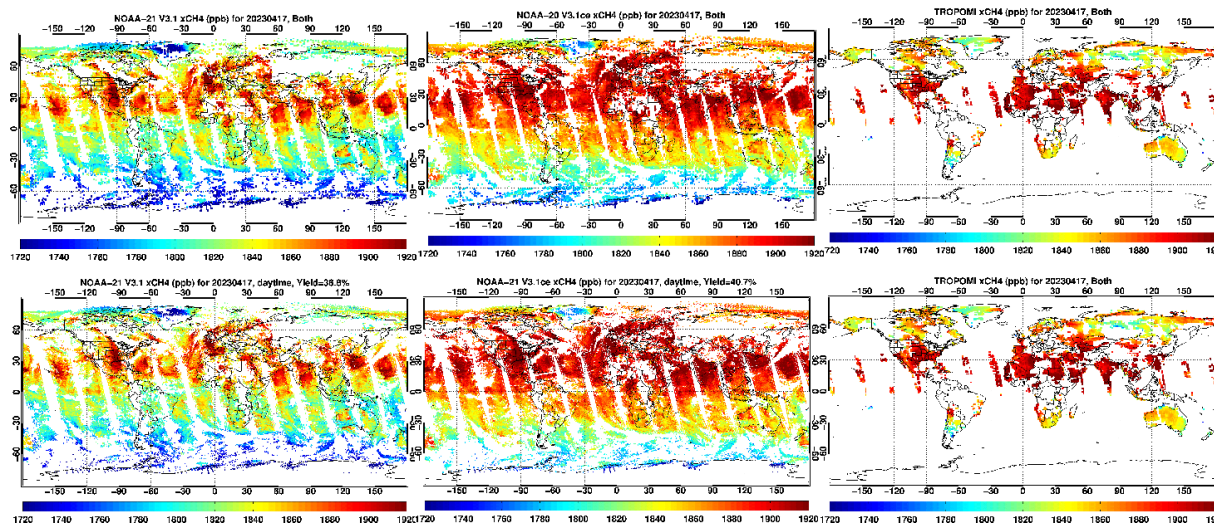
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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

## Issues/Risks:

None

NOAA-20 (top row) and NOAA-21 (bottom row) CH<sub>4</sub> with the proposed A-priori updates  
Evaluation with the TROPOMI CH<sub>4</sub> Product for the Focus Day: 20230417.



| Milestones   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation                        |
|--|---------------|---------------|------------------------|---|
| NOAA-21 NUCAPS T(p), q(p), O3(p), OLR, CO, CH <sub>4</sub> and CO <sub>2</sub> Provisional Maturity  | Nov-23        | Dec-23        | Jan-24                 | Combined review for all the NUCAPS Products |
| Implementing Validation Archive (VALAR) and focus-day data collections for NOAA-21 NUCAPS product validations                                  | May-23        | May-23        | Mar-24                 | On-going process to meet validation needs   |
| Addition of CAMEL emissivity database and snow emissivity physical model 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            |   |
| NOAA-21 Validated Maturity for Temperature/WV/Ozone profiles and trace gas concentration (CO, CH <sub>4</sub> , and CO <sub>2</sub> ) products | Jun-24        | Jun-24        | On-schedule            |   |



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..

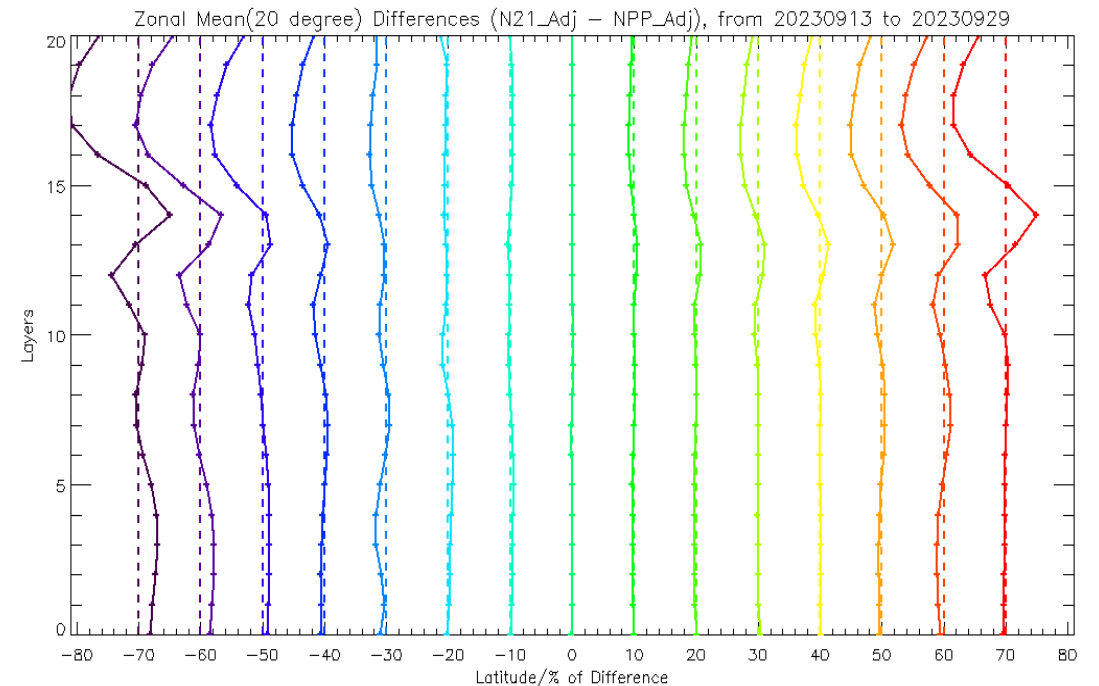
| Milestones   | Original Date    | Forecast Date    | Actual Completion Date | Variance Explanation |
|--|------------------|------------------|------------------------|----------------------|
| Provide Delta to Level 1a, 1b and 1g for NOAA-21 OMPS V2Limb | Jan-23           | Dec-23           |                        | NASA R&D             |
| Update V8TOz and V8Pro tables for NOAA-21 Provisional        | Feb-23<br>Mar-23 | Jul-23<br>Jul-23 | Aug-23<br>Dec-23       | SDR<br>Instability   |

Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation  |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|---|
| Cost / Budget            |                                   | X                                  |                                  |                                |   |
| Technical / Programmatic |                                   | X                                  |                                  |                                |   |
| Schedule                 |                                   |                                    | X                                |                                | CAC Badge renewals,<br>SDR instability,<br>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

## Accomplishments / Events:

- Fixed an issue in the LST validation with BSRN data and converted the IDL code to python, completing the validation for data in 2022.
- Ongoing work includes the continuation of all weather LST extension and code conversion. Completed the code for CDF matching with the matching LUT between the downscaled MIRS LST and VIIRS LST output to a NetCDF file based on one year of global data collection.
- Prepared materials including simulation regression output and validation results for the preparation of a book chapter on JPSS and GOES-R LST validation and reviewed the draft.
- Verified the LSE output from ASSISTT integration, summarized the findings in a report and sent it to ASSISTT team.
- Further evaluated the NOAA LSE over snow surface through a comparison with MYD11C1 and MYD21C1 LSE products. (slide 2-3). Analyzed the time series of spectral emissivity and snow fraction over a snow covered area.(slide 4-5)
- Conducted R-based LST validation over BSRN stations and completed the validation for the time period from 2019 to 2022. Analyzed the R-based validation results over SURFRAD and ARM. (slide 6-7)
- Ongoing efforts involve coding for L2 N21 LST validation against ground observations from SURFRAD, ARM, BSRN and NDBC.

## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

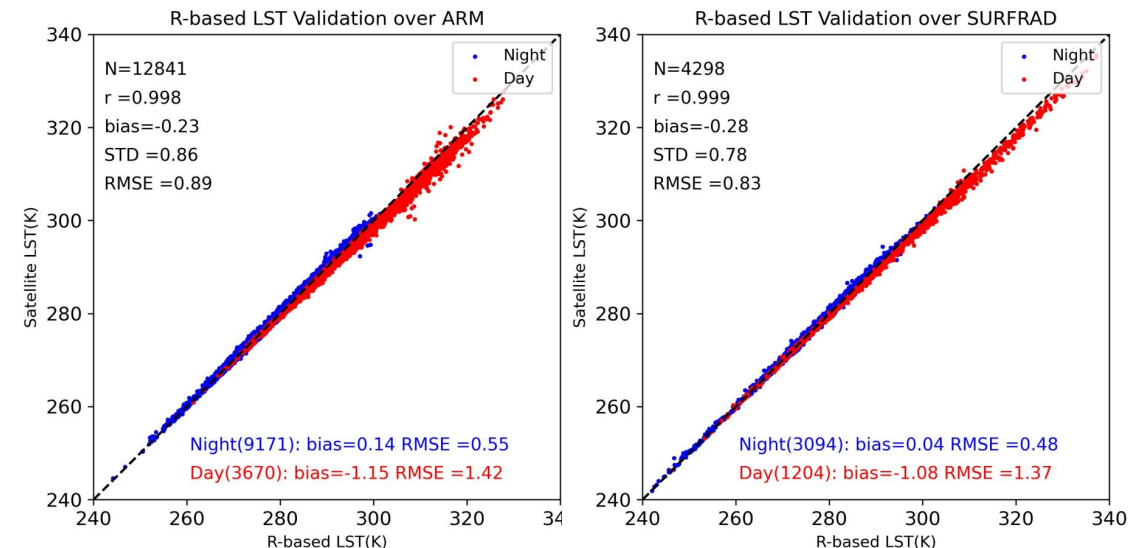
- Project has completed.
- Project is within budget, scope and on schedule.
- Project has deviated slightly from the plan but should recover.
- Project has fallen significantly behind schedule, and/or significantly over budget.

## Issues/Risks:

None

## Highlights:

### Radiance based LST validation over ARM and SURFRAD



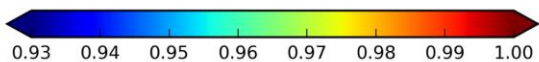
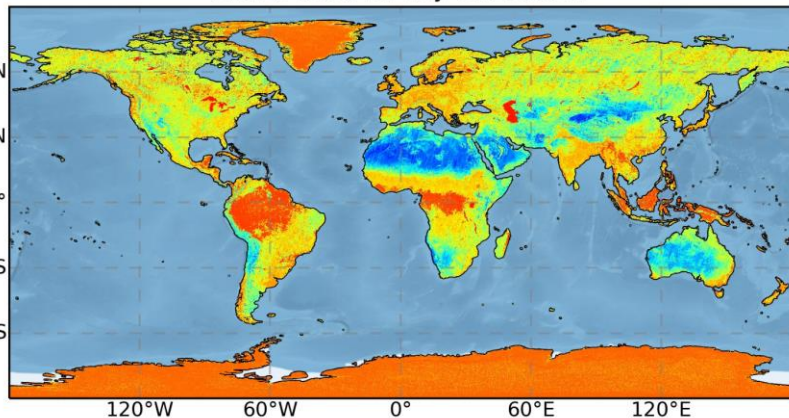
R-based SNPP VIIRS LST validation over ARM stations for the time period from 2020-01-01 to 2023-09-30, and over SURFRAD for the time period from 2019-06-01 to 2023-10-30

| Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| CCAP Initial Delivery - All weather LST                             | Oct-23        | Jan-24        |                        |                      |
| NOAA-21 data monitoring, evaluation and provisional maturity review | Oct-23        | Feb-24        |                        |                      |
| Experimental Development of high spatial resolution LST             | Oct-23        | Mar-24        |                        |                      |
| Annual report of L2 and L3 VIIRS LST validation                     | Mar-24        | May-24        |                        |                      |
| Updated DAP delivery if needed                                      | Apr-24        | Jun-24        |                        |                      |
| CCAP final delivery-All weather LST                                 | Jan-24        | Jul-24        |                        |                      |
| Monitoring and Anomaly watch, analysis and report                   | Oct-23        | Sep-24        |                        |                      |

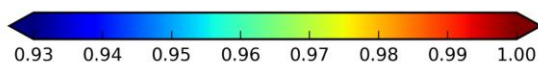
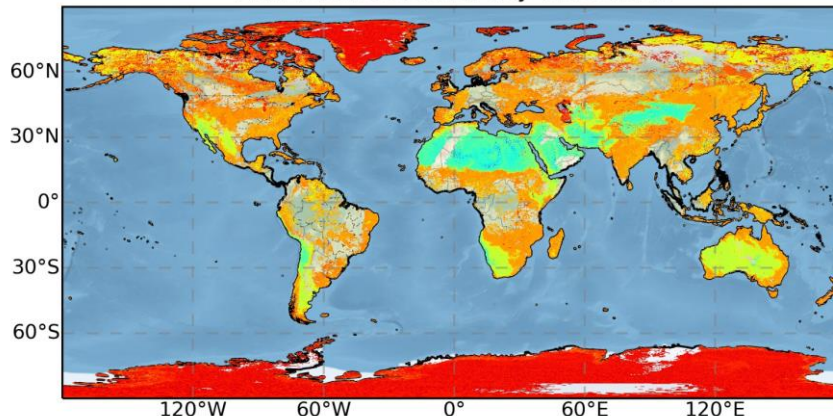
# LSE cross comparison with MYD11C1

## MYD11C1

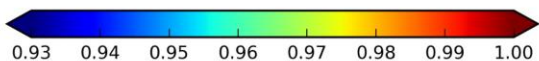
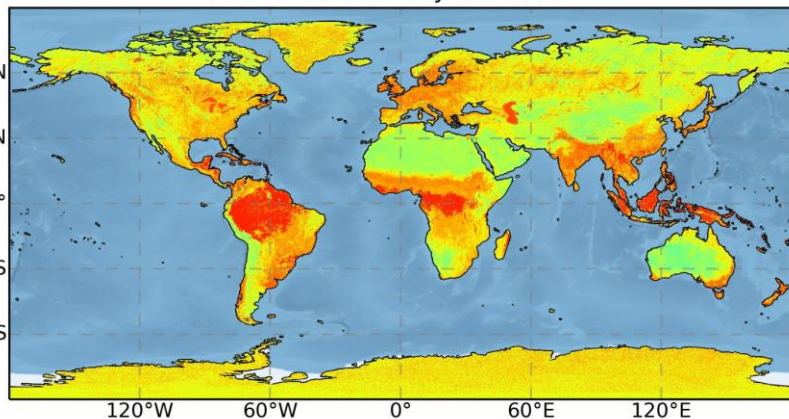
Emi15 local for day :20231024



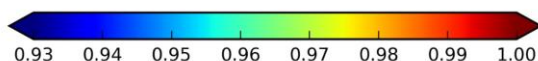
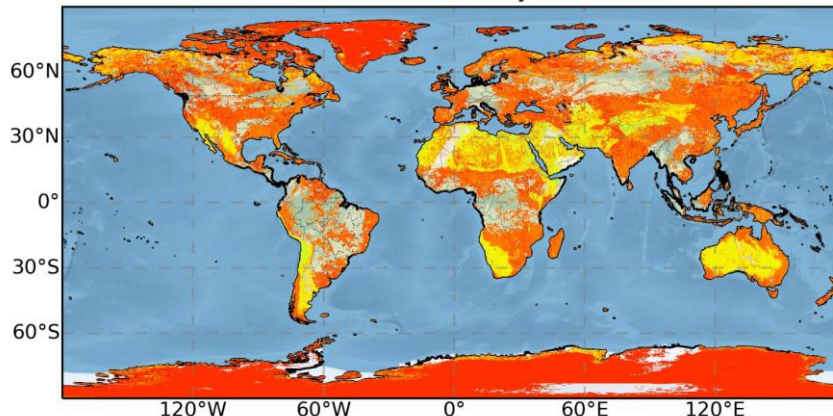
Emi15 MYD11C1 for day :20231024



Emi16 local for day :20231024



Emi16 MYD11C1 for day :20231024



- To further evaluate the LSE over snow surface, the NOAA spectral LSE was compared with corresponding LSE from MYD11C1 and MYD21C1 products. Top left presents VIIRS band 15 LSE and bottom left is VIIRS band 16 LSE. Top right is MODIS band 31 LSE and bottom right is MODIS band 32 LSE.
- It is observed that MYD11C1 generally has higher spectral LSE over snow surface.



# LSE cross comparison with MYD21C1

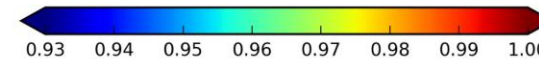
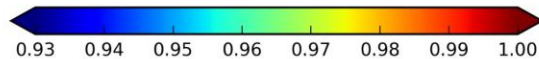
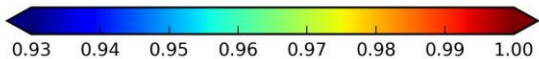
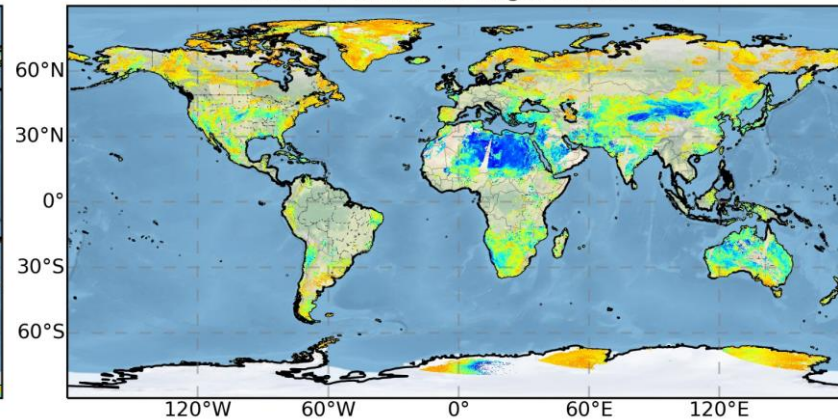
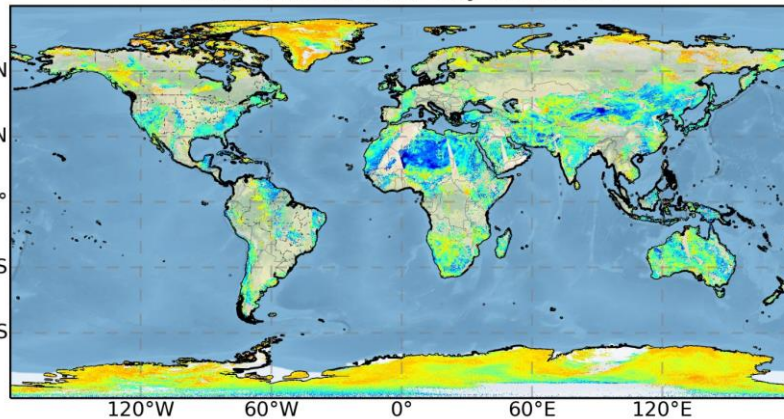
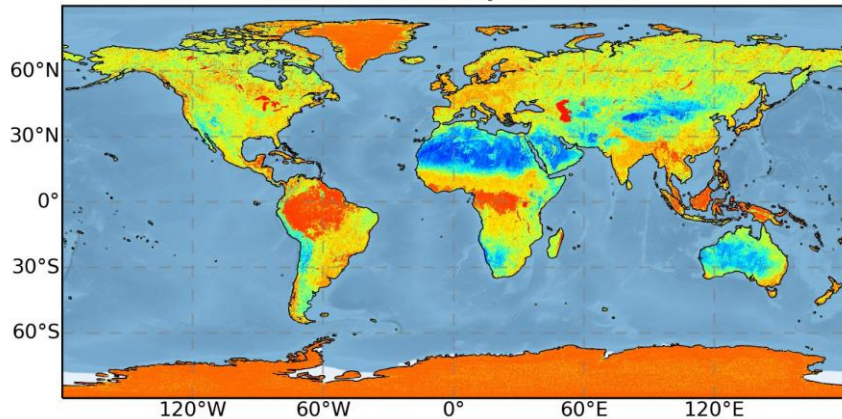
## MYD21C1 Daytime

## MYD21C1 Nighttime

Emi15 local for day :20231024

Emi31 MYD21C1 for Day :20231024

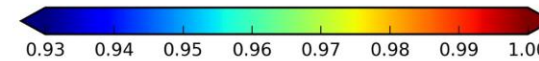
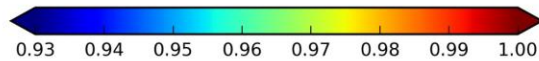
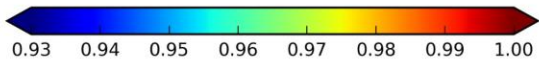
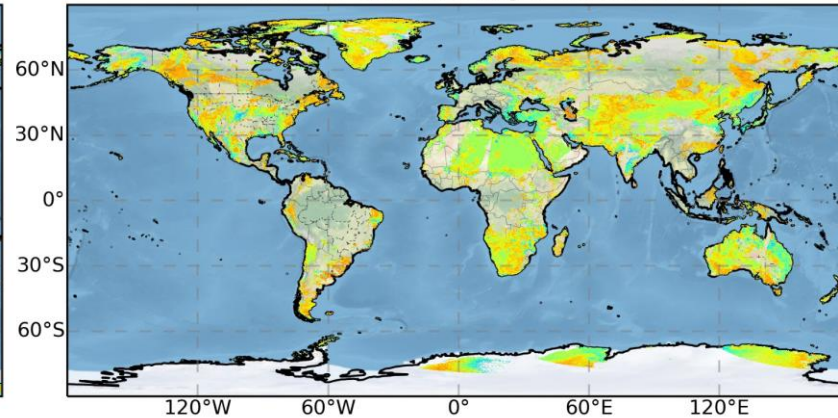
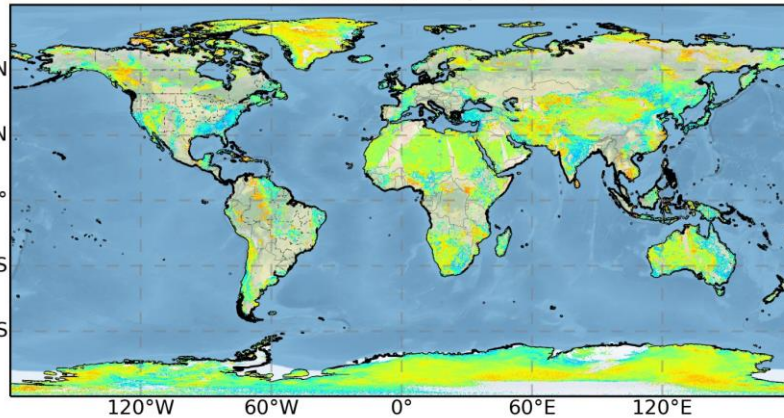
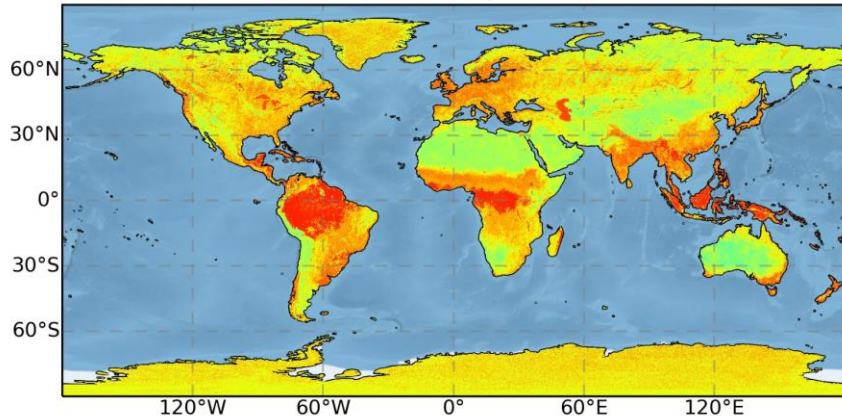
Emi31 MYD21C1 for Night :20231024



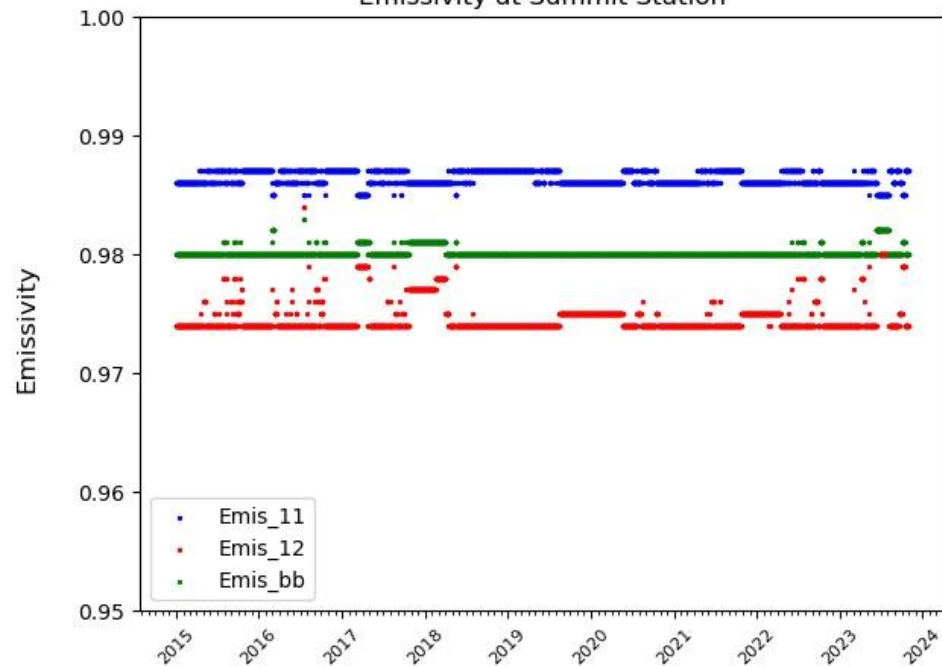
Emi16 local for day :20231024

Emi32 MYD21C1 for Day :20231024

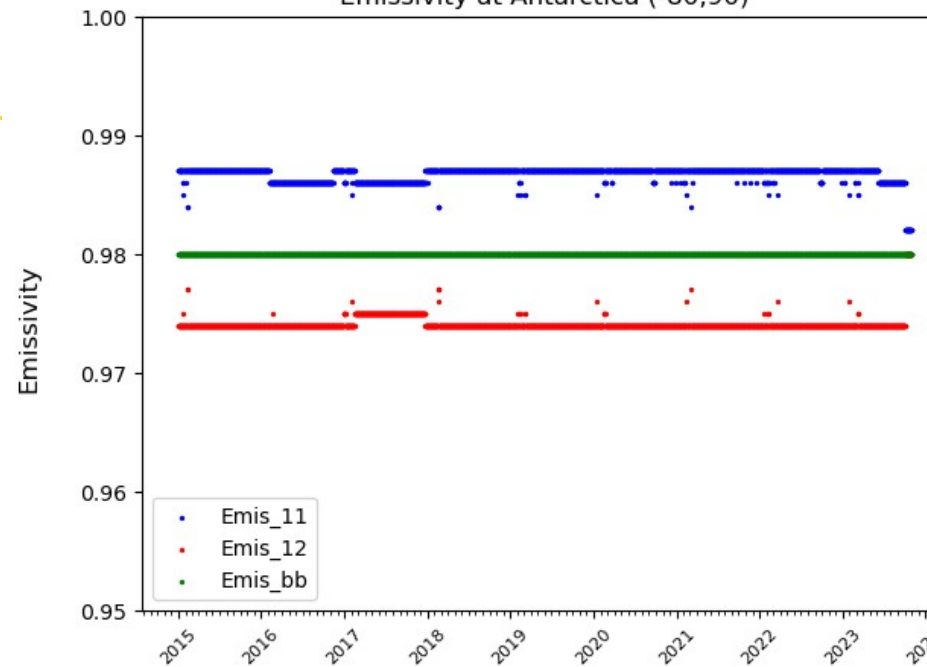
Emi32 MYD21C1 for Night :20231024



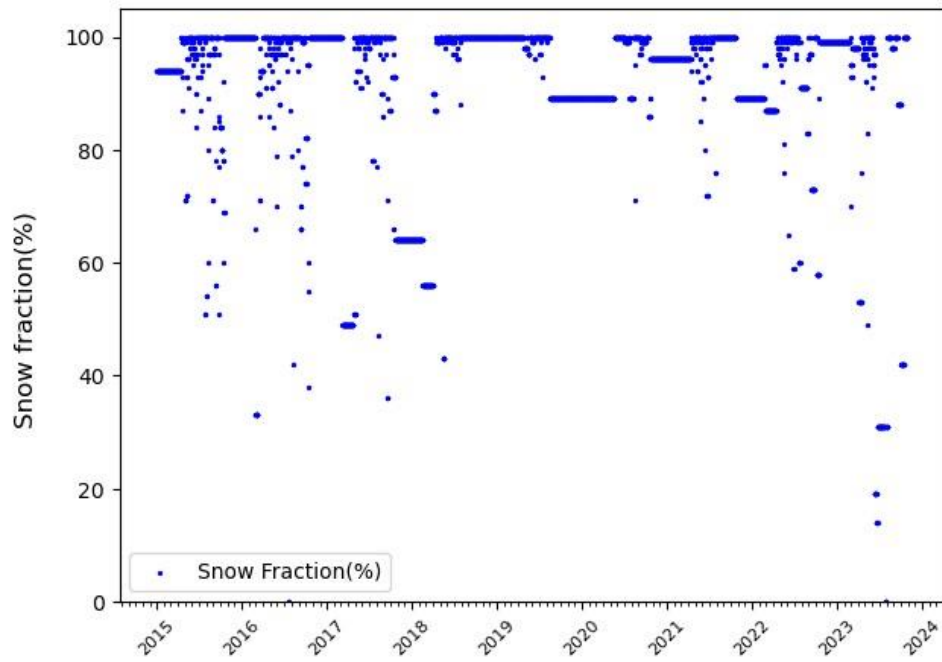
Emissivity at Summit Station



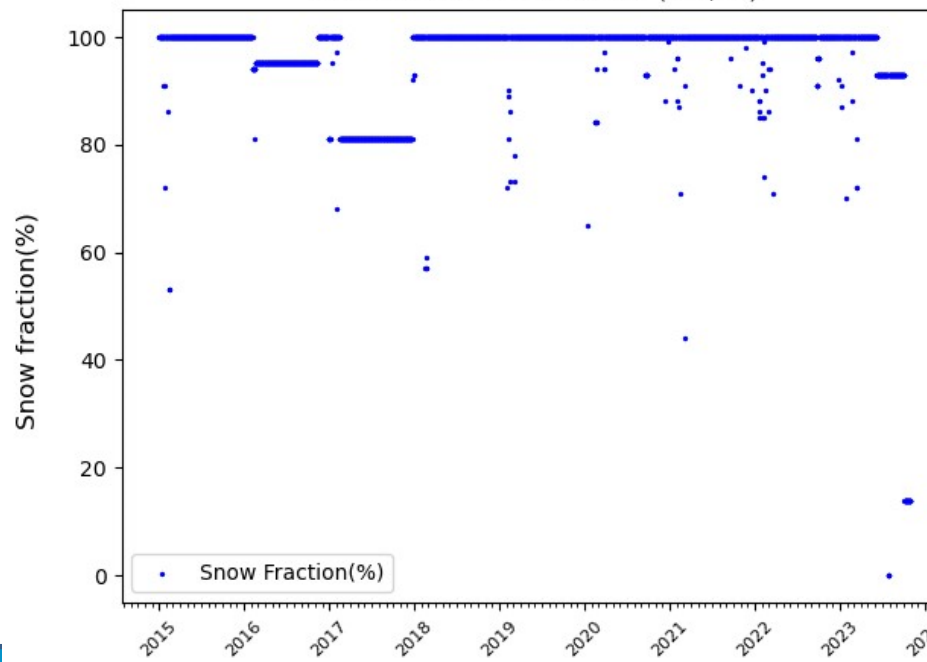
Emissivity at Antarctica (-80,90)



Snowfraction at Summit Station



Snowfraction at Antarctica (-80,90)

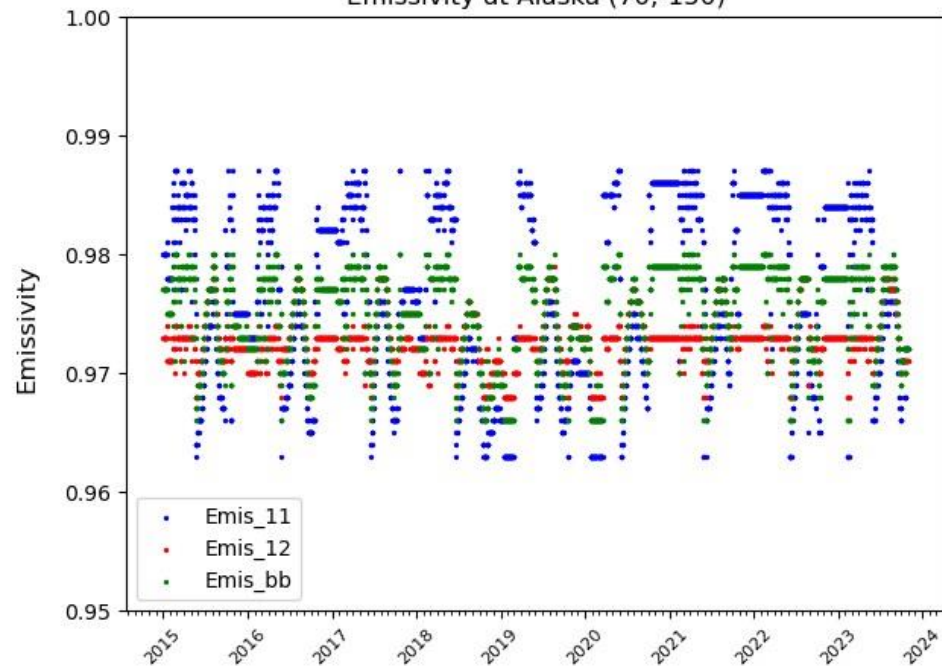


## LSE and snow fraction Time Series Analysis

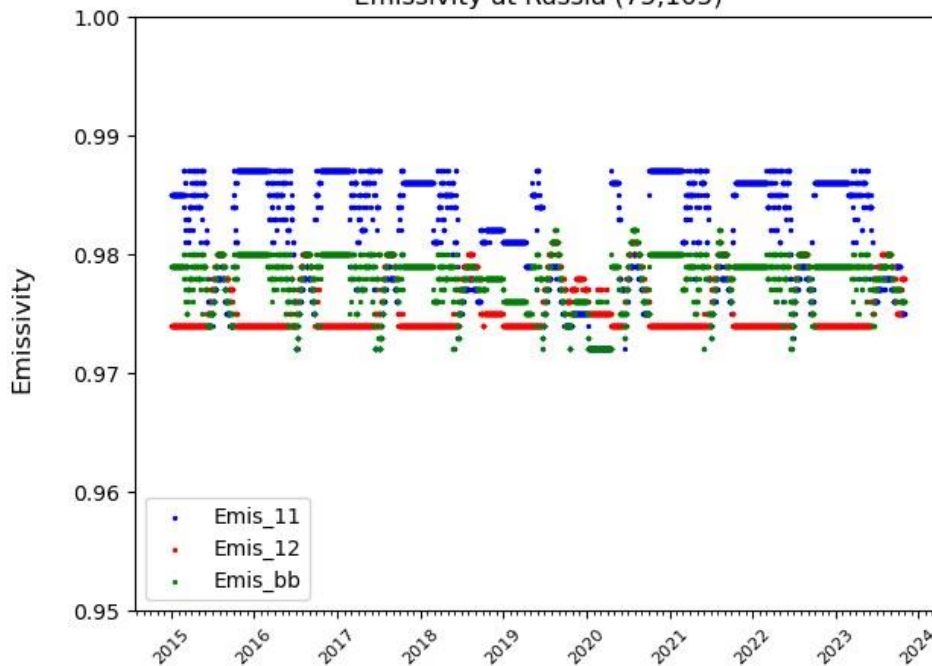
- The time series of spectral emissivity and snow fraction over a snow covered area were analyzed
- The data source is emissivity in v2r2 version generated locally
- Snow fraction exhibits variations over Greenland area, resulting in variations in LSE for both band15 and band16. The snow fraction shows interannual variations.
- Snow fraction exhibits fewer variations over Antarctic, impacting slightly band15 and band16 LSE with no effect on broadband LSE.



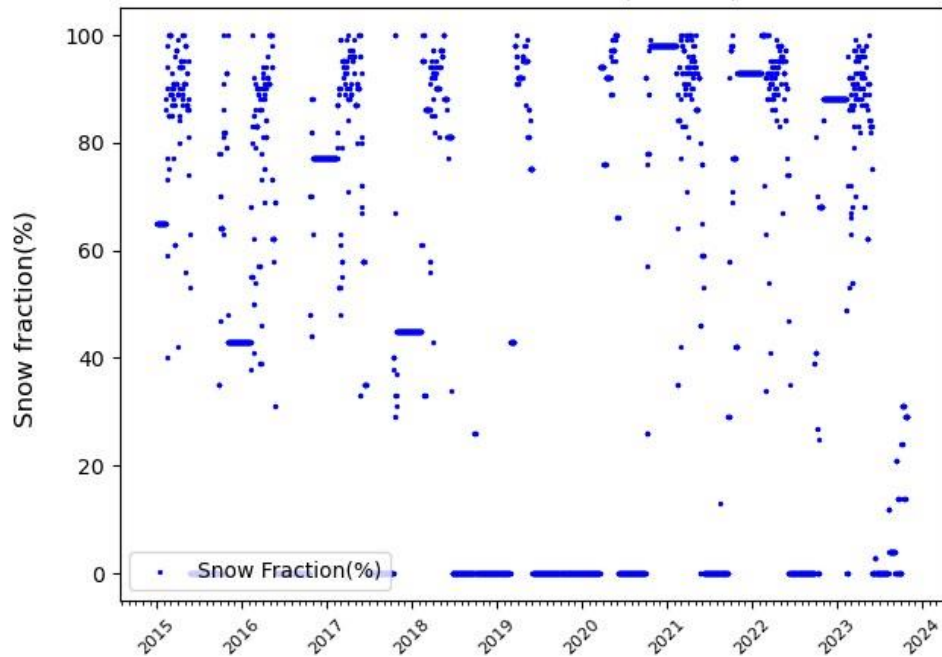
Emissivity at Alaska (70,-150)



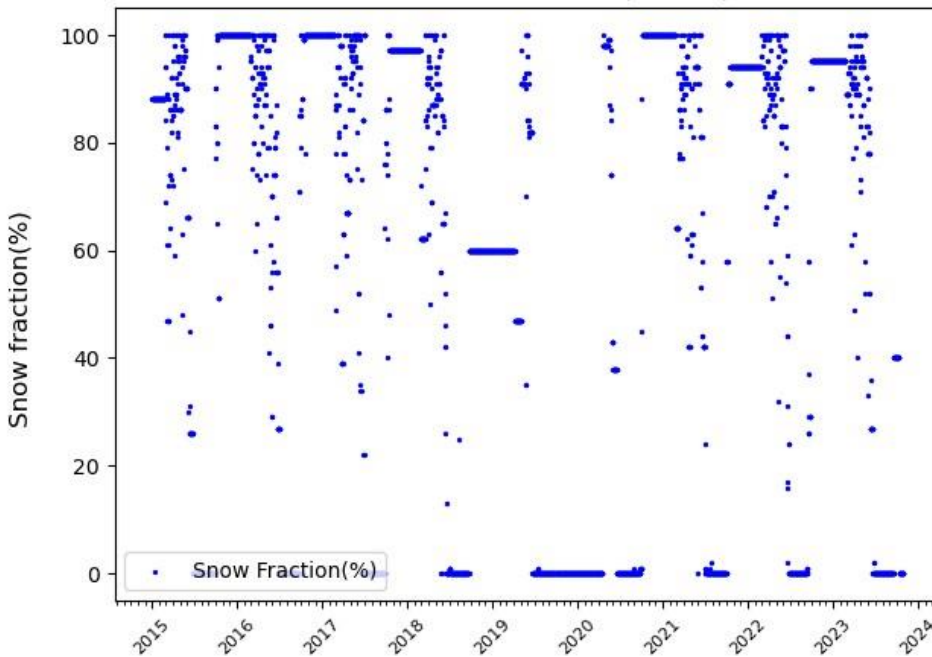
Emissivity at Russia (75,105)



Snowfraction at Alaska (70,-150)



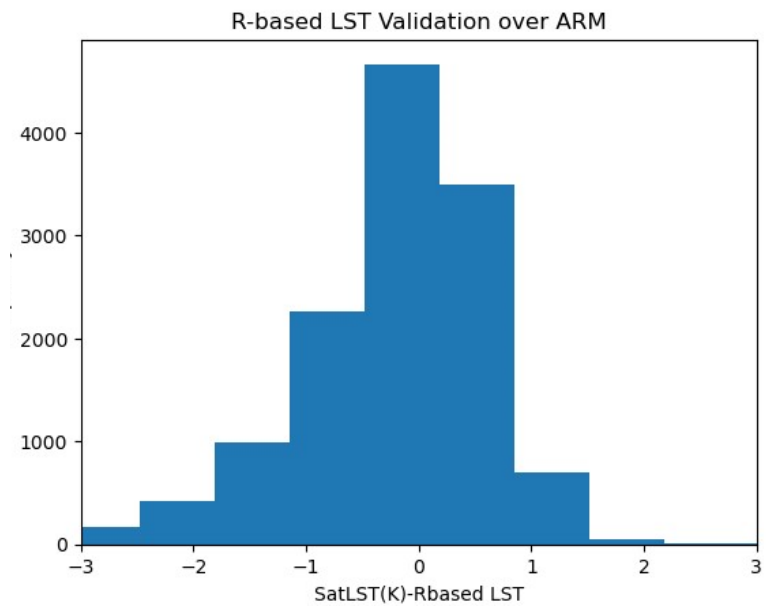
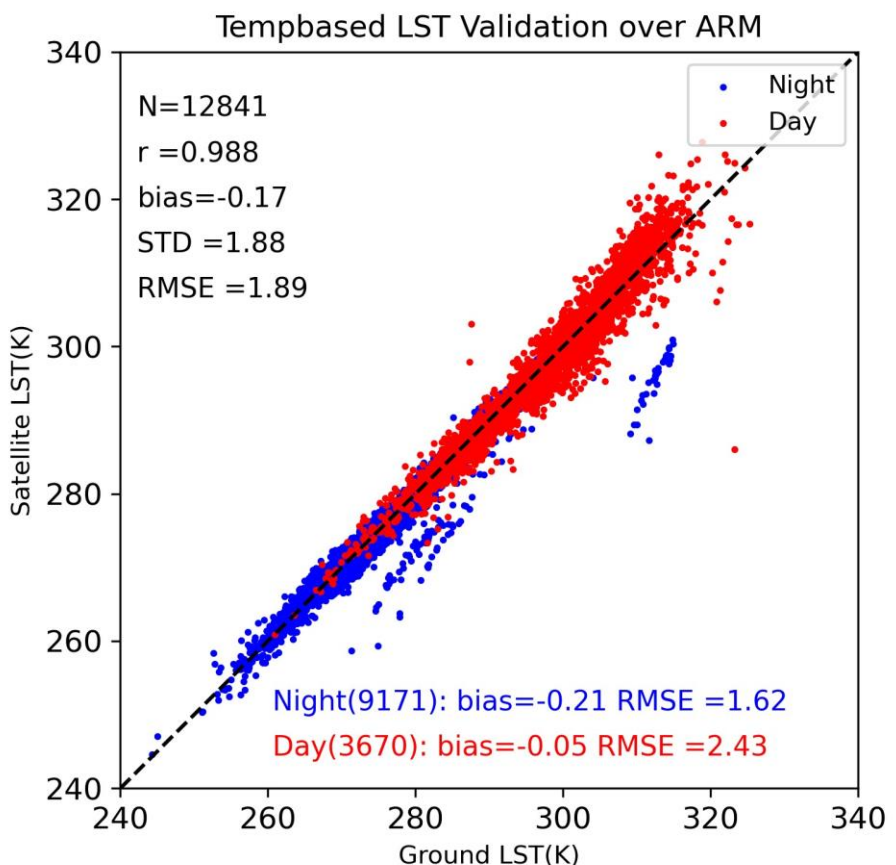
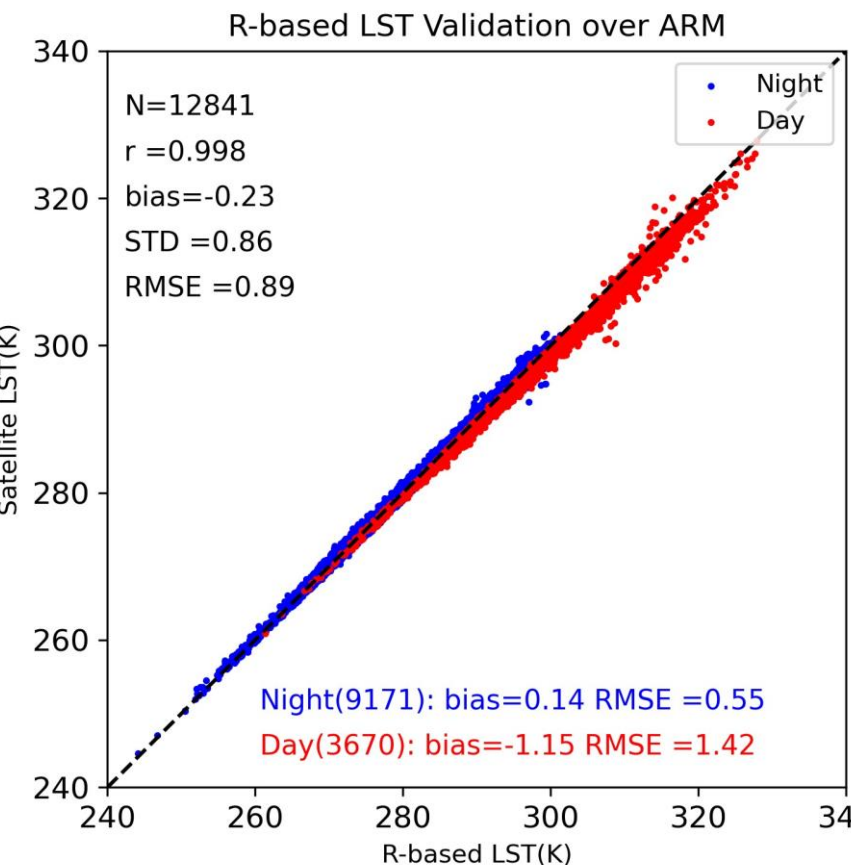
Snowfraction at Russia (75,105)



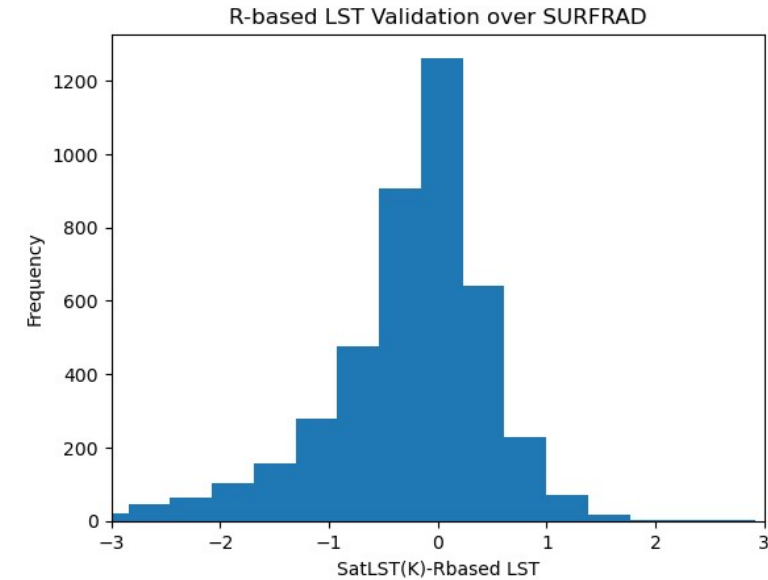
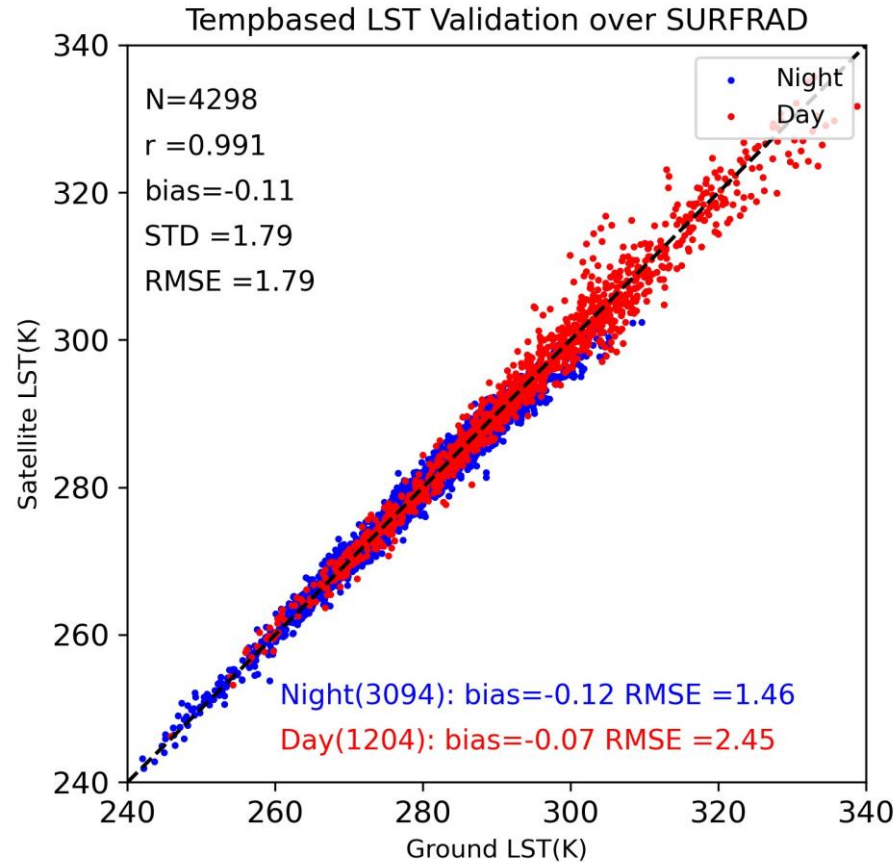
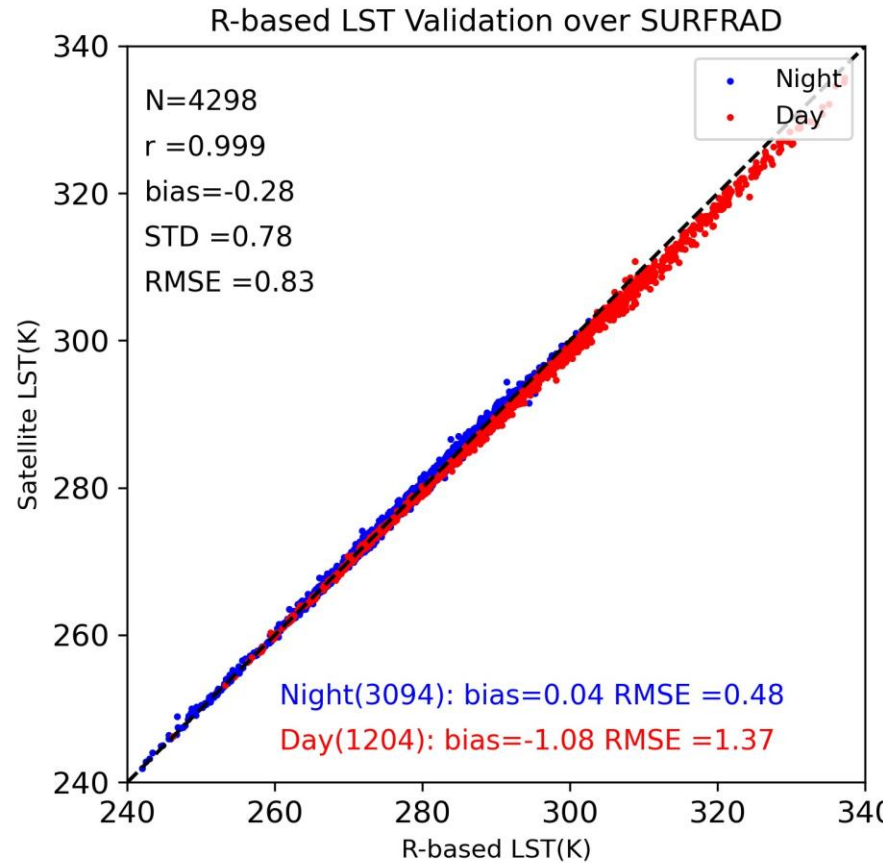
## LSE and snow fraction Time Series Analysis

- Snow fraction shows significant variations over Alaska and Russia area, leading to substantial variations in band15 LSE with less impact for band 16 LSE
- This effect is particularly pronounced in Alaska, where there is an approximately 0.03 variations in LSE throughout the annual cycle.

# R-based SNPP VIIRS LST Validation over ARM Stations



- R-based SNPP VIIRS LST validation over ARM stations for time period from 2020-01-01 to 2023-09-30
- Left figure shows the r-based validation result and the middle figure is the temp-based LST validation result, right figure is the histogram of LST difference between satellite LST and R-LST.
- The large deviation from T-based LST validation is attributed to error in the ground observations.
- Overall a better agreement 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 SNPP VIIRS LST validation over SURFRAD stations for the time period from 2019-06-01 to 2023-10-30
- Left figure displays the r-based validation results, the middle figure shows the t-based LST validation results, and right figure presents the histogram of LST difference between satellite LST and R-LST.
- Overall, a better agreement 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

## Accomplishments / Events:

- The EDR reprocessing was moved back to UMD Bamboo cluster system due to low memory size and limited number of CPUs of the available STAR Linux servers. The RWG checked disk storage available on Bamboo cluster and coordinated with IT support and other users to allocate computing resources for EDR reprocessing.
- The RWG developed tools for parallel run, management and monitoring of EDR reprocessing on Bamboo cluster.
- The RWG recompiled the latest EDR software on Bamboo based on the docker image provided by the ASSIST team, setup the run environment ready and planned EDR reprocessing with available reprocessed VIIRS SDR data on Bamboo and STAR first.
- The latest EDR software was ready on Bamboo: the RWG re-installed gcc 8.3.0, recompiled all the OTS libraries, and rebuilt the cloud algorithm package, ready for use now.
- Obtained the snow map data from Apr. 2018 to Oct. 2023 from the ASSIST team.

| 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 <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(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.



## Accomplishments / Events:

- Fully reprocessed N21 SST records from 19 Mar 2023-pr, consistent with NPP/N20 have been archived in NASA JPL PO.DAAC. L2P data are available from <https://doi.org/10.5067/GHN21-2P280> and L3U data available from <https://doi.org/10.5067/GHN21-3U280>.
- As part of verifying the JPSS VIIRS SST record (Feb 2012-on) and extending it back to 2000, full-mission records of two MODISs' onboard Terra/Aqua have been reprocessed and documented in "NOAA MODIS SST Reanalysis Version 1" by Jonasson et al <https://doi.org/10.3390/rs15235589>. Figure below demonstrates the MODIS RAN1 accuracy and precision relative to the NOAA specs.
- The VIIRS and MODIS SSTs are closely consistent (VIIRS has slightly improved precision, due to the use of the 8.6  $\mu\text{m}$  band which is not functional on both MODISs). The new version 2.81 of L3S-LEO products which includes data of N21 and two MODISs has been produced. Its archival in PO.DAAC is also underway, following the recently completed archival of N21 SSTs.
- All other product consistency & validation activities w/NPP/N20/N21, non-JPSS LEO SSTs (AVHRR GAC/FAC & MODIS, and corresponding milestones are underway.

## Overall Status:

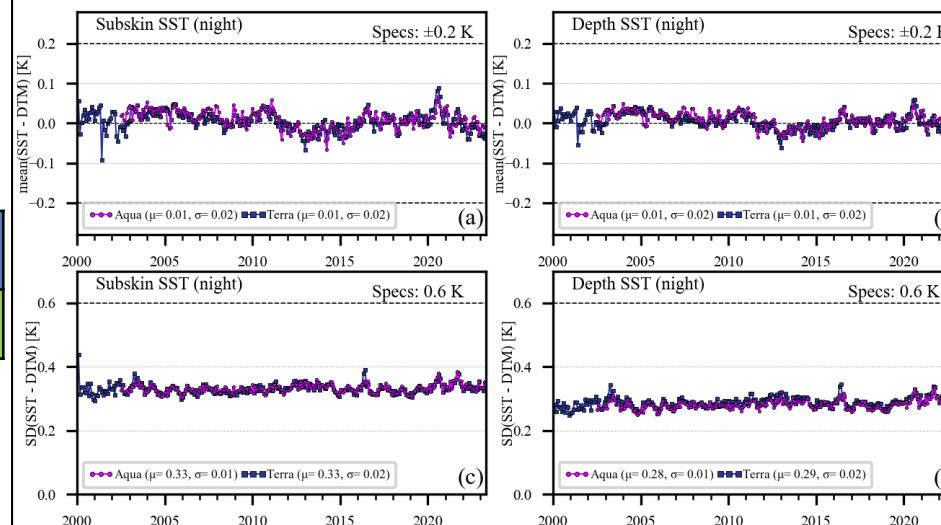
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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

## Issues/Risks:

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

## Highlights: Fully consistent full-mission records of JPSS/VIIRS and EOS/MODIS



Time series of MODIS accuracy (global mean bias of satellite minus drifters and tropical moorings SSTs) and precision (corresponding standard deviations) for the full missions of Terra (24 Feb 2000 – on) and Aqua (04 Jul 2002 – on). NOAA SST specs for accuracy  $\pm 0.2\text{K}$  and precision  $0.6\text{K}$  are also overlaid

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|------------|---------------|---------------|------------------------|----------------------|
|            |               |               |                        |                      |

## Accomplishments / Events:

- NOAA-21 SFR (Beta) was added to the SFR processing system at GINA, University of Alaska Fairbanks. The product is being produced and disseminated to Alaska Weather Forecast Offices.
- NOAA-21 SFR was also added to the DB-based CISESS SFR production system and the images are posted online in near real-time. The product is being disseminated to SPoRT who will integrate the data to their LDM distribution and make it available to all NWS WFOs.
- Collaborated with and assisted both SPoRT and GINA with their SFR configuration and display in AWIPS
- Collected forecaster feedback on SFR

## Overall Status:

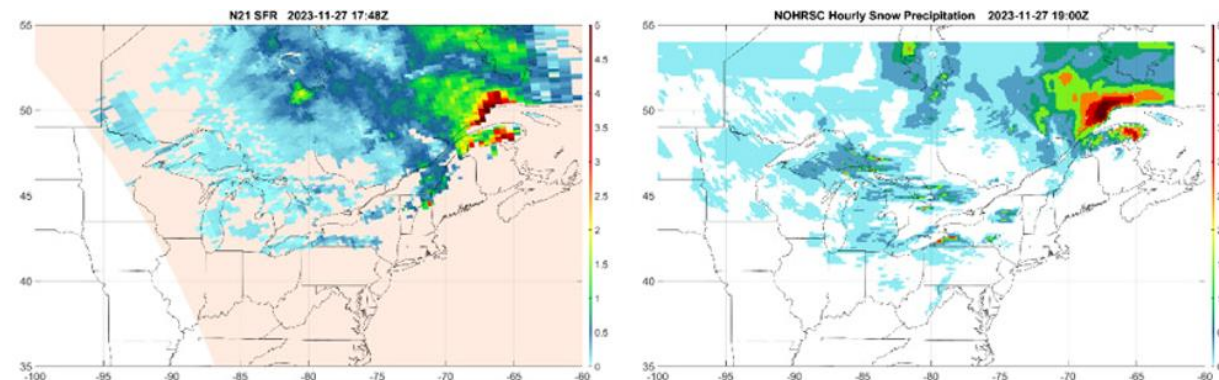
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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

None

## Highlights: NOAA-21 SFR Captures Intense Snowfall Event



Left: NOAA-21 SFR on November 27, 2023; Right: The corresponding NORHSC hourly snowfall analysis. NOAA-21 captured an intense snowstorm in the Northeast into Quebec, Canada. It also successfully detected the lake effect snow in the Great Lakes region, e.g. over and around Lake Erie and Lake Ontario, but underestimated the snowfall intensity due to the shallow snowfall system.

| Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| Enhance the machine learning snowfall detection model using N21 observations                                | Jan-24        | Jan-24        |                        |                      |
| Enhance the machine learning models for 1DVAR initialization and SFR bias correction using N21 observations | 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      |                        |                      |

## 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 November of 2023 for the production of AST-2023.
- The team has developed an efficient approach for updating the water surface fraction (WSF) product on a monthly basis:
  - This approach takes advantage of the daily flood data produced by the VIIRS flood mapping team.
- In order to validate the updated WSF data, the team also developed a tool for producing high resolution (20m) near cloud free Sentinel-2 image composites using Google Earth Engine:
  - This tool provides best available free high resolution satellite images needed to validate the WSF data updated for any given month (up to the most recent month, see the highlights).

## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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

None

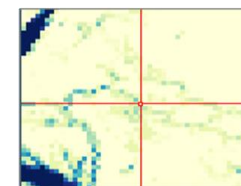
## Highlights:

### Mapping of Seasonal Inundation in Bangladesh by Monthly WSF Data

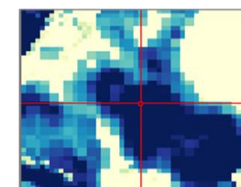
Many lowland areas in Bangladesh could be inundated for months during the monsoon season (June to October). Annual map products are not designed to capture these large scale seasonal dynamics. A new capability developed by the surface type team can address this issue by updating the water surface fraction (WSF) product on a monthly basis.

This example highlights an area northeast of Dhaka. It was dry in May 2023, but was mostly flooded in October 2023, which was well captured by the updated WSF data and verified by the Sentinel-2 image composites.

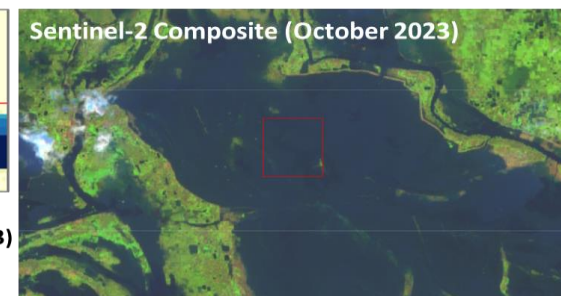
In the WSF maps (left), the yellow to dark blue color ramp represents WSF values from 0% to 100%. In the Sentinel-2 composites (right), water and flooded vegetation appear dark and dark green, while dry areas are indicated by various shades of green and brown. Residual clouds appear bright white. The red squares on top of the Sentinel-2 composites represent a 1-km area centered at the red cursor location shown in the WSF maps.



250m WSF (original)



250m WSF (Updated for Oct. 2023)



| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|------------|---------------|---------------|------------------------|----------------------|
|            |               |               |                        |                      |



### Accomplishments / Events:

- Conducted intensive Cal/Val for VIIRS SDR during the recovery from the Suomi NPP satellite anomaly on 11/1/2023: Based on the STAR VIIRS SDR team's recommendation, the VIIRS SDR products were approved for operational use starting at 0:00 UTC on 11/3/2023
- Delivered for deployment in the IDPS operations the 9th (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 11/13/2023: the NPP DN0 LUT update successfully reduced the additional DNB striping that remained after recovery from the satellite anomaly on 11/1/2023
- Assisted in scheduling and analyzed data from N20, N21, and NPP VIIRS lunar calibration with spacecraft roll maneuvers on 11/23/2023: Considered the data for updating N20 F-PREDICTED LUT
- Developed and tested a prototype N21 VIIRS SDSM solar screen transmission LUT based on data acquired during the first year of the on-orbit operations

### Overall Status:

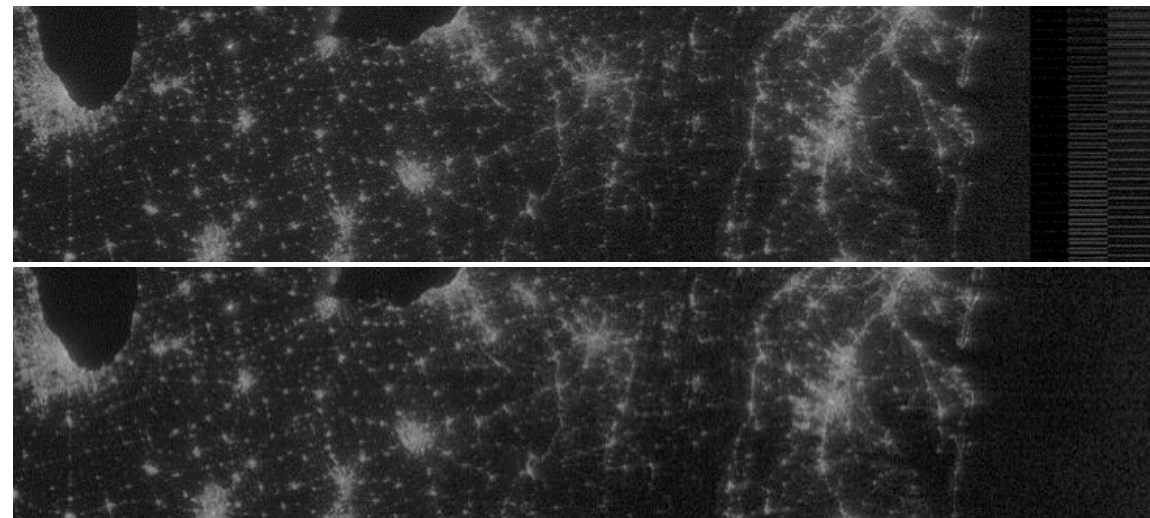
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | X                                  |                                  |                                |                      |
| Technical / Programmatic |                                   | X                                  |                                  |                                |                      |
| Schedule                 |                                   | X                                  |                                  |                                |                      |

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

### Issues/Risks:

J3/J4 VIIRS granule size change

### Highlights:



Suomi NPP VIIRS SDR DNB images processed before (top) and after (bottom) the LUT update based on data acquired during the new moon on 11/13/2023

| Milestones   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|--|---------------|---------------|------------------------|----------------------|
| Complete SNPP VIIRS SDR 2012-2020 reprocessing delivery to CLASS           | Dec-23        | Dec-23        | Oct-23                 |                      |
| 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        |                        |                      |

## 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](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 [FAQ](#) and Vegetation Health Indices data from [the STAR VH website](#) have been used for testing.

## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(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<br>H 10-1                   | 1961-2021       | 1982-2021 | Yes                        | 50            | 0.629  | 41            | 0.704 | 41            | 0.707 |
| India     | P 10-12<br>H 3-5                  | 1961-2021       | 1982-2021 | Yes                        | 44            | 0.186  | 34            | 0.507 | 42            | 0.099 |
| Mongolia  | P 4-6<br>H 8-9                    | 1961-2021       | 1982-2021 | No                         | 30            | 0.373  | 27            | 0.477 | 28            | 0.466 |
| Russia    | PW 9-10; PS 4-5<br>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<br>HW 7-8; HS 8-9 | 1992-2021       | 1992-2021 | No                         | 6             | 0.339  | 24            | 0.563 | 25            | 0.565 |

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 early 2024. The NOAA-21 cloud advection validation dataset now contains over 41,000 EDR ash pixels. Updated VOLCAT and EDR cloud advection ash mass loading validation figures are included in the bottom right. Of note, the median ash mass loading error and precision (IQR) for both VOLCAT and EDR (VOLCAT:  $0.20 \log_{10}(g/m_2)$ ,  $0.27 \log_{10}(g/m_2)$ ; EDR:  $0.21 \log_{10}(g/m_2)$ ,  $0.27 \log_{10}(g/m_2)$ ) are well within product specifications and are consistent with previous fully validated sensors (e.g., NOAA-20, GOES-16, etc). Performing mass loading validation in  $\log_{10}$  space is needed since mass loading can range 2-3 orders of magnitude for volcanic eruptions.
- VOLCAT VIIRS volcanic ash plume identification and extraction work is an enhancement to the VOLCAT methodology. This work was deprioritized during the second half FY23 in lieu of focus on NOAA-21 EDR/VOLCAT validation. 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:

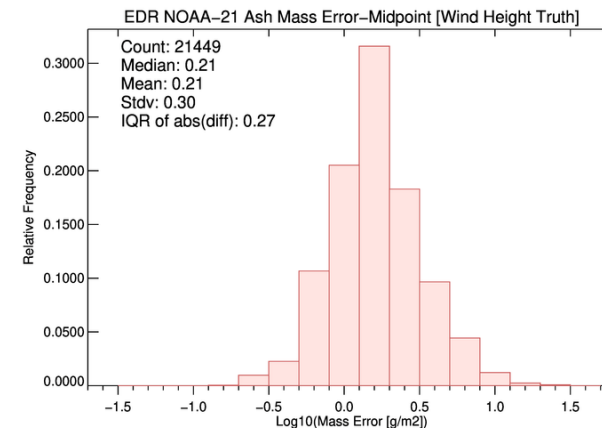
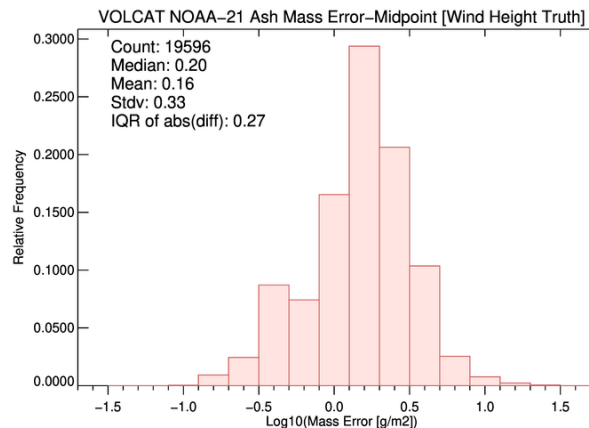
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation   |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--|
| Cost / Budget            |                                   | X                                  |                                  |                                |  |
| Technical / Programmatic |                                   | X                                  |                                  |                                |  |
| Schedule                 |                                   |                                    | X                                |                                | VOLCAT enhancement (improved detection was deprioritized for validation work) will continue into much of FY24) |

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

Issues/Risks:

Highlights: Volcanic ash science team has continued to add cases to the NOAA-21 validation for full maturity review. Below are VOLCAT (left) and EDR (right) Ash Mass Loading error for all cases in the cloud advection pattern ash mass loading retrieval

| 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        |                        |                      |





## Accomplishments / Events:

- VIIRS-NOAA-21 global ocean color products have been routinely produced. Data flow has been smooth (Level-1B to Level-2 to Level-3) without any issues.
- All VIIRS-NOAA-21 global ocean color product images have been routinely generated and displayed in OCView, including Level-3 daily, 8-day, monthly, and climatology data/images.
- In addition, VIIRS-NOAA-21 derived ocean color data are being routinely monitored and compared with those from in situ measurements (MOBY, AERONET-OC).
- In preparing for the VIIRS-NOAA-21 ocean color Beta maturity review, we have evaluated VIIRS-NOAA-21 ocean color data quality, compared with VIIRS-SNPP and VIIRS-NOAA-20, as well as those from in situ data.
- Summary: For VIIRS-NOAA-21 ocean color data to be useful, we must do the vicarious calibration for VIIRS-NOAA-21 and reprocess the mission-long data (i.e., it must be after the combined Beta/Provisional maturity).

| Milestones   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|--|---------------|---------------|------------------------|----------------------|
| Ocean Color J2 Provisional Code delivery to ASSIST | Apr-2024      | Apr-2024      |                        |                      |
| Ocean Color Beta Maturity                          | Nov-2023      | Mar-2024      |                        |                      |
| Ocean Color Provisional Maturity                   | Mar-2024      | Mar-2024      |                        |                      |
| Ocean Color Validated Maturity                     | Jul-2025      | Jul-2025      |                        |                      |

## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(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**



# Ocean Color FY24 Milestones/Deliverables

| Task/Milestone  | Planned Completion Date                               | Fiscal Quarter | Comments        |
|---|---|----------------|-----------------|
| <b>NOAA-21 OC data processing</b>   |   |                |                 |
| NOAA-21 Beta maturity for ocean color EDR   | Sep-23 (or 8 months after NOAA-21 Beta SDR available) | Q4 FY23        | NOAA-21 OC data |
| 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 |
| <b>VIIRS calibration/validation</b>   |   |                |                 |
| 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         |
| <b>VIIRS algorithm refinement (Maintenance DAP)</b>   |   |                |                 |
| 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        |                 |
| <b>VIIRS OC data processing/reprocessing</b>  |   |                |                 |
| 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        |                 |