



## NOAA JPSS Monthly Program Office

# AMP/STAR FY22 TTA

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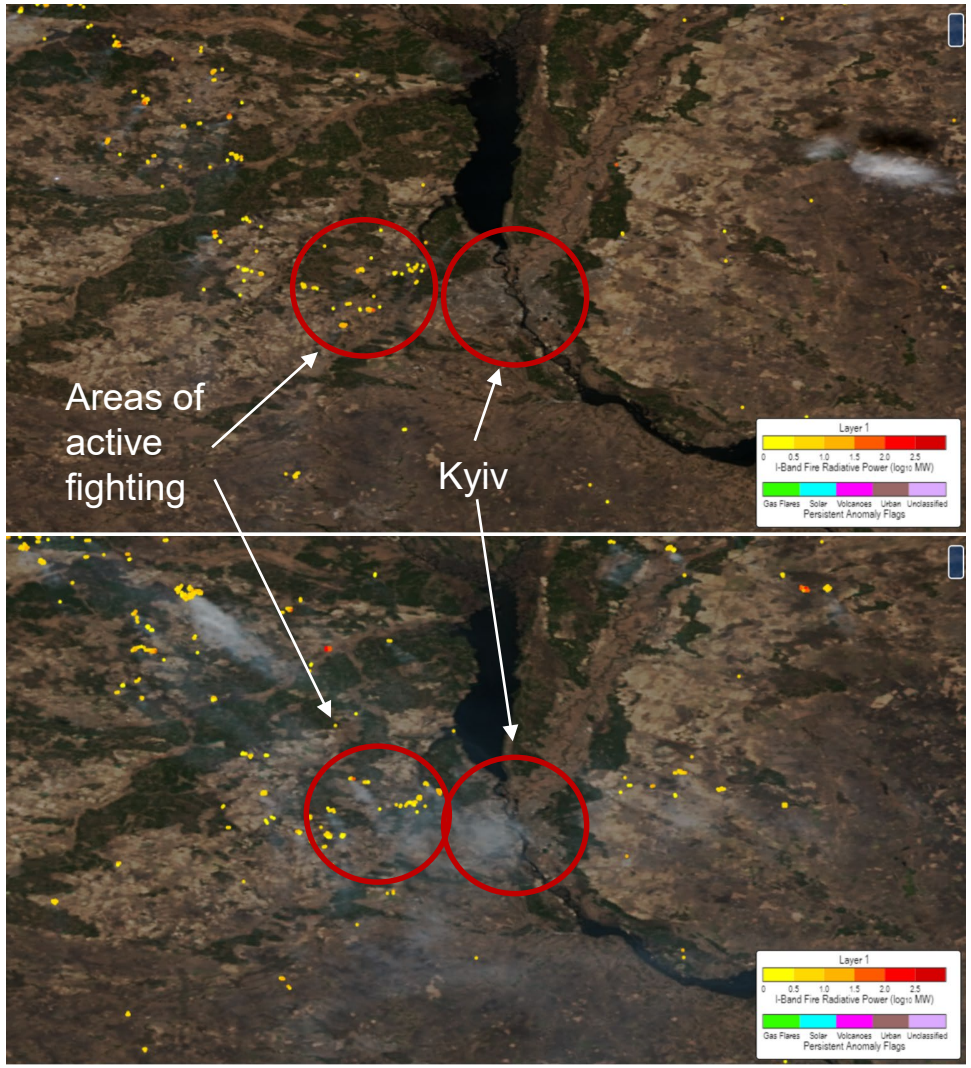
April, 2022

# Highlights from the Science Teams (March)

## Tracking War in Ukraine with Active Fires



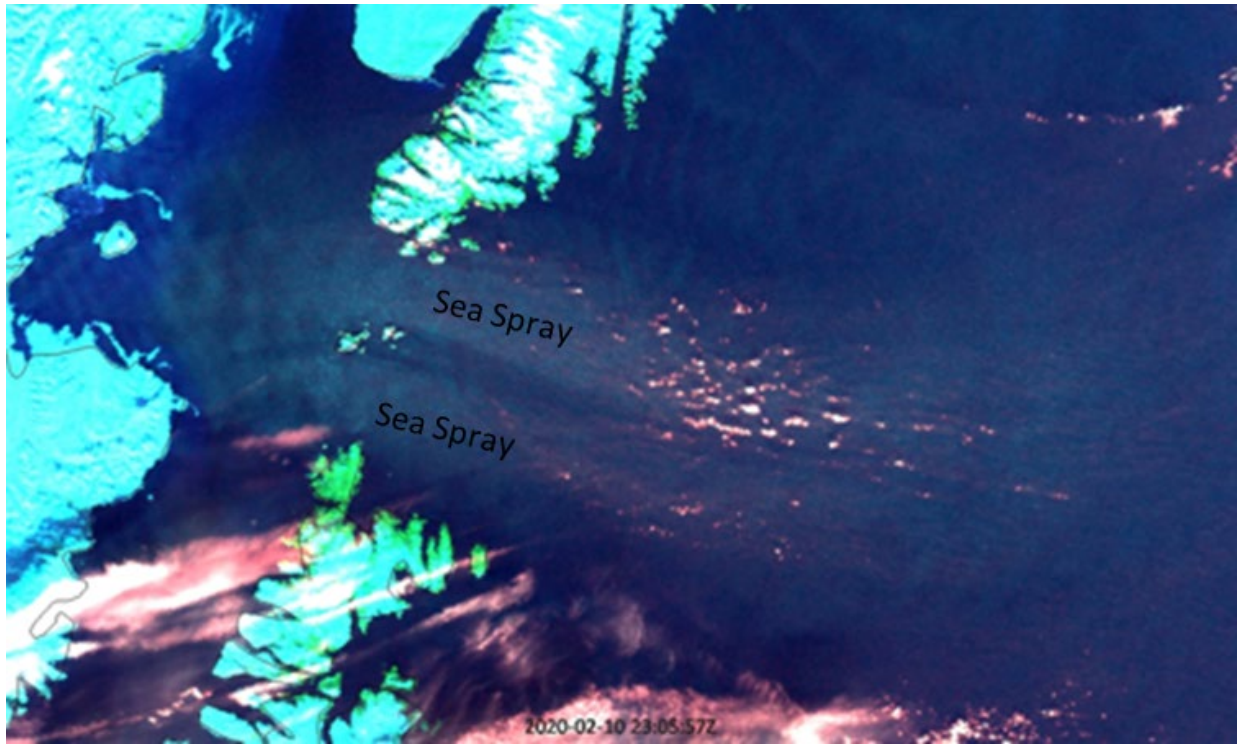

In late February, Russian military forces entered eastern and northern Ukraine, and pitched fighting has taken place since then.

These battles often result in fires that can be detected using the VIIRS Active Fires EDR product. The location of these fires can be used informally to track the location of the battle fronts (although unrelated agricultural fires, and the lack of fire detections with heavy cloud cover can confound these analyses) and confirm news reports.

The maps at left show the areas around Kyiv, Ukraine on March 21 and 23. Fires to the northwest of the city likely indicate areas of heavy fighting.

# Highlights from the Science Teams (March)

## Detecting sea spray in clear sky conditions

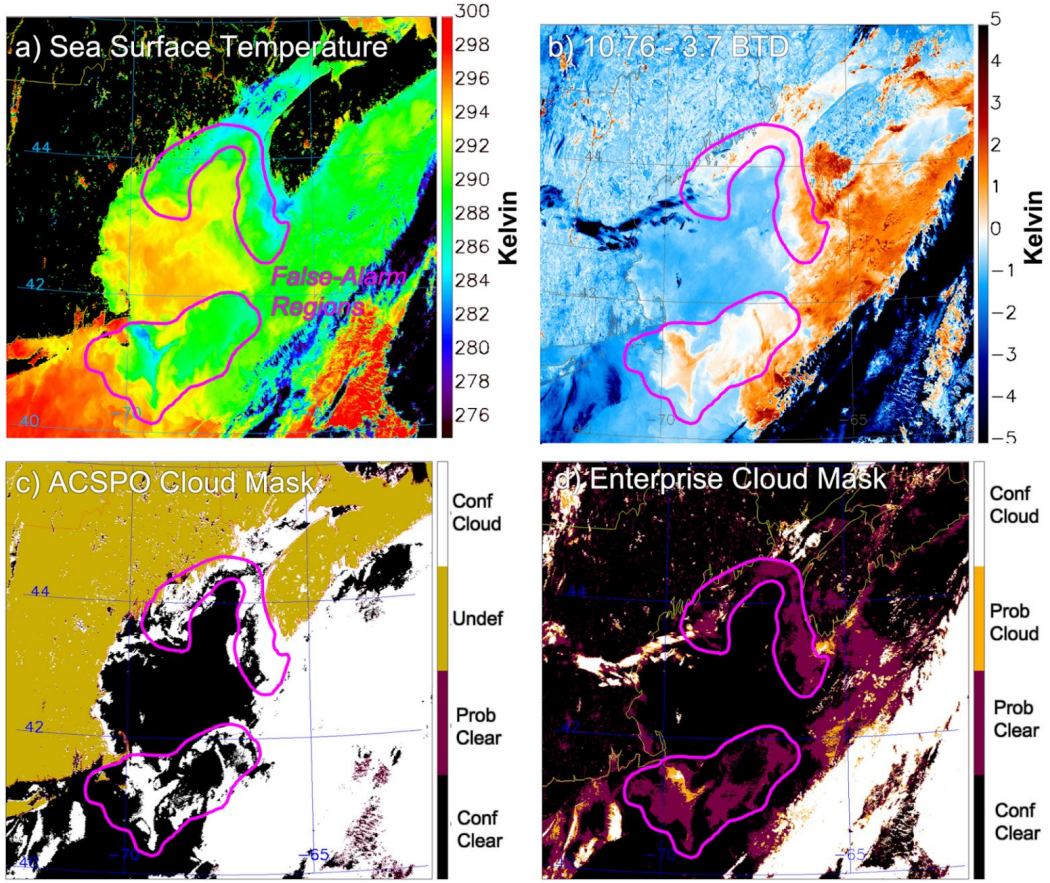



Citation: Line, W. E., L. Grasso, D. Hillger, C. Dierking, A. Jacobs, and S. Shea, 2022: Using NOAA Satellite Imagery to Detect and Track Hazardous Sea Spray in the High Latitudes. *Wea. Forecasting*, 37, 351-369, https://doi.org/10.1175/WAF-D-21-0137.1.

This collaborative study between CoRP/RAMMB, CIRA, and NWS Alaska forecasters introduces clear-sky sea spray detection techniques using ABI and VIIRS imagery. Freezing sea spray poses a threat to vessels, as ice accumulation can destabilize, and even sink a ship. Freezing spray is a NWS forecast variable that receives little verification. Given the threat to life and property, and lack of verification, detection of sea spray using the approaches discussed in this paper provide immediate value to NWS operations.

# Highlights from the Science Teams (March)

## VIIRS DNB Helps Flag False Clouds at Night

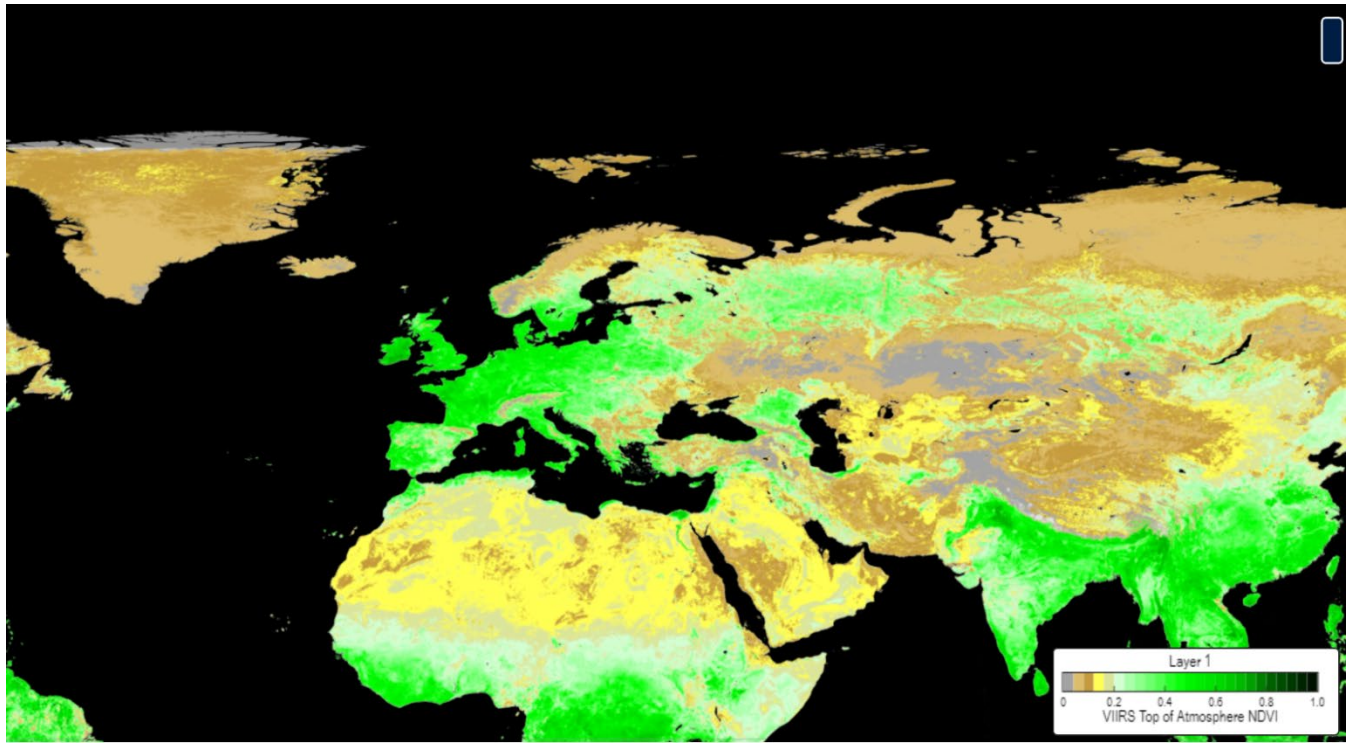



Unexpected false low cloud fields were found in conventional nighttime cloud masks, which are produced under special circumstances of a cool/uniform lower surface and a warmer/moist lower atmospheric layer. These conditions can happen in regions of tidal mixing, river outflows, coastal upwelling, and radiative cooling over lake bodies, as well as over some land surfaces. This study, which used Day/Night Band moonlight imagery as a definitive statement on the presence/absence of clouds-over-ocean, suggests that some areas are predisposed to the false cloud artifact. Discarding valid clear-sky information in these areas as cloud-contaminated may impart local biases to the sea-surface temperature record, which is compiled at night.

*Figure: S-NPP VIIRS observations and derived products on 30 July 2018 at 0630 UTC. (a) SST retrievals, (b) the conventional "low cloud at night test" (NLCT; 10.7–3.7 μm BTD), (c) ASCPO Clear Sky Mask (only "Confidently Clear" pixels are used for SST), and (d) the NOAA Enterprise Cloud Mask. Magenta lines encompass the regions of main low-cloud false alarm around Georges Bank/Nantucket Shoals and coastal Gulf of Maine.*

# Highlights from the Science Teams (March)

**EDR LTM site retirement and new products on JSTAR Mapper**




On March 31, the STAR JPSS EDR Long Term Monitoring site was retired after having provided daily global maps of JPSS EDR products since 2015. The site function's have been superseded by the existing JSTAR Mapper website (https://www.star.nesdis.noaa.gov/jpss/mapper/), which provides similar global maps in a modern web mapping framework.

As part of this transition several new products (which had been available on the EDR LTM site) have been added to the JSTAR Mapper website including NDVI, OMPS SO2 and Nadir Profiler Total Ozone, various MIRS and NUCAPS products, and the VIIRS Day/Night Band and NCC imagery. The ATMS Limb Corrected product will move to ICVS in mid-April, while the CMORPH products will move to their own STAR hosted site in May.

# Accomplishments

- Delivery Algorithm Packages (DAPs) - Mission Unique Products:
  - **Delivery of J2 Mounting Matrix Coefficients PCT/LUTs updates based on the Pre-Dynamic alignment measurement report**:
    - 3/08/2022: STAR delivered JPSS-2 ATMS PCT with Pre-Dynamic Mounting Coefficients DAP (ADR8814/CCR5909) to DPMS
    - 3/11/2022: STAR delivered JPSS-2 CrIS PCT with Pre-Dynamic Mounting Coefficient DAP (ADR8762/CCR5910) to DPMS
    - 2/24/2022: STAR delivered Launch-Ready JPSS-2 VIIRS SDR LUTs Update (with Mounting Matrix coefficients updates) DAP (ADR8822/CCR5512) to DPMS
    - 3/08/2022: STAR delivered JPSS-2 OMPS mounting matrix updates package (ADR9905/CCR5513) to DPMS
  - 3/22/2022 STAR delivered OMPS Out of Cycle LUT update DAP (ADR9908/CCR5926 OMPS J02 Nadir Version Table Update N_TIM_PAT_VER Value) to DPMS. *Changes*: NVT (Nadir Version Table) LUT OMPS-TBL-GND-PI_j02 update
  - 4/04/2022 STAR delivered VIIRS code DAP (ADR9903/CCR5939 VIIRS SDR Not Produced as Expected for Defective Data Packets) to DPMS

- DAPs – Enterprise Products:
  - 3/17/2022: STAR delivered J2 Final DAP for Active Fires (v1r1, I-Band) to NDE (maintenance delivery for NPP and N20)
    *Changes*: The primary science upgrade is that the J02 platform now uses a different fire radiative constant from NPP and J01
  - 3/25/2022: STAR delivered Final DAP Patch for VFM (v1r0, for S-NPP & NOAA-20) to NDE
    *Changes*: suppresses errors for nighttime and polar granules; switch Cloud Mask from a required to an optional input
  - 4/07/2022: STAR delivered VIIRS Offline LSA DAP to NDE (J2 update for Offline LSA)
    *Changes:* Snow/Snow-free observations separation in offline temporal filtering; updated climatology files
  - 4/08/2022: STAR delivered J2 HEAP (algorithm version: v3r0, DAP version: v4r0) final DAP to NDE (maintenance delivery for NPP and N20)
    *Changes*: compiling the code now uses the ASSISTT build scripts
  - 3/29/2022: STAR delivered J2 NVPS (v2r2) final DAP (VI & GVF, code & documents only) to NDE
    *Improvements/Changes*: reduced operations time; redesigned quality flags; more reasonable view sun zenith and view zenith angles
  - 4/08/2022: STAR delivered J2 NVPS final DAP (VI & GVF, data only) to NDE
  - 3/31/2022: STAR delivered J2 MiRS final DAP (v11.8) to NDE (maintenance delivery for NPP and N20)
    *Changes*: machine learning based snowfall detection algorithms; machine learning ice water path initialization; machine learning SFR bias correction; integration of an additional option for the radiometric bias correction: dynamic bias correction (uses a machine learning approach). Default: static bias correction (using the static tuning files)
  - 4/14/2022: STAR delivered updated test cases for the JPSS MiRS DAP (with valid SFR output) to NDE

# Accomplishments – JPSS Cal Val Supports

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

| | | |
|---|---|---|
| S-NPP | Weekly OMPS TC/NP Dark Table Updates | 03/01/22, 03/08/22, 03/15/22, 03/22/22, 03/29/22, 04/06/22, 04/12/22, 04/19/22 |
| NOAA-20 | Weekly OMPS TC/NP Dark Table Updates | 03/01/22, 03/08/22, 03/15/22, 03/22/22, 03/29/22, 04/06/22, 04/12/22, 04/19/22 |
| S-NPP | Bi-Weekly OMPS NP Wavelength & Solar Flux Update | 03/01/22, 03/15/22, 03/29/22, 04/12/22 |
| NOAA-20 | Bi-Weekly OMPS NP Wavelength & Solar Flux Update | 03/08/22, 03/22/22, 04/06/22, 04/19/22 |
| S-NPP | Monthly VIIRS LUT Update of DNB Offsets and Gains | 03/08/22, 04/06/22 |
| NOAA-20 | Monthly VIIRS LUT Update of DNB Offsets and Gains | 03/08/22, 04/06/22 |

- Transition of the reprocessed SDRs to CLASS/NCEI:
  - The transition of the reprocessed SNPP OMPS (V1 and V2) data to CLASS/NCEI completed on March 9, 2022

- IDPS Builds Checkouts / JPSS-2 Pre-Launch Testing events:
  - Feb/Mar-2022: STAR SDR/Imagery/ICVS/EDR (NUCAPS & MiRS) teams checked one-orbit J2 Proxy test data set
  - 3/01/2022: OMPS SDR team checked J2 OMPS RDRs from JCT3-Ambient IDPS data flow
  - Block 2.3 Mx6 I&T STAR review/checkout: JSTAR submitted summary report to DPMS/RTN/OSPO on 3/22/2022
    - 3/10/2022: VIIRS SDR team submitted review/checkout report (no issue)
    - 3/11/2022: ATMS SDR team submitted review/checkout report (no issue)
    - 3/17/2022: CrIS SDR team submitted review/checkout report (no issue)
    - 3/18/2022: VIIRS Imagery team submitted review/checkout report (no issue)
    - 3/21/2022: OMPS SDR team submitted review/checkout report (no issue)

# Upcoming Milestones/Deliveries

- JSTAR Code/LUT/Product Deliveries:

  DAP to DPMS:
  - Jun-22: Final launch-ready JPSS-2 PCT/MM-coef DAP (ATMS & CrIS)
  - Jun-22: Final launch-ready JPSS-2 LUTs/MM-coef DAP (VIIRS & OMPS)
  - Sep-22: NOAA-20 NCC LUT update (VIIRS Imagery)

  NOAA-20/JPSS-2 Algorithm DAP to NDE/CoastWatch:
  - Apr-22: Final J2 OMPS Ozone V8Pro DAP
  - Apr-22: Final J2 Global Gridded LST/LSA DAP (**Prelim J2 DAP delivered to NDE on 12/30/2021**)
  - May-22: Final J2 Super DAP (Clouds, Aerosol, Volcanic Ash, Cryosphere, VPW, LST, LSA)
  - Jun-22: J2-ready OMPS LP DAP
  - Jun-22: J2-ready Ocean Color DAP to Cloud (ASSISTT □ NCCF)

# FY22 STAR JPSS Milestones

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| **Algorithm Updates DAPs** | | | | |
| Final launch-ready JPSS-2 ATMS PCT/MM-coef DAP | Jun-22 | Jun-22 | **Pre-dynamic MM: 03/08/22** | **02/25/22 to ASSISTT** |
| Final launch-ready JPSS-2 CrIS PCT/MM-coef DAP | Jun-22 | Jun-22 | **Pre-dynamic MM: 03/11/22** | **03/07/22 to ASSISTT** |
| Final launch-ready JPSS-2 VIIRS LUTs/MM-coef DAP | Jun-22 | Jun-22 | **Pre-dynamic MM: 02/24/22** | **02/18/22 to ASSISTT** |
| Final launch-ready JPSS-2 OMPS LUTs/MM-coef DAP | Jun-22 | Jun-22 | **Pre-dynamic MM: 03/08/22** | **03/02/22 to ASSISTT** |
| Final J2 ready Super DAP (include NPP/N20 updates), Clouds/Aerosol/VolcanicAsh/Cryosphere/LST/LSA/VPW | Mar-22 | May-22 | **12/06/21 v3.1 patch**<br>**02/24/22 XML cnf file to NDE** | |
| Final J2 ready Active Fires DAP (include NPP/N20 updates, I-Band) | Mar-22 | Mar-22 | 03/17/22 | |
| Surface Reflectance: Final J2 ready DAP | Oct-21 | Oct-21 | 10/07/21<br>02/02/22 (patch DAP) | |
| NVPS (VI & GVF): Final J2 ready DAP | Mar-22 | Mar-22 | 03/29/22 (code & docs)<br>04/08/22 data only | |
| Vegetation Health: Initial/Final (combined) J2 ready DAP | Dec-21 | Dec-21 | 12/20/21 | |
| SST: Final J2 ready DAP (ACSPO 2.80) | Dec-21 | Dec-21 | Initial/Final DAP: 09/16/21<br>EUM & SMM doc: 12/15/21 | No final DAP delivery needed |
| NUCAPS: Final J2 ready DAP | Mar-22 | Mar-22 | 04/08/22 | |
| MiRS & SFR: Final J2 ready DAP | Mar-22 | Mar-22 | 03/31/22 | 12/30/21 v11.6 patch |
| OMPS Ozone V8Pro: Final J2 ready DAP | Mar-22 | Apr-22 | | **02/17/22 to ASSISTT** |
| OMPS Ozone V8TOz: Final J2 ready DAP | Jan-22 | Jan-22 | 02/03/22<br>V8TOZ: v4r2; V8TOS: v5r0 | 11/26/21 to ASSISTT |
| L3 Global Gridded LST/LSA (J2 DAP) | Mar-22 | Apr-22 | **12/30/21 Prelim J2 DAP** | |
| Reformatting Toolkit | Mar-22 | Apr-22 | | |
| AMSR-3 ready DAP (include AMSR-2 updates) | Sep-22 | Sep-22 | | |

# FY22 STAR JPSS Milestones

| Milestones | Original Date | Forecast Date | Actual Date | Variance Explanation |
|---|---|---|---|---|
| **Algorithm Cal/Val/LTM** | | | | |
| FY21 End of Year Science Team Presentations (all teams) | Oct-21 | Oct-21 | Oct/Nov-2021 | |
| FY23 Program Management Review (all teams) | Jun-22 | Jun-22 | | |
| Enterprise Cal/Val plan for J2 OMPS LP SDR & EDR | Dec-21 | Dec-21 | 12/09/21 | |
| GCOM: AMSR-3/Enterprise Cal/Val Plan - draft delivery | Jan-22 | Jan-22 | Jan-22 | |
| GCOM: AMSR-3/Enterprise Cal/Val Plan - final delivery | Jun-22 | Jun-22 | | |
| AST-2021 (VIIRS Annual Surface Type) | Sep-22 | Sep-22 | | |
| Support Alaska Demo (JPSS Aviation Initiative) | Sep-22 | Sep-22 | | |
| JPSS-3 pre-launch test data review/analyze (SDR teams) | Sep-22 | Sep-22 | | |
| Update J2-ICVS prototype to support J2 ICVS readiness (for JCT-3 test) | Sep-22 | Sep-22 | Oct-21: JCT2a-DSE<br>Feb-22: one-orbit J2 data | |
| Maintain / expand existing EDR LTM web pages and JSTAR Mappers | Sep-22 | Sep-22 | | |
| Images of the Month | Monthly | Monthly | | |

# FY22 STAR JPSS Milestones

| Milestones | Original Date | Forecast Date | Actual Completion Date |
|---|---|---|---|
| **Operational/Program Support** | | | |
| S-NPP: Weekly OMPS TC/NP Dark Table Updates | Weekly | Weekly | 10/05/21, 10/13/21, 10/19/21, 10/26/21, 11/02/21, 11/09/21, 11/16/21, 11/23/21, 11/30/21, 12/07/21, 12/14/21, 12/21/21, 01/04/22, 01/11/22, 01/18/22, 01/25/22, 02/01/22, 02/08/22, 02/15/22, 02/22/22, **03/01/22, 03/08/22, 03/15/22, 03/22/22, 03/29/22, 04/06/22, 04/12/22, 04/19/22** |
| S-NPP: Bi-Weekly OMPS NP Wavelength & Solar Flux | Bi-Weekly | Bi-Weekly | 10/13/21, 10/26/21, 11/09/21, 11/23/21, 12/07/21, 12/21/21, 01/04/22, 01/18/22, 02/01/22, 02/15/22, **03/01/22, 03/15/22, 03/29/22, 04/12/22** |
| S-NPP: Monthly VIIRS LUT update of DNB Offsets and Gains | Monthly | Monthly | 10/12/21, 11/09/21, 12/14/21, 01/11/22, 02/08/22, **03/08/22, 04/06/22** |
| NOAA-20: Weekly OMPS TC/NP Dark Table Updates | Weekly | Weekly | 10/05/21, 10/13/21, 10/19/21, 10/26/21, 11/02/21, 11/09/21, 11/16/21, 11/23/21, 11/30/21, 12/07/21, 12/14/21, 12/21/21, 01/04/22, 01/11/22, 01/18/22, 01/25/22, 02/01/22, 02/08/22, 02/15/22, 02/22/22, **03/01/22, 03/08/22, 03/15/22, 03/22/22, 03/29/22, 04/06/22, 04/12/22, 04/19/22** |
| NOAA-20: Bi-Weekly OMPS NP Wavelength & Solar Flux | Bi-Weekly | Bi-Weekly | 10/05/21, 10/19/21, 11/02/21, 11/16/21, 11/30/21, 12/14/21, 01/04/22, 01/11/22, 01/25/22, 02/08/22, 02/22/22, **03/08/22, 03/22/22, 04/06/22, 04/19/22** |
| NOAA-20: Monthly VIIRS LUT update of DNB Offsets and Gains | Monthly | Monthly | 10/12/21, 11/09/21, 12/14/21, 01/11/22, 02/08/22, **03/08/22, 04/06/22** |
| Block 2.3 Mx builds deploy regression review/checkout (**Jan-22 Mx5**; **Mar-22 Mx6**; Jun-22 Mx7; Sep-22 Mx8. SDRs and VIIRS Imagery teams) | Sep-22 | Sep-22 | **Mx5 SOL: 11/23/21; Mx5 I&T: 01/06/22**<br>**Mx6 I&T: 03/22/22** |
| Participant/support JPSS-2 pre-launch testing events (**Mar-22 JCT3-Ambient;** Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | **03/01/22: JCT3-Ambient (OMPS J2 RDRs)** |

# STAR JPSS Schedule: TTA Milestones

**Color code**:

**Green:** **Completed Milestones**

**Gray:** **Non-FY22 Milestones**

# ATMS SDR

March, 2022

## *Accomplishments / Events:*

- Analyzed the JPSS-2 observatory TVAC cold cycle #1 ATMS performance testing data sets to assess the J2 ATMS channel NEDT and RFI.
- Generated J2 observatory TVAC data figures at different redundancy configurations and compared NEDTs against instrument TVAC CP-Low NEDT. Prepared and presented analysis report to NASA flight team.
- Kept discussing the derivative of ATMS beam alignment error correction coefficients. Started working on the NPP and N20 pre-launch data to derive new set of correction coefficients so as to compare to current operational one.
- Evaluated the bias between uncorrected and corrected beam alignment error coefficients using NOAA-20 operational data.
- Discussed the implementation of ATMS scan level NEDT calculation algorithm in ADL
- Finalized ATMS SDR ATBD update for release

## *Overall Status:*

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

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

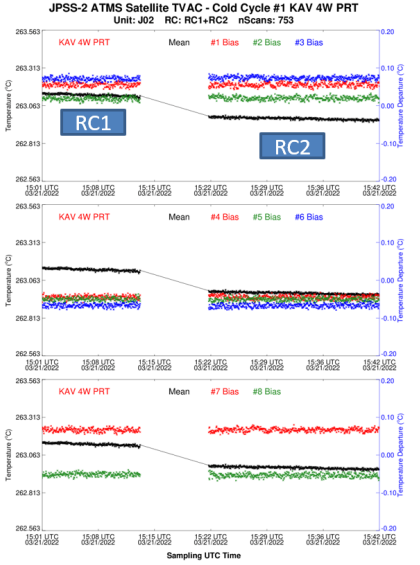
## ***Issues/Risks:***

None

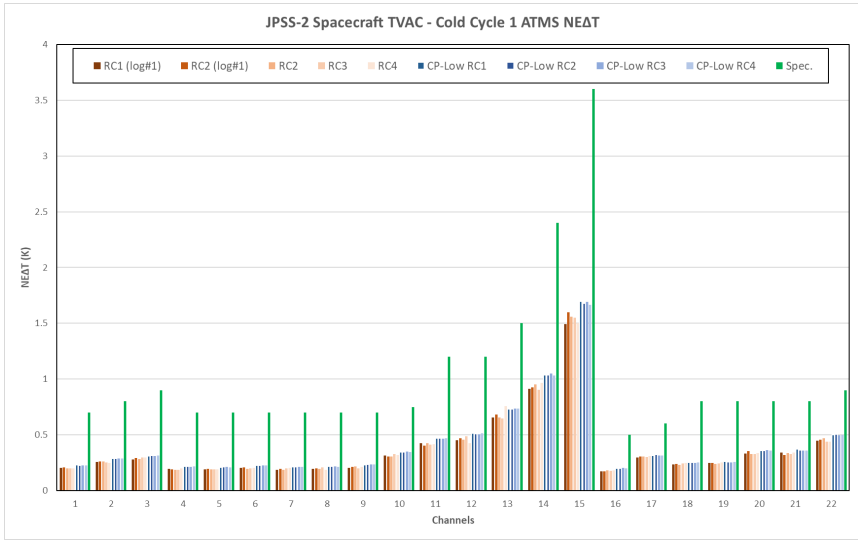
| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| Generate JPSS-2 ATMS mounting matrix coefficients (MM-coef) based on the JPSS-2 pre-launch instrument interface alignment measurements report | Mar-22 | Mar-22 | 02/25/22 | pre-dynamic |
| Update of ATMS non-linearity correction coefficients after applying TVAC target thermal gradient correction | Apr-22 | Apr-22 | | |
| Verify and finalize JPSS-2 ATMS processing coefficients table (PCT) using JPSS-2 pre-launch JCT data (JCT-3 satellite TVAC data) | Apr-22 | Apr-22 | | |
| Deliver final launch-ready JPSS-2 ATMS PCT/MM-coef DAP to ASSISTT | May-22 | May-22 | 02/25/22 | pre-dynamic |
| Deliver final launch-ready JPSS-2 ATMS PCT/MM-coef DAP to DPMS | Jun-22 | Jun-22 | 03/08/22 | pre-dynamic |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Improvement of ATMS lunar calibration algorithm by updating lunar temperature estimation model | Aug-22 | Aug-22 | | |
| Analyze ATMS reprocessing data. Cooperate with EUMETSAT for ATMS reprocessing data application in climate study | Sep-22 | Sep-22 | | |
| JPSS-3 ATMS pre-launch measurement and test data review/analyze | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |
| Block 2.3 Mx builds deploy regression review/checkout (Dec-21 Mx5; Mar-22 Mx6; Jun-22 Mx7; Sep-22 Mx8) | Sep-22 | Sep-22 | 12/17/21 Mx5<br>03/11/22 Mx6 | |

## *Highlights:*

**JPSS-2 Observatory TVAC Cold Cycle #1 RC1+RC2 KAV PRT**




**JPSS-2 ATMS NEDT at different RCs from observatory TVAC and instrument TVAC CP-Low**



# CrIS SDR

*March, 2022*

## *Accomplishments / Events:*

- The CrIS Science Team, in collaboration with NASA flight and L3Harris developed effective solutions for the expeditious mitigation of the NOAA-20 CrIS anomaly, mainly associated with erroneous sensor temperature measurements. Great efforts have been made to collect the feedback from the NWP and EDR products. Results presented in **Fig. 1** demonstrate the effectiveness of the proposed solution by showing that affected observations (green-color regions in left-map) were completely eliminated (right-map). It is expected that the changes will be implemented to MX7.
- There has been continuous monitoring of the NOAA-20 CrIS instrument noise increase events. For the event #18 (Mar. 22), the end of the event shows a sudden drop, different from the other events that had surge at the end. Investigation is in progress.
- Fully verified the J2 mounting matrix reported by NG, and delivered the updated CrIS PCT for ADR 8762/CCR 5910.
- Reviewed the IDPS Block 2.3 Mx6 I&T Deploy Regression Data, and delivered the assessment report on 03/17/2022 (**Fig. 2**).
- Analyzed the one-orbit (earth view) of J2 data w/JCT-2A Spacecraft telemetry. Recommended to use the data for EDR testing.
- Both STAR and UW CrIS teams have analyzed the new JPSS-2 CrIS Side-1 ICT PRT2 calibrations coefficients. Results demonstrated that use of new coefficients improves radiometric consistency between Side-1 and Side-2 and supports in-orbit operations on Side 1 (**Fig. 3**). New Engineering Packet (EP) v207 was delivered to L3Harris on April 1st, 2022.
- Discussed the CrIS quadratic nonlinearity correction formalism (**Fig. 4**), the cause of the SNPP LWIR FOV1 noise anomaly, the J2 Neon mitigation plan, the recommendation of Neon bulb warm up times for various J2, J3 & J4 in operational scenarios, and the interpretation of CrIS J2, J3 & J4 neon bulb life test results in CrIS science team meeting.
- Completed the calculation of the PC score for 12/14/2021 using a hybrid method. This method enabled to remove the higher residuals over the hot scenes. An abstract related to this topic was submitted to the 2022 EUMETSAT conference.
- Provided a presentation entitled “Lake Titicaca as potential validation site” at the GSICS Annual Meeting.

## *Overall Status:*

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

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

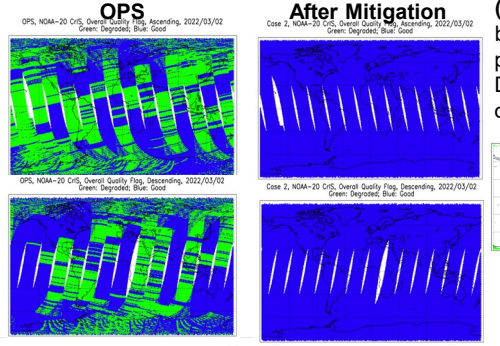
### *Issues/Risks:*

Dr. Lin Lin has joined the CrIS Team to provide support at 0.8 FTE starting on Jan 24, 2022. Dr. Arun Ravindranath has joined the CrIS Team to provide support at 1.0 FTE starting on March 1, 2022. This is helping to mitigate the workforce reduction experience in last months.

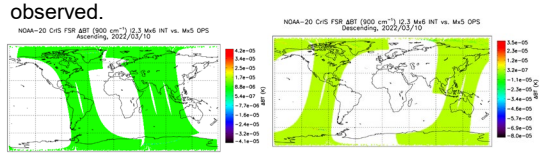
| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 10/29/21 | |
| Deliver the engineering packet v42 with new mapping parameters for SNPP CrIS | Oct-21 | Oct-21 | 10/22/21 | |
| Report the comparison assessment of CrIS radiometric nonlinearity correction formalism | Feb-22 | Mar-22 | 03/16/22 | Anomaly Resolution |
| Support and participate in the J3 CrIS Pre-ship Review | Mar-22 | Apr-22 | | Vendor Rescheduled |
| Generate JPSS-2 CrIS mounting matrix coefficients (MM-coef) based on the JPSS-2 pre-launch instrument interface alignment measurements report | Mar-22 | Mar-22 | 03/07/22 | pre-dynamic |
| Verify and finalize JPSS-2 CrIS processing coefficients table (PCT) using JPSS-2 pre-launch JCT data (JCT-3 satellite TVAC data) | Apr-22 | Apr-22 | | |
| Deliver final launch-ready JPSS-2 CrIS PCT/MM-coef DAP to ASSISTT | May-22 | May-22 | 03/07/22 | pre-dynamic |
| Deliver final launch-ready JPSS-2 CrIS PCT/MM-coef DAP to DPMS | Jun-22 | Jun-22 | 03/11/22 | pre-dynamic |
| JSTAR CrIS Website upgrade | Aug-22 | Aug-22 | | |
| Demonstrate the functionality of the methods planned to be used to mitigate the failure of the J2 CrIS neon calibration system | Sep-22 | Sep-22 | | |
| New developments and studies (working on the CrIS principal components generation, enhance the infrared cloud detection algorithm for radiometric assessment) | Aug-22 | Aug-22 | | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| JPSS-3 CrIS pre-launch measurement and test data review/analyze | Sep-22 | Sep-22 | | |
| JPSS-3 CrIS Pre-launch evaluation tools development | Sep-22 | Sep-22 | | |
| JPSS-3 Flight/Ground support | Sep-22 | Sep-22 | | |
| Radiometric inter-comparison of S-NPP and NOAA-20 CrIS SDR data against other IR observations, including MetOp/IASI, AQUA/AIRS and GOES/ABI | Jun-22 | Jun-22 | | |
| Perform regular RDR and SDR data analysis for instrument and data health | Sep-22 | Sep-22 | | |
| Support investigation and resolution of anomalies from CrIS sensors including potential intensive Cal/Val activities | Sep-22 | Sep-22 | | |
| Participate/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |
| Block 2.3 Mx builds deploy regression review/checkout (Dec-21 Mx5; Mar-22 Mx6; Jun-22 Mx7; Sep-22 Mx8) | Sep-22 | Sep-22 | 12/23/21 Mx5<br>03/17/22 Mx6 | |

## *Highlights:*

**(1)** The Data Quality Flag (DQF) maps of NOAA-20 CrIS SDR data on March 2, 2022. Left-map shows the anomaly impact. Right maps show the effect of the recommended solution.

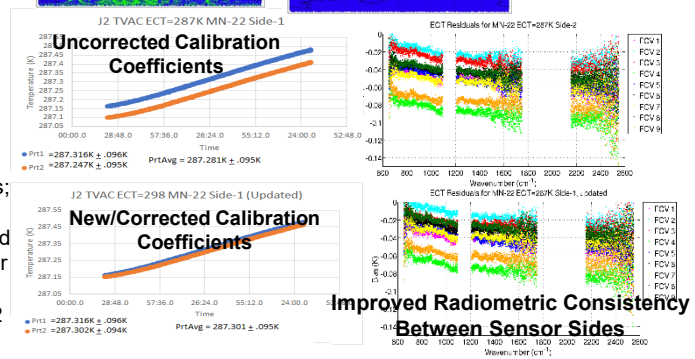



**(2)** NOAA-20 CrIS SDR radiometric bias map between the I&T Mx6 and the operational Mx5 SDR products for March 10, (left) Ascending and (right) Descending orbits. No quality degradation was observed.

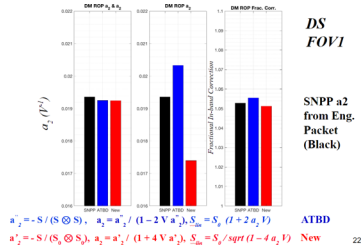


**(3)** Left: ICT PRT temperatures before and after the coefficient update for Side-1 ECT=287K MN-22 J2 TVAC tests;

Right: ECT Side-1 and Side-2 Residuals after the coefficient update for ECT=287K MN-22 J2 TVAC tests




**(4)** Nonlinearity Formalism comparison using the nonlinear coefficient values in the EP using the Stepped temperature method (Black), the operational formalism (blue) and the new formalism (red).



# VIIRS SDR

*March, 2022*

## *Accomplishments / Events:*

- To reduce seasonal variability of NOAA-20 VIIRS geolocation errors, created and validated a prototype ADL code change for applying the geolocation thermal correction that is based on the day-of-year: IDPS implementation deferred until after JPSS-2 launch
- Participated in the GSICS annual meeting on March 14-18, 2022, and presented “Suomi NPP VIIRS Calibration Comparison between NOAA and NASA Versions and Impacts on L1b Products”
- Created and delivered for deployment in the IDPS operations updated NOAA-20 and Suomi NPP DNB offset and gain ratios LUTs generated using the new moon calibration data from Mar. 2, 2022
- Assisted in scheduling NOAA-20 and Suomi NPP VIIRS lunar calibration on Mar. 13, 2022, (without roll maneuvers) and analyzed the collected data to monitor radiometric response of the reflective solar bands

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 11/05/21 | |
| DAP delivery (ADR9760/CCR5724, N20 VIIRS-SDR-F-PREDICTED-LUT Update #7) | | | 10/27/21 | |
| DAP delivery (ADR9903/CCR5939 VIIRS SDR Not Produced as Expected for Defective Data Packets) | | | 04/04/22 | |
| Generate JPSS-2 VIIRS mounting matrix coefficients (MM-coef) based on the JPSS-2 pre-launch instrument interface alignment measurements report | Mar-22 | Mar-22 | 02/18/22 | pre-dynamic |
| Verify and finalize JPSS-2 VIIRS lookup tables (LUTs) using JPSS-2 pre-launch JCT data (JCT-3 satellite TVAC data) | Apr-22 | Apr-22 | | |
| Deliver final launch-ready JPSS-2 VIIRS LUTs/MM-coef DAP to ASSISTT | May-22 | May-22 | 02/18/22 | pre-dynamic |
| *Deliver final launch-ready JPSS-2 VIIRS LUTs/MM-coef DAP to DPMS* | *Jun-22* | *Jun-22* | 02/24/22 | pre-dynamic |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| NOAA-20 VIIRS TEB RVS and Offset change testing and validation | Dec-21 | Dec-21 | Nov-21 | |
| RDR code change to handle anomalous packets(similar to DB anomaly over Mexico) | Mar-22 | Mar-22 | Mar-22 | |
| Develop VIIRS Global Area Coverage (VGAC) production capabilities in collaboration with NCEI to meet user needs (ISSCP, EUMETSAT, and others) | Sep-22 | Sep-22 | | |
| OnDemand reprocessing delivery to CLASS (SNPP recalibrated & reprocessed VIIRS SDR) | Sep-22 | Sep-22 | | |
| NOAA-20 VIIRS recalibration & reprocessing (on CLOUD) | Sep-22 | Sep-22 | | |
| Delivery of VIIRS RSB calibration LUTs to mitigate degradation, as needed | Sep-22 | Sep-22 | | |
| Delivery of VIIRS DNB straylight LUTs, as needed | Sep-22 | Sep-22 | | |
| NOAA-20 VIIRS as GSICS reference | Mar-22 | Mar-22 | | Report 1 |
| Absolute calibration using CEOS RadCalNet Sites | Jun-22 | Jun-22 | | Report 2 |
| Offline RSB/DNB/TEB Cal/Val analyses | Jun-22 | Jun-22 | | Report 3 |
| Continue cross-calibration and monitoring between NOAA-20 and SNPP VIIRS | Sep-22 | Sep-22 | | Report 4 |
| JPSS-3 VIIRS pre-launch measurement and test data review/analyze | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |
| Block 2.3 Mx builds deploy regression review/checkout (Dec-21 Mx5; Mar-22 Mx6; Jun-22 Mx7; Sep-22 Mx8) | Sep-22 | Sep-22 | 12/16/21 Mx5<br>03/10/22 Mx6 | |
| Operational Support: VIIRS LUT update of DNB Offsets and Gains (S-NPP & NOAA-20) | Monthly | Monthly | | |

## *Overall Status:*

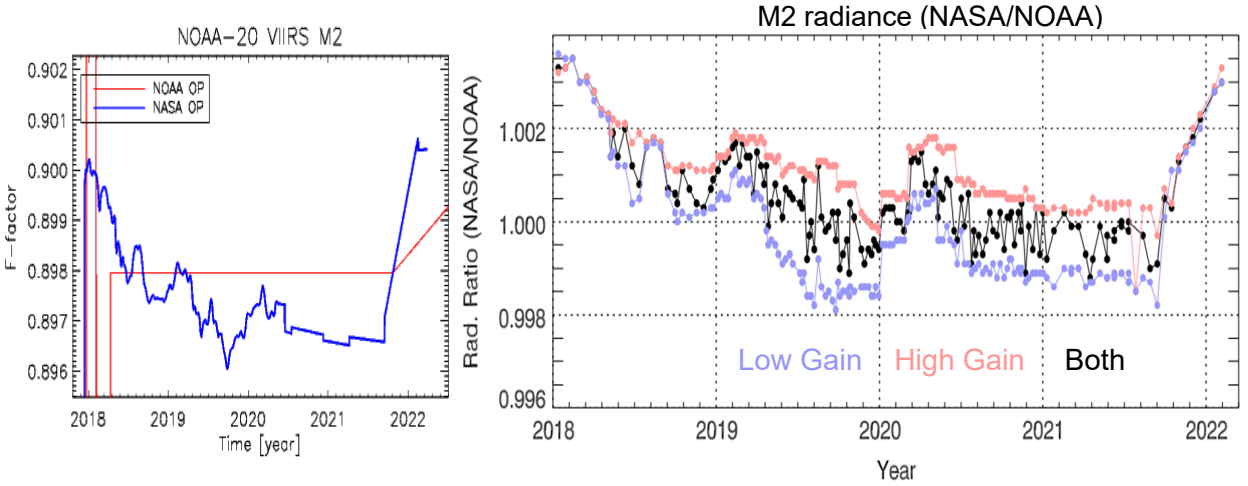
| | Green[1] (Completed) | Blue[2] (On-Schedule) | Yellow[3] (Caution) | Red[4] (Critical) | Reason for Deviation |
|---|---|---|---|---|---|
| **Cost / Budget** | | x | | | |
| **Technical / Programmatic** | | x | | | |
| **Schedule** | | x | | | |

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

### ***Issues/Risks:***

None

## *Highlights:*




Comparison of the NOAA-20 VIIRS reflective solar band radiometric calibration scaling coefficient (F factor) and radiance product time series from NOAA and NASA (Collection 2) processing: although majority of bands agree within 0.2%, differences up to 0.4% can be observed

# OMPS SDR

*March, 2022*

## *Accomplishments / Events:*

- Delivered OMPS biweekly NP solar irradiance bi-weekly LUTs.
- Analyzed the JCT3A OMPS RDR data: Captured a problem with the JCT3 OMPS Nadir Version Table (NVT);Captured a time-offset issue in the JCT3A spacecraft diary RDR data; Delivered the updated NVT table to ensure the success of JCT3 TVAC IDPS testing.
- Presented an oral talk about 10-year stability performance of SNPP OMPS Nadir sensors at the GSICS 2022 virtual conference (see Fig. for the gain and nonlinearity stability over 10 years).
- Computed and tested the initial version of mounting matrix deliveries for JPSS-02 OMPS Nadir for both NM and NP
- Continued to make updates and improvements to the OMPS VCRTM interface package.
- Developed an initial version of NOAA-20 OMPS NM (mid. resol.) and NP inter-sensor comparison.
- Continued efforts to develop the raw solar flux and dark calibration processing code.
- Completed a manuscript about the SNPP OMPS SDR reprocessing (in STAR FRC review now).
- Completed a manuscript about 10-year stability performance of SNPP OMPS Nadir sensors (internal review within all co-authors).

## *Overall Status:*

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

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

## ***Issues/Risks:***

None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 11/05/21 | |
| DAP (ADR9633/CCR5577 OMPS TC geolocation code change for off-nadir geolocation error correction) | | | 12/03/21 | |
| DAP (ADR9908/CCR5926 OMPS J02 Nadir Version LUT Update N_TIM_PAT_VER Value) | | | 03/22/22 | |
| Generate JPSS-2 OMPS mounting matrix coefficients (MM-coef) based on the JPSS-2 pre-launch instrument interface alignment measurements report | Mar-22 | Mar-22 | 03/02/22 | pre-dynamic |
| Verify and finalize JPSS-2 OMPS lookup tables (LUTs) using JPSS-2 pre-launch JCT data (JCT-3 satellite TVAC data) | Apr-22 | Apr-22 | | |
| Deliver final launch-ready JPSS-2 OMPS LUTs/MM-coef DAP to ASSISTT | May-22 | May-22 | 03/02/22 | pre-dynamic |
| Deliver final launch-ready JPSS-2 OMPS LUTs/MM-coef DAP to DPMS | Jun-22 | Jun-22 | 03/08/22 | pre-dynamic |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| OMPS SDR Calibration ATBD (update) | Jun-22 | Jun-22 | | |
| **Development/Update (Internal delivery):** | | | | |
| ADL-OMPS offline processing code update (with flexible NM resolutions) | Jul-22 | Jul-22 | | |
| ADL-OMPS diagnostic (>380 nm) offline code development for geolocation | Aug-22 | Aug-22 | | |
| OMPS polarization impact and mitigation algorithm development | Aug-22 | Aug-22 | | |
| 1) J2 OMPS SNR calculation algorithm code update<br>2) J2 OMPS SDR solar intrusion detection code prototype | Jan-22 | Jan-22 | Jan-22 | |
| 1) J2 OMPS NM/NP Day-1 solar analysis code prototype using NOAA-20 as proxy<br>2) OMPS NM/NP x-sensor comparison code development (e.g., RTM/DCC methods) | Feb-22 | Feb-22 | Feb-22 | |
| 1) J2 OMPS geolocation error assessment code update using JCT3 OMPS SDR data and J2 mounting matric coef.<br>2) OMPS dark and solar raw flux processing code update<br>3) Inter-sensor code prototype development (e.g., SNPP/NOAA-20/J2 OMPS, OMPS-GOME-2) | Apr-22 | Apr-22 | | |
| 1) OMPS Wavelength registration change investigation from ground to flight<br>2) J2 High resolution risk mitigation algorithm development update in support to J2<br>3) J2 OMPS pre-launch straylight correction analysis<br>4) OMPS SDR quality validation baseline tool prototype developments (e.g., RTM-DD, SNO-DD, NM (VIIRS)-DD, 32D-AD)<br>5) NM/NP SDR re-processing and data stability analysis update<br>6) Assess impact of a new solar reference data on OMPS NM/NP SDR data quality | Sep-22 | Sep-22 | | |
| Sustainment, monitoring, maintenance S-NPP & NOAA-20 in flight performance | Sep-22 | Sep-22 | | |
| JPSS-3 OMPS pre-launch measurement and test data review/analyze | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Mar-22 JCT3-Ambient; Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | 03/01/22 | JCT3-Ambient |
| Block 2.3 Mx builds deploy regression review/checkout (Dec-21 Mx5; Mar-22 Mx6; Jun-22 Mx7; Sep-22 Mx8) | Sep-22 | Sep-22 | 01/04/22 Mx5<br>03/21/22 Mx6 | |
| Operational Support: Weekly updates darks for NM and NP (S-NPP & NOAA-20) | Weekly | Weekly | | |
| Operational Support: Bi-weekly update NP Wavelength and solar flux (S-NPP & NOAA-20) | Bi-Weekly | Bi-Weekly | | |

**1O-Year Stability Performance of SNPP OMPS Nadir Sensors: CCD Gain and Sensor Nonlinearity**

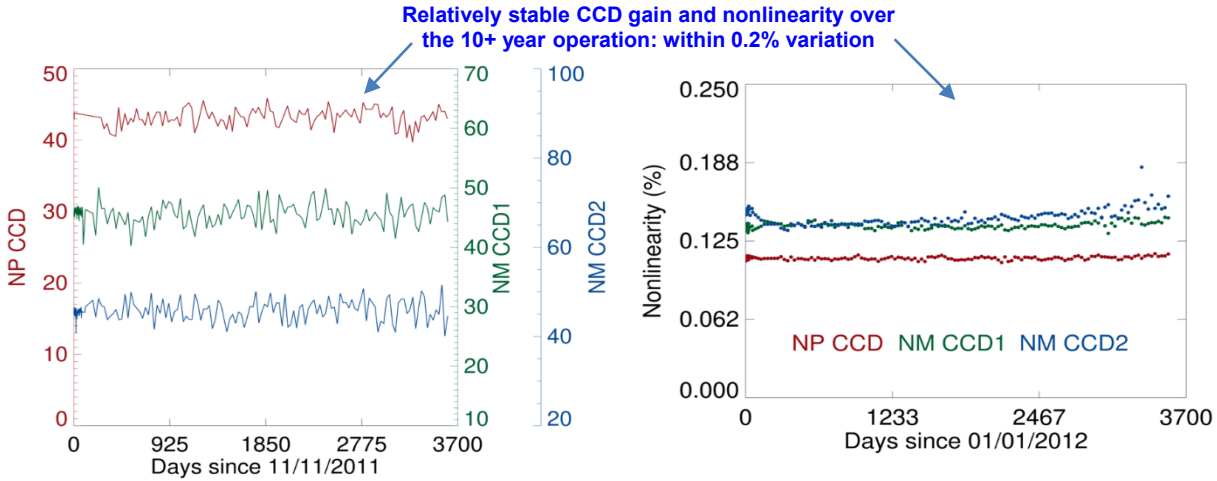



Fig. The image on the right shows the trend of gain values (electron# per count) for each half focal plane over the 10-year operation for OMPS-NP (red), OMPS-NM CCD1 (green) and OMPS-NM CCD2 (blue). The image on the left shows the trends of system nonlinearity at 15000 count level for each focal plane half over the 10+ year operation for OMPS-NP CCD (red), OMPS-NM CCD1 (green) and OMPS-NM CCD2 (blue).

# SDR Reprocessing

*March, 2022*

## *Accomplishments / Events:*

- The official transition of the reprocessed SNPP SDRs to CLASS/NCEI started on December 1, 2021.
- The transition of the reprocessed SNPP ATMS (V1 and V2), CrIS, and OMPS (V1 and V2) data was completed in December 2021, February 2022 and March 9, 2022, respectively. These data are available at CLASS website now.
- The transition of the reprocessed SNPP VIIRS started on March 15, 2022.
- The VIIRS data transition is ongoing with 6 parallel jobs with data volume control of a stable daily data transition speed of ~2.95T/day
- The reprocessed SNPP VIIRS SDR data from 1/2/2012 to 4/5/2012 (47.84T, 2.96% of total) has been completed as of March 31, 2022.
- It's expected that the VIIRS data transition will complete in September, 2023.

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Complete planning and testing on transition of S-NPP reprocessed SDR data to CLASS | Oct-21 | Oct-21 | Oct-21 | |
| Complete transition of 1000 Tb of reprocessed S-NPP SDR data to CLASS | Sep-22 | Sep-22 | | |

## *Overall Status:*

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

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

### *Issues/Risks:*

None

## *Highlights:* Status of the Reprocessed SNPP Data Transition

| Sensor | Data Type (name) | Period | Notes | Volume (Tb) | Status |
|---|---|---|---|---|---|
| ATMS | TDR (TATMS) | 2011-11-08 to 2019-10-15 | V2 | 0.406 | Completed on Dec. 20, 2021 |
| | SDR (SATMS) | 2011-11-08 to 2019-10-15 | V2 | 0.431 | |
| | GEO (GATMO) | 2011-11-08 to 2019-10-15 | V2 | 0.420 | |
| ATMS | TDR (TATMS) | 2011-11-08 to 2017-03-08 | V1 | 0.273 | Completed on Dec. 30, 2021 |
| | SDR (SATMS) | 2011-11-08 to 2017-03-08 | V1 | 0.289 | |
| | GEO (GATMO) | 2011-11-08 to 2017-03-08 | V1 | 0.283 | |
| CrIS | GCRSO | 2012-02-20 to 2020-01-29 | V2 | 0.369 | Completed on Feb. 25, 2022 |
| | SCRIS | 2012-02-20 to 2020-01-29 | V2 | 67.994 | |
| | SCRIF | 2014-12-04 to 2020-01-29 | V2 | 74.455 | |
| OMPS | TC (SOMTC, GOTCO) | 2012-01-30 to 2018-09-30 | V1 | 1.2 | Completed on Mar. 4, 2022 |
| | NP (SOMPS, GONPO) | 2012-01-25 to 2017-03-08 | V1 | 0.134 | |
| OMPS | NP (SOMPS, GONPO) | 2012-01-25 to 2021-06-30 | V2 | 0.246 | Completed on Mar. 9, 2022 |
| | TC (SOMTC, GOTCO) | 2012-01-30 to 2021-06-30 | V2 | 1.695 | |
| VIIRS | VIIRS ALL SDR | 2012-01-02 to 2020-04-30 | V2 | 1615 | Completed 2.96% |
| Total | | | | 1764.65 | |

# ICVS

March, 2022

## *Accomplishments / Events:*

- Provided near real time S-NPP and NOAA-20 spacecraft and instrument status and data quality monitoring report to support SDR team activities.
- Successfully verified ICVS-LTM support to JPSS-2 using simulated JPSS-2 RDR, SDR, and GEO data.
- Evaluated JPSS-2 spacecraft telemetry and diary RDR data using the latest ICVS-LTM spacecraft data processing package and discussed the data format changes with STAR JPSS program POC.
- Updated the ICVS-Anomaly Impact Watch Portal (AWP) by adding recent major anomaly events.
- Updated the SNPP/NOAA-20 inter-sensor bias monitoring tool by adding the 32D-AD method.
- Provided VIIRS daily radiance maximum/minimum dynamic trending products in ICVS-beta website.
- Created N20 and NPP reprocessing SDR data quality demonstration web pages in ICVS-beta website.
- Initialed the function of OMPS NM 380 nm and VIIRS M1 band inter-sensor comparison to the ICVS.
- Started developing regional validation site product demonstration webpage to support JPSS SDR team Cal/Val activities.

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| Update ICVS JPSS-2 modules to support J2 pre-launch JCT verification (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) and on-orbit NRT monitoring | Sep-22 | Sep-22 | | |
| Maintain the ICVS for SNPP and NOAA-20 including ICVS-GSICS Portal and provide anomaly reports | Sep-22 | Sep-22 | | |
| Work closely with JPSS cal/val teams to facilitate the evaluations of SDR anomaly events | Sep-22 | Sep-22 | | |
| Initialize a NRT geolocation accuracy monitoring module for SNPP/NOAA-20 OMPS NM in coordination with OMPS SDR team together | Nov-21 | Nov-21 | Nov-21 | |
| Improve the ICVS SDR data quality evaluation testbed with more sensors | Dec-21 | Dec-21 | Dec-21 | |
| Update the following sub-systems within the ICVS towards operations<br>a) SNPP and NOAA-20 ICVS-Vector (dynamic visualization information)<br>b) Git repository for ICVS software package version control | Feb-22 | Feb-22 | Feb-22 | |
| Update the following sub-systems within the ICVS towards operation<br>a) ICVS-Anomaly Impact Watch Portal (AWP)<br>b) SNPP/NOAA-20 inter-sensor bias monitoring tool via the 32D-AD method | Mar-22 | Mar-22 | | |
| Upgrade the ICVS-Vector (dynamic visualization information) for J2 using JCT as proxy data | May-22 | May-22 | | |
| Initialize the instrument and data anomaly detection development using AI methods | Jun-22 | Jun-22 | | |
| Initialize the S-NPP vs NOAA-20 ATMS inter-sensor bias trending product using double difference through RO profiles | Jul-22 | Jul-22 | | |
| Initialize the cloud mask module for ICVS-OMPS (beta version) | Aug-22 | Aug-22 | | |
| FY22 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 11/01/21 | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |

## *Overall Status:*

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

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

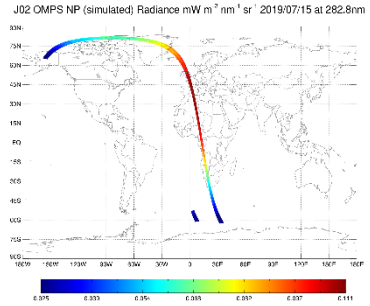
## ***Issues/Risks:***

None

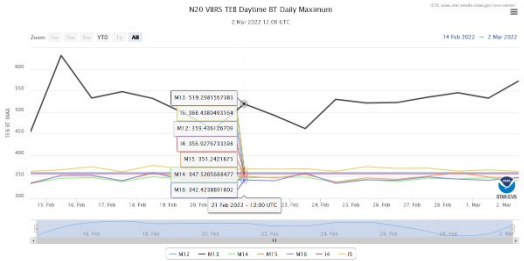
## *Highlights:*

***Significantly contribute to STAR SDR Teams***

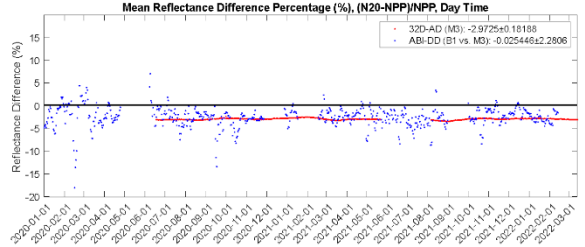
JPSS-2 (Simulated) OMPS NP Radiance at 282.8nm



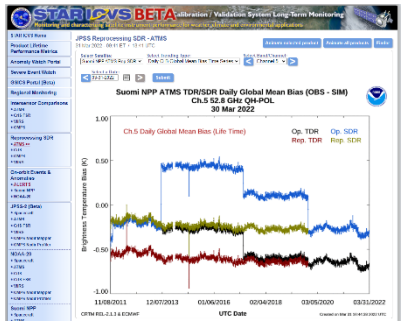

N20 VIIRS TEB Daytime Tb Daily Maximum Trending



N20 vs. NPP VIIRS 32-Day Mean Inter-sensor Bias Time Series




N20 ATMS Reprocessing TDR/SDR Data Quality Trending



# VIIRS Imagery

March, 2022

## *Accomplishments / Events:*

- JPSS-2 VIIRS Proxy EDR Imagery checkout
  - Mostly good, only minor artifact noted
- Mx6 Imagery checkout
  - No issues aside from previously identified M-6 “speckles” (now DR9904)
- Recent VIIRS Imagery presentations involving members of the team
  - Steve Miller presented at the JPSS Science Seminar on 3/21: “In search of bioluminescent milky seas with the VIIRS Day/Night Band”
- Recent VIIRS Imagery publications involving members of the team
  - Line, W. E., L. Grasso, D. Hillger, C. Dierking, A. Jacobs, and S. Shea, 2022: Using NOAA Satellite Imagery to Detect and Track Hazardous Sea Spray in the High Latitudes. Wea. Forecasting, 37, 351-369, https://doi.org/10.1175/WAF-D-21-0137.1. See figure
  - Elvidge, Christopher D., Mikhail Zhizhin, David Keith, Steven D. Miller... 2022: The VIIRS Day/Night Band: A Flicker Meter in Space? Remote Sensing, 14(6) 1316. https://doi.org/10.3390/rs14061316.

## *Overall Status:*

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

N20 NCC LUT update

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| N20 NCC LUT update DAP (to ASSISTT) | Aug-22 | Aug-22 | | |
| N20 NCC LUT update DAP (to DPMS) | Sep-22 | Sep-22 | | |
| New Imagery products or product enhancements (display on SLIDER) | Sep-22 | Sep-22 | continuing | |
| Realtime Imagery monitoring and display systems (SLIDER, etc.) | Sep-22 | Sep-22 | continuing | |
| Images of the Month to STAR JPSS Program/website and interesting Imagery to Social Media outlets | Monthly | Monthly | continuing | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |
| Block 2.3 Mx builds deploy regression review/checkout (**Dec-21 Mx5**; **Mar-22 Mx6**; Jun-22 Mx7; Sep-22 Mx8) | Sep-22 | Sep-22 | 11/23/21 Mx5 SOL<br>12/29/21 Mx5 I&T<br>03/18/22 Mx6 I&T | |

## *Highlights: Image of the Month*

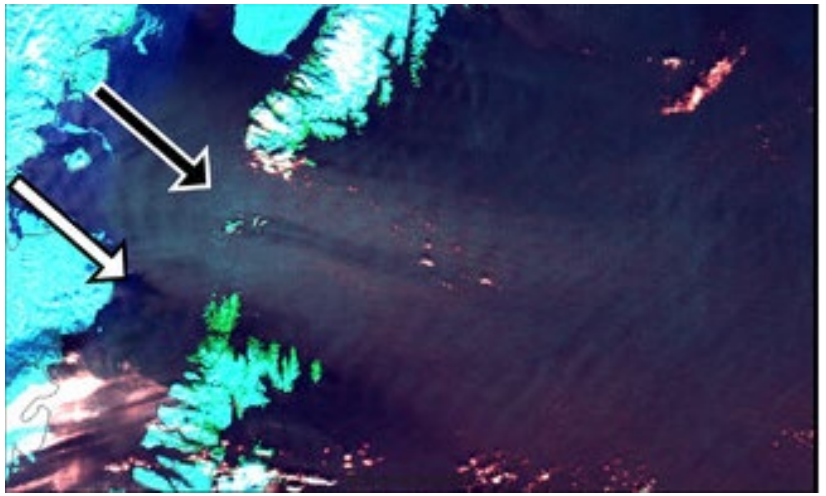


Figure: 2214 UTC 10 Feb 2020 VIIRS sea spray RGB. Arrows point to areas of sea spray (black with white outline) and non–sea spray (white with black outline).

# Clouds

March, 2022

## Accomplishments / Events:

- The CIRA team continued to evaluate CBHs using ground-based measurements. Comparisons with ARM data for 2019-2021 for AK and OK sites were completed, shown in the highlighted slides, and the effort is ongoing for multiple-year METAR data, including selected case studies for multilayer cloud scenes. In support of the Aviation Initiative, we continue to add new features to CIRA's aviation website to accommodate direct user feedback and report input as requested by users.
- The CIMSS Cloud group was contacted by users in Alaska and CSU, who noted performance issues over nighttime cold clear surfaces in the ECM1 (operations). This was traced to the surface temperature threshold for several classifiers. The Cloud team is now optimizing surface temperature thresholds on several classifiers for ECM2, which results in improved performance in these challenging conditions.

## Overall Status:

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

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

## Issues/Risks:

None

## Milestones:

- ***See next slides***

## Highlights:

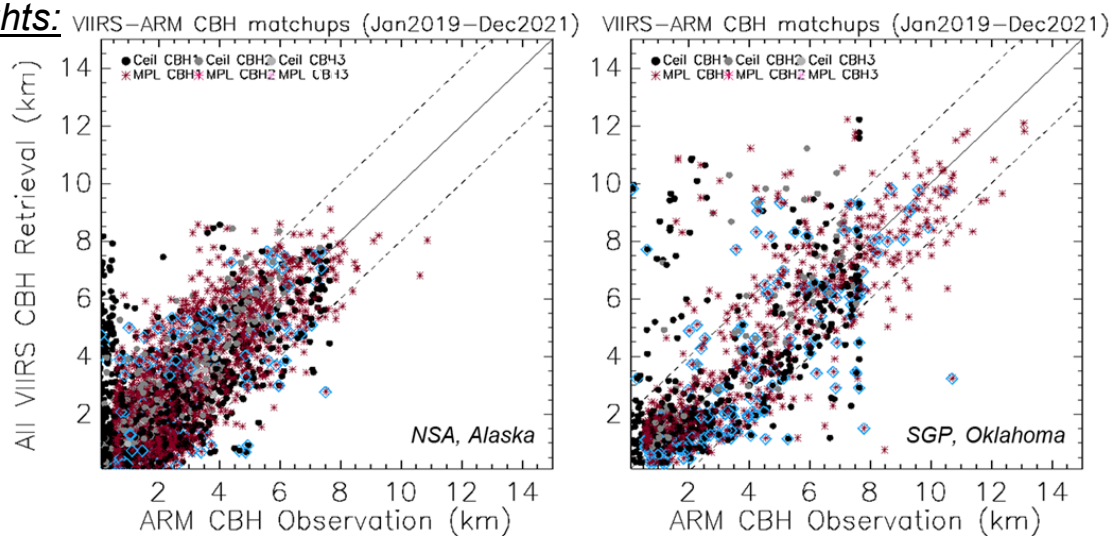



Figure 1. CBH comparisons of VIIRS and ARM (Ceilometer and Micro-Pulse Lidar) for two years (2019-2021). For AK NSA site (2285 matchups),89.2% against ceilometer data and 82.1% against MPL measurements are within 2 km error ranges, and 84.0% and 67.5% for OK SGP (770 matchups) respectively. Note that matchups are valid when CTH from lidar is within 2-km accuracy range compared with VIIRS CTH ("within-spec"), and nighttime CBHs from DNB (NLCOMP) are colored in blue.

# Clouds (Cloud Mask)

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | ASSIST provided data for analysis last week of March. Will be analyzed by team by end of April |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Verify DNB and new ECM implementation within STAR Algorithm Processing Framework (SAPF) and adjust LUT based on feedback from teams | Jan-22 | Apr-22 | | SAPF run delayed |
| Verify ECM LUT against J2 simulated data prior to J2 launch | Aug-22 | Aug-22 | | |
| Support Alaska Demo and ESRL usage and reviews | Aug-22 | Aug-22 | | |
| Work with NCEP on All Sky Radiance (ASR) assimilation. Adjust mask as necessary | Sep-22 | Sep-22 | | |
| Apply CALIPSO tools to NDE Mask with Lunar Ref | Sep-22 | Sep-22 | | |
| Continue collaboration wtith OAR/ESRL/GML on use of RadFlux Cloud Fraction for Verification including high-latitude sites | Sep-22 | Sep-22 | | |
| Support ASSISTT update to NESDIS Data Exploitation (NDE) at appropriate time(s) | Sep-22 | Sep-22 | | |
| Support consistency validation of products from CSPP | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

# Clouds (Cloud Phase/Type)

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | ASSIST provided data for analysis last week of March. Will be analyzed by team by end of April |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Optimize cloud phase thresholds for NOAA-21 and maintain code consistency with GOES-R deliveries | Aug-22 | Aug-22 | | |
| Modify phase as needed based on height/winds interaction and development from GOES-R | Aug-22 | Aug-22 | | |
| Support S-NPP and NOAA-20 EDR monitoring | Sep-22 | Sep-22 | | |
| Support ASSISTT update to NESDIS Data Exploitation (NDE) at appropriate time(s) | Sep-22 | Sep-22 | | |
| Support consistency validation of products from CSPP | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

# Clouds (ACHA)

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | ASSIST provided data for analysis last week of March. Will be analyzed by team by end of April |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Support NCEPs use for ASR assimilation | Jan-22 | Sep-22 | | Making consistent with ECM date |
| Continue improving multilayer ACHA by analysis of CALIPSO and AEOLUS lidars and extend to level of best fit of Polar Winds | Jan-22 | Sep-22 | | This is ongoing work |
| Verify extending the treatment of scattering to support 3.75 micron. Needed for NCOMP replacement | Aug-22 | Aug-22 | | |
| Continue work on ACHA COMP and begin JPSS-2 ACHA COMP validation plan | Aug-22 | Aug-22 | | |
| Continue working with FAA to adopt ACHA products instead of simplistic NCAR cloud heights. Continue support of Alaska Demo CTH requests | Aug-22 | Aug-22 | | |
| Support Polar AMVs as needed including use of CrIS | Aug-22 | Aug-22 | | |
| Continue to display ACHA products in CIMSS and STAR LTM site | Sep-22 | Sep-22 | | |
| Support ASSISTT update to NESDIS Data Exploitation (NDE) at appropriate time(s) | Sep-22 | Sep-22 | | |
| Support consistency validation of products from CSPP | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

# Clouds (DCOMP)

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | ASSIST provided data for analysis last week of March. Will be analyzed by team by end of April |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Improve the performance of thin ice clouds by using ACHA COD and will work with the ACHA team on development and validation | Aug-22 | Aug-22 | | |
| Validate DCOMP at night using DNB | Aug-22 | Aug-22 | | |
| Incorporate method to identify pixels with potentially incorrect phase within DCOMP DQFs | Sep-22 | Sep-22 | | |
| Inter-sensor calibration studies by using visible reflectance and cloud optical thickness from GOES, JPSS and MODIS. Use this to adjust VIIRS M5 and M7 as needed | Sep-22 | Sep-22 | | |
| Consistency checks for day and night retrievals | Sep-22 | Sep-22 | | |
| Continuous use of microwave-based LWP data for validation | Sep-22 | Sep-22 | | |
| Develop collaboration with OAR/ESRL/GML on use of RadFlux Cloud Optical Depth for Verification | Sep-22 | Sep-22 | | |
| Improving the near real-time monitoring tools with (simple ) web application | Sep-22 | Sep-22 | | |
| Support several projects (i.e., processing of data, visualization tools, & ATMS/VIIRS precip for Alaska Demo) | Sep-22 | Sep-22 | | |
| Support ASSISTT update to NESDIS Data Exploitation (NDE) at appropriate time(s) | Sep-22 | Sep-22 | | |
| Support consistency validation of products from CSPP | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

# Clouds (NCOMP)

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | ASSIST provided data for analysis last week of March. Will be analyzed by team by end of April |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Consistency checks for day and night retrievals | Sep-22 | Sep-22 | | |
| Continuous use of microwave-based LWP data for validation. (coordinate with DCOMP) | Sep-22 | Sep-22 | | |
| Support ASSISTT update to NESDIS Data Exploitation (NDE) at appropriate time(s) | Sep-22 | Sep-22 | | |
| Support consistency validation of products from CSPP | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

# Clouds (Cloud Base Height)

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | ASSIST provided data for analysis last week of March. Will be analyzed by team by end of April |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Verify DCOMP nighttime COD (DNB) improvement in Cloud Base for performance over NWP or IR-only | Jan-22 | Apr-22 | | SAPF run delayed |
| Apply fix for SZA expansion of daytime DCOMP to 82º (degraded between 75-82º SZA) | Jan-22 | Jan-22 | Jan-22 | |
| Implement low layer cloud confidence flags for multi-layer cloud systems, leveraging GOES-RR | Jan-22 | Apr-22 | | This is ongoing work |
| Develop gridded products for vertical cross-sections and AWIPS-2 | Sep-22 | Sep-22 | | |
| Develop a new aviation website and incorporate feedback from NWS/AWC | Sep-22 | Sep-22 | | |
| Support Alaska Demo and any necessary reviews | Sep-22 | Sep-22 | | |
| Validate products from SAPF and continue data analysis using ARM, METAR, PIREPs, and CloudSat/CALIPSO | Sep-22 | Sep-22 | | |
| Implement an updated lunar irradiance model in CLAVR-x for nighttime COD and compare products | Sep-22 | Sep-22 | | |
| Support ASSISTT update to NESDIS Data Exploitation (NDE) at appropriate time(s) | Sep-22 | Sep-22 | | |
| Support consistency validation of products from CSPP | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

# Clouds (CCL)

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | ASSIST provided data for analysis last week of March. Will be analyzed by team by end of April |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Continue CCL visualization and demo for the Aviation Weather Center, with focus on Alaska Region and Hawaii. Work directly with respective POC's and use feedback to improve CCL | Sep-22 | Sep-22 | | |
| Support Alaska Demo and any necessary reviews | Sep-22 | Sep-22 | | |
| Validate NDE CCL output, supercooled/convective probability layers for nighttime cases with lunar DCOMP included for Base | Sep-22 | Sep-22 | | |
| Support ASSISTT update to NESDIS Data Exploitation (NDE) at appropriate time(s) | Sep-22 | Sep-22 | | |
| Support consistency validation of products from CSPP | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

# Aerosol

*March, 2022*

## *Accomplishments / Events:*

- Committee on Earth Observation Satellites (CEOS) Atmospheric Composition Virtual Constellation (AC-VC) Annual Meeting: In her role as the topical lead for CEOS AC-VC aerosols and air quality subgroup, Shobha Kondragunta organized a 3-hr session at the annual meeting held virtually from March 14-18, 2022. The talks presented in her session discussed the recent advancements made in using NOAA geostationary satellite air quality products for smoke exposure monitoring, value of aerosol layer height retrieval capability from ultraviolet-visible spectrometers (e.g., South Korea's Geostationary Environment Monitoring Spectrometer) in air quality monitoring, and an open group discussion on finalizing the draft of the white paper to be introduced at the CEOS SIT meeting end of this month. The white paper leads Kondragunta of NOAA and Veihelmann of European Space Agency proposed 14 recommendations in the 92-page document entitled "Monitoring Surface PM2.5: An International Constellation Approach to Enhancing the Role of Satellite Observations".

## *Overall Status:*

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

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

### ***Issues/Risks:***

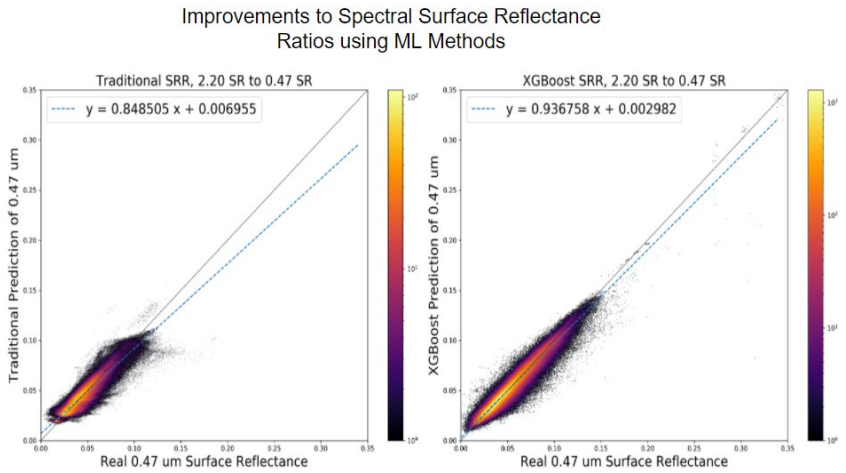
No risks

## *Milestones:*

- ***See next slides***

## *Highlight:*

**New Machine Learning (ML) methodologies show promise for retrieving surface reflectance, a key parameter needed to derive accurate aerosols**



# Aerosol (AOD)

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Evaluate robustness of method to determine AOD bias characteristics | May-22 | May-22 | | |
| Complete implementation of AI-based surface reflectance relationship in VIIRS enterprise aerosol optical depth algorithm | Jun-22 | Jun-22 | | |
| Extend record and evaluation of merged S-NPP/NOAA-20 and gridded global AOD products | Jul-22 | Jul-22 | | |
| Based on latest J2 SRF update LUTs and other processing coefficients used in AOD algorithm | Aug-22 | Aug-22 | | |
| Complete first assessment of multi-year VIIRS aerosol optical depth product (Summary report on accuracy and precision) | Aug-22 | Aug-22 | | |
| Explore VIIRS AOD error characteristics for any relationship with aerosol model selection/residuals (Summary report identifying relationship between AOD error and retrieval residual, surface type) | Aug-22 | Aug-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

# Aerosol (ADP)

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Exploring callback approach by including other bands for thick smoke/dust plumes, which are frequently missed due to cloud mask | Jun-22 | Jun-22 | | |
| Further refining smoke detection over land in IR-Visible path by including more surface type from IGBP classifications to defining surface reflectance relationship, such as the approaches used in AOD algorithm. In addition, work will be carried out for reducing/eliminating the detected smoke plumes difference between two orbits | Jun-22 | Jun-22 | | |
| Exploring regional thresholds for dust detection over land in deep-blue algorithm path | Jun-22 | Jun-22 | | |
| Reprocess the entire SNPP and NOAA-20 VIIRS ADP and generate smoke and dust climatologies | Jun-22 | Jun-22 | | |
| Analyze near real time aerosol optical depth and detection products for performance of quality flags and how to optimize the quality flags for a given scenario that can potentially lead to data artifacts | Jun-22 | Jun-22 | | |
| Reducing false smoke detection for SO2 plumes over ocean from volcanic eruptions by including 8.4 µm band, which is SO2 absorption band | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Continue long-term validation of SNPP and NOAA-20 VIIRS ADP by comparisons with AERONET, CALIPSO, MISR, and IMPROVE | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

# Volcanic Ash

*March, 2022*

## *Accomplishments / Events:*

- Updated NRT VOLCAT system with latest enhancements, including ash event file dissemination for all sensors
- Continued preparation for the VOLCAT CDR
- Collaborating with the volcanological community on a post-mortem analysis of the Jan 15 Hunga Tonga-Hunga Ha'apai eruption
- The containers for the primary VOLCAT processing engine can now be automatically built using the GitLab Continuous Integration (CI) pipeline process, including automated testing of each build. This greatly accelerates new development and deliveries to the NCCF via the Cloud integration team. (STAR milestone)

## *Overall Status:*

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

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

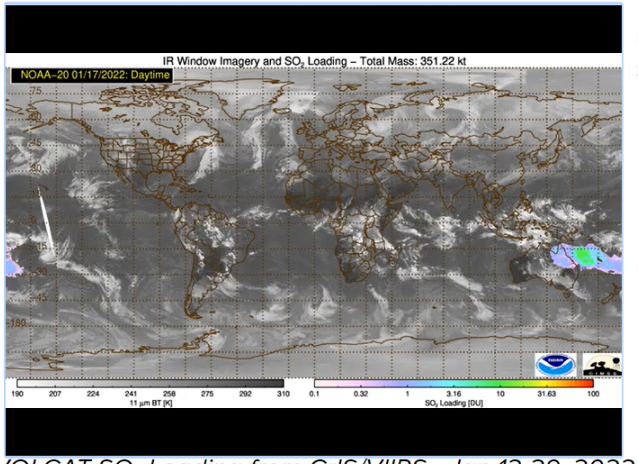
### ***Issues/Risks:***

None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Development activities that support transition to VOLCAT | Sep-22 | Sep-22 | | |
| Software and LUT updates for J2 | Sep-22 | Sep-22 | | |
| Update thresholds and LUT's, if needed | Sep-22 | Sep-22 | | |
| Routinely validate volcanic ash products | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## *Highlights:*

### VOLCAT: Tracking Volcanic Clouds




*VOLCAT $SO_2$ Loading from CrIS/VIIRS - Jan 13-29, 2022*

**Unique features of VOLCAT $SO_2$ applications:**

- $SO_2$ height and loading are retrieved for each CrIS FOV in a probabilistic manner
- VIIRS enables the gaps in spatial coverage to be filled
- Large $SO_2$ clouds are automatically tracked and labeled according to the source volcano and eruption date, enabling systematic trend analysis and cataloging

# Cryosphere

March, 2022

## Accomplishments / Events:

***Blended VIIRS and SSMIS binary snow cover product**. We continue generating spatially continuous (gap-free) daily global maps of snow cover by combining observations from VIIRS and from satellite microwave sensors (currently DMSP SSMIS). Observations from all available SSMIS sensors (DMSP F-16, -17 and -18) are used to infer information on the snow cover. This helps both to improve the accuracy and the effective spatial resolution of microwave snow retrievals. Microwave snow retrievals complement VIIRS estimates over cloud-obscured areas and during the polar night. Similar to the VIIRS-based gridded snow maps, the combined VIIRS+SSMIS map is produced on a regular latitude-longitude grid with the grid cell of 0.01 degree or about 1 km. Figure 1 presents an example of the daily combined snow cover map. Qualitative comparison of the VIIRS and SSMIS combined map with a binary snow cover map generated by IMS analysts demonstrates a good agreement of the two products.

## Overall Status:

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

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

### Issues/Risks:

None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 10/28/21 | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Incorporate passive microwave filter to improve ice products | Dec-21 | Dec-21 | Dec-21 | |
| Cloud shadow flag, blended snow cover product | Sep-22 | Sep-22 | | |
| New physically-based snow and snow-free land BRDF, algorithm to infer the snow fraction | Sep-22 | Sep-22 | | |
| Generate new lookup tables, retrieval coefficients for JPSS-2 (all snow, and ice products) | Sep-22 | Sep-22 | | |
| Weekly and monthly ice products composite | Sep-22 | Sep-22 | | |
| Continuous monitoring of S-NPP and NOAA-20 products | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## Highlights: Blended Snow Cover Product

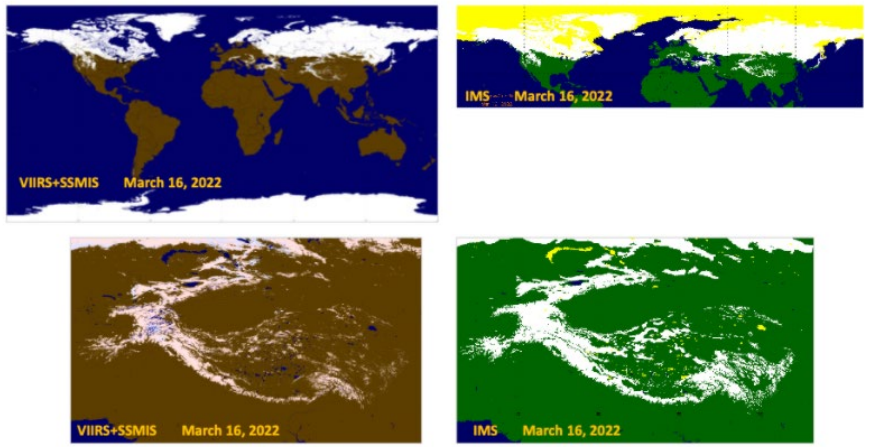



Fig 1. Example of a blended VIIRS+SSMIS snow cover map and IMS interactive snow and ice cover map produced at NIC for the same day. The lower row shows matching snow map images centered at the Tibet-Tian-Shan region.

# Active Fires

*March, 2022*

## *Accomplishments / Events:*

**Presentation at the 2022 IMET Conference -** Ivan Csiszar was one of the presenters of the training material "2022 JPSS/GOES-R Satellite product overview" given at this year's Incident Meteorologist (IMET) conference by a team from the Fire and Smoke Proving Ground Initiative. Csiszar gave an overview of the fire mapping and monitoring capabilities from the Visible Infrared Imaging Radiometer Suite (VIIRS) and provided a product status update. The presentation was given during three afternoon sessions of the conference on March 8, 9 and 10. Other presenters were Bill Sjoberg (GST@JPSS), Chris Schmidt (CIMSS), Ravan Ahmadov (CIRES@NOAA/GSL), William Straka III (CIMSS), Dave Peterson (NRL), Arunas Kuciauskas (NRL) and Jorel Torres (CIRA). The total number of IMET attendees of the training sessions was 56.

JPSS-2 code delivered to NDE, including updated FRP coefficient

Worked on updating the persistent anomaly database and adapt procedure for easy update

Fire hotspots and smoke observed in the Florida Panhandle - VIIRS Day Land Cloud Fire RGB. https://twitter.com/CIRA_CSU/status/1500966531924119558?s=20&t=8xKH46GILtth6HNEZHrVkg

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 11/05/21 | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | Mar-22 | Mar-22 | 03/17/22 | |
| I-band algorithm improvements for non-optimal conditions | Sep-22 | Sep-22 | | |
| J2 readiness and sensor performance evaluation | Sep-22 | Sep-22 | | |
| Opportunistic validation using in-situ data (Error rates and FRP APU) | Sep-22 | Sep-22 | | More limited validation |
| Persistent anomaly data files updates | Sep-22 | Sep-22 | | Less frequent updates |
| Suomi NPP / NOAA-20 data analysis and feedback | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## *Overall Status:*

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

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

### ***Issues/Risks:***

None

## *Highlight: Ready for J2*

STAR FY22 QPR Q2 (Jan, Feb, Mar) | Fire Accomplishments / New Technology slide 1/2

### VIIRS fire product: readiness for JPSS-2

**Heritage algorithm to retrieve fire radiative power (FRP) (*Wooster et al., 2005*)**

$$FRP_{MIR} = \frac{A_{sample}\sigma}{a}\left(L_{MIR} - L_{B,MIR}\right)$$

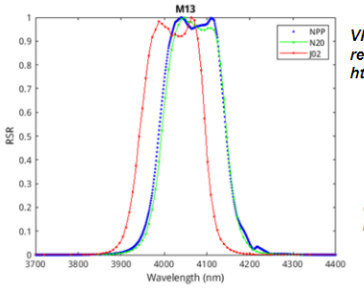
| | |
|---|---|
| $L_{MIR}$ | 4 μm observed radiance |
| $L_{B,MIR}$ | 4 μm calculated background radiance |
| $A_{sample}$ | area of pixel |
| a | constant (function of instrument SRF) |

***a* [$Wm^{-2}sr^{-1}\mu m^{-1}K^{-4}$]:**
***2.88 (Suomi NPP, NOAA-20)***
***2.95 (JPSS-2)***

***JPSS-2 VIIRS M13 band is also expected to be less impacted by atmospheric absorption than Suomi NPP and NOAA-20 – need for explicit atmospheric correction in the operational products for compatibility***

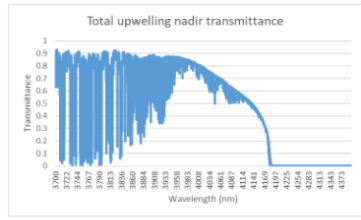
*Wooster, M.J., Roberts, G., Perry, G.L.W., Kaufman, Y.J., 2005. Retrieval of biomass combustion rates and totals from fire radiative power observations: FRP derivation and calibration relationships between biomass consumption and fire radiative energy release. J. Geophys. Res. 110, D24311 https://doi.org/10.1029/*

*Courtesy Wilfrid Schroeder, NOAA/NESDIS/OSPO*




*VIIRS band M13 spectral response functions https://ncc.nesdis.noaa.gov/*

*Courtesy VIIRS Sensor Team, NOAA/NESDIS/STAR*




*An example of total atmospheric transmittance spectrum ($H_2O$, $CO_2$, $O_3$, $N_2O$, CO, $CH_4$, water continuum absorption) derived using the Community Radiative Transfer Model (CRTM).*

*Data courtesy Yong Chen, NOAA/NESDIS/STAR*

# Surface Type

March, 2022

## Accomplishments / Events:

- STAR-UMD VIIRS Surface Type team has downloaded and processed S-NPP and NOAA-20 VIIRS granule surface reflectance data acquired in March 2022 for the production of AST-2022.
- The team is exploring the usefulness of available global 10m – 30m land cover products for improving VIIRS AST product:
  - The team has obtained a global 10m land cover dataset released by the European Space Agency (ESA).
  - The team has developed a multi-thread C++ code for calculating the percentage of different surface types within VIIRS 1km grids. This code greatly improved the processing speed because the number of pixels in the 10m land cover dataset was 10,000 times of that of 1km VIIRS pixels.
  - The percentage maps calculated using this 10m dataset (see highlight figures) will be used to improve the AST2021 product.

## Overall Status:

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

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

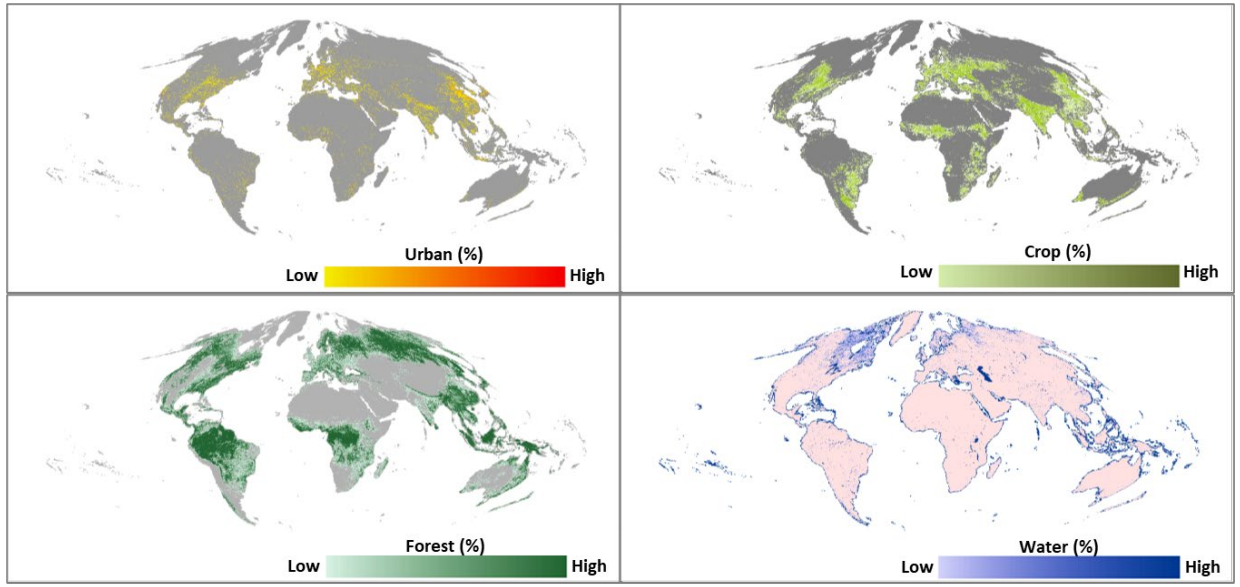
## Issues/Risks:

None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 10/29/21 | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Deliver AST-2020 to NDE (with JRR Super DAP) | May-22 | May-22 | | |
| Complete global monthly composites based on 2021 VIIRS data | Apr-22 | Apr-22 | | |
| Generate global annual classification metrics | May-22 | May-22 | | |
| Develop approaches for using newly available high resolution global maps on urban and water | Sep-22 | Sep-22 | | |
| Experiment methods for mapping surface type change | Sep-22 | Sep-22 | | |
| Generate VIIRS AST21 based on 2021 VIIRS data using SVM algorithm | Aug-22 | Aug-22 | | |
| Comparison of AST21 with surface type validation data | Sep-22 | Sep-22 | | |
| Delivery of AST21 (made available for users through STAR FTP) | Sep-22 | Sep-22 | | |
| Routinely monitor surface type changes in the training and validation data sets | Sep-22 | Sep-22 | | |
| Improve and update training and validation data, ATBD and VIIRS AST web sites | Sep-22 | Sep-22 | | |

## Highlights:

*Percentage maps for selected surface types calculated from a 10m land cover product released by the European Space Agency (ESA), which will be used to improve the AST2021 product. Ocean waters and the Antarctic are not mapped by the ESA land cover map.*



# Surface Reflectance

March 2022

## *Accomplishments / Events:*

- Evaluation of the v1r1 SR using long term data (half year from April to September, 2021), summarized the validation results.
- Maintain the SR routine validation against the latest AERONET data and show the scatter plot and validation results on the team website.
- Test the new update v1r2 SR update impact and overall performance, including the SR AERONET validation comparison between v1r1 and v1r2 using two month data, respectively, time series analysis and quality flags change.
- Keep working with NASA team for the SR look up table update.
- Developed an experimental gridded SR dataset (I1, I2 and I3 band) for the Leaf Area Index product. Check out the Band I3 SDR issue for NOAA20.

## *Overall Status:*

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

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
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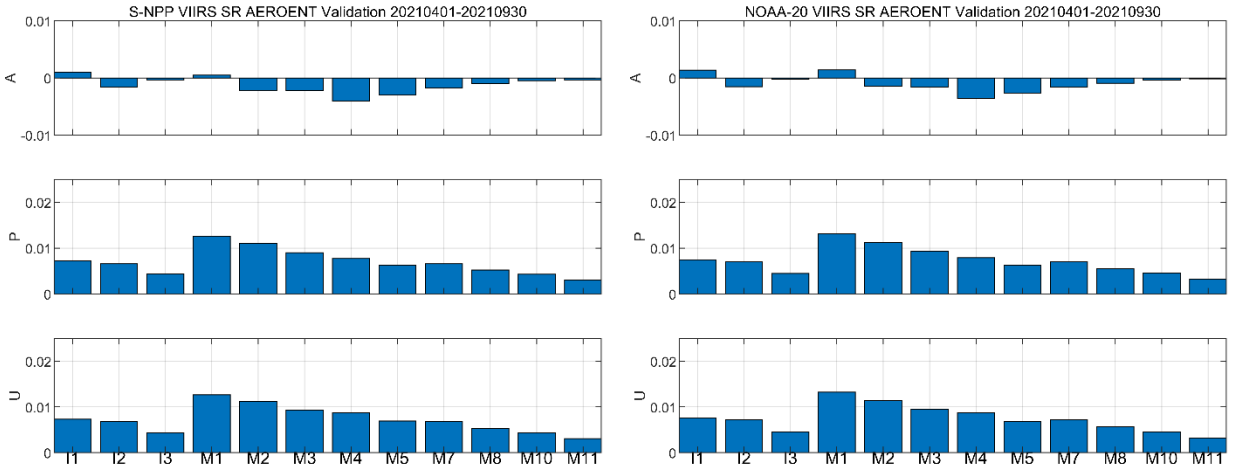
### ***Issues/Risks:***

None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 11/03/21 | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | Oct-21 | Oct-21 | 10/07/21 | |
| Continue to validate against in-situ measurements and inter-comparison with other SR Products | Dec-21 | Dec-21 | 12/15/21 | |
| J2 final patch DAP to NDE | | | 02/02/22 | |
| The SR Long-term monitoring improvement and perform the time-series analysis | Mar-22 | Mar-22 | 03/15/22 | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| JPSS-2 pre launch readiness | Jun-22 | Jun-22 | | |
| Cal/Val update for SNPP and NOAA20 SR product; Collect the vegetation product feedback of the impact of SR | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Mar-22 & Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## *Highlights:*

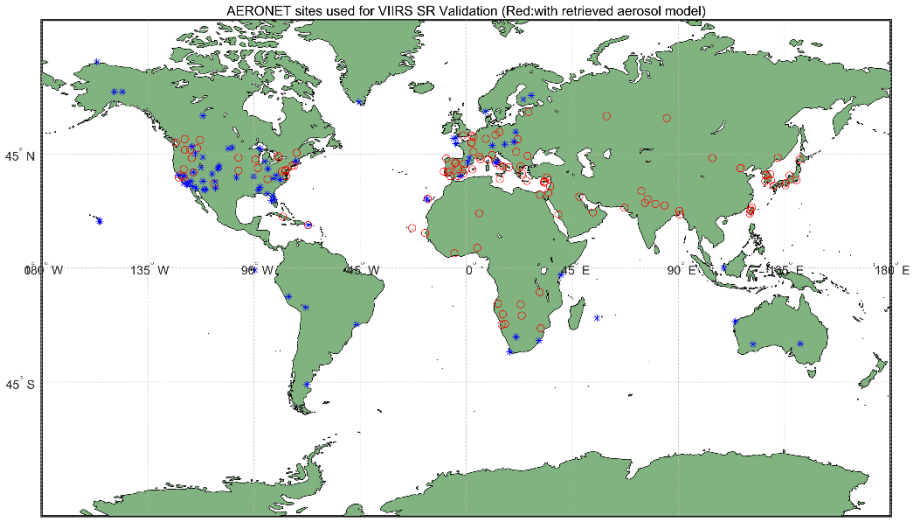


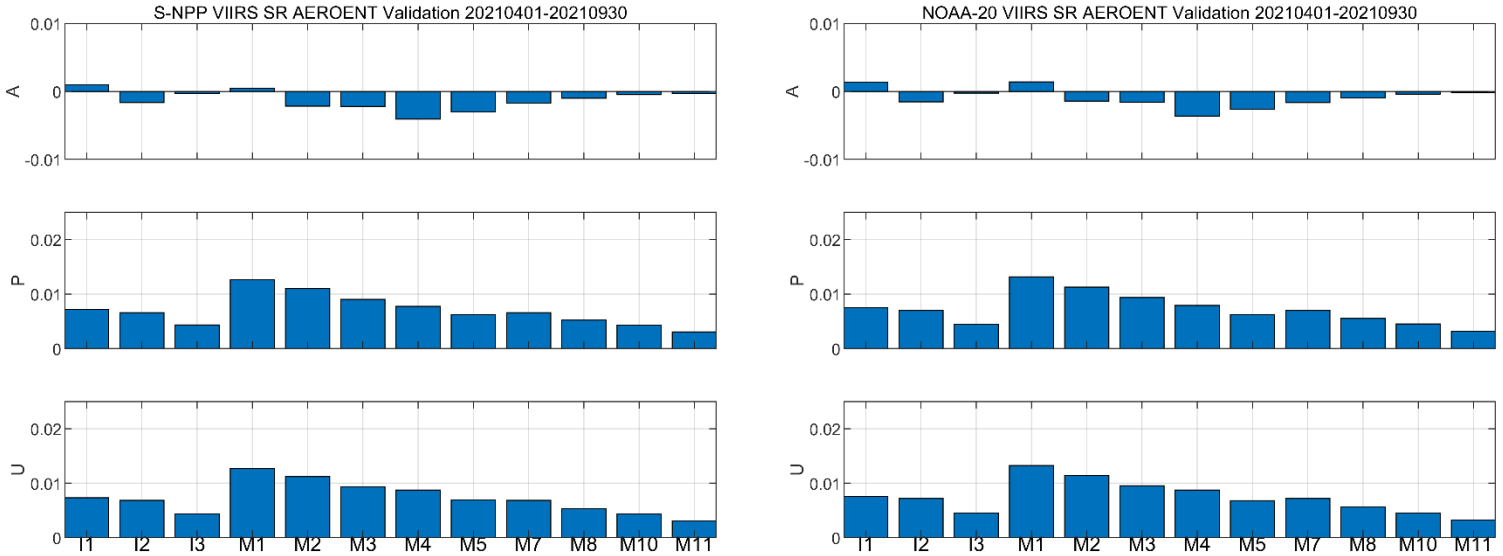

Long term (April-September, 2021) SR validation using global AERONET sites (123 sites), SNPP (left) and NOAA20 (Right) have a good agreements

# Long term Surface Reflectance validation



- Long term S-NPP and NOAA20 AERONET SR Validation Results
  - 9*9 M band (18*18 for I Band) pixels at AERONET sites
  - SR EDR within [0, 1]
  - Confidently clear
  - No cloud shadow or cirrus.
  - No snow
  - Not AOD climatology or high AOD
  - Half year's data, from April to September, 2021
  - 123 sites with best aerosol model parameters



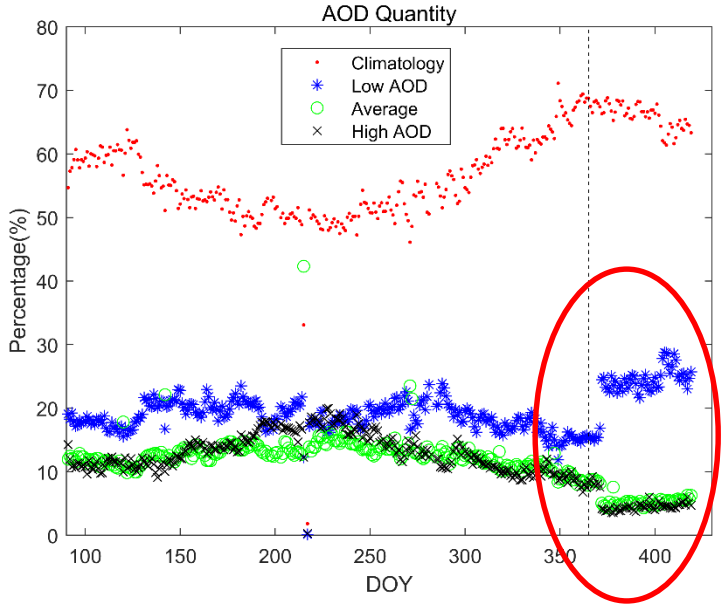



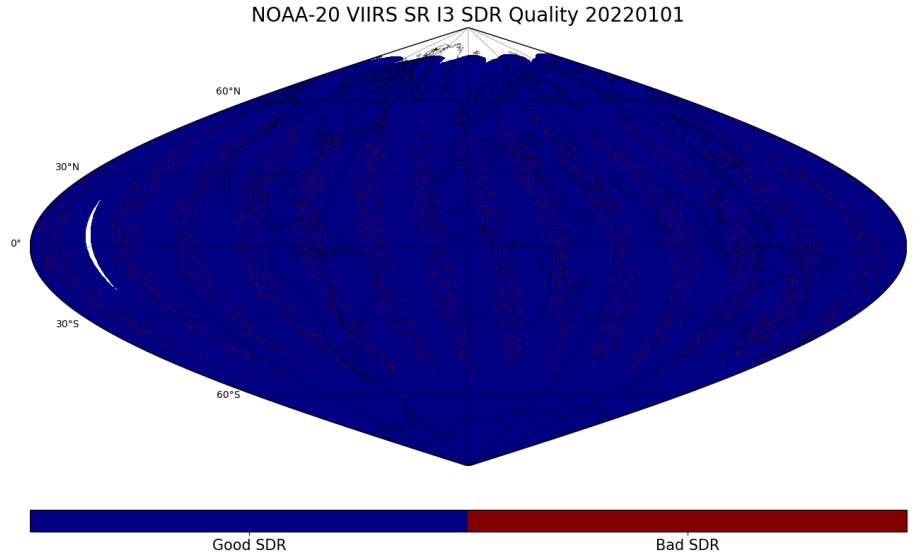
# v1r2 main update and issues

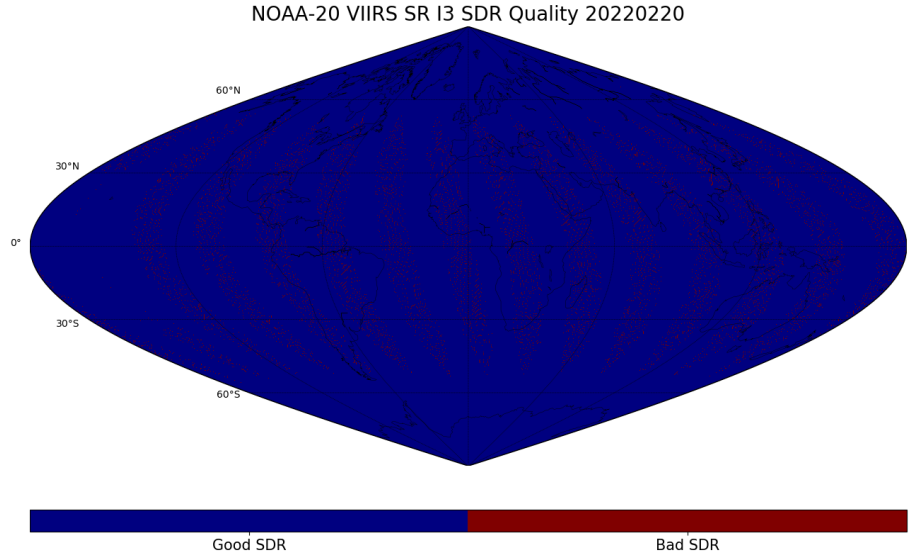


- Main update about v1r2 SR product.
  - A new criteria is applied for the AOD quantity flag, according to the new criteria, more pixels are classified into low or average aerosol quantity (as figure shows).

- Issues
  - VIIRS I3 band has one scanline with bad quality (#29 out of 32)
  - For the global data, around 2-3% I3 reflectance data will be marked with bad SDR quality.



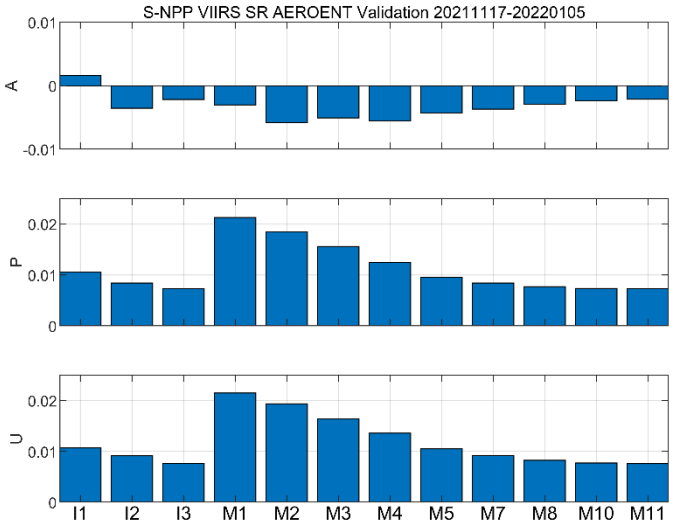



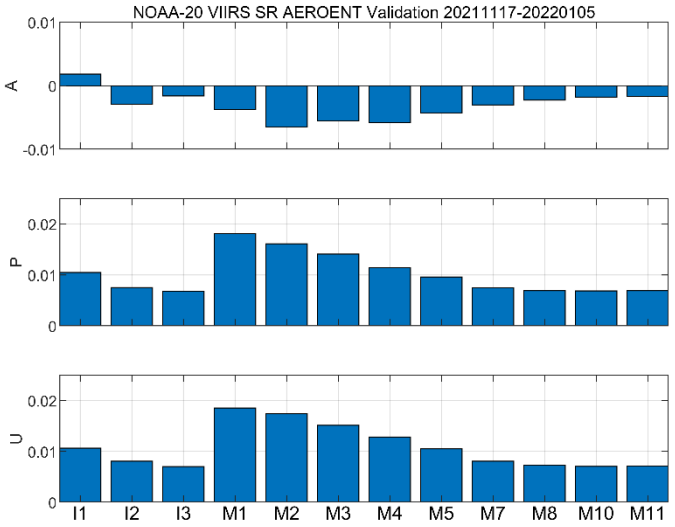



# v1r2 and v1r1 validation comparison

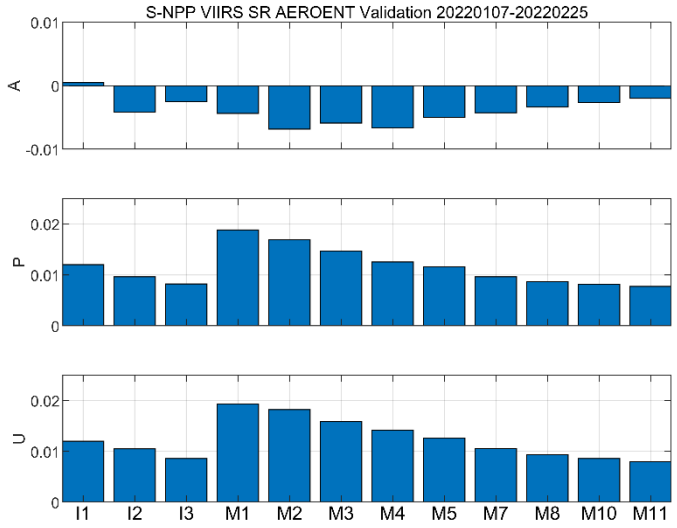


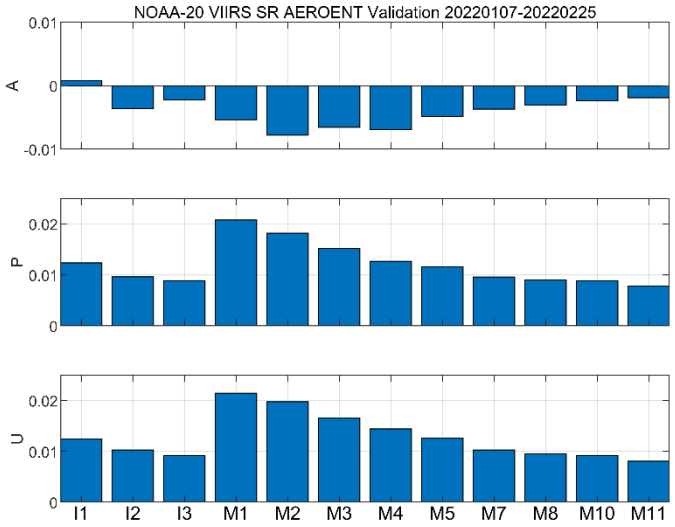
v1r1




v1r2




- S-NPP and NOAA20 AERONET SR Validation Results comparison between v1r1 and v1r2

- V1r2 made update to AOD quantity, to ensure the v1r1 and v1r2 use some criteria in screening data, for AOD:
  - Not Climatology
  - Not Heavy AOD (AOD550 < 1)

- v1r1 results based on 50 days data (Nov 17,21 to Jan. 5, 22)
- v1r2 results based on 50 days data (Jan 7, 22 to Feb 25, 22)
- The results shows v1r1 and v1r2 are comparable.

# Land Surface Temperature

March, 2022

## *Accomplishments / Events:*

- Finished the reprocessing of the L2 VIIRS LST validation against ground measurements from SURFRAD, BSRN and ARM network using the latest data available. Time series analysis were performed. (Highlights, slide 2-4)
- Fixed an issue in the cron job of the L3 VIIRS LST validation and finished the reprocessing of the validation results.
- Analyze the ground site heterogeneity based on the Landsat8 data. (slide 5)
- Completed the data fusion of MIRS LST and VIIRS LST based on Cumulative Distribution Function (CDF) matching and Multiresolution Kalman Filtering (MKF) methods. The downscaled MIRS LST was evaluated through the comparison with VIIRS LST (slide 6)
- Completed the manuscript draft entitled :"10 years of VIIRS LST product validation over multiple stations"

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 11/01/21 | |
| ATBD update | Oct-21 | Dec-21 | Dec-21 | |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| L3 Global Gridded LST/LSA DAP to NDE (Prelim J2 DAP) | | | 12/30/21 | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | |
| L3 Global Gridded LST/LSA DAP to NDE (Prelim J2 DAP) | | | 12/30/21 | |
| L3 Global Gridded LST/LSA DAP to NDE (final J2 DAP) | Apr-22 | Apr-22 | | |
| Manuscript ready for Remote Sensing special issue "VIIRS 2011–2021: Ten Years of Success in Earth Observations" | Apr-22 | Apr-22 | | |
| All weather LST generation based on the microwave LST and VIIRS LST: methodology development and experiment | May-22 | May-22 | | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| LUT interpolation method development and test | Jun-22 | Jun-22 | | |
| Routine Validation Summary/report of LST product including L2 and L3 | Jul-22 | Jul-22 | | |
| LST uncertainty evaluation and calibration | Aug-22 | Aug-22 | | |
| Routine monitoring tool and its update | Aug-22 | Aug-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## *Overall Status:*

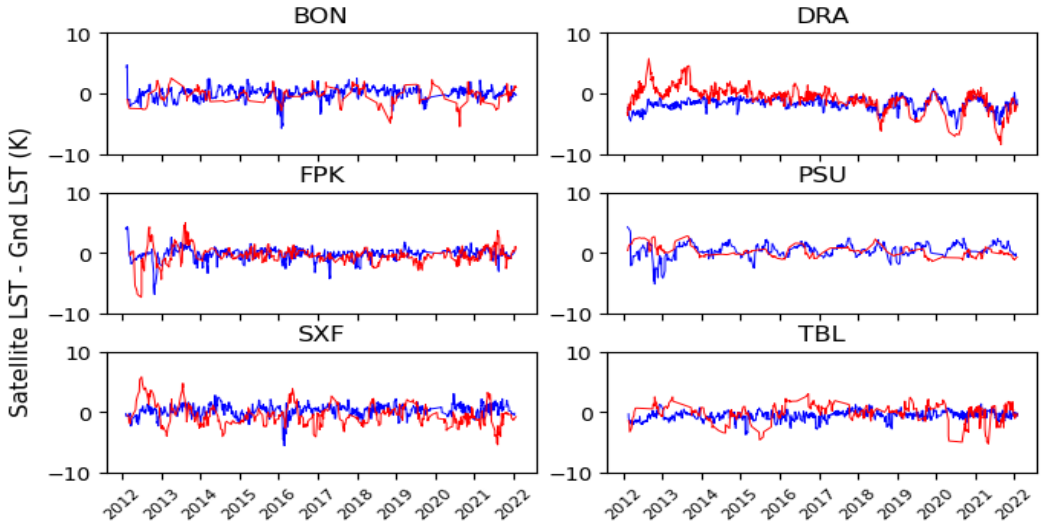
| | Green[1] (Completed) | Blue[2] (On-Schedule) | Yellow[3] (Caution) | Red[4] (Critical) | Reason for Deviation |
|---|---|---|---|---|---|
| Cost / Budget | | x | | | |
| Technical / Programmatic | | x | | | |
| Schedule | | x | | | |

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

***Issues/Risks:***

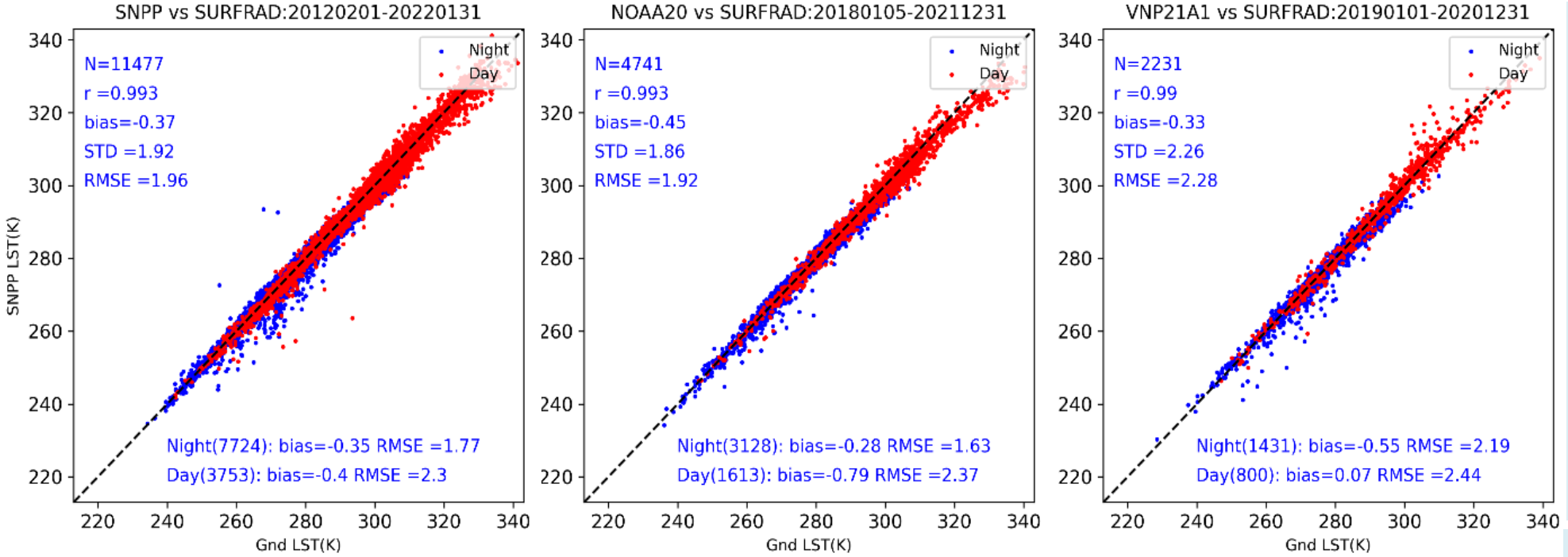
None

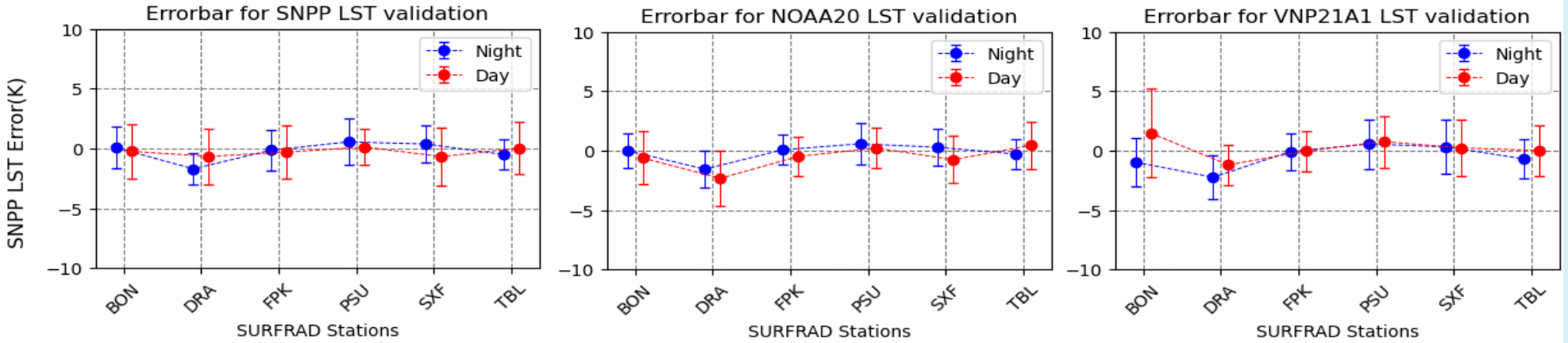
## *Highlights:* 10 Years of SNPP VIIRS LST validation against SURFRAD




LST error time series over six SURFRAD sites for both daytime(red color) and nighttime(blue color)

# SNPP, NOAA20 LST and VNP21 LST validation against SURFRAD

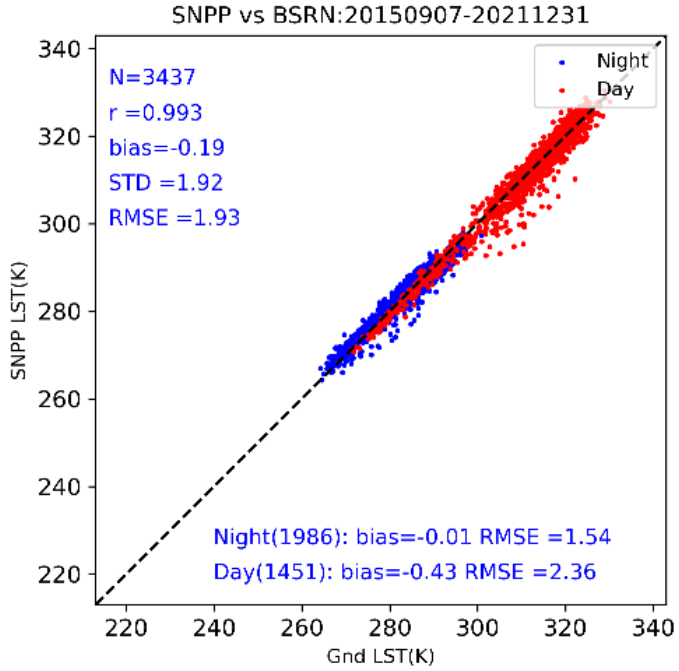


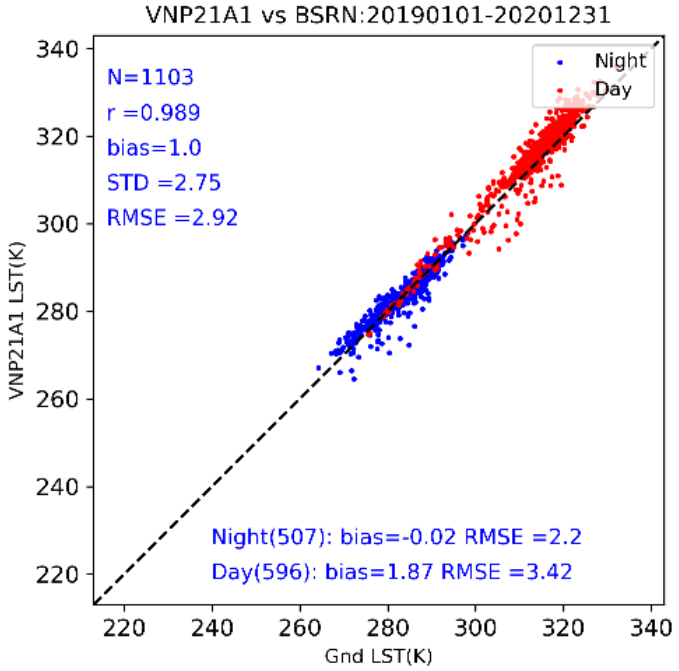




- Ten years of SNPP VIIRS LST for period Feb. 1 ,2012 to Jan. 2022 was used in the validation against SURFRAD
- Four years of NOAA20 VIIRS LST for period Jan. 2018 to Dec. 2021 was used in the validation
- Two years of VNP21A1 in 2019 and 2020 was used in the validation
- Six SURFRAD sites were included in this study.

- Consistent validation results with a bias of -0.37 K and -0.45 K and RMSE of 1.96 K and 1.92 K were found between SNPP and NOAA20 VIIRS LST, respectively.
- VNP21LST shows a smaller bias at daytime, while relatively large bias and RMSE at nighttime compared to NOAA LST.

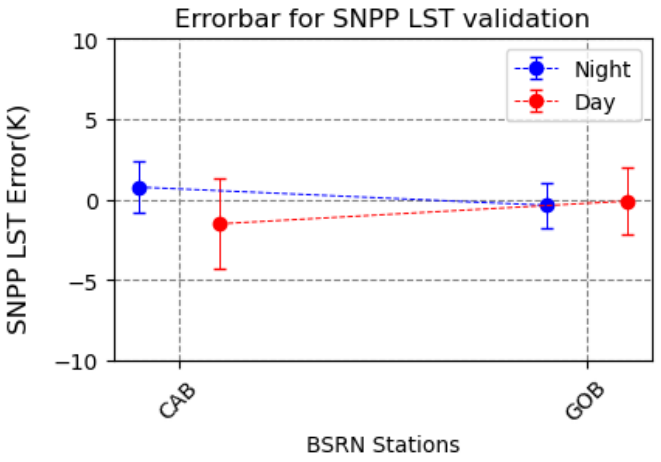
# SNPP and VNP21 LST validation against BRSN observations

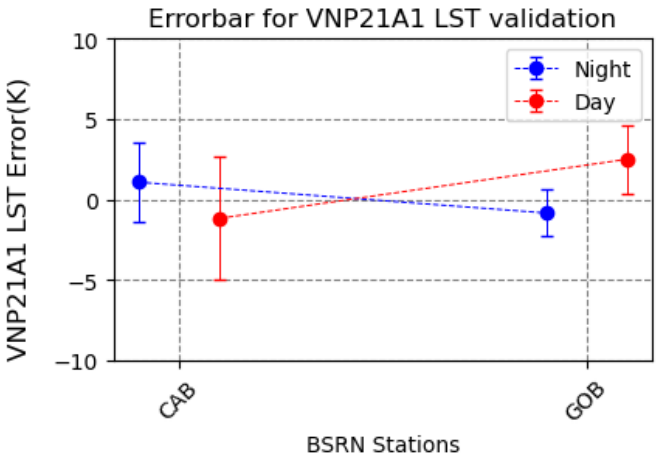


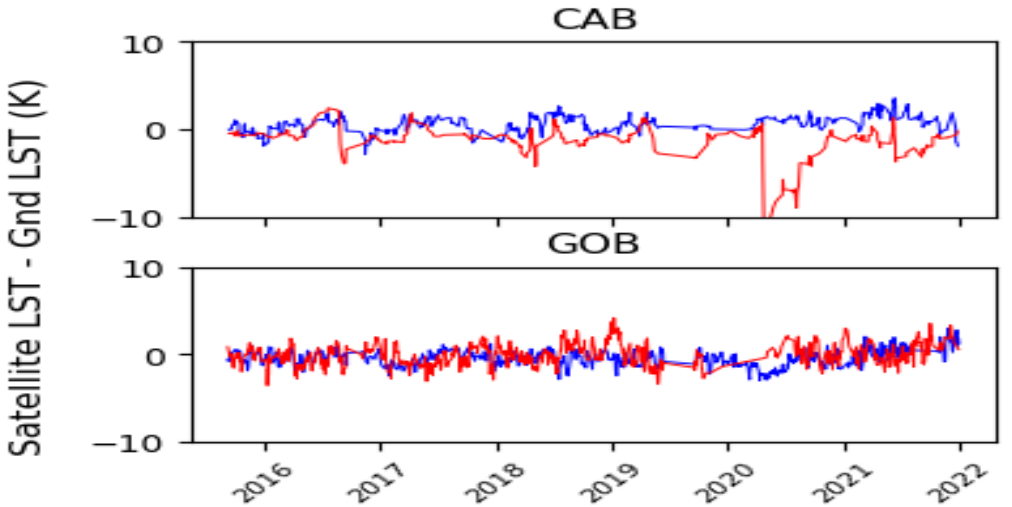




- Six years of SNPP VIIRS LST for period from Sep. 2015 to Dec. 2021 was used in the validation against BSRN
- Two years of VNP21A1 in 2019 and 2020 was used in the validation
- Two BSRN sites were included in this study.

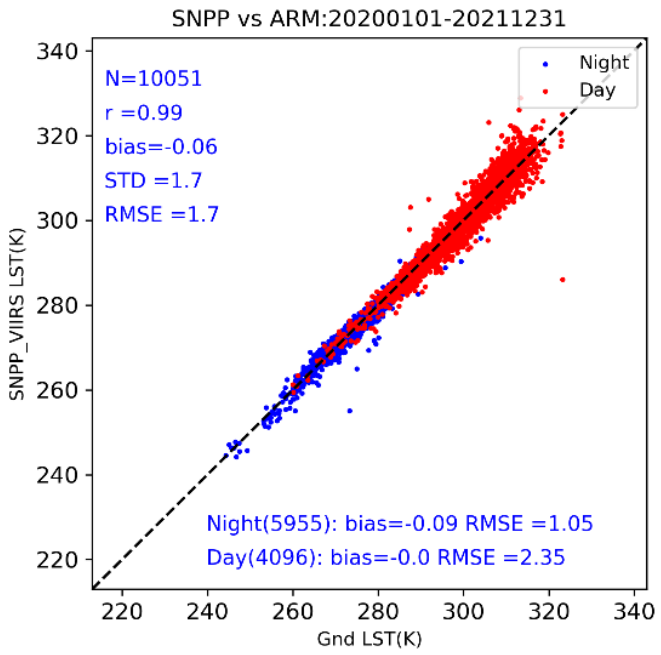
- The validation results for SNPP VIIRS LST yields zero bias and RMSE of 1.5 K at nighttime and a bias of -0.4 K and RMSE of 2.4 K at daytime. Time series indicates a significant cold bias around April 2020, which is caused by the site management actities.
- The validation for VNP21A1 LST yields a significant warm bias of 1.9 K at daytime with a RMSE of 3.4 K while a zero bias and RMSE of 2.2 K at nighttime

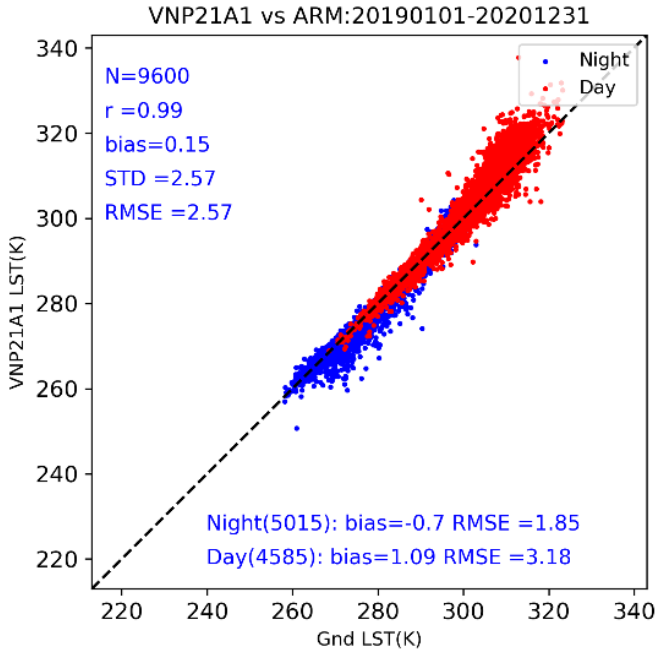


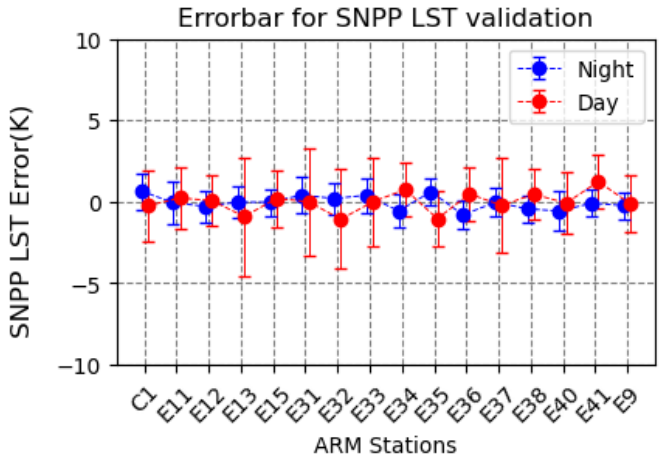



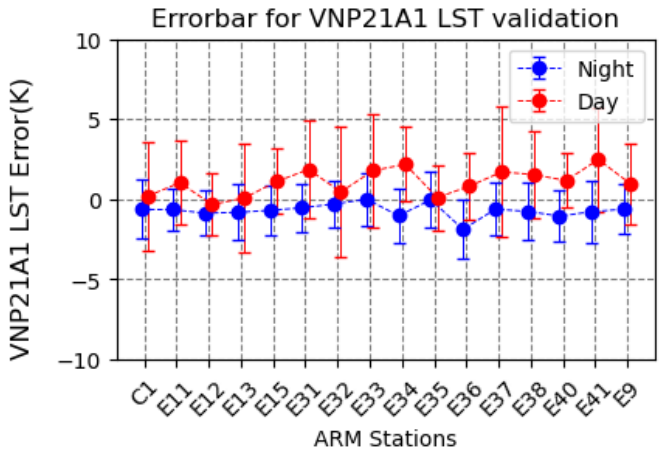



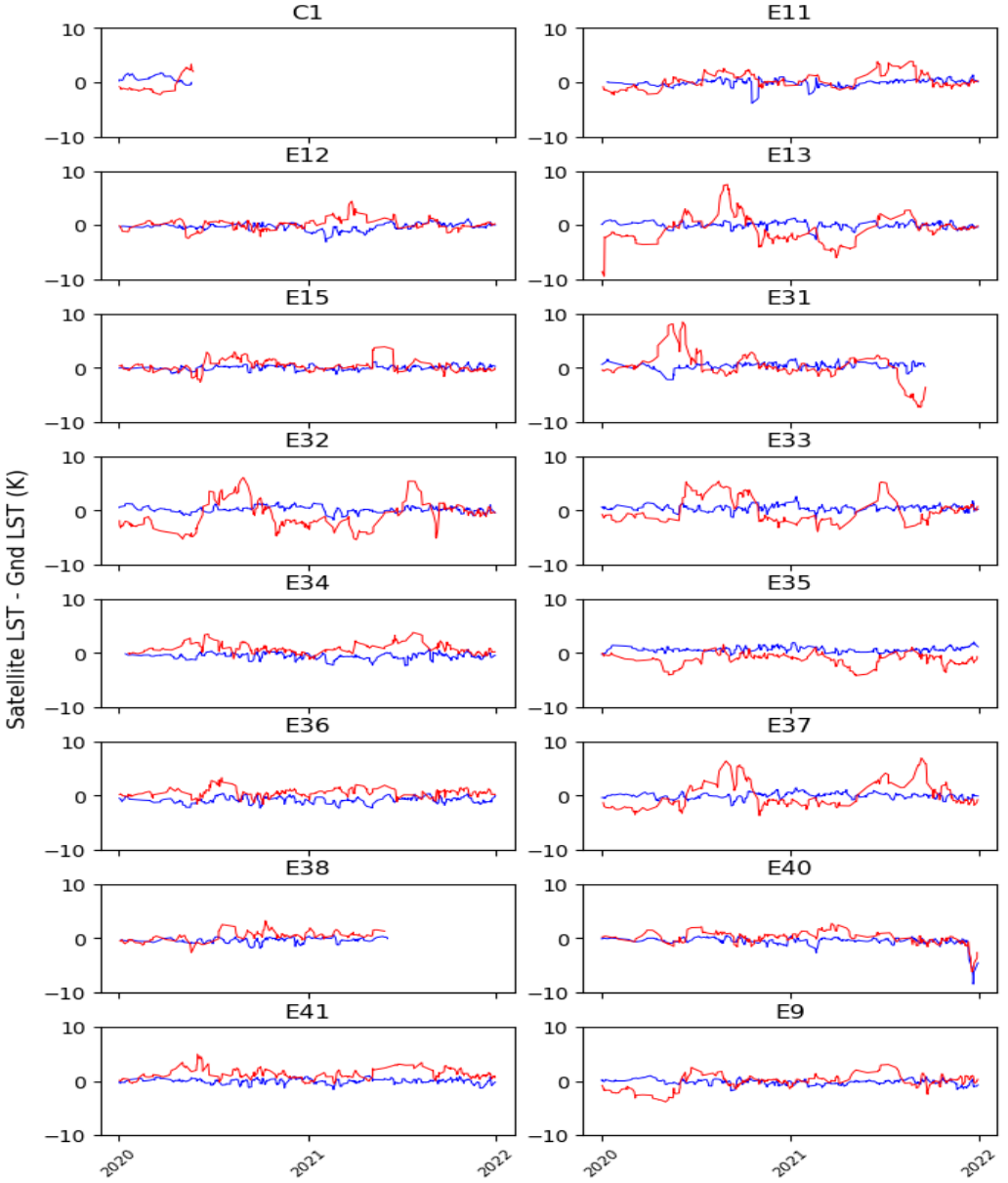
# SNPP and VNP21 LST validation against ARM observations



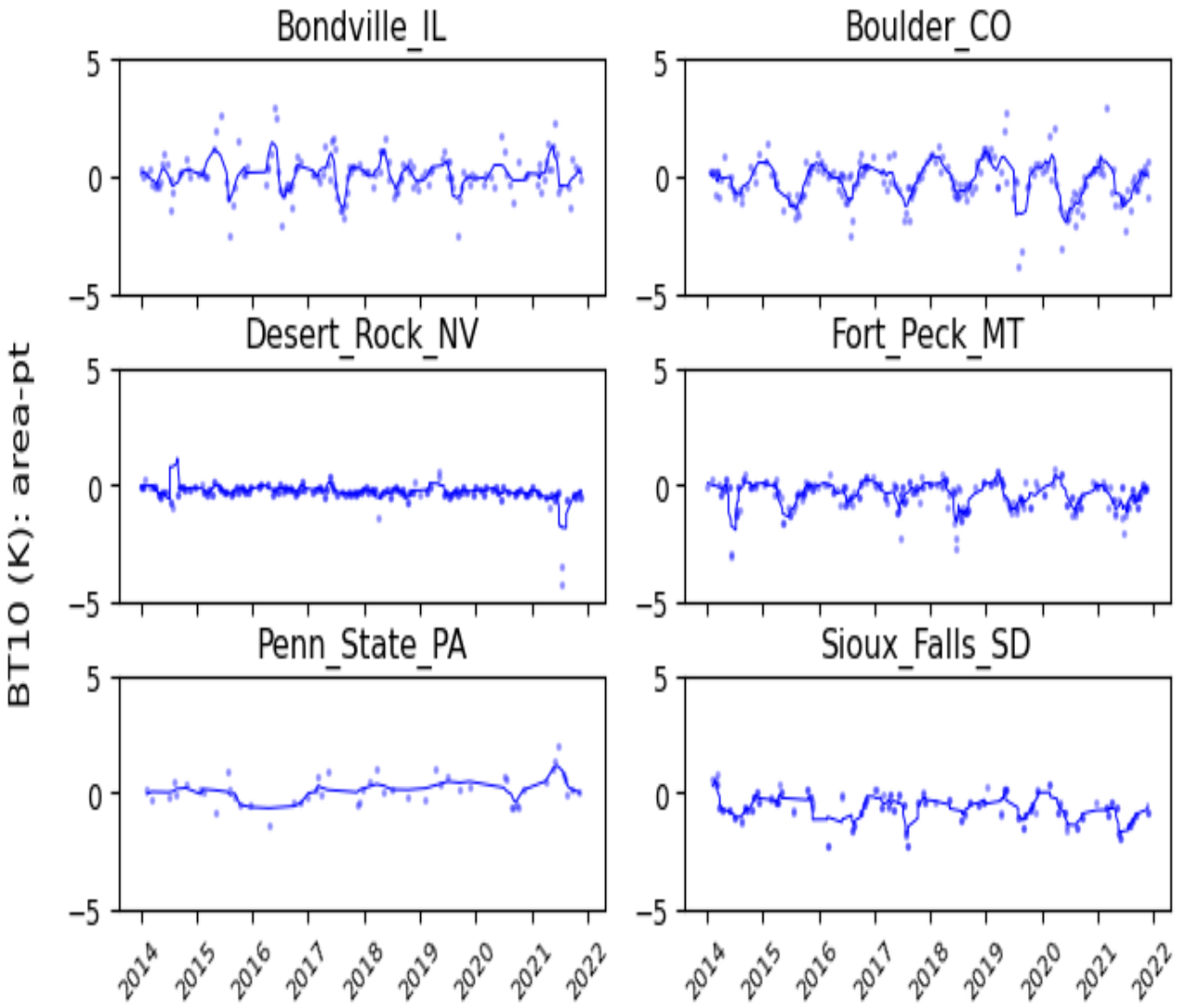



# Ground site heterogeneity analysis-SURFRAD stations

Heterogeneity analysis over SURFRAD stations

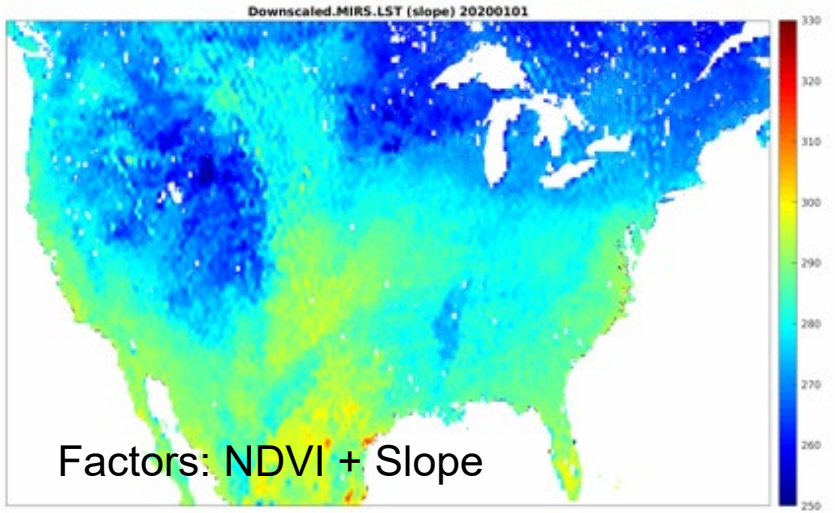


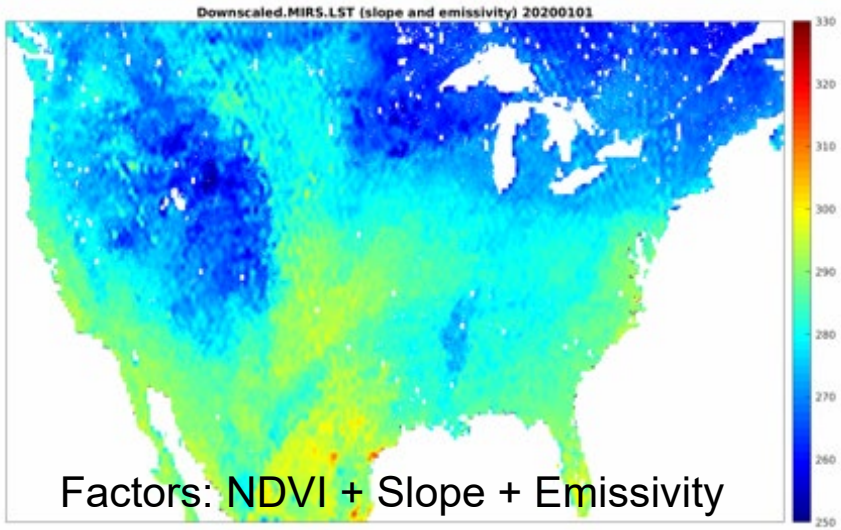

- The Landsat8 pixels falling within an area circled at the site location with a radius of 1 km are aggregated to get the value for the VIIRS pixel i.e. $Var_{area}$.
- The field view of the in-situ instrument is calculated considering the tower height and sensor geometry, and the site circle response area radius is 35 m for SURFRAD, 30m for arm, and 45 m for BSRN stations, which presents approximately 90% response of the site instrument. Then the Landsat8 pixel falling within the area are aggregated to get the in-situ value i.e. $Var_{point}$.
- The scale difference between the two i.e. $Var_{area} - Var_{point}$ can be used as an indicator to quantify the heterogeneity of a ground station.

- Pronounce seasonal variations are observed over TBL, FPK, and BON stations, and a weak variation is observed over SXF station. Over the DRA site, however, the interannual curve is very straight with very small fluctuations over years.
- Note that the points are very limited over the PSU site which restraints its statistical significance.
- A constant deviation is observed from FPK and SXF stations with a cold bias of -0.43 K and -0.63 K, respectively, which indicates a greater heterogeneity level over these two sites.

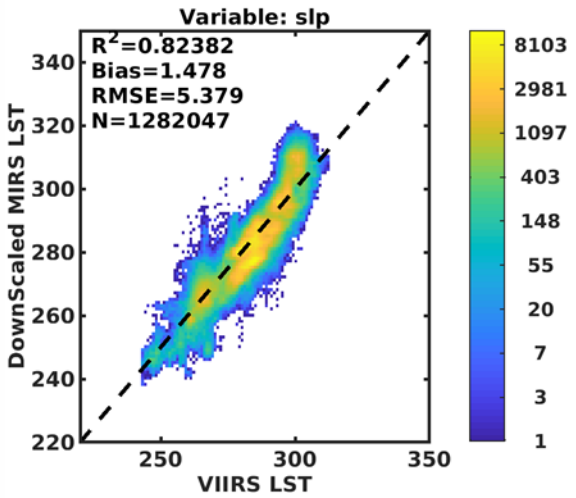
# MIRS LST downscaling

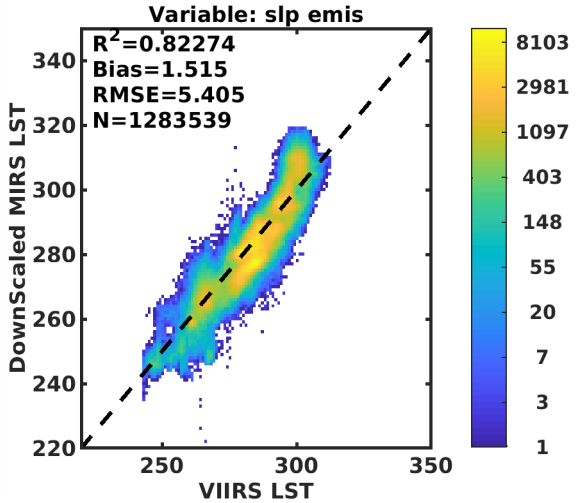
## The downscaled MIRS LST



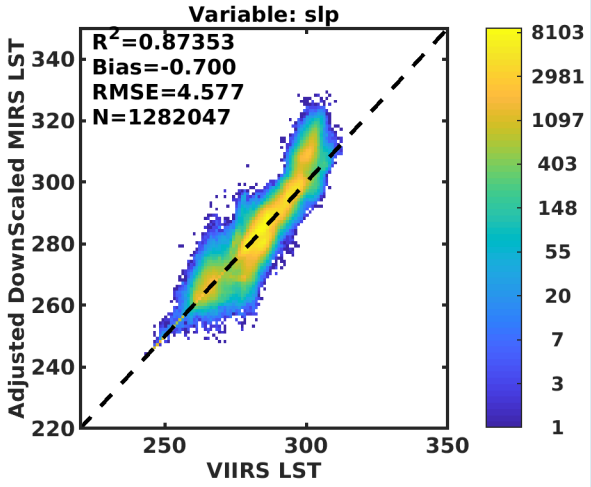



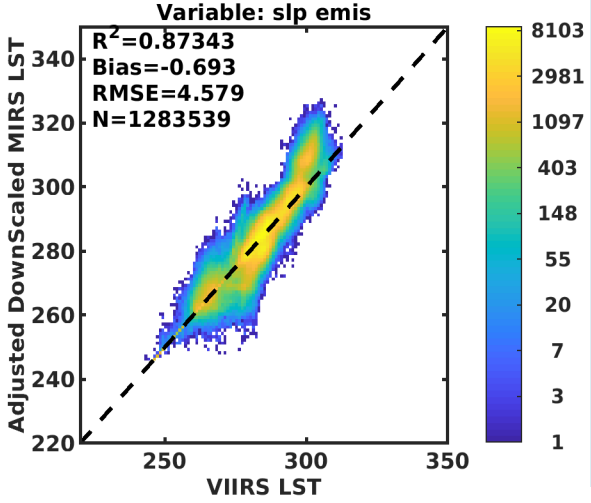

## The downscaled MIRS LST




## the adjusted downscaled MIRS LST




2020-01-15

- Downscale the MIRS LST to the spatial resolution of 0.009 degree based on Geographically weighted regression(GWR) method
- Multiple factors combination strategy were tested in this study in which two combinations were selected for the further test: NDVI and slope(top left); NDVI, slope and emissivity(bottom left)
- The scatter plot shows the comparison between VIIRS LST and downscaled MIRS LST (middle figure)
- The adjusted downscaled MIRS LST is obtained based on Cumulative Distribution Function (CDF) method (right figures). It indicates CDF method can help adjust the outliers and improve the accuracy of the LST.

# Surface Albedo

*March, 2022*

## *Accomplishments / Events:*

- Analyzed the VIIRS Enterprise albedo and ground albedo over Desert Rock
- Monitored the global albedo performance between NOAA-20 and S-NPP
- Keep working on albedo anomaly assessment from MODIS albedo
  - MODIS data as a substitute before VIIRS albedo is reprocessed
  - The data span 2012 to 2021 (same as VIIRS) would be used to provide climatology
- Coordinate with ASSISTT about the DAP package integration
  - Examined the test data from ASSISTT NRT run
  - Help positioned the issue causing the data missing

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End PMR | Oct-21 | Oct-21 | 11/01/21 | |
| Manuscript ready for Albedo Climatology update | Dec-21 | Apr-22 | | More time needed |
| Generating the VIIRS BRDF climatology and real-time BRDF/Albedo test data generation | Jan-22 | Jan-22 | | |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Offline LSA DAP delivery (J2, climatology files) | | | 04/07/22 | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | |
| L3 Global Gridded LST/LSA DAP to NDE (Prelim J2 DAP) | | | 12/30/21 | |
| L3 Global Gridded LST/LSA DAP to NDE (final J2 DAP) | Apr-22 | Apr-22 | | |
| BRDF data development plan ready | Mar-22 | Mar-22 | Ready in team, but Project Postponed | |
| VIIRS cloudy-sky albedo improvement | May-22 | May-22 | | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Routine monitoring tool and its update | Aug-22 | Aug-22 | | |
| NOAA-21 data test if provided | Aug-22 | Aug-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Mar-22 & Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## *Overall Status:*

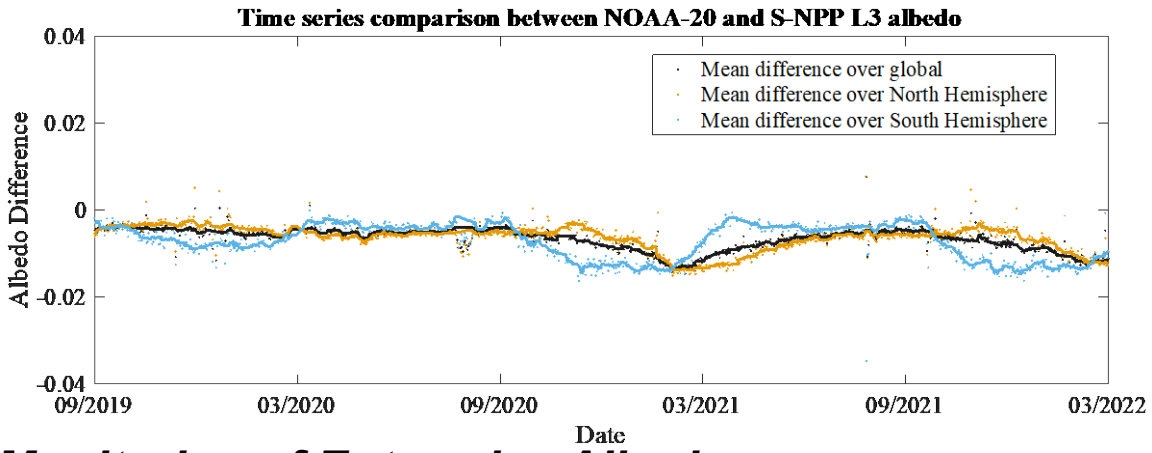
| | Green[1] (Completed) | Blue[2] (On-Schedule) | Yellow[3] (Caution) | Red[4] (Critical) | Reason for Deviation |
|---|---|---|---|---|---|
| Cost / Budget | | X | | | |
| Technical / Programmatic | | X | | | |
| Schedule | | X | | | |

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

***Issues/Risks:***

None

## *Highlights:*



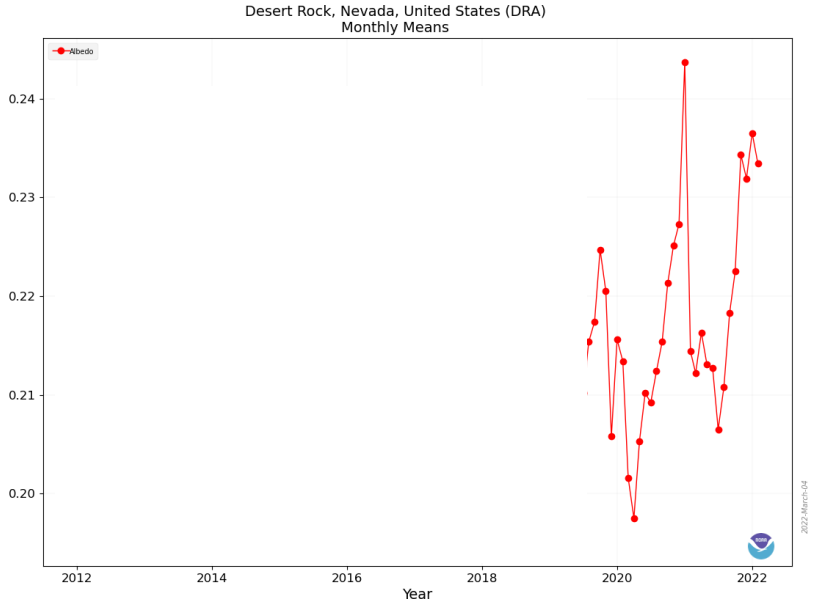

## ***Monitoring of Enterprise Albedo:***

Global consistency is observed between NOAA-20 and S-NPP global albedo.

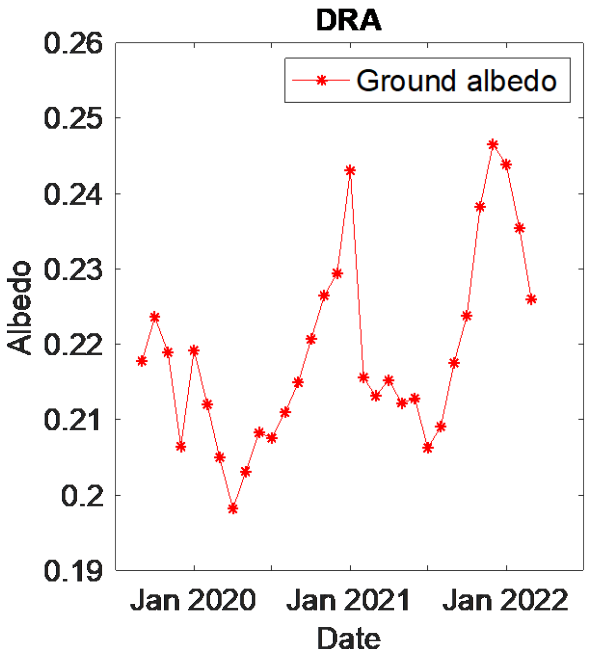
# Satellite and Ground Albedos over Desert Rock

- Apparent interannual albedo variation has been observed from the monthly albedo plots demonstrated in SURFRAD webpage (**Left figure**). Since this trend is insignificant in satellite albedo, thus we tried to analyze it.
- We plotted the monthly mean albedo locally and observed similar but less significant interannual variation (**Middle figure**). The difference with the left figure results from the different methods to calculate monthly mean from ground radiation measurements.
- We plot the monthly mean albedo with clear-sky days only and found the seasonal trend is more stable (**Right figure**), while the ground albedo demonstrate a systematic increase in recent two years.

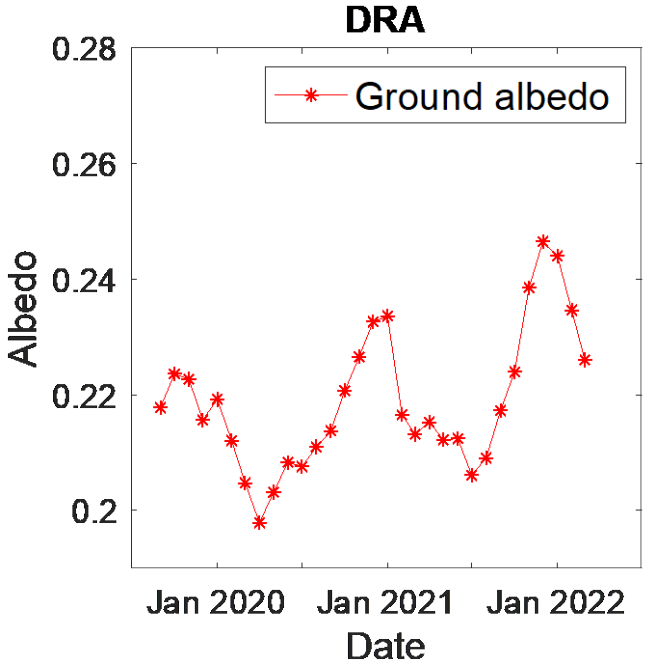
**Monthly mean albedo plot by SURFRAD**




**Monthly mean albedo local with all days**



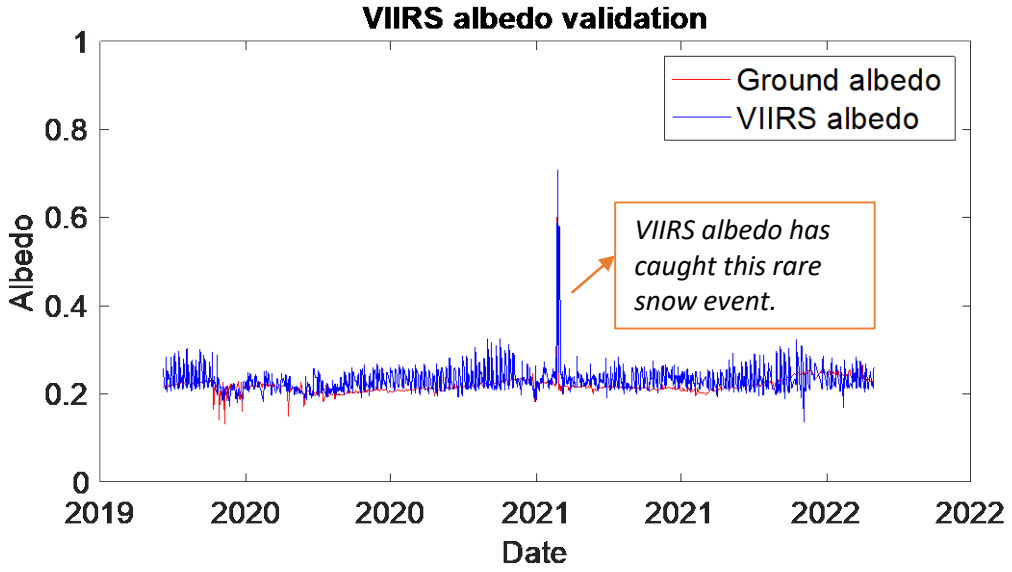

**Monthly mean albedo local with clear-sky days**



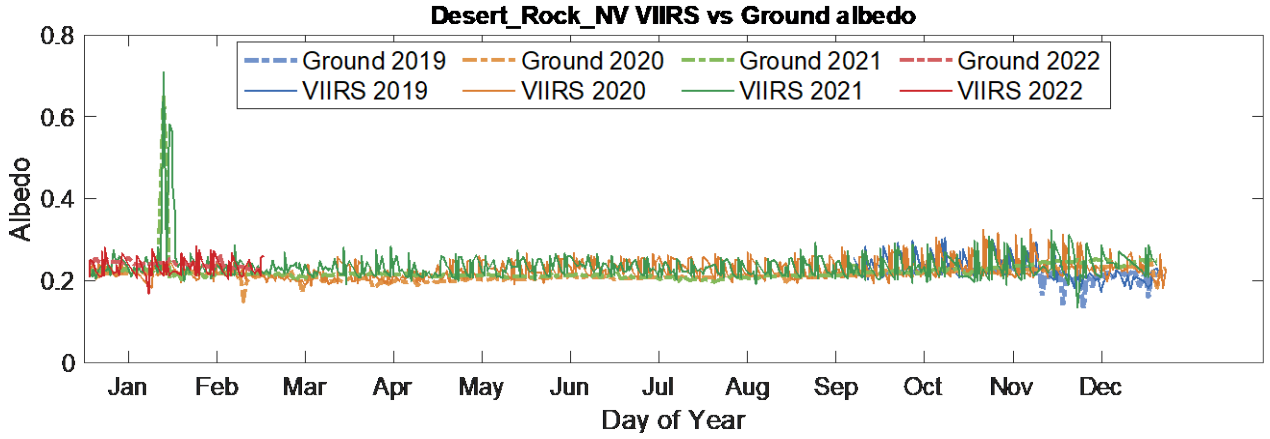
# VIIRS albedo vs. ground over Desert Rock

Satellite albedos, including VIIRS and Landsat data were deployed to observe the interannual albedo feature over DRA site. Generally, satellite observations are quite stable in recent years.

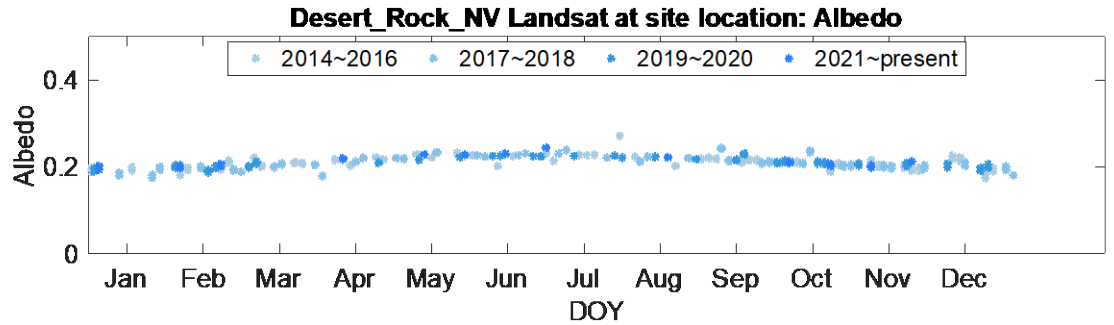
## Daily mean albedo comparison

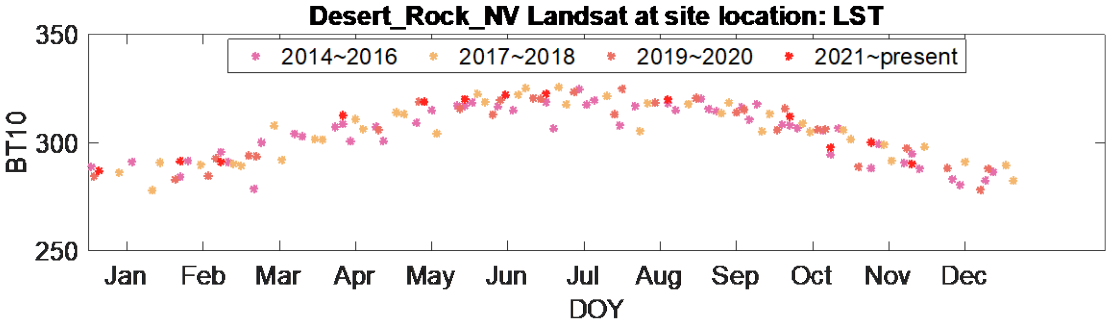


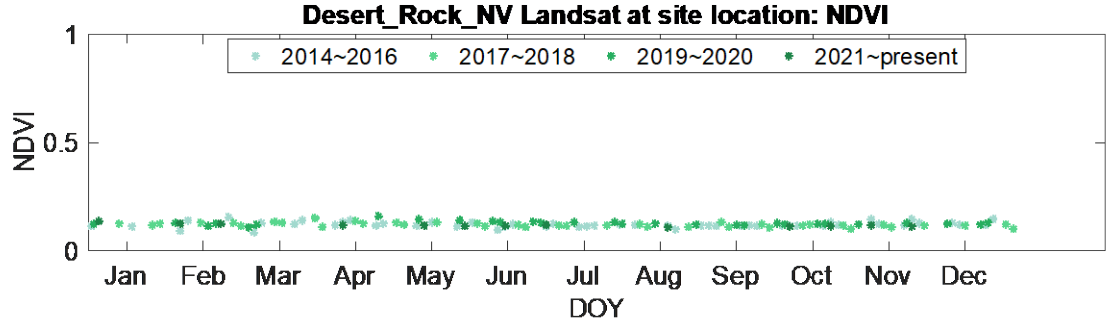

## Daily mean albedo comparison with each year separated




## Landsat Data plot with two-year groups

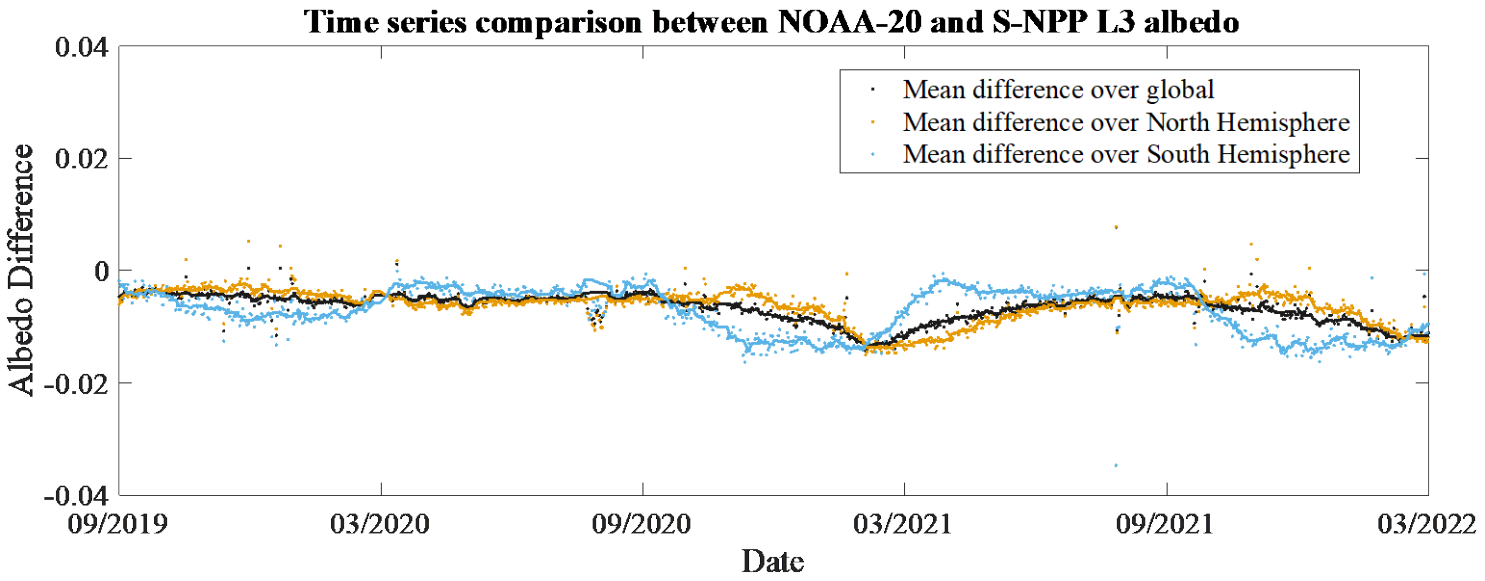


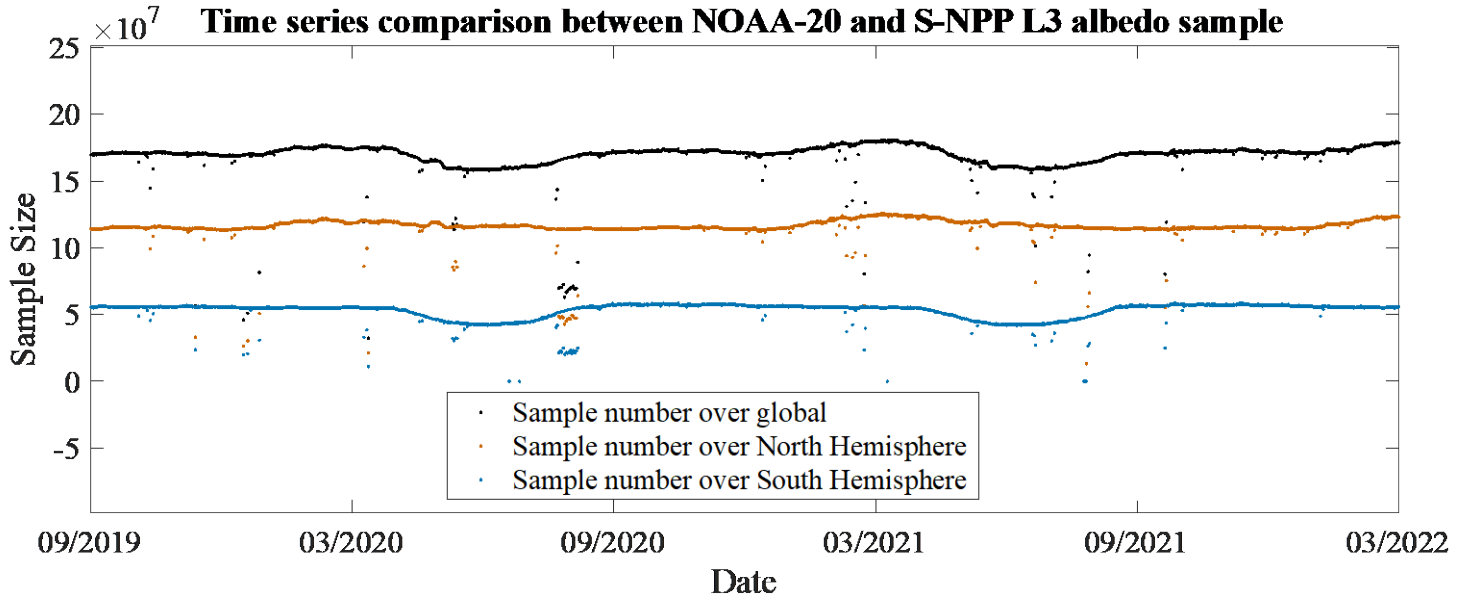



# L3 Enterprise albedo monitoring

- With more L3 albedo accumulated after validated provisional review, the consistency between S-NPP and NOAA-20 albedo was evaluated in global range and two hemispheres
- Global consistency is observed between NOAA-20 and S-NPP global albedo.
- The maximum difference is <-0.02 and S-NPP mean albedo is larger, dominated by snow and ice albedo coverage
- Some outliers out of the trend line is related to the incomplete coverage over globe due to regional satellite data missing

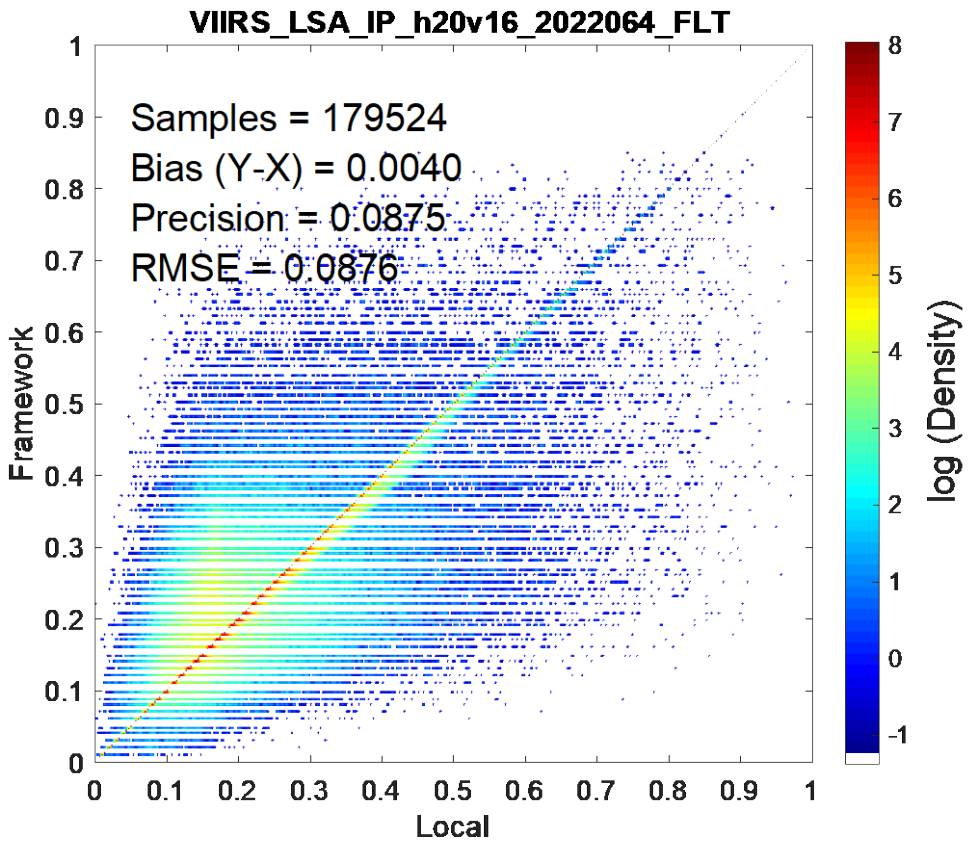


# Enterprise albedo v2r0 DAP verification

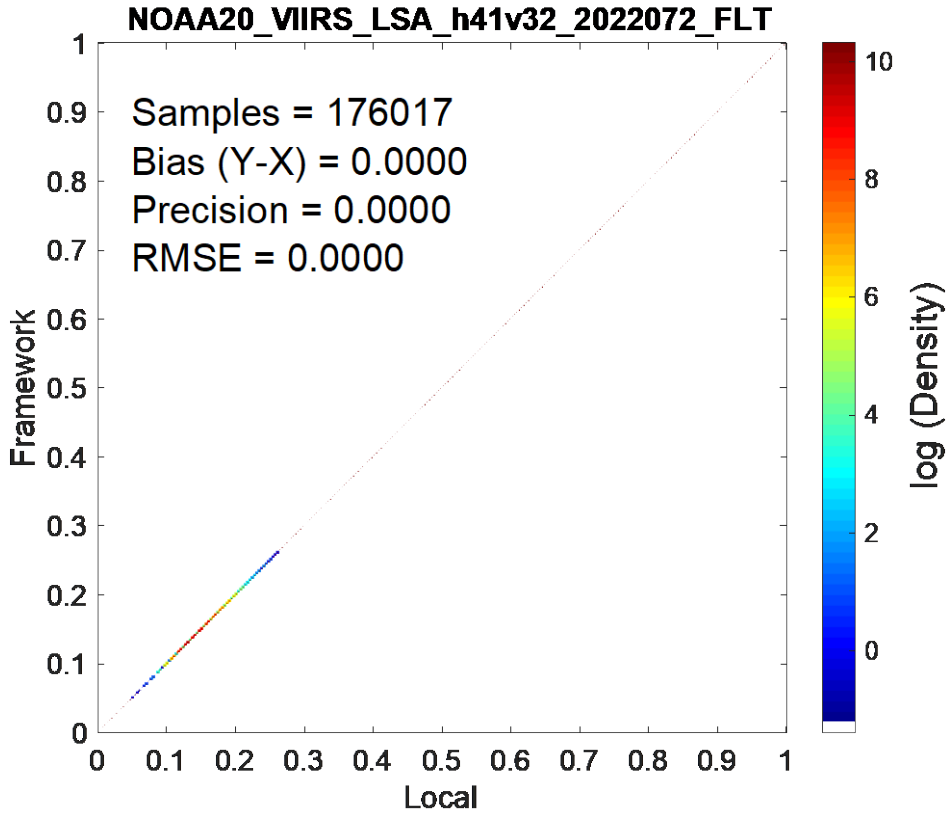
- Assisted the Framework to verify the NRT output
- The online clear-sky part commits between local and framework
- The offline output from framework commits well with local output finally

First comparison case




*After the issue figured out*

Second comparison case



# Vegetation Index and Green Vegetation Fraction

*March 2022*

## *Accomplishments / Events:*

- Researched methods for improving consistency between polar-orbiting and geostationary VI. Tested possible applicability of one of these methods to GOES-R ABI and NOAA-20 VIIRS data.
- Due to recent server and surface reflectance updates in OSPO, the local run GVF was compared with the operational GVF to verify the consistency of the operational GVF.
- Mingshi Chen left the vegetation products team, so his code and documentation were transferred to other team members. Trial local runs of Mingshi's VI and GVF code were performed.

## *Overall Status:*

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

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

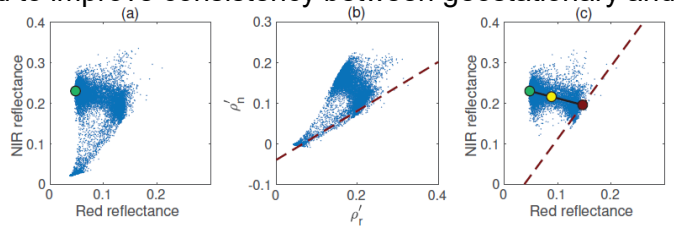
## ***Issues/Risks:***

None

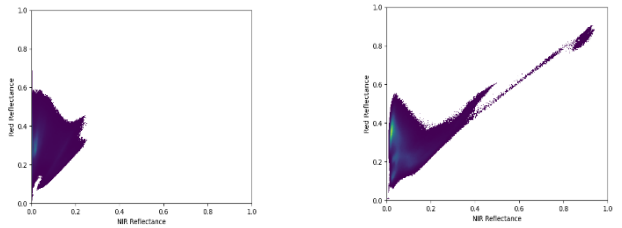
| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 10/29/21 | |
| Prototype code of 1km global GVF product | Oct-21 | Dec-21 | Dec-21 | |
| Prototype of VI generation using ABI data | Feb-22 | Feb-22 | Feb-22 | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | Mar-22 | Mar-22 | 03/29/22 (code & docs) 04/08/22 (data) | |
| LAI data development plan ready | Mar-22 | Mar-22 | | NPPWG project reschedule pending |
| Technical readiness of 1km GVF development | May-22 | May-22 | | |
| Operational support readiness of J2 VI and GVF products | Jun-22 | Jun-22 | | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Ground measurements collection and processing. LAI experimental product preliminary in-situ validation and cross-comparison with other products. | Sep-22 | Sep-22 | | |
| Calibration/Validation update for SNPP and NOAA20 VI and GVF products | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## *Highlights:*

From Obata et al. (2021): NIR vs. red reflectance plots showing vegetation and soil tie points used in method to improve consistency between geostationary and LEO vegetation index.




Plots of NIR vs. red reflectance from GOES-R ABI (below left) and NOAA-20 VIIRS (below right) show that method may be applicable to these data as well.

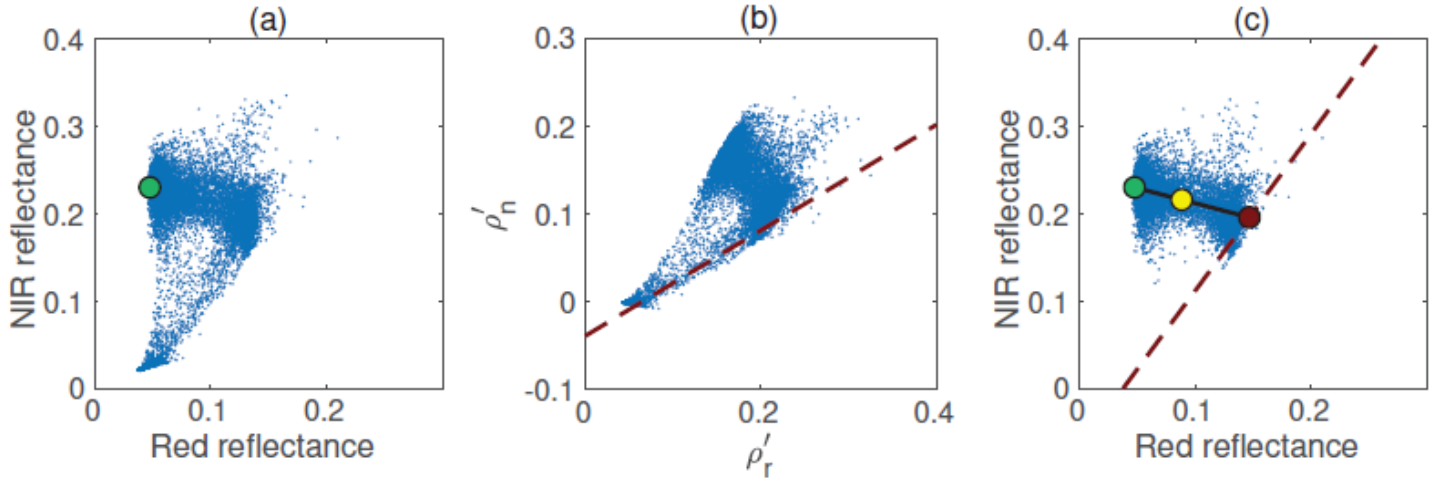


# Geostationary and polar-orbiting satellite VI consistency issue and proposed solution

- Geostationary (GEO) satellites now have the capability of producing vegetation indices at comparable resolution to those produced by low Earth orbit (LEO) satellites, and with higher temporal resolution
- GEO VIs have different characteristics from LEO VIs, due to different spectral response functions and different solar/ view geometries
- It would be desirable to combine GEO and LEO VIs to generate as spatially and temporally detailed a VI product as possible
- Obata et al (2020, 2021) have suggested a method for adjusting GEO NDVIs for improved compatibility with LEO NDVIs
- This method depends on determining vegetation and soil tie points ($\rho_v$, $\rho_s$) that each consist of a red and NIR reflectance value pair

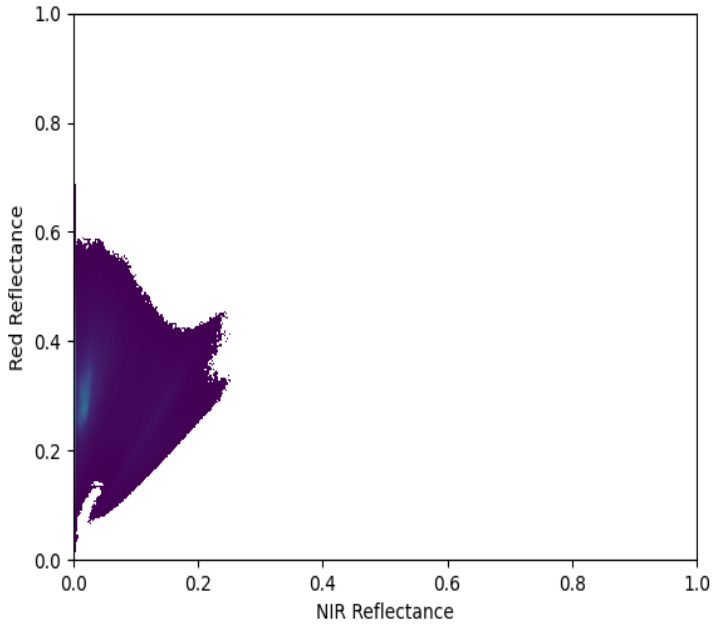
# How to find $\rho_v$, $\rho_s$?

- $\rho_v$: Compute SAVI for all red, NIR reflectance pairs. Find those that are within the 90$^{th}$ ± 1 percentile of all SAVI. Then sort those in ascending order of red reflectance. Those with the lowest 5% of red reflectances were selected, then averaged to generate $\rho_v$. (green in figure below)
- $\rho_s$: Find "soil line" in red, NIR reflectance space (including water bodies). The red, NIR reflectance space had to be rotated in order to find the soil line. Quantile regression was then performed. Mean red and NIR reflectances of non-water points were found (yellow), then the line connecting that point with $\rho_v$ was extended to the soil line to determine $\rho_s$ (red) (figure from Obata et al. 2021)

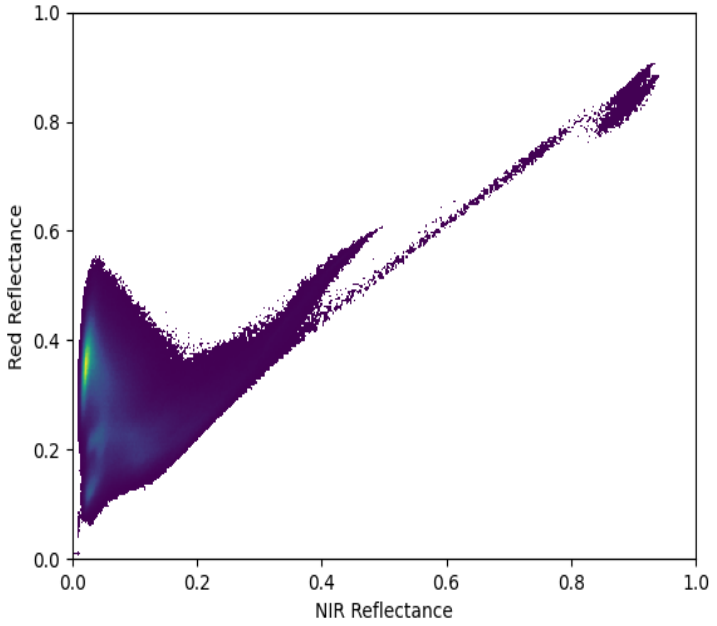


# $\rho_{red}$ vs $\rho_{NIR}$ plots using global ABI and VIIRS data demonstrate possible applicability of Obata et al. (2020, 2021) methods

GOES-R ABI



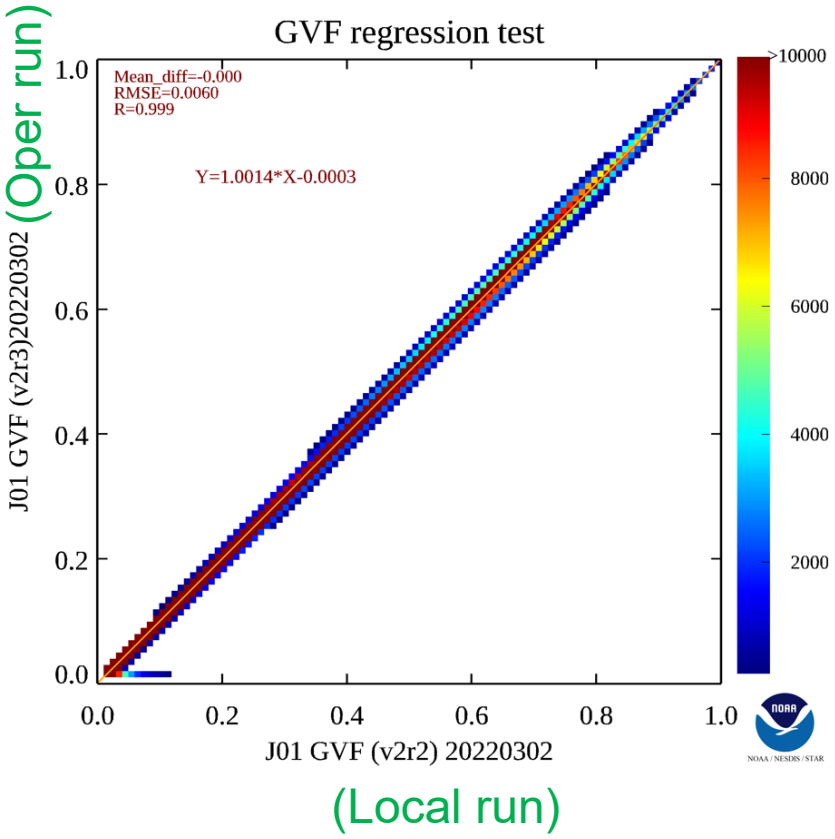

NOAA-20 VIIRS




- Vegetation and soil lines are clearly visible
- Relationships are clearly different between the two instruments
- Could derive tie points using Obata et al. (2020, 2021) or other methods

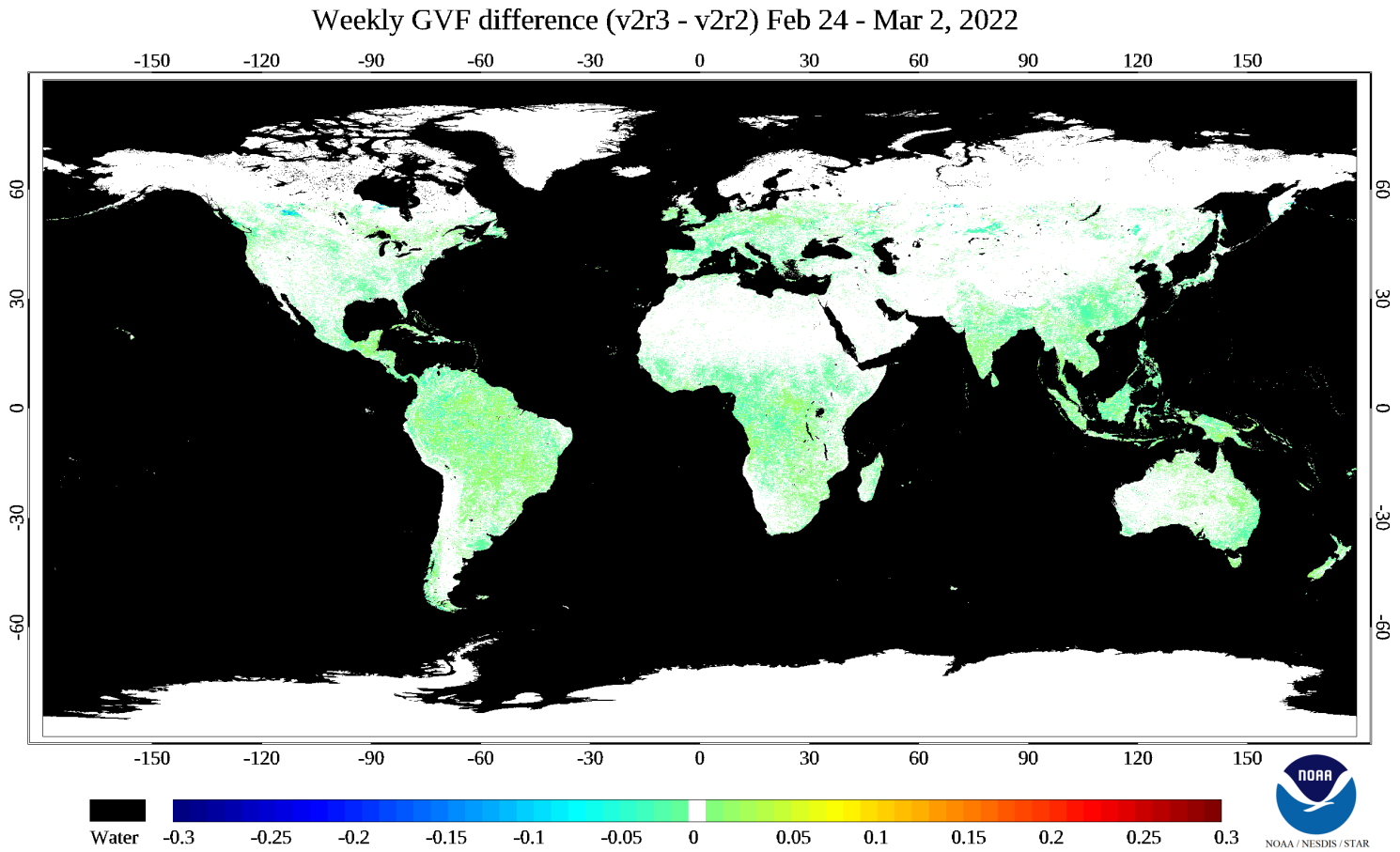
# Compared operational GVF with local run GVF

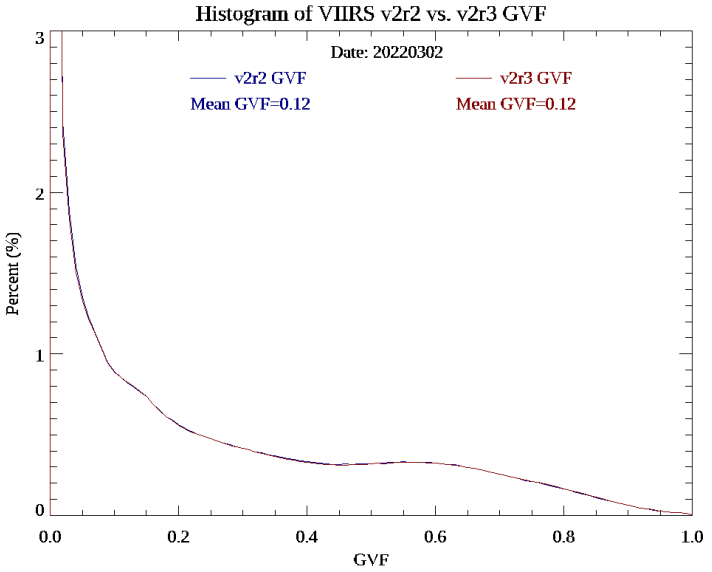
- OSPO requested a comparison of the operational GVF with the local run GVF due to the following changes at OSPO:
  1. NDE server system has been updated from RH6 to RH7 recently.
  2. Also, SR has been updated to new version (v1r2)
- Local run J01 GVF for Mar 1-3, 2022 was completed and sent to OSPO
- The scatter plot showed the operational run GVF matched the local run GVF very well (bias=0, RMSE=0.006)

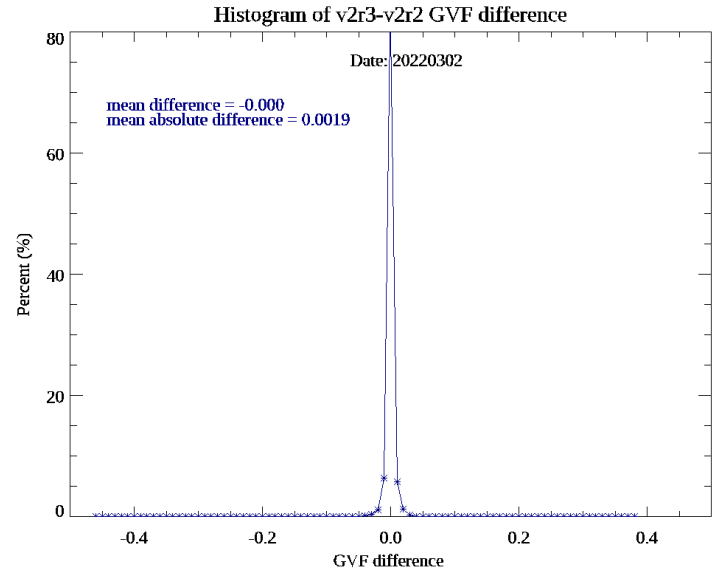


# Operational GVF vs local run GVF comparison

- The GVF difference map showed very small differences between the operational GVF and the local run GVF
- Histograms of the two global GVF data sets matched very well



# Acquired DAP Code and documents from Mingshi Chen

- Other NVPS staff obtained GVF code and documents from the most recent DAP (delivered on May 17, 2021) from Mingshi Chen since he left our team on March 4, 2022.
- Code:
  - NVPS_GVF_v3r0_20210517.tar.gz
  - NVPS_VI_v2r1_20210517.tar.gz
- Documents
  - VI ATBD (VIIRS_VI_ATBD_v3r0_20210517)
  - GVF ATBD (VIIRS_NVPS_GVF_ATBD_v4r1_20210517_final)
  - SMM (VIIRS_NVPS_SMM_v1r4_20210517_final)
  - EUM (VIIRS_NVPS_EUM_v4_20210517_final)
  - Readme (README_NVPS_DAP_20210517_final)
  - Memo (Memo_NVPS_DAP_v3r0_20210517_final)
- water mask
  - GVF water mask
  - Block_Water_Mask
  - TileLandMask
- Sample code runs on local system were performed

# Vegetation Health

*March, 2022*

## *Accomplishments / Events:*

- Drafting a manuscript on our research on the radiation product and crop yield, kept on updating various figures and tables;
- While drafting the manuscript, felt the need to introduce a new variable combining VCI, TCI and RCI to complete the logic of the manuscript, so a related dataset was produced, regional average according to several types of masks was calculated, and correlation calculation with crop yield was performed (highlighted);
- Communicated with users on various queries relating to VH Products;
- Generated a series of data and figures of VIIRS/VHP-1 and -4, -16 km resolution products, covering March 2021;

## *Overall Status:*

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

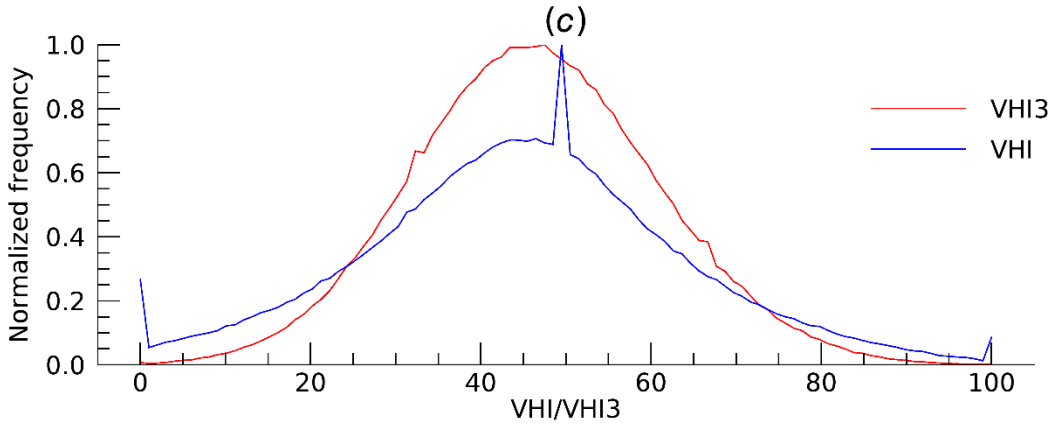
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

### ***Issues/Risks:***

None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | Not needed |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates, initial/final DAPs combined) | Dec-21 | Dec-21 | 12/20/21 | |
| Algorithm: VHindices-Malaria (South America) | Sep-22 | Sep-22 | | |
| VIIRS-0.5 km SMN & SMT (8-year Max-Min Climatology) | Sep-22 | Sep-22 | | Not needed |
| 40-year Vegetation Greenness (NDVI) & Global warming | Sep-22 | Sep-22 | | |
| Climate warming & temperature (SMT) in agricultural regions | Sep-22 | Sep-22 | | |
| FAO locust activity vs VHindices in 2021 | Sep-22 | Sep-22 | 01/12/22 | |
| NDVImax/min & BTmax/min: 0.5 and 1 km correlation | Sep-22 | Sep-22 | | |
| Regional drought and global warming trends | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## *Highlights: Comparison of Histogram of VHI and VHI3: (VCI+TCI+RCI)/3*



# Ocean Color

March, 2022

## *Accomplishments / Events:*

- Held March 2022 NOAA CalVal cruise support at the Hawaii MOBY site
- The Ocean Color Team participated The Ocean Sciences Meeting (virtual), February 24-March 4, 2022, and contributed 7 oral presentations in the conference.

## *Overall Status:*

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

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

## ***Issues/Risks:***

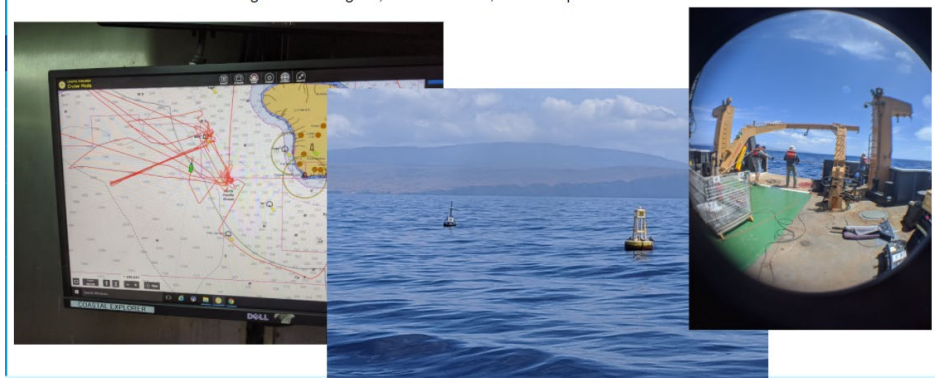
None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 11/01/21 | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| J2 ready DAP to CoastWatch (include NPP/N20 updates) | Dec-21 | Dec-21 | 10/29/21 | cc ASSISTT |
| Re-deliver the J2 DAP to CW | | | 01/28/22 | |
| J2 ready DAP to ASSISTT (include NPP/N20 updates) | Mar-22 | Mar-22 | Mar-22 | CoastWatch delivery |
| J2 ready DAP to Cloud (include NPP/N20 updates) | Jun-22 | Jun-22 | | ASSISTT delivery |
| Support CoastWatch/ASSISTT for J2 OC MSL12 testing/verification, if needed | Sep-22 | Sep-22 | | |
| J2 OC data processing (MSL12) ready for J2 launch | Sep-22 | Sep-22 | | |
| Start mission-long VIIRS OC data reprocessing | Mar-22 | Aug-22 | | J2 DAP issues |
| Evaluation of MSL12 ver 1.51 performance over global ocean | Sep-22 | Sep-22 | | |
| Producing consistent VIIRS SNPP and NOAA-20 ocean color products | Sep-22 | Sep-22 | | |
| Cal/Val team complete the 7th VIIRS ocean color dedicated cruise | Jul-22 | Jul-22 | | |
| Improvement of the OCView tool or web presentation | Aug-22 | Aug-22 | | |
| Continue working on improvement of the ocean color data processing system (MSL12), particularly over global coastal and inland water regions | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## *Highlights: VIIRS Cal/Val Cruise March 7-18 2022*

| STAR FY22 QPR Q2 (Jan, Feb, Mar) | VIIRS Calibration Validation Cruise (March 7 to 18, 2022) |
|---|---|

On March 2022, VIIRS Calibration and Validation team had a Cruise around the MOBY site. MOBY team had deployed new tech refreshed MOBY (MarONet) just in time for this cruise along with current MOBY272 deployment. The cruise marks the start of cross over between heritage MOBY to new MarONet/MOBY-Refresh. Also, will be a basis for the cross calibration and validation among in situ biological, environmental, and bio-optical measurements..



# Sea Surface Temperature

*March, 2022*

## *Accomplishments / Events:*

- Backfilling of VIIRS v2.80 SST datasets in Physical Oceanography Distributed Active Archive Center (PO.DAAC; https://podaac.jpl.nasa.gov/) continues. The links to landing pages and data are: NPP L2P: https://doi.org/10.5067/GHVRS-2PO28; N20 L2P: https://doi.org/10.5067/GHV20-2PO28; NPP L3U: https://doi.org/10.5067/GHVRS-3UO28; N20 L3U: https://doi.org/10.5067/GHV20-3UO28). It will take up to 3 months to fully populate the NPP (2012-on) and N20 (2018-on) archives.
- Work on preparation for N21 launch continues. SST online monitoring systems SQUAM, MICROS, ARMS are being updated to be ready for N21 Cal/Val.
- Analyses of ACSPO Clear Sky Mask (ACSM) continues aimed at improved and more streamlined and efficient processing. The plan is to release the improved ACSM in ACSPO 3.0 by Dec 2023.
- Analyses of improved SST algorithms continues. The plan is to include improved retrievals in ACSPO 3.0 due for release by Dec 2023.
- Analyses towards Daily gridded Supercollated SST products (from 2 VIIRSs and 2 Metop-FGs) continues.

## *Overall Status:*

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

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

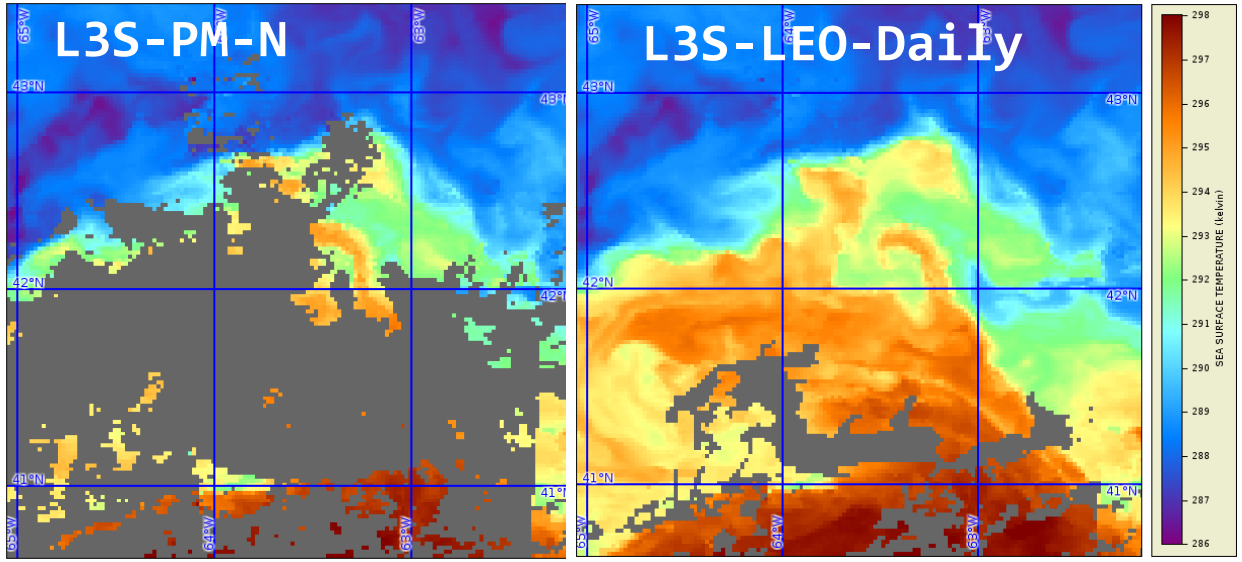
## ***Issues/Risks:***

Tonga volcanic eruption may result in cold SST biases of unknown magnitude.

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (no science code update: initial/final combined) | Dec-21 | Dec-21 | 12/15/21 SPSRB docus (EUM, SMM) | if needed (e.g., update for Intel 19.0.5, filename change, etc) |
| Continue development of ACSPO 2.90. Improve Clear-Sky Mask & SST Algorithms. Focus on NPP/N20 SST consistency | Aug-22 | Aug-22 | | |
| Integrate in ACSPO. Test in STAR environment. Include N21 functionalities in NOAA Match-Up code/Monitoring | Aug-22 | Aug-22 | | |
| Continue NOAA SQUAM and ARMS monitoring & validation against iQuam. Provision for N21 infrastructure | Aug-22 | Aug-22 | | |
| Maintain ACSPO, SQUAM, iQuam, ARMS, match-up & RAN infrastructure & codes. Improve/optimize/add N21 | Sep-22 | Sep-22 | | |
| Monitor SST performance online. Identify anomalies. Work w/SST Algorithms & SDR Team and archives to address | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## *Highlights:*

SST off the US East Coast, 30 Sep 2019. Left: Night composite of 2 VIIRSs. Right: Night & Day composite of 2 VIIRSs + 2 Metop's. Note improved coverage



# VIIRS Polar Winds

March, 2022

## *Accomplishments / Events:*

- **Global Doublet Tandem VIIRS winds - Working Quality Control**. A month-long (October 2021) test period of Global Doublet Tandem VIIRS winds were generated using alternating SNPP and NOAA-20 passes, which are reprojected into 6 sectors: North pole, South pole, North hemisphere ascending, North hemisphere descending, SH ascending, SH descending. These winds are compared to radiosondes to check not only the quality of the winds, but to further check the ability of the quality control (QC) to retain the best quality winds, which is based on a novel approach. Results show that in NWP operations, the Tandem VIIRS winds can be used with a QI threshold of 60 to meet requirements, though a more robust period of validation is needed.

## *Overall Status:*

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

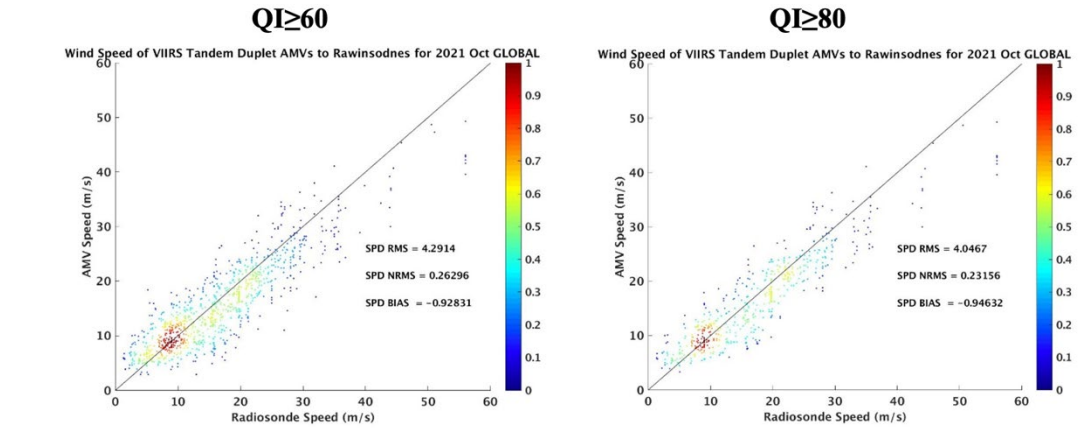
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

## ***Issues/Risks:***

None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 10/28/21 | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | May-22 | May-22 | | |
| Super DAP v3.1 patch delivery | | | 12/06/21 | |
| Implement VIIRS tandem winds | Mar-22 | Mar-22 | Dec-21 | Running routinely at CIMSS |
| Generate new lookup tables, retrieval coefficients for JPSS-2 | Sep-22 | Sep-22 | | |
| Continuous monitoring of S-NPP and NOAA-20 products | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

*Highlights: Further analysis of Tandem Wind Accuracy shows reasonable bias/rms compared with rawinsondes*




*VIIRS minus RAOB wind speed scatterplot for QI ≥ 60 and QI ≥ 80 for all available cases during October 2021. The colorbars on the right side are the density distributions.*

# NUCAPS Products

March, 2022

## Accomplishments / Events

- NUCAPS Team manuscript: "Temperature-Dependent Optical Constants of Water in the Thermal Infrared Derived from Data Archaeology", Status: Accepted for publication in Optics Continuum
- NUCAPS team optimized the Ammonia retrievals through CrIS specific parameters and thresholds and compared the Ammonia retrievals with the AIRS Ammonia retrievals. The NUCAPS team is currently working on finalizing the SARTA wrapper scripts to include NH3 retrieval as part of the NUCAPS operational products.
- Continued support the CrIS SDR team on the evaluation of impacts on the NUCAPS EDR products from the NOAA CrIS sensor anomaly due to temperature sensor failure. The results indicated that there is no apparent degradation in the NUCAPS EDR and OLR products.
- Continued work on extending the AMS-presentations into journal article publications. In this context, the NUCAPS analyzed a large array of focus day results for, (1) damping factor optimizations, and (2) ozone a-priori improvements.
- Continued work on the NUCAPS implementation for the NCIS Cloud infrastructure; Continued work on three major updates, (a) averaging kernels, (b) ozone climatology improvements, and (c) surface corrections to the NUCAPS V3.1 for mission long reprocessing.
- Continued evaluation of the MetOp-B/C NUCAPS with the EUMETSAT derived products using an ensemble of 12 focus days of NUCAPS products matched with truth data sets (ECMWF, TCCON, and Aircore data) spanned across a year covering different seasons.

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 11/10/21 | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | Mar-22 | Mar-22 | 04/08/22 | |
| NUCAPS Averaging Kernels (AK) and improved stability indices. S-NPP Mission long reprocessing version (NUCAPS v3.1) | Dec-21 | May-22 | Submitted User Request Form/Change Request | Waiting on OSPO Approvals |
| Addition of Ammonia product to NUCAPS operational retrievals ( NUCAPS v3.2) | May-22 | May-22 | | Optimized NH3 for CrIS |
| NUCAPS augmentation for EPS-SG (NUCAPS v3.3) | Jul-22 | Jul-22 | | |
| NUCAPS IR-only retrieval for risk mitigation and conceptual GEO-CrIS retrieval products (NUCAPS v3.4) | Jan-22 | Jan-22 | Results published in a joint paper with the CrIS SDR team | No plans yet for an operational DAP |
| Land, Snow/Ice and Ocean Spectral Emissivity Improvements | Mar-22 | Mar-22 | Mar-22 | Paper accepted for publication |
| Reactive maintenance and Improvements to surface emissivity first guess using CAMEL, temperature lower-tropospheric bias improvements over land, optimized cloud clearing and Local Angle Corrections (LAC) for S-NPP/NOAA-20 NUCAPS | Sep-22 | Sep-22 | | |
| NOAA-GML Theme 1: NUCAPS trace gas product validation with corroborative data sets and collaboration with GML and other stakeholders in support of NOAA/NESDIS initiatives | Sep-22 | Sep-22 | | continuing |
| NOAA-GML Theme 2: NUCAPS ozone and water vapor products validations with CLIMCAPS and O3SNDS, and collaboration with GML and other stakeholders in support of NOAA/NESDIS initiatives | Sep-22 | Sep-22 | | continuing |
| Routine monitoring of trace gas products, T(p) and q(p) bias improvements | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## Overall Status:

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

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

## Issues/Risks:

None

# Ammonia Retrievals from NUCAPS CrIS

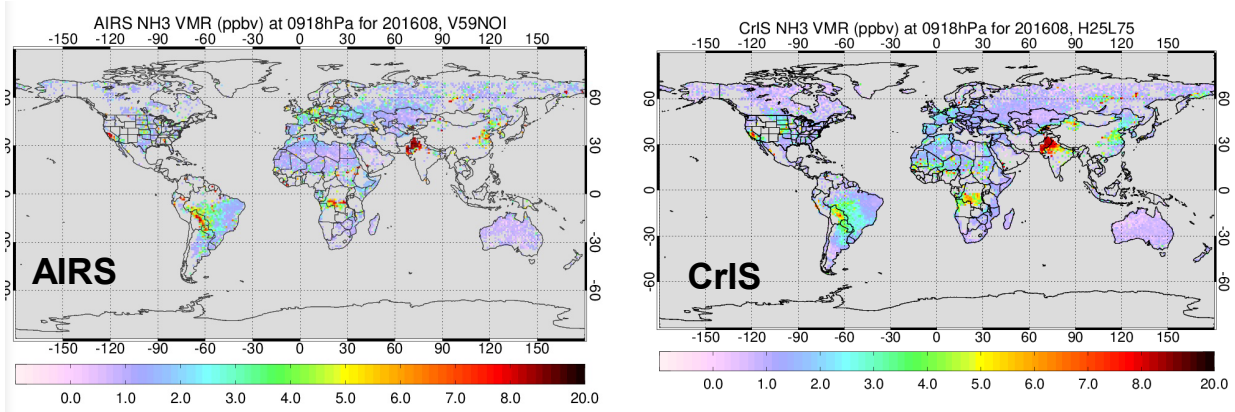



Figure shows an evaluation of the CrIS optimized Ammonia retrievals with the AIRS retrievals for August 2016. The NUCAPS team optimized the Ammonia retrievals through developing parameters and thresholds specifically for CrIS and is currently working on finalizing the SARTA wrapper scripts to include NH3 retrieval as part of the NUCAPS operational products.

# MiRS Products

March, 2022

## Accomplishments / Events:

- In preparation for the planned launch of the next generation of European polar orbiting satellites (EPS-SG), EUMETSAT has generated an updated set of Microwave Sounder (MWS) proxy data, the follow on sensor to AMSU and MHS. MiRS is being.extended to process MWS data. The MiRS software has been successfully tested on the latest proxy data (see highlights). Comparisons with ERA5 reanalyses also show good agreement between the MiRS retrieval and the reanalysis.

## Overall Status:

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

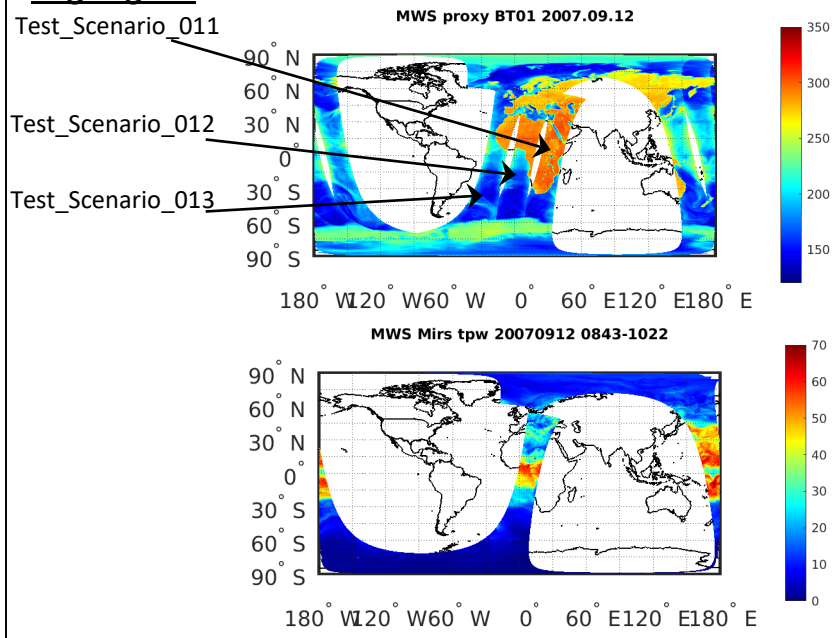
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

## Issues/Risks:

None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Patch DAP delivery (to ASSISTT) | | | V11.6 10/19/21<br>V11.8 10/28/21<br>V11.8 11/17/21 | |
| MiRS 11.6 Patch Delivery (Patch DAP for MiRS (J1, J2, S-NPP) | | | 12/30/21 | To NDE |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | Mar-22 | Mar-22 | 03/31/22 | |
| Complete collocation and evaluation of experimental MiRS-TC version for one year of Atlantic and Pacific basin TCs in 2020 | Jan-22 | Jan-22 | Jan-22 | |
| Update snow and ice emissivity catalogs (look-up tables) for EPS-SG/MWS to account for polarization differences at 23 and 31 GHz | Apr-22 | Apr-22 | | |
| Develop AI (post processing) approaches to precipitation retrieval in MiRS, leveraging the collocated MiRS-MRMS datasets for training and validation | Jun-22 | Jun-22 | | |
| MiRS DAP (v11.9 or v11.10): integrate SFR algorithm updates, code/science improvements, final pre-J2 launch delivery | Jul-22 | Jul-22 | | |
| Begin reprocessing entire JPSS mission data for both SNPP and N20 using latest version of MiRS. Complete reprocessing for SNPP for the period 2011-2015 | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe; May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## Highlights:




*Top: EUMETSAT channel 1 (23 GHz) MWS proxy data for three different quality control scenarios. Bottom: MiRS retrieved total precipitable water for test scenario 12.*

# Snowfall Rate

March, 2022

## Accomplishments / Events:

- Study is ongoing to improve Metop-B and Metop-C SFR algorithms with machine learning (ML) techniques. Two ML models have been trained for each satellite to perform ice water path initialization and SFR bias correction. Compared to the operational version, the snowfall produced with the ML enhanced algorithms is in noticeably better agreement with the EUMETSAT reanalysis ERA5. Specifically, it largely mitigates the issue of light snow overestimation while improves the underestimation issue associated with heavy snow. However, orographic snowfall remains a challenge and will require focused study in the future.

## Overall Status:

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

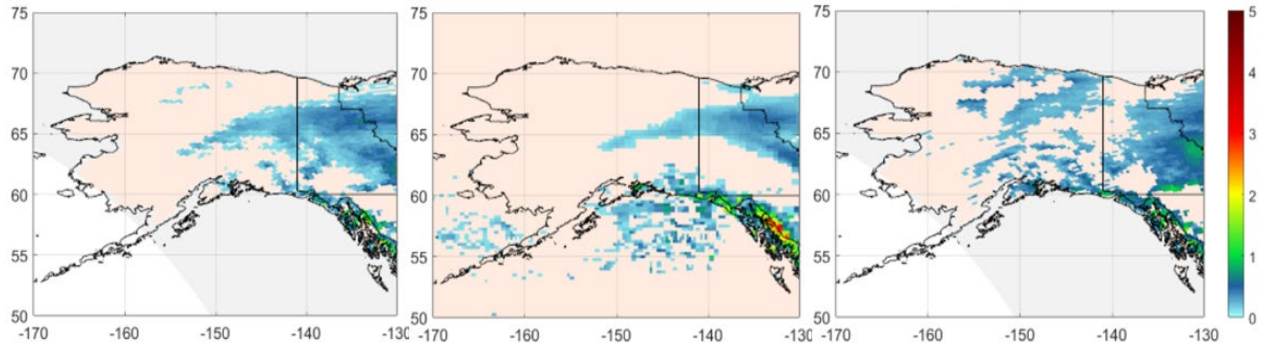
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

## Issues/Risks:

None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| Final J2 ready DAP to NDE (include NPP/N20 updates) | Mar-22 | Mar-22 | 03/31/22 | |
| Patch DAP delivery (to ASSISTT) | | | V11.6 10/19/21<br>V11.8 10/28/21<br>V11.8 11/17/21 | |
| MiRS 11.6 Patch Delivery (Patch DAP for MiRS (J1, J2, S-NPP) | | | 12/30/21 | To NDE |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Develop NOAA-20 ML Snowfall Detection model. Improve SFR algorithm through ML | Jun-22 | Jun-22 | | |
| NOAA-20 and S-NPP cross-calibration & comparison after algorithm update | Aug-22 | Aug-22 | | |
| NOAA-20 and S-NPP stratified validation after algorithm update | Aug-22 | Aug-22 | | |
| SFR near real-time webpage, operational monitoring | Sep-22 | Sep-22 | | |
| Implement ML ATMS SD in the Enterprise SFR system | Sep-22 | Sep-22 | | |
| Deliver ATMS SFR with ML SD to MiRS | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | |

## Highlights: Improving Metop-C SFR with Machine Learning




Snowfall rate in Alaska on November 25, 2021. (Left) Metop-C SFR with ML enhancement; (middle) EUMETSAT reanalysis ERA5; and (right) operational Metop-C SFR. The ML algorithm has less overestimation issue than the operational version with light snowfall. However, it still underestimates the intense orographic snowfall at the southwestern Alaska and Canadian border.

# OMPS Ozone (V8Pro, V2Limb & V8TOz)

*March, 2022*

## *Accomplishments / Events:*

Organized and chaired the GSICS UVN Spectrometer session at the annual meeting and gave two talks.

Continuing to study V2Limb infrequent Cloud Height failures at NDE.

Discrepancies between the Enterprise V8TOz (EV8TOz) and the OSPO version as applied to GOME-2 were identified and new analysis is proceeding.

Assisting in the creation of the NOAA User Readiness Plan for Atmospheric Composition observations from Space (NURPACS)

Drafting product requirements for SAT Atmospheric Composition (Ozone) products.

Participated in CEOS Atmospheric Composition Virtual Constellation and CEOS Working Group on Cal/Val meetings.

## *Overall Status:*

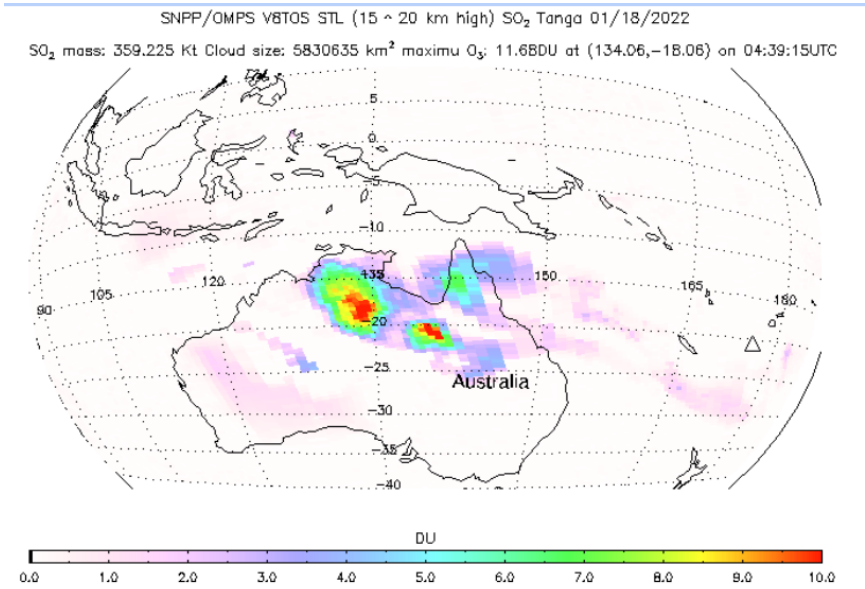
| | Green[1] (Completed) | Blue[2] (On-Schedule) | Yellow[3] (Caution) | Red[4] (Critical) | Reason for Deviation |
|---|---|---|---|---|---|
| **Cost / Budget** | | X | | | |
| **Technical / Programmatic** | | X | | | |
| **Schedule** | | X | | | |

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

***Issues/Risks:None***

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | 10/26/21 | |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Final J2 ready DAP to NDE (include NPP/N20 updates), V8TOz | Jan-22 | Jan-22 | 02/03/22 | |
| Final J2 ready DAP to NDE (include NPP/N20 updates), V8Pro | Apr-22 | Apr-22 | | To ASSISTT: 02/17/22 |
| Revise Cal/Val Plan to include JPSS-2 Limb and draft schedule | Dec-21 | Dec-21 | 12/09/21 | |
| Update Version 2.5Limb, three improved Climatologies, Cloud Top, Repaired | Jan-22 | Jan-22 | Jan 22* | *Cloud Top not resolved |
| Version 2.7 Limb Profile SDR and EDR (include J2 LP) | Sep-22 | Sep-22 | | To ASSISTT: Apr-22 |
| J2 Radiative Transfer & Bandpass Tables for V8Pro and V8TOz | Sep-22 | Mar-22 | Jan-22 (for V8TOz) | |
| Soft calibration adjustments for V8TOz (TC) and V8PRo (NP)<br>NPP reprocessing for V8Pro & V8TOz | Nov-21<br>May-22 | Feb-21<br>Apr-22 | **11/26/21 (TC)<br>02/17/22 (NP)** | SDR Delays |
| N20 V8Pro and V8TOz reprocessing | May-22 | May-22 | | |
| Limb Darks and Orbital Definition files: Weekly ancillary file deliveries to PDA / NDE | Sep-22 | Sep-22 | | Ongoing |
| Overpass data sets and comparisons to GB and MERRA2 | Sep-22 | Sep-22 | | Ongoing |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | As Needed |
| Participant/support JPSS-2 pre-launch testing events (Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE) | Sep-22 | Sep-22 | | Ongoing |

## Highlights: Visualization of NPP OMPS SO2 cloud from Tonga eruption



# GCOM-W1 Products

*March, 2022*

## *Accomplishments / Events:*

- Monthly Mean VIIRS Sea Ice Concentration Has Similar Structure but Higher Concentrations than NSIDC Product. The Cryosphere team is looking at GCOM-W1 AMSR2 Sea Ice Concentration to help determine the reason for the differences, as NSIDC is based upon multiple passive microwave instruments including AMSR2.
  - VIIRS product is at a much higher resolution and therefore more likely to produce a higher SIC value for a given grid cell, especially in the pack ice.
  - n melting environments VIIRS produces higher SIC values compared to passive microwave (ASMSR2), which tends to underestimate SIC
  - Improvements in the VIIRS product are also possible by including weighting techniques that consider additional information, such as scan and solar angles. It is also possible to blend the products with AMSR2, as presented by the CIMSS team in a recent publication.

## *Overall Status:*

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

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

### ***Issues/Risks:***

None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| AMSR-3 Cal/Val Plan - draft delivery | Jan-21 | Jan-22 | Jan-22 | |
| AMSR-3 Cal/Val Plan - final delivery | Jun-22 | Jun-22 | | |
| AMSR-3 ready DAP to ASSISTT (include AMSR-2 updates) | Jun-22 | Jun-22 | | |
| AMSR-3 ready DAP to NDE (include AMSR-2 updates) | Sep-22 | Sep-22 | | |
| Algorithm Updates Review | Sep-22 | Sep-22 | | |
| Assessment of new algorithms for enterprise algorithms for both AMSR2 and AMSR3 | Jun-22 | Jun-22 | | |
| Reprocessing of L2 EDR's (Full L2 products from launch through July 2022) | Jul-22 | Jul-22 | | |
| Continue AMSR2 L1 monitoring; develop AMSR3 capabilities | Sep-22 | Sep-22 | | |
| Support ASSISTT/NDE evaluation as required/needed | Sep-22 | Sep-22 | | |

## *Highlights:Differences between VIIRS and NSIDC Sea Ice Concentration*

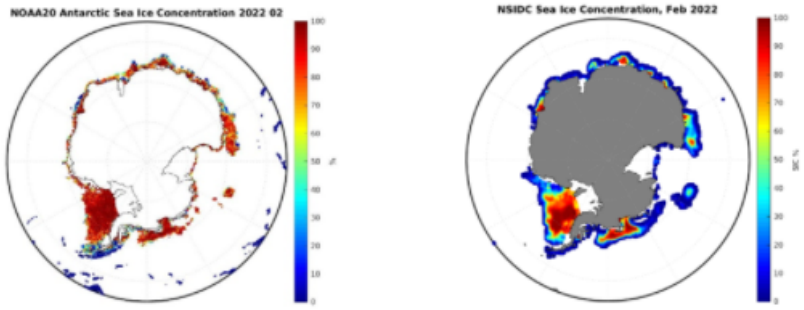



Figure 1. Left: NOAA-20 VIIRS Mean Monthly SIC at 1-km resolution for February 2022. Only 1-km grid cells with more than 2 points are plotted, otherwise a fill-value is used and plotted as missing. Right: NSIDC Mean Monthly SIC at 25-km derived from multi-passive microwave products. Only 25-km grid cell SIC greater than 0 are plotted, otherwise the grid cell is plotted as missing.

# NOAA Products Validation System (NPROVS)

*March, 2022*

## *Accomplishments / Events:*

- Successfully demonstrated the Phase-2 integration of NWS High Resolution Rapid Refresh (HRRR) regional forecast data into NPROVS processing of collocated radiosonde, satellite and nwp weather profiles. This capability supplements the phase-1 task which integrated HRRR data into NPROVS gridded dataset compilation. See highlight.

## *Overall Status:*

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

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
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***Issues/Risks:*** None

| Milestones | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---|---|---|---|
| FY21 End of Year Science Team Presentations (PMR) | Oct-21 | Oct-21 | | not required - no major issues |
| FY23 Program Management Review | Jun-22 | Jun-22 | | |
| Maintain / expand existing EDR LTM web pages and JSTAR Mapper web site | Aug-22 | Aug-22 | | Remove LTM |
| Maintain /expand NPROVS and support NUCAPS / MiRS EDR assessments for NPP, NOAA-20, JPSS-2 and MetOp-A,B,C; GNSS NESDIS-COSMIC-2 | Aug-22 | Aug-22 | | |
| Manage JPSS dedicated Radiosonde program (DOE-ARM), EDR/Raob collocations (Special), expand to store SDR (GSICS / GRUAN; 75TB) | Aug-22 | Aug-22 | | |
| Support JPSS AWIPS (NUCAPS) and Hydrological (MiRS) Iniatives and Case Studies | Aug-22 | Aug-22 | | |

## Highlight:

x.

The 2 panels show examples using the HRRR to supplement assessments of NOAA Unique Combined Atmospheric Processing System (NUCAPS) products at the DOE-Atmospheric Radiation Measurement (ARM) site (Oklahoma), also a GCOS Reference Upper Air Network (GRUAN) site. Two different **HRRR** profiles are displayed, one collocated with the radiosonde (upper) and the other with the NUCAPS (IR+MW) profile, they are 2-hours apart; temperature (solid) and H2O vapor (dashed) profiles are shown. The remaining profiles are identical and include the NOAA **GFS 6-hour forecast**, **ECMWF Analysis** and **NUCAPS** each collocated to the **Radiosonde**.