NOAA JPSS Monthly Program Office

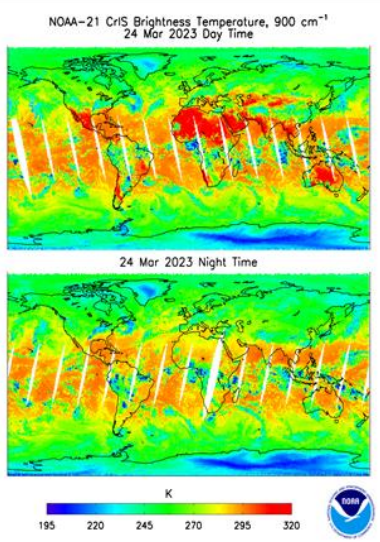
AMP/STAR FY23 TTA

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

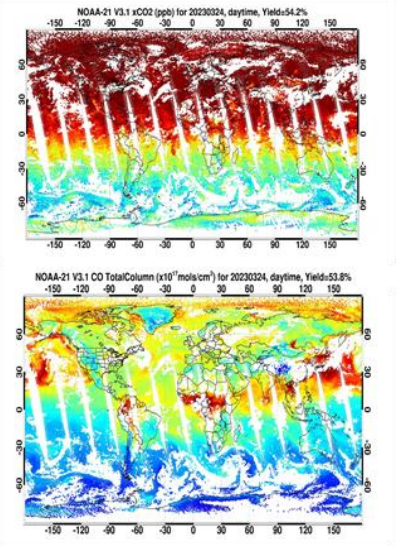
April, 2023

Highlights from the Science Teams (March)

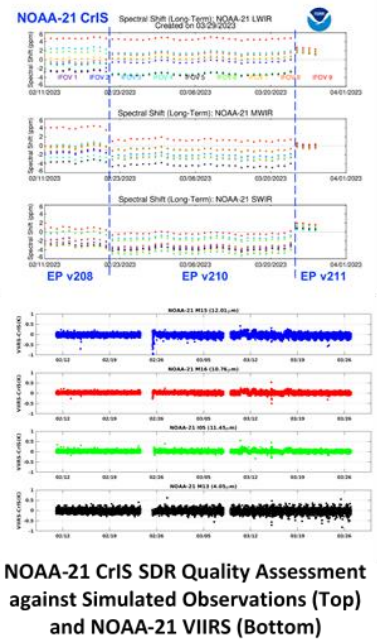
NOAA-21 provisional reviews



NOAA-21 CrIS Calibrated Observations



NUCAPS NOAA-21 CO_2 (Top) and CO (Bottom)



NOAA-21 CrIS SDR Quality Assessment against Simulated Observations (Top) and NOAA-21 VIIRS (Bottom)

On March 30, 2023, several STAR JPSS science teams participated in provisional maturity reviews for their NOAA-21 products. The products included the VIIRS, CrIS, and OMPS SDR products, and the VIIRS KPP Imagery EDRs. All reviews went well, with the products being declared ready for provisional status as of the meeting, except the OMPS products. The OMPS products required a LUT update which was scheduled to take place on April 14 to reach provisional maturity.

The OMPS Nadir Profiler and Nadir Mapper EDRS were also declared beta maturity at this meeting.

The next products up for a maturity review are the VIIRS Sea Surface Temperature and ATMS Snow Fall Rate products – both of which will are scheduled to be considered for beta maturity in April.

Highlights from the Science Teams (March)

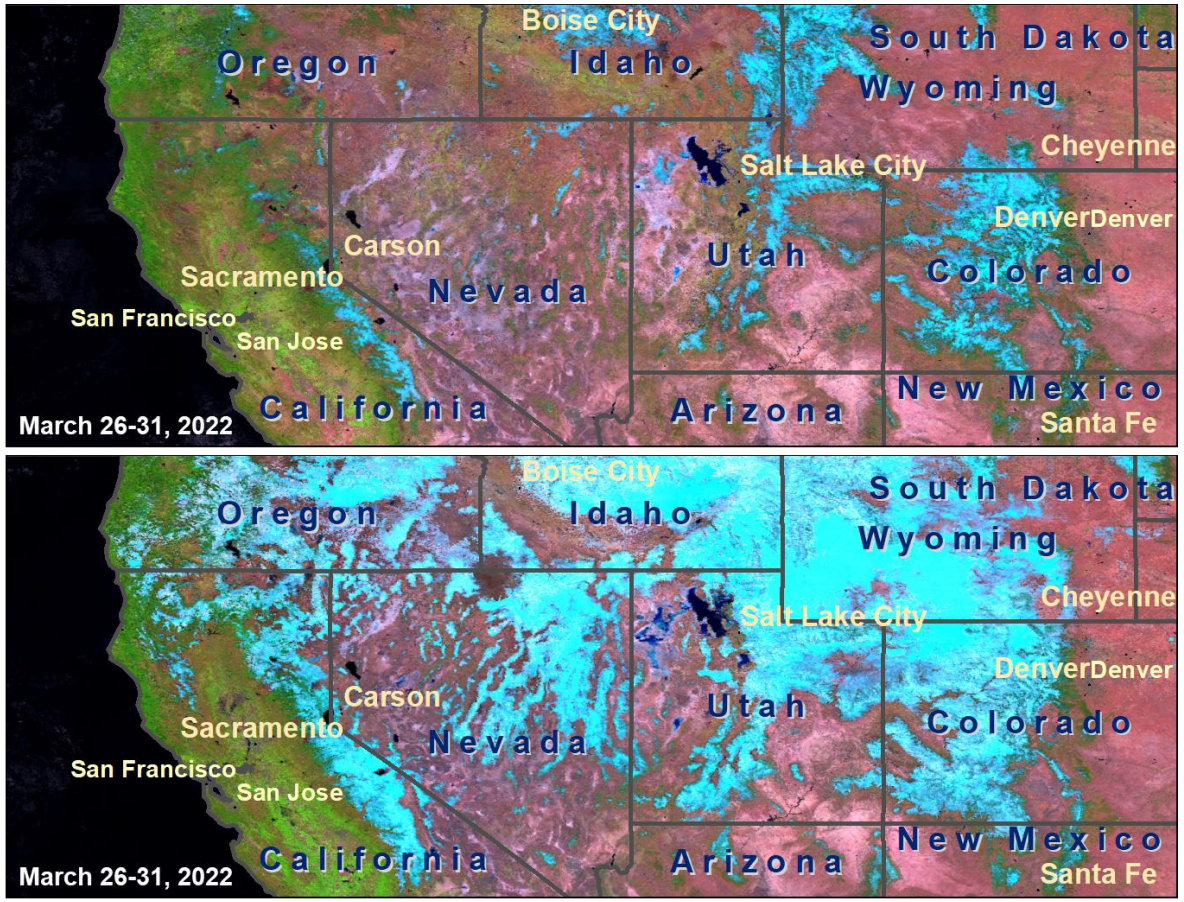
STAR JPSS Meeting participation

Several STAR scientists took part in meetings in March including

- Active Fires lead Ivan Csiszar, who gave a Spanish language presentation on smoke and fires as part of the NOAA/WMO Regional Association IV Virtual Satellite Applications Training Workshop, hosted by the Ministry of Environment and Natural Resources (MARN) of El Salvador.
- VIIRS SDR team member, Jason Choi, who delivered an oral presentation on VIIRS NOAA-21 post launch testing and calibration, the Joint Agency Commercial Imagery Evaluation (JACIE) conference - Constellations and Calibrations session, at the USGS HQ in Reston, VA.
- CrIS SDR team lead, Dr. Flavio Iturbide-Sanchez attended the ITSC-24 conference, held in Tromso, Norway during March 15-22, 2023. Dr. Iturbide-Sanchez participated with two oral presentations, one of them dedicated to report the latest calibration and validations efforts on the NOAA-21 CrIS sensor and a second presentation dedicated to discuss the advantages and challenges associated with designing a new numerical weather prediction (NWP) data assimilation system based entirely on artificial intelligence (AI) techniques.
- The 2023 annual meeting of the Global Space-based Inter-Calibration System (GSICS) Research Working Group (GRWG) and Data management Working Group (GDWG) was held in NOAA Center for Weather and Climate Prediction (NCWCP) on 27 February – 3 March 2023.

Highlights from the Science Teams (March)

Two Extremes of Western US Snowpack



Snowpack is an important water source for a vast region in western U.S. spanning from Colorado to California. Water availability in this region is directly affected by the amount of spring snow cover. Following an extremely low snow cover in 2022, the 2023 snowpack in many regions in western U.S. might be the largest on record. Weekly composites created using VIIRS observations acquired during the last week of March in 2022 and 2023 captured the two extremes. These composites were created as part of the surface type processing flow using daily observations acquired by S-NPP and NOAA-20. Snow/Ice appears in different shades of cyan. Other colors indicate areas without snow cover.

Figure. VIIRS derived weekly snow cover composites for March 26-31, 2022 and March 26-31, 2023. Snowpack shows up in shades of light blue.

Accomplishments – NCCF Deliveries

Delivery Date	Delivery Algorithm Packages (DAPs) – Enterprise Products:	Recipient
03/07/23	Ensemble tropical rainfall potential (eTRaP) Final CCAP (blended product that uses MiRS)	NCCF
03/15/23	Enterprise Flood Mapping Final CCAP	NCCF
03/17/23	V8TOZ J2 Provisional Preliminary CCAP SCR	Google Drive
03/23/23	3/23/2023 SMOPS CCAP Patch Delivery to the Cloud (v3)	NCCF
03/23/23	Hurricane Intensity and Strength (HISA) (before called as TCI) HISA Preliminary CCAP Delivery to OSPO for software code review (SCR)	NCCF
04/03/23	VIIRS Surface Reflectance Preliminary CCAP Delivery to OSPO for SCR	Google Drive
04/07/23	Patch that fixes outputs for the JPSS CCAPs with a creation timestamp of 60.0 seconds. This update can be applied to the CCAPs for Clouds, CBH/CCL, Cloud COMP, Aerosols, VolAsh, Ice, and Snow, and the online units of LSA and LST.	NCCF

Accomplishments – JPSS Cal Val Support

NOAA-20/S-NPP Operational Calibration Support:

S-NPP	Weekly OMPS TC/NP Dark Table Updates	03/07/23, 03/14/23, 3/21/23, 3/28/23
NOAA-20	Weekly OMPS TC/NP Dark Table Updates	03/07/23, 03/14/23, 3/21/23, 3/28/23
NOAA-21	Weekly OMPS TC/NP Dark Table Updates	03/07/23, 03/14/23, 3/21/23, 3/28/23
S-NPP	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	03/14/23, 3/28/23
NOAA-20	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	03/07/23, 3/21/23
NOAA-21	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	03/01/23 (out of cycle, includes TC and NP), 03/22/23
S-NPP	Monthly VIIRS LUT Update of DNB Offsets and Gains	03/28/23
NOAA-20	Monthly VIIRS LUT Update of DNB Offsets and Gains	03/28/23
NOAA-21	Monthly VIIRS LUT Update of DNB Offsets and Gains	03/28/23
NOAA-21	Monthly VIIRS DNB Straylight correction update	03/27/23

NOAA-21 Cal/Val Maturity Reviews

March, 2023 Maturity Reviews	
VIIRS SDR Provisional Maturity	Successfully Completed on 3/30; Effective Date: 3/30
VIIRS KPP/non-KPP Imagery EDR	Successfully Completed on 3/30; Effective Date: 3/30
OMPS NP/TC SDR Provisional Maturity Review	Successfully Completed on 3/30; Effective Date: 4/14 upon LUT update in IDPS
OMPS NP/TC Ozone EDR Beta Maturity	Successfully Completed on 3/30; Effective Date: 4/14 upon LUT update in IDPS
CrIS SDR Provisional Maturity	Successfully Completed on 3/30; Effective Date: 3/23
April, 2023 Maturity Reviews	
MiRS EDRs Beta Maturity	4/27 (virtual review)
Snow Fall Rate (SFR) Beta Maturity	4/27 (virtual review)
VIIRS SST Beta Maturity	4/27 (virtual review)

May, 2023 Maturity Reviews	
OMPS NP/TC Ozone EDR Provisional Maturity	TBC: 5/25
NUCAPS EDR Beta Maturity	TBC: 5/25
VIIRS Active Fires Beta Maturity	TBC: 5/25
ATMS SDR/TDR Validated Maturity	Scheduled for 5/10 (TBC with the ATMS SDR team)

JSTAR Code/LUT/Product Deliveries

Date	DAPs to DPMS
3/01/23	CrIS team delivered the Engineering Packet Offline Version 211 (EPv211) to Harris
3/02/23	ADR-9960/CCR-5997 J2 OMPS-NM and J2 OMPS-NP albedo coefficients update
3/03/23	NOAA-21 OMPS NM/NP OSOL wavelength LUTs for wavelength scale registration and fix 3-pixel wavelength shift errors.
3/15/23	CrIS J2 Eng. Pkg. update delivery EPv211(for Provisional Maturity)
3/17/23	ADR-10301/ CCR-6462 N21 VIIRS SDR DELTA-C LUT Update for TEB Cold FPA Temperature Setpoints Change
3/20/23	ADR-10306/ CCR-6465 N21 VIIRS SDR LUT Update F-PREDICTED #3 and LGS-GAINS #3 - FT
3/21/23	Start of N21 bi-weekly LUT update: ADR-10303/ CCR-6463 N21 OMPS NP Wavelength & OSOL FT Update #G001
3/27/23	Start of N21 stray light correction LUT updates. A total of 12 LUTs will be delivered and later re-used.

Date	Remaining J2-Ready DAPs to NCCF
March, 2023 (delayed to October)	CCAP in October J2-ready OMPS LP DAP to NCCF (ASSISTT □ NCCF) Science team plan: Delivery to the ASSISTT by the end of April. ASSISTT team plan: SCR delivery to OSPO in June, and final CCAP delivery in October.
March, 2023 (Delayed to August)	J2-ready (J2-Beta) Ocean Color DAP to NCCF (ASSISTT □ NCCF) ASSISTT team plan: SCR delivery to OSPO in June, and final CCAP delivery in August

FY23 STAR JPSS Milestones

Milestones	Original Date (column J)	Forecast Date	Actual Completion Date	Variance Explanation
Algorithm Updates DAPs/CCAPs				
ATMS J2 PCT updates (as needed)	Jan-23	Jan-23	Delivered	
CrIS J2 Eng Pkg update delivery	Jan-23	02/09	Delivered on 02/09 for Beta	
VIIRS J2 LUTs update delivery	Jan-23	Jan-23	Delivered (January 26)	
OMPS J2 LUTs update delivery	Jan-23	Jan-23	Delivered	
OMPS LP J2 ready DAP (to NCCF)	Mar-23	June-23	**Larry can deliver by end of April for L1 and L2**	
Ocean Color J2 ready DAP (to NCCF)	Mar-23	June-23		
CCAP to NCCF (Aerosol AOD & ADP)	Oct-22	Oct-22	10/26/22	
CCAP to NCCF (CM, Phase, Height, CBH, CCL, COMP)	Oct-22	Oct-22	10/26/22	
CCAP to NCCF (VPW, Cryosphere, Volcanic Ash)	Nov-22	Nov-22	11/15/2022, 11/18/2022, **VPW: 01/06/2023**	
CCAP to NCCF (LST, LSA)	Nov-22	Nov-22	Delayed to 12/15/2022 **Delayed: 01/20/2023**	
CCAP to NCCF (VI, GVF)	Nov-22	Nov-22	11/15/2022, **1/11/2023**	
CCAP to NCCF (MiRS, OMPS NP V8Pro)	Jan-23	Jan-23	MiRS:12/31(separate delivery) **MiRS: v11.9 Final CCAP Delivered:1/26/2023** **Delivered: OMPS 12/23 V8TOz Delivered: 3/17/23**	
CCAP to NCCF (HEAP, N4RT)	Mar-23	Mar-23	**Code delivered for SCR 2/6**	
CCAP to NCCF (ACSPO SST)	Apr-23	Apr-23	**Science team will deliver the code update in March that uses VIIRS TC GEO**	
Enterprise Fires	Apr-23	Apr-23		
CCAP to NCCF (VH, VOLCAT Phase 1, OMPS V8TOz)	May-23	May-23		
CCAP to NCCF (Gridded Land)	Jul-23	Jul-23		
CCAP to NCCF (Cloud Provisional)	Jul-23	Jul-23		

FY23 STAR JPSS Milestones

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

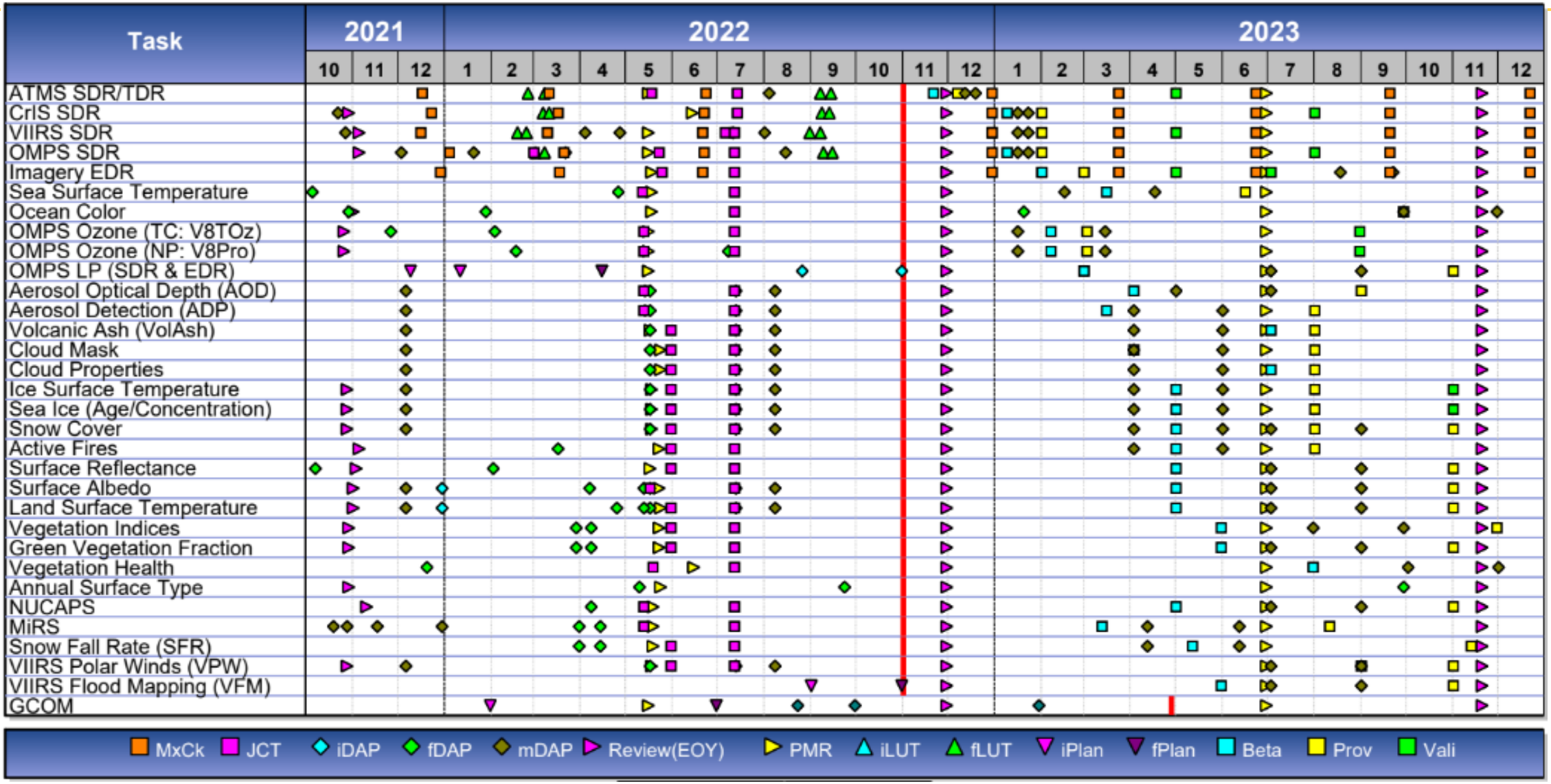
FY23 STAR JPSS Milestones

Milestones	Original Date	Forecast Date	Actual Date	Variance Explanation
NOAA-21 Cal/Val Maturity Reviews				
ATMS TDR/SDR (B/P: Dec-2022; V: May-2023)	May-23	May-23	Provisional Achieved: 12/15; Validated Planned: 05/10	
CrIS SDR (B: Jan-23; P: Feb-23; V: Aug-23)	Aug-23	Aug-23	Provisional Achieved: 03/30; Validated Planned: 09/28	K-band Transmitter swap
VIIRS SDR (B: Dec-22; P: Feb-23; V: May-23)	May-23	May-23	Provisional Achieved: 03/30; Validated Planned: 07/13	K-band Transmitter swap
OMPS SDR (B: Jan-23; P: Feb-23; V: Aug-23)	Aug-23	Aug-23	Provisional Achieved: 03/30; Validated Planned: 12/22	K-band Transmitter swap
KPP VIIRS Imagery (B: Jan-23; P: Feb-23; V: May-23)	May-23	May-23	Provisional Achieved: 03/30; Validated Planned: 07/13	K-band Transmitter swap
Non-KPP VIIRS Imagery (B: Feb-23; P: Mar-23; V: Jul-23)	Jul-23	Jul-23	Provisional Achieved: 03/30; Validated Planned: 07/13	K-band Transmitter swap
Clouds (B: CM: Apr-23; Others: Jul-23; P: Aug-23)	Aug-23	Aug-23	Delay of 2 months expected to reach Beta and Provisional Maturity due to delays in data availability associated with K-band transmitter swap. Since the validated maturity has a longer span, there is a possibility that the science teams may be able meet the validated maturity dates without any delays. Dates finalized and are available on JSTAR website. JSTAR team is currently discussing with individual teams on expediting the maturity reviews.	K-band Transmitter swap
Aerosol AOD (B: Apr-23; P: Sep-23)	Sep-23	Sep-23		K-band Transmitter swap
Aerosol ADP (B: Mar-23; P: Aug-23)	Aug-23	Aug-23		K-band Transmitter swap
Volcanic Ash (B: Jul-23; P: Aug-23)	Aug-23	Aug-23		K-band Transmitter swap
Cryosphere (B: May-23; P: Aug-23 for Sea Ice & Binary Snow)	Aug-23	Aug-23		K-band Transmitter swap
LST/LSA/SR/GVF/VI (B: May-23)	May-23	May-23		K-band Transmitter swap
Vegetation Health (B: Jul-23)	Jul-23	Jul-23		K-band Transmitter swap
Ocean Color (B: Sep-23)	Sep-23	Sep-23		K-band Transmitter swap
VPW (B: Sep-23)	Sep-23	Sep-23		K-band Transmitter swap
VFM (B: May-23)	May-23	May-23		K-band Transmitter swap
SST (B: Mar-23; P: Jun-23)	Jun-23	Jun-23	Planned Beta (Expedited): 4/27	Expedited
MiRS (B: Mar-23; P: Aug-23)	Aug-23	Aug-23	Planned Beta (Expedited): 4/27	Expedited
SFR (B: May-23)	May-23	May-23	Planned Beta (Expedited): 4/27	Expedited
NUCAPS (B: May-23)	May-23	May-23	Planned Beta (Expedited):5/25	Expedited
OMPS NP EDR V8Pro & V8TOz (B: Feb-23; P: Mar-23)	Mar-23	Mar-23	Beta Achieved: 03/30; Provisional Planned:05/25	Expedited
Active Fires (B: May-23; P: Aug-23)	Aug-23	Aug-23	Planned Beta (Expedited): 5/25	Expedited
OMPS LP (B: Mar-23)	Mar-23	Mar-23		

FY23 STAR JPSS Milestones

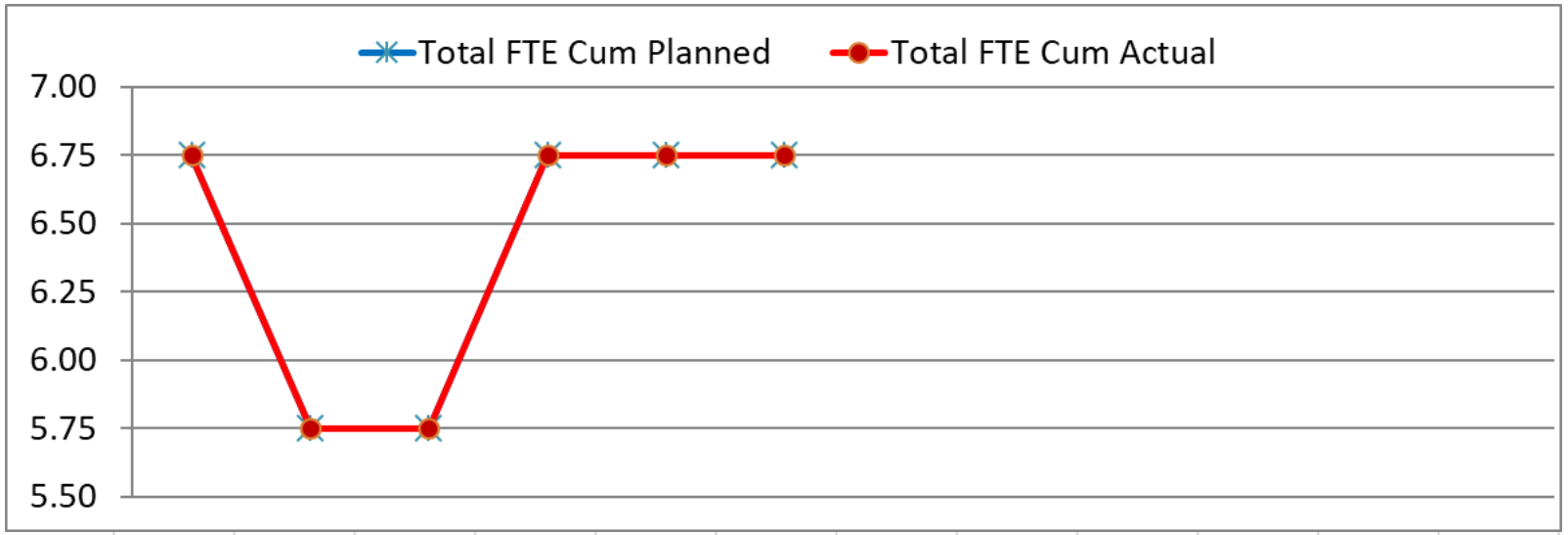
Milestones	Original Date	Forecast Date	Actual Completion Date
Operational/Program Support			
S-NPP: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	10/04/22, 10/12/22, 10/19/22, 10/26/22, 11/01/22, 11/08/22, 11/15/22, 11/22/22, 11/28/22, 12/06/22, 12/13/22, 12/19/22, 01/03/23, 01/10/23, 01/17/23, 01/23/23, 0131/23, 02/07/23, 02/14/23, 02/21/23, 02/28/23, **03/07/23, 03/14/23, 3/21/23, 3/28/23**
S-NPP: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	10/12/22, 10/26/22, 11/08/22, 11/22/22, 12/06/22, 12/19/22, 01/03/23, 01/17/23, 1/31/23, 02/14/23, 02/28/23, **03/14/23, 3/28/23**
S-NPP: Monthly VIIRS LUT update of DNB Offsets and Gains	Monthly	Monthly	10/04/22, 11/01/22, 11/28/22, 01/03/23, 01/30/23, 02/27/23, **3/28/23**
NOAA-20: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	10/04/22, 10/12/22, 10/19/22, 10/26/22, 11/01/22, 11/08/22, 11/08/22, 11/15/22, 11/22/22, 11/28/22, 12/06/22, 12/13/22, 12/19/22, **01/03/23,** 01/03/23, 01/10/23, 01/17/23, 01/23/23, 0131/23, 02/07/23, 02/14/23, 02/21/23, 02/28/23, **03/07/23, 03/14/23, 3/21/23, 3/28/23**
NOAA-20: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	10/04/22, 10/19/22, 11/02/22, 11/15/22, 11/29/22, 12/13/22, 01/03/23, 01/10/23, 01/24/23, 02/07/23, 02/21/23, **03/07/23, 3/21/23**
NOAA-20: Monthly VIIRS LUT update of DNB Offsets and Gains	Monthly	Monthly	10/04/22, 11/01/22, 11/28/22, **01/03/23,** 01/30/23, 02/27/23, **3/28/23**
NOAA-21: Weekly OMPS TC/NP Dark Table Updates	Weekly	Weekly	**01/31/23, 02/14/23, 02/21/23, 03/07/23, 03/14/23, 3/21/23, 3/28/23**
NOAA-21: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	**03/07/23, 03/22/23**
NOAA-21: Monthly VIIRS LUT update of DNB Offsets and Gains	Monthly	Monthly	03/6/23, **3/28/23**
Mx builds deploy regression review/checkout (Mar-23 Mx8; Jun-23 Mx9; Sep-23 Mx10; SDRs and VIIRS Imagery teams)			MX8 SOL STAR 'Go/No GO' Report Due:4/14 MX8 I &T STAR 'Go/NOGO' Report Due: May 10

STAR JPSS Schedule: TTA Milestones



- Chart not updated for status as of end November 2022 ~ awaiting apps software license.

J-STAR FY23 Planned v Actual Staffing Plan



J-STAR FTEs	Oct '22	Nov '22	Dec '22	Jan '23	Feb '23	Mar '23	Apr '23	May '23	Jun '23	Jul '23	Aug '23	Sep '23
Cum Planned (CS)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cum Actual (CS)	1.00	1.00	1.00	1.00	1.00	1.00						
Cum Planned (WYE)	5.75	4.75	4.75	5.75	5.75	5.75						
Cum Actual (WYE)	5.75	4.75	4.75	5.75	5.75	5.75						
Total FTE Cum Planned	6.75	5.75	5.75	6.75	6.75	6.75						
Total FTE Cum Actual	6.75	5.75	5.75	6.75	6.75	6.75						

CS: Alisa Young (on detail)
WYE: Qingyuan Richard Zhang (Corp)
Prasanjit Dash (SOCD)
Michael Cheeseman (SMCD)
Murty Divakarla (25%)
Tom Atkins (50%)
Jeffrey Weinrich
Tess Valenzuela (RMD)

Color code:

Green: **Completed Milestones**

Gray: **Ongoing FY23 Milestones**

Active Fires

March 2023

Accomplishments / Events:

- Performed analysis of NOAA-21 Active Fire data in support of the VIIRS SDR Provisional Review. Found an increase in NOAA-21 M13 measurements compared to Suomi NPP and NOAA-20 due to the shift in the NOAA-21 M13 band placement
- Gave a Spanish-language presentation “Detección y Caracterización de Incendios y Humo del ABI y VIIRS” (“Detection and Characterization of Fires and Smoke from ABI and VIIRS”) as part of the NOAA/WMO Regional Association IV Virtual Satellite Applications Training Workshop, hosted by the Ministry of Environment and Natural Resources (MARN) of El Salvador
- Continued working with NCEP EMC and OAR on the transition of the operational HRRR-smoke model to using the VIIRS I-band product as input

Overall Status:

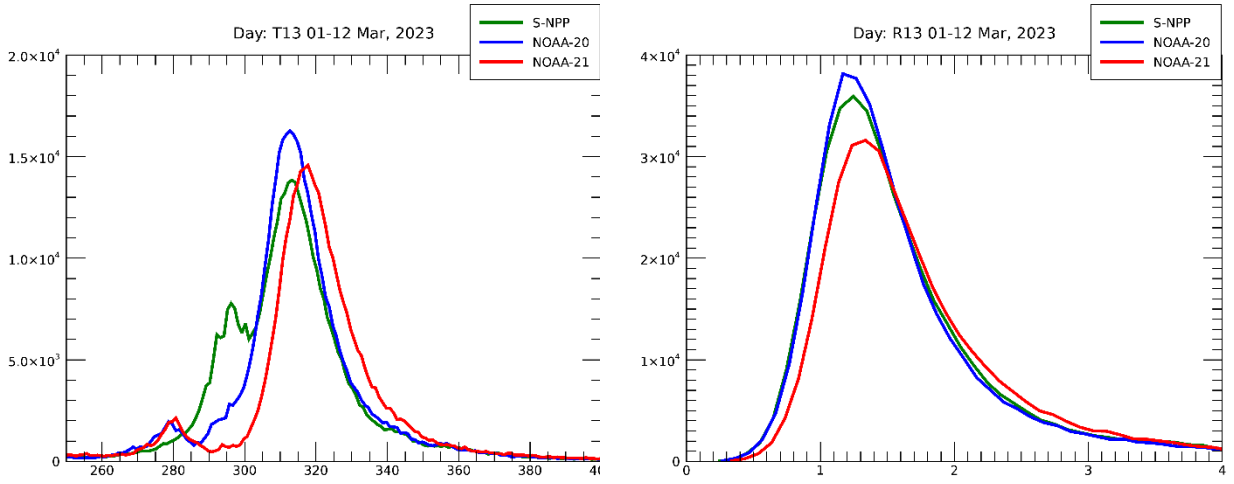
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

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

Issues/Risks:

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

Highlight: NOAA-21 VIIRS M13 measurements for I-band fire detections



Frequency distributions of VIIRS M13 brightness temperatures (K; left) and radiances (W/m^2-sr-µm; right) corresponding to I-band fire detections in the 375m NDE products). NOAA-21 preliminary, non-operational data

Aerosol

March 2023

Accomplishments / Events:

- Continued monitoring NOAA21 EPS AOD retrievals. Collected VIIRS and AERONET AOD needed to generate matchups. A visual examination of the global images of retrieved AOD showed no issues.
- Investigated potential improvements in the VIIRS EPS AOD retrievals.
  - Using SNPP and NOAA20 VIIRS observations and region-specific aerosol models derived spectral surface reflectance relationships for various surface types over defined spatial domains.
  - Tested the use of the regional relationship vs. the global surface relationship; surface relationships dependent on NDVI, angles, and others vs. only NDVI dependence; use of hybrid vs. only SW and SWIR scheme and various thresholds for switching between the schemes.

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

Overall Status:

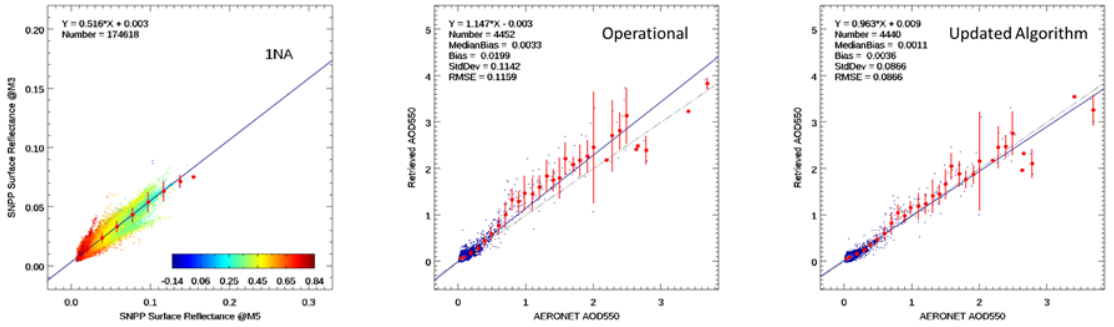
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

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

Issues/Risks:

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

Highlight:



Left: Relationship between surface reflectances in VIIRS bands M3 and M5 derived for North America. *Middle*: evaluation of operational AOD retrievals over the Western North America; *Right*: evaluation of retrievals from the updated algorithm. Root mean square error (RMSE) decreased by ~25%.

Clouds

March, 2023

Accomplishments / Events:

- The Cloud team has begun to look at the algorithms from the NDE-IT string for evaluation after the Imagery SDR and EDRs have become Provisional. Data is being collected for the Cloud Mask provisional review in June 2023.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Develop VIIRS/CALIOP validation tools for JPSS-2	Dec-22	TBD		Code completed but requires N21 data to test
Integrate latest Enterprise Cloud Mask (ECM) version within NDE	Dec-22	Dec-22	Mar-23	A future update will be made post Provisional
Prepare Cloud Base Height (CBH)/Cloud Cover Layers (CCL) algorithm transition and operation for JPSS-2	Jan-23	Apr-23		Data had been turn
Integrate new ECM lookup table to allow easier threshold changes	Mar-23	Dec-23		Current LUT works good, but developing new LUT and waiting for integration date.
JPSS-2 Beta Review (ECM)	Apr-23	Jun-23		Changed due to Transmitter issue
Validate CCL that was recently delivered, especially convective/supercooled layers as part of CCL Beta review	Jul-23	Sept-23		Changed due to Transmitter issue
NOAA-21 Cloud Products Beta Maturity	Jul-23	Aug-23		Changed due to Transmitter issue
NOAA-21 Cloud Products Provisional Maturity	Aug-23	Sept-23		Changed due to Transmitter issue

Overall Status:

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

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

Issues/Risks:

None

Highlights:

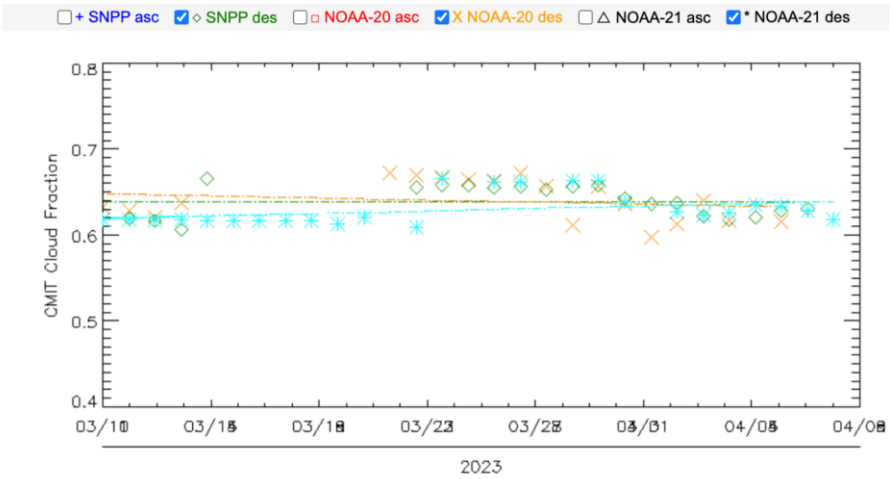


Figure 1. The cloud maske mean cloud fraction from the Integration and testing (IT) string for all three sensors. Note that the analysis tool was not fixed until 23 March 2023 and data from the NDE IT string is occasionally spotty in nature .

ATMS SDR

March 2023

Accomplishments / Events:

- Continue to analyze the NOAA-21 ATMS Active Geolocation, Backflip Pitch Maneuver, and Noise Characterization PLT data sets to characterize the NOAA-21 ATMS post-launch on-orbit performance.
- Analyzed the backflip pitch maneuver data to verify if there is radio frequency interference (RFI) observed in ATMS data when the TWTA is turned on. Derived the reflector emissivity coefficients from uncontaminated pitch maneuver data. Identified if there is any unknown contamination in emissivity retrieval, which may potentially reduce the emissivity accuracy.
- Tested the PCT with updated cold bias correction coefficients, reflector emissivity, beam pointing angle coefficients, and antenna pattern correction coefficients derived from N21 ATMS post-launch test data analysis. Discussed the impact of antenna pattern measurement datasets on TDR to SDR conversion quality. Discussed the impact of near field satellite radiation contamination correction on SDR data angular dependent bias correction. Preliminary evaluation results indicate that the new PCT can effectively improve the science data quality. The operational transition process will be started soon.
- Prepared and reviewed the PLT test analysis report documents to support N21 Post-Launch Assessment Review (PLAR)/Handover Readiness Review (HRR) meeting

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

Overall Status:

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

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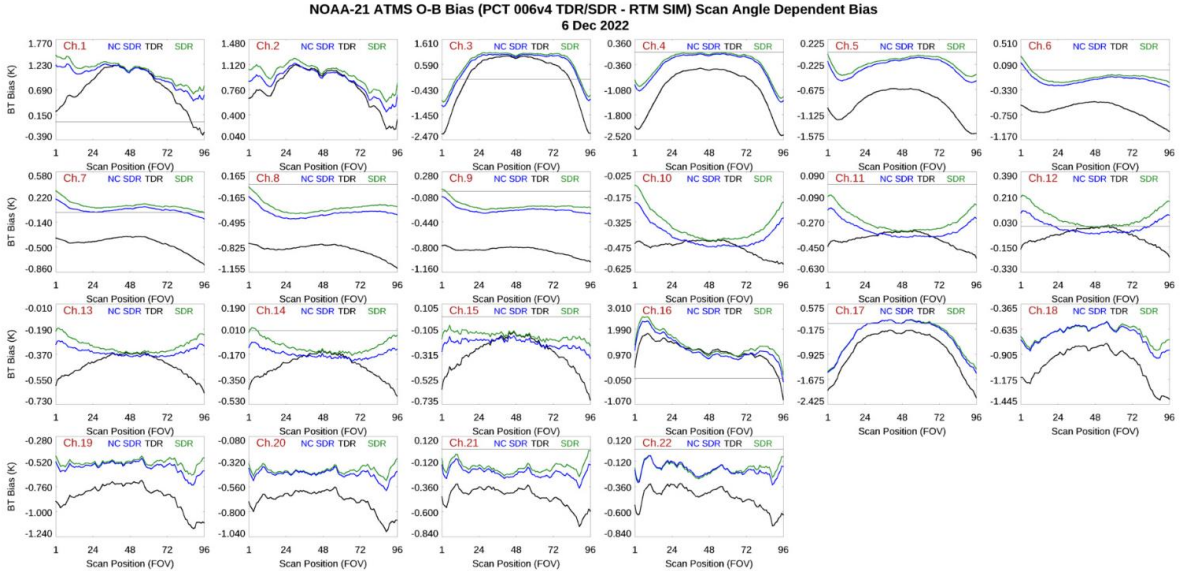
Issues/Risks:

None

Highlights:

N21 ATMS all channel O-B angular dependent bias analysis using latest updated PCT



Clouds

March 2023

Accomplishments / Events:

- The Cloud team has begun to look at the algorithms from the NDE-IT string for evaluation after the Imagery SDR and EDRs have become Provisional. Data is being collected for the Cloud Mask provisional review in June 2023.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
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Integrate latest Enterprise Cloud Mask (ECM) version within NDE	Dec-22	Dec-22	Mar-23	A future update will be made post Provisional
Prepare Cloud Base Height (CBH)/Cloud Cover Layers (CCL) algorithm transition and operation for JPSS-2	Jan-23	Apr-23		Data had been turn
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NOAA-21 Cloud Products Provisional Maturity	Aug-23	Sept-23		Changed due to Transmitter issue

Overall Status:

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

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

Issues/Risks:

None

Highlights:

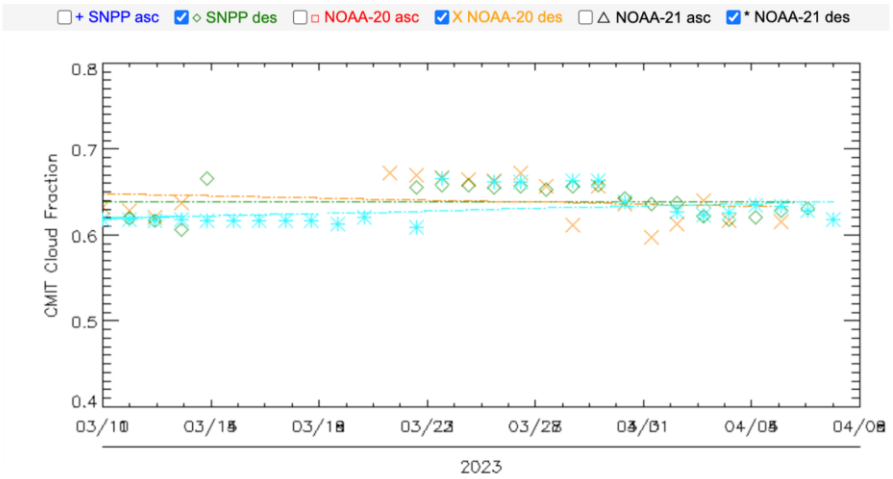


Figure 1. The cloud maske mean cloud fraction from the Integration and testing (IT) string for all three sensors. Note that the analysis tool was not fixed until 23 March 2023 and data from the NDE IT string is occasionally spotty in nature .

CrIS SDR

March 2023

Accomplishments / Events:

- Completed the NOAA-21 CrIS Provisional Maturity Science Review on March 30th: Successfully demonstrated that NOAA-21 CrIS SDR product satisfies Provisional Maturity Level requirements, and the science data was declared to have achieved provisional on March 30, 2023 (**Fig.1, Fig.5, Fig.6, Fig.7** and **Fig.8** for examples of the analysis). Submitted a provisional maturity review presentation and ReadMe file for the review.
- Measured radiometric nonlinearity using Diagnostic Mode data from Feb 24-25 (**Fig.2**). There is good agreement between TVAC DM method, ECT method and on-orbit nonlinearity.
- On-orbit nonlinearity coefficient (a2) refinements were made based on Normal Mode Earth view FOV2FOV analysis (**Fig.3**). These final values were implemented into EPv211.
- Completed the assessment of new Engineering Packet (v211) offline version for NOAA-21 CrIS using 3 days of data generated by ADL (**Fig.4**). The new calibration table was delivered to L3Harris on 3/20.
- EPv211 was successfully uploaded on March 23, which marks the milestone of reaching Effective Provisional Maturity Level. Updates included optimized spectral, nonlinearity and geolocation mapping parameters derived from NOAA-21 CrIS on-orbit observations. This led to significant improvements observed for NOAA-21 CrIS in spectral performance, FOV2FOV radiometric variability, consistency of radiometric performance compared to GOES 16/18 ABI, and geolocation accuracy with respect to VIIRS.
- Performed intensive monitoring and assessment of the Spectral and Radiometric Accuracy, Telemetry monitoring, ZPD location assessment, on-orbit nonlinearity verification, noise performance, geolocation, and intercomparisons using the early commissioning data in preparation for the Provisional Maturity Review.
- Making progress on the preparation of several journal articles, including for the commissioning of NOAA-21 CrIS, the Neon Mitigation plan, and one on the CrIS Spike Anomaly Algorithm.
- Continued to refine the new STAR CrIS SDR Cal/Val website, including the developing and testing of new tools for CrIS SDR imaginary radiance maps and O-B maps.

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

Overall Status:

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

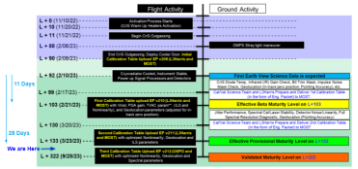
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

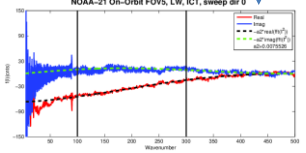
- The CrIS Team got a 100TB storage on STAR servers (data638 and data645) in May 2022. However, the CrIS Team is still in need of hardware/software resources. Presently, there is only one server dedicated to 6 CrIS Team members. We have received access to new servers, but these are shared with other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

Highlights:

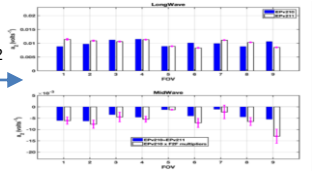
(1) The latest Timeline of NOAA-21 CrIS commissioning and Cal/Val Activities (as of 3/30/2023)



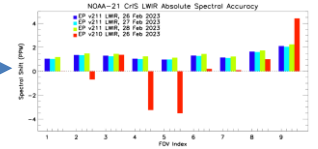
(2) Fitting Out-of-band DM spectra to comput the NOAA-21 On-Orbit Nonlinearity for LWIR FOV5 for verification for Provisional Maturity Review.



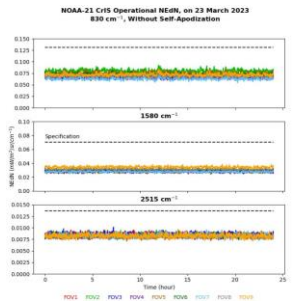
(3) A comparison of the a2 nonlinearity coefficients between EPv210 and Epv211 (optimized using on-orbit FOV-2-FOV analysis).



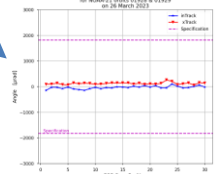
(4) NOAA-21 CrIS absolute spectral accuracy for LWIR band before and after the EP update



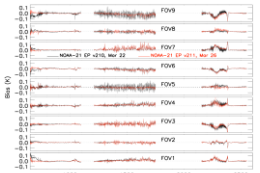
(5) NOAA-21 CrIS operational NEdN on 3/23/2023 without the self-apodization. The NOAA-21 CrIS radiometric noise (NEdN) has shown stability and consistency for all detectors. This is based on EP v211



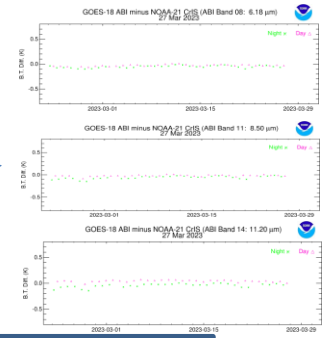
(6) NOAA-21 geolocation accuracy on 3/26/2023 with EP v211



(7) NOAA-21 CrIS FOV-2-FOV variability with EP v211 update in red, EP v210 for comparison in black; improvement in radiometric consistency in MWIR and LWIR bands



(8) CrIS-ABI intercomparisons for ABI bands 8, 11 and 14 on 3/27/2023. Comparison shows that highly stable calibration of NOAA-21 CrIS radiances.



Cryosphere

March, 2023

Accomplishments / Events:

NOAA-20 VIIRS Ice Surface Temperature identifies extreme warming An extreme surface warming event over the western Arctic was observed in early March. The very warm ISTs (260-270 K) become widespread across western Beaufort Sea north of Alaska by 07 March. A large lead feature in southeast Beaufort Sea becomes evident in the IST field by 08 March, associated with 265+ K values, which is 10-20 K warmer than was observed the day before. (See Highlight)

Calibration of NOAA-20 and S-NPP products with MOSAiC data The Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC) field campaign provides year-long in situ measurements of IST and Thickness at multiple locations over central Arctic sea ice for validation of the VIIRS IST and Thickness EDR from the Enterprise algorithm. Analysis indicates there is good agreement.

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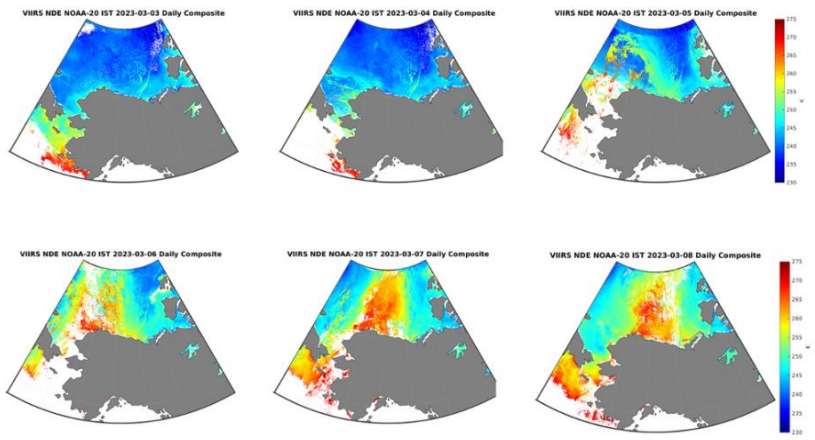
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

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

Highlight: Extreme warming over western Arctic.



NOAA-20 VIIRS daily composite IST from 03 (upper-left) to 08 (lower-right) March 2023.

JSTAR Mapper and NPROVS

March, 2023

Accomplishments / Events:

- The JSTAR Mapper team met with CrIS and ATMS teams to discuss adding SDR based imagery to Mapper website, completed a first draft version of the GOES Aerosol Index and the Fire Radiative product onto a STEMS testbed site.
- The NPROVS team provided briefings at the NUCAPS All-Hands and JPSS User Initiative meetings which included the latest results with respect to the NUCAPS v3.1 which is pending operational implementation in May **(Highlight)**
- Work continues to reprocess the NPROVS Special datasets comprised of the GCOS Reference Upper Air Network (GRUAN) Data Products (GDP) for Vaisala RS41 and Mesei IMS-100 radiosondes.
- Anthony Reale presented at the NCWCP-UMD mini-conference, March 13-16, "*NOAA Unique Combined Atmospheric Processing System (NUCAPS) Performance in 3 Unique Winter Cases*".

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

Highlights

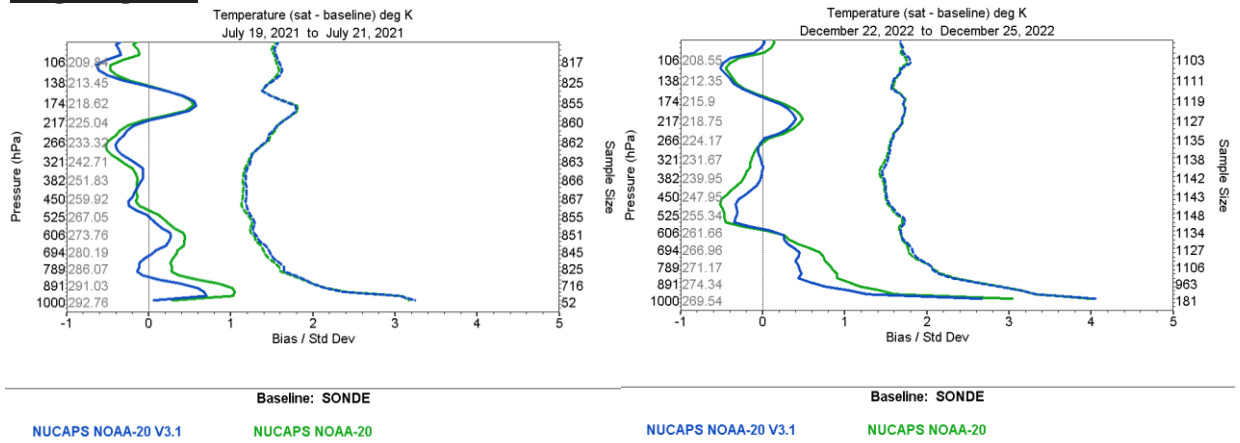

Figure 1: Each panel illustrates (NUCAPS – Radiosonde) vertical (surface to 100hPa; 16km) statistics for Temperature bias (solid) and standard deviation (dash) differences compiled over a 3-day time period during December-2021 (left) and July-2022 (right), respectively. The green plots are for the current **operational NUCAPS (v3)** and the blue for the pending **test NUCAPS (v3.1)**; the time/distance windows for the collocated radiosonde and NUCAPS profiles used in the comparisons are 6-hrs and 100km. As can be seen, the v3.1 shows overall reduced bias differences for both the summer and winter test periods in the lower troposphere below 600 hPa (5km).

GCOM-W

March, 2023

Accomplishments / Events:

- In preparation for AMSR3 retrieval delivery, a long-term rainfall record assessment of the current (GPROF2010v3) and new algorithm (GPROF2017) performance is initiated using MRMS observations over the CONUS as a reference. In the initial step, Quantitative Rainfall Estimates are compared on monthly scales. (Example for June 2022 shown in the figure). The new algorithm shows better performance in all standard metrics.
- The long-term record assessment is being created to allow for easy implementation to the existing validation system (NPreciSe)
- In the joint effort with the ASSISTT team the new algorithm code review is initiated on GCOM box. Step-1 requirements on updating data reader format and computing environment have been successfully met.

Overall Status:

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

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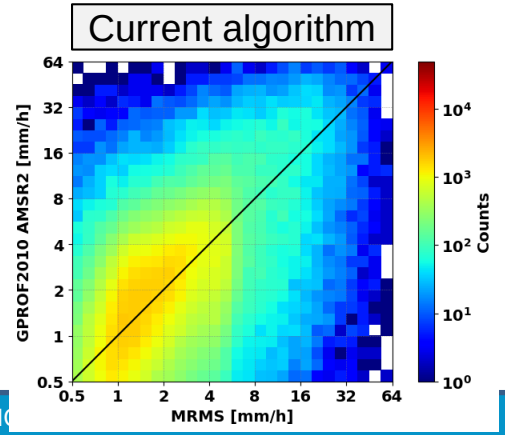
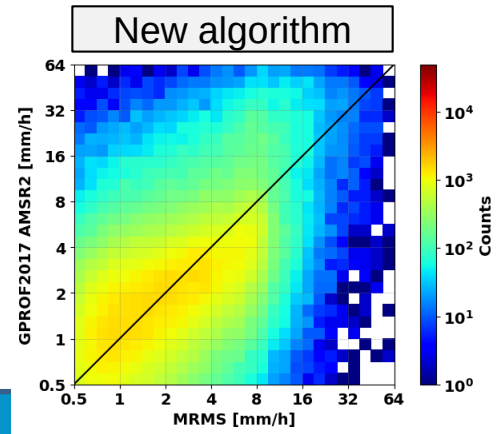
Issues/Risks:

None

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

June 2022	Current algorithm	New algorithm
Correlation Coefficient	0.41	**0.54**
Bias [%]	-14.3	**-5.3**
Absolute Bias [mm h^{-1}]	-0.016	**-0.001**
RMSD [mm h^{-1}]	1.09	**0.98**





ICVS

March 2023

Accomplishments / Events:

- Generated NOAA-21 OMPS/CrIS/VIIRS near real time instrument health status, performance, and science data quality monitoring products to support SDR team Provisional maturity reviews.
- Identified the NOAA-21 CrIS SWIR observations vs. radiative transfer model simulations bias anomaly root cause based on the ICVS-LTM monitoring products. Proposed a anomaly detection algorithm based on instrument temperatures to mitigate the impact of false alarm in lunar intrusion detection.
- Implemented the OMPS NM geolocation accuracy monitoring package in ICVS beta web site for pre-operational testing.
- Updated ICVS-LTM event log web pages to add NCCF EDR transition to operation status to provide more JPSS operational status information
- Analyzed the NOAA-21 OMPS NM wavelength shift and provide monitoring products in ICVS-LTM website to support OMPS SDR team post-launch cal/val activities and provisional review.
- Continued to improve ATMS/CrIS/VIIRS/OMPS instrument health status and science data quality near real time monitoring product generation packages to improve the result accuracy and execution efficiency/reliability
- Published the manuscript about ATMS AI manuscript (https://doi.org/10.3390/atmos14030503).

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

Overall Status:

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

1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
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4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

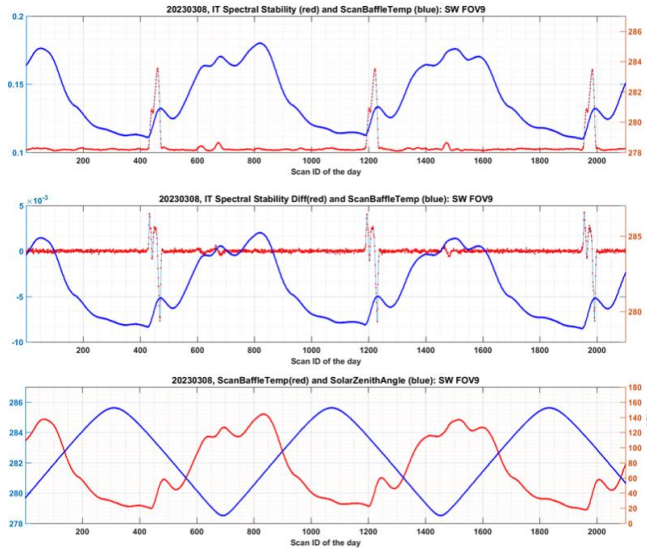
Issues/Risks:

None

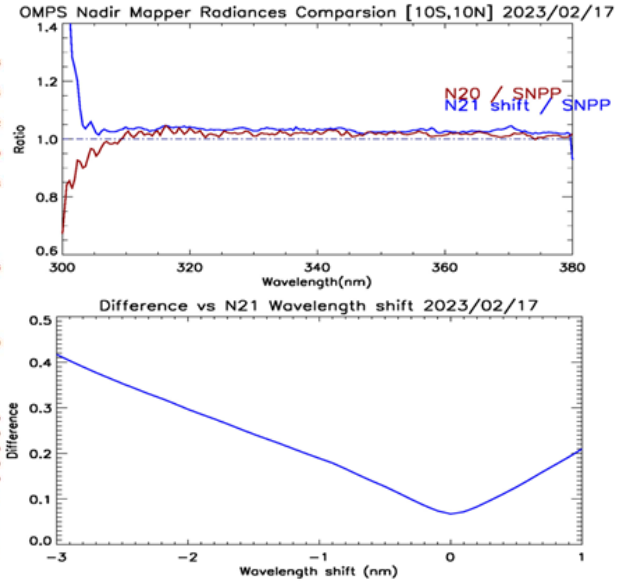
Highlights:

Significantly contribute to STAR SDR Teams

(a) N21 CrIS SWIR anomaly detected with the scan baffle temperature and solar zenith angle



(b) N21 OMPS NM radiance comparison and wavelength shift monitoring using reprocessed SDR



VIIRS Imagery

March 2023

Accomplishments / Events:

- Continued collection and analysis of NOAA-21 VIIRS Imagery, including comparisons with NOAA-20 and S-NPP, communicating findings with the SDR team
- Presented for the NOAA-21 VIIRS EDR Imagery Provisional Review on March 30
- Recent VIIRS Imagery Publication
  - Seaman, C.J., W.E. Line, R. Ziel, J.L. Jenkins, C. Dierking and G. Hanson, 2023: Multispectral Satellite Imagery Products for Fire Weather Applications. J. Atmos. Ocean. Tech., https://doi.org/10.1175/JTECH-D-22-0107.1.
- Recent VIIRS Imagery Blog Posts
  - NOAA-21 VIIRS Imagery Beta Mature
  - Overnight Texas Thunderstorm
- Recent VIIRS Imagery Social Media Posts
  - VIIRS NCC of low-pressure system approaching Pacific Northwest
  - VIIRS NCC of snow on Hawaii Peaks
  - VIIRS Day Land Cloud RGB of eastern US snow-cover
  - VIIRS Geocolor of Gulf of Alaska low

Overall Status:

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

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

Issues/Risks:

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

Highlights: Image of the Month

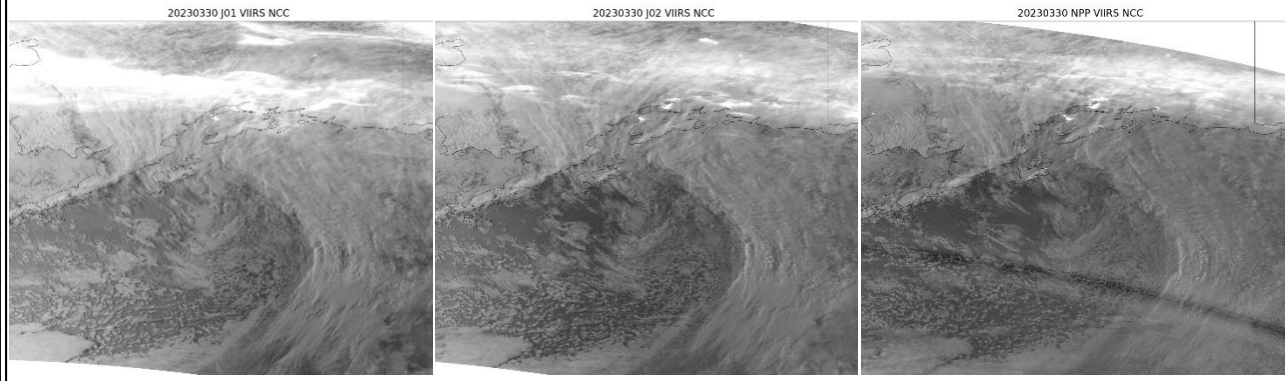


Figure: NOAA-20 (left), NOAA-21 (middle), S-NPP (right) VIIRS Near Constant Contrast product over the Gulf of Alaska from 30 March 2023. The NOAA-21 Image comes shortly after NOAA-21 VIIRS DNB LUTs were implemented, bringing image quality in line with the other two VIIRS.

Leaf Area Index

March 2023

Accomplishments / Events:

- Communicated with the EMC model scientists about how LAI is used in the model, and the requirement and concerns.
- Processed the historical surface reflectance (back to 2018) and generated the corresponding LAI data. Tested the backup algorithm using two bands (red and NIR only).
- Optimized the temporal smoothing and gap filling algorithm to make it more efficient and improve the performance.
- Prepared the software package for the upcoming code delivery.
- Prepared the FY23 LAI proposal and related documents. Prepared the external review documents.

Overall Status:

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

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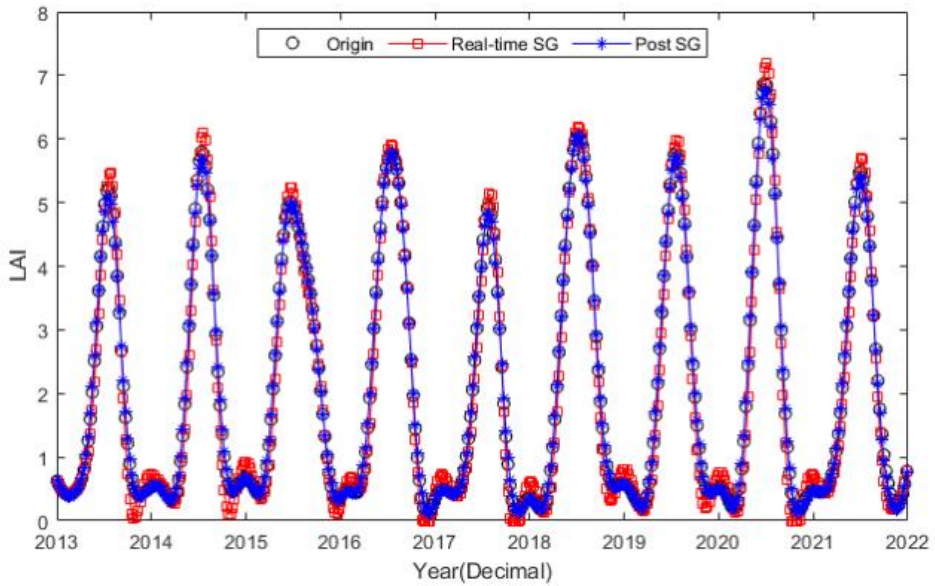
Issues/Risks:

None

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

Highlights:



LAI real-time temporal smoothing and gap filling for operational run

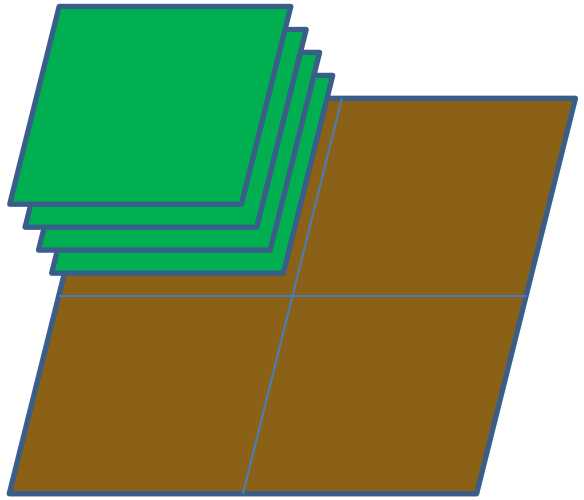
Investigate the Vegetation variable in Noah-MP

- **Vegetation parameters in the model**

For a mixed pixel/grid, the component LAI is used in the model, for instance the mean LAI of a single tree, combine with the tree coverage fraction to describe the whole grid.

$$LAI = gLAI_0$$

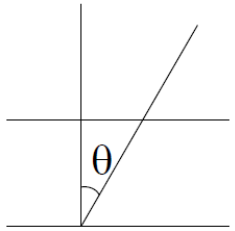
LAI_0: mean LAI of a single tree. g is ground cover.



LAI=1, GVF = 0.25, LAI_0 = 4

- **Relationship between GVF and LAI**

The modified Beer's Law:



$$P(\theta) = e^{-G(\theta)\Omega L/\cos\theta}$$

where θ is the zenith angle,
Ω is the clumping index
G(θ) is the project coefficient
L is the leaf area index

Leaf spatial distribution

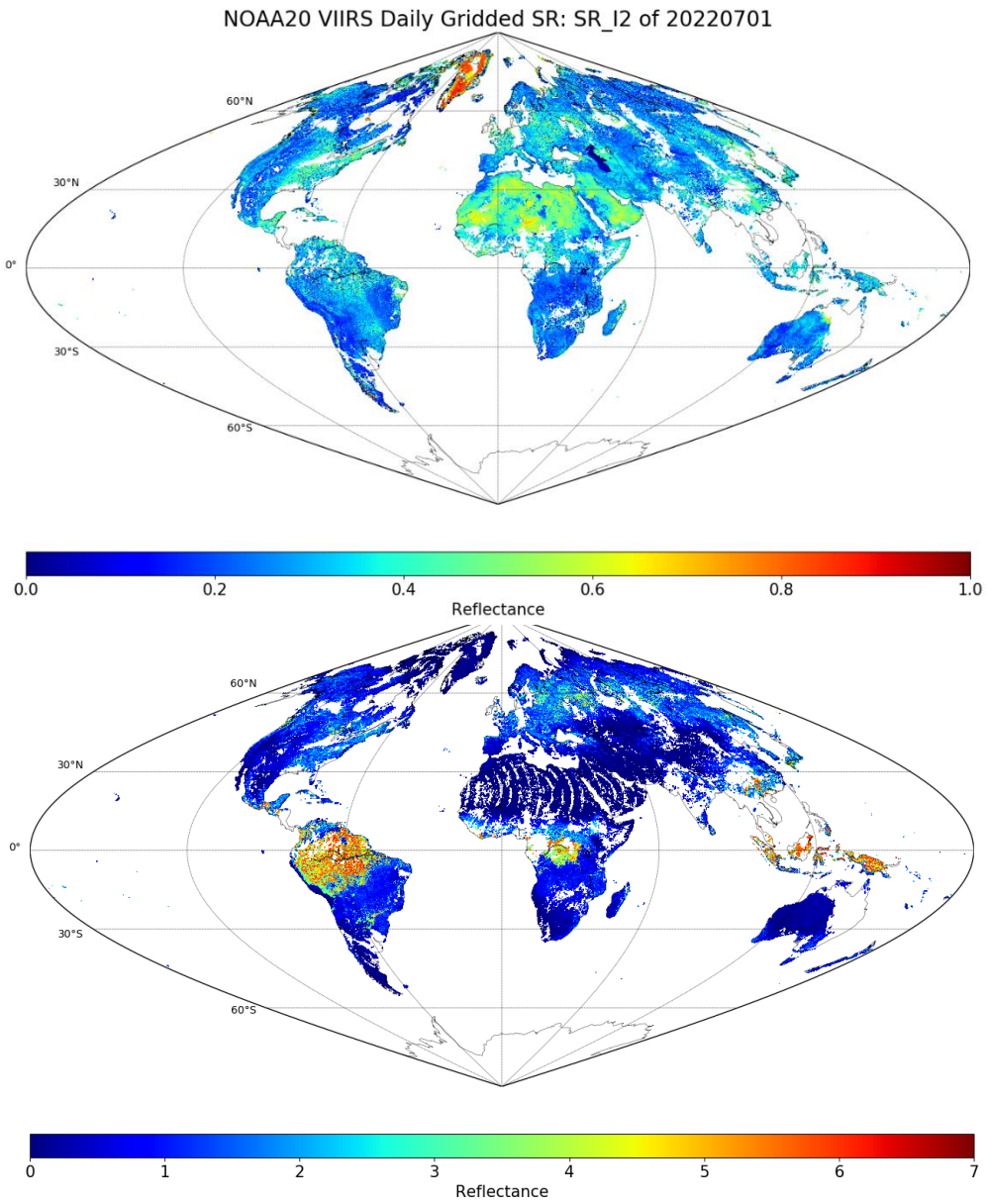
Leaf angular distribution

$L_e = \Omega L$, effective LAI

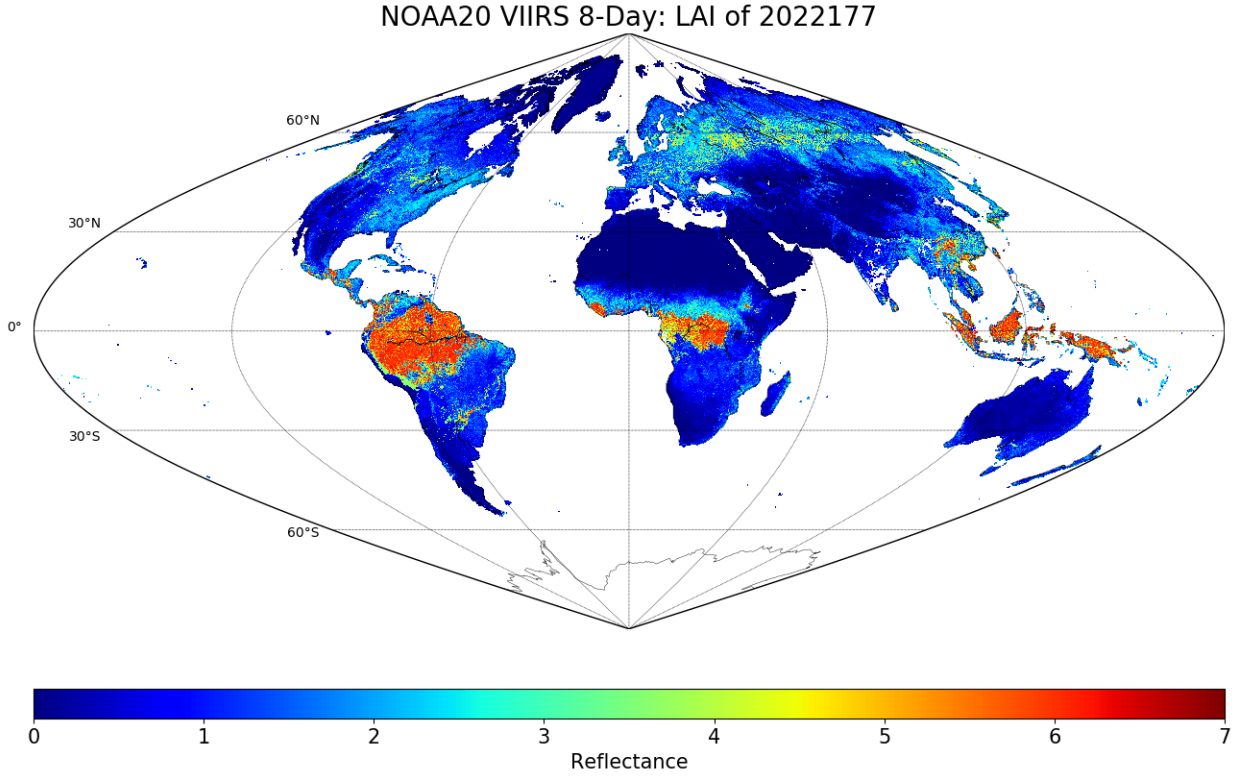
According to (Roujean and Lacaze, 2002), establish a relationship between GVF and LAI. when θ = 0, GVF ≈ 1-P(0), so GVF could be calculated from LAI & other variables according to:

$$GVF = a[1 - T(0)] = a\left[1 - e^{-bG(0)\Omega LAI}\right]$$

LAI Product Processing



The LAI algorithm take granule SR (L2) as the main input, firstly compositing to generate daily gridded SR (L3), based on which, the daily LAI is retrieved by the algorithm. A compositing process is performed during a 8-day period to get weekly LAI with much less gaps. Finally, a temporal smoothing and gap filling is used to get the final product.



Surface Reflectance

March 2023

Accomplishments / Events:

- Work with ASSIST team to test the new DAP.
- Got the JPSS-2 Surface reflectance test data from the PDA IT (non-operational) and did the preliminary test.
- Visual check the data coverage and value via true color image and single band SR map. Check each items of the quality flag.
- Perform the AERONET surface reflectance validation, and did a simple inter-comparison with SNPP and NOAA20. Plan to evaluate the consistency after the BRDF correction.
- Refine the daily gridded SR compositing algorithm and software package, routinely generated for the LAI 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			

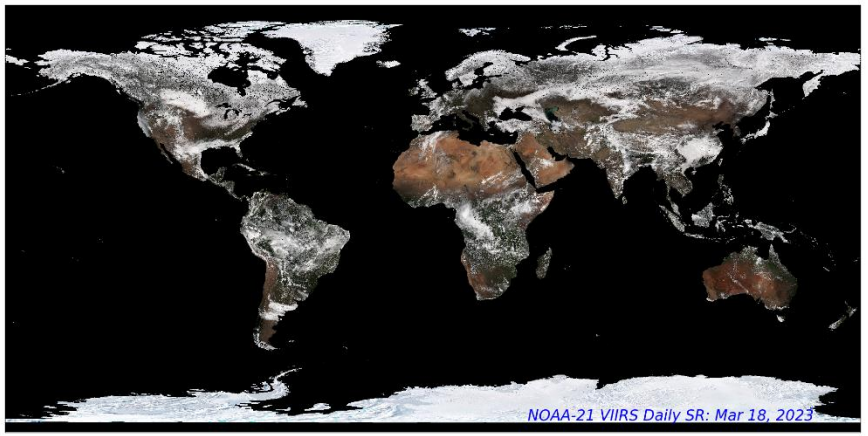
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

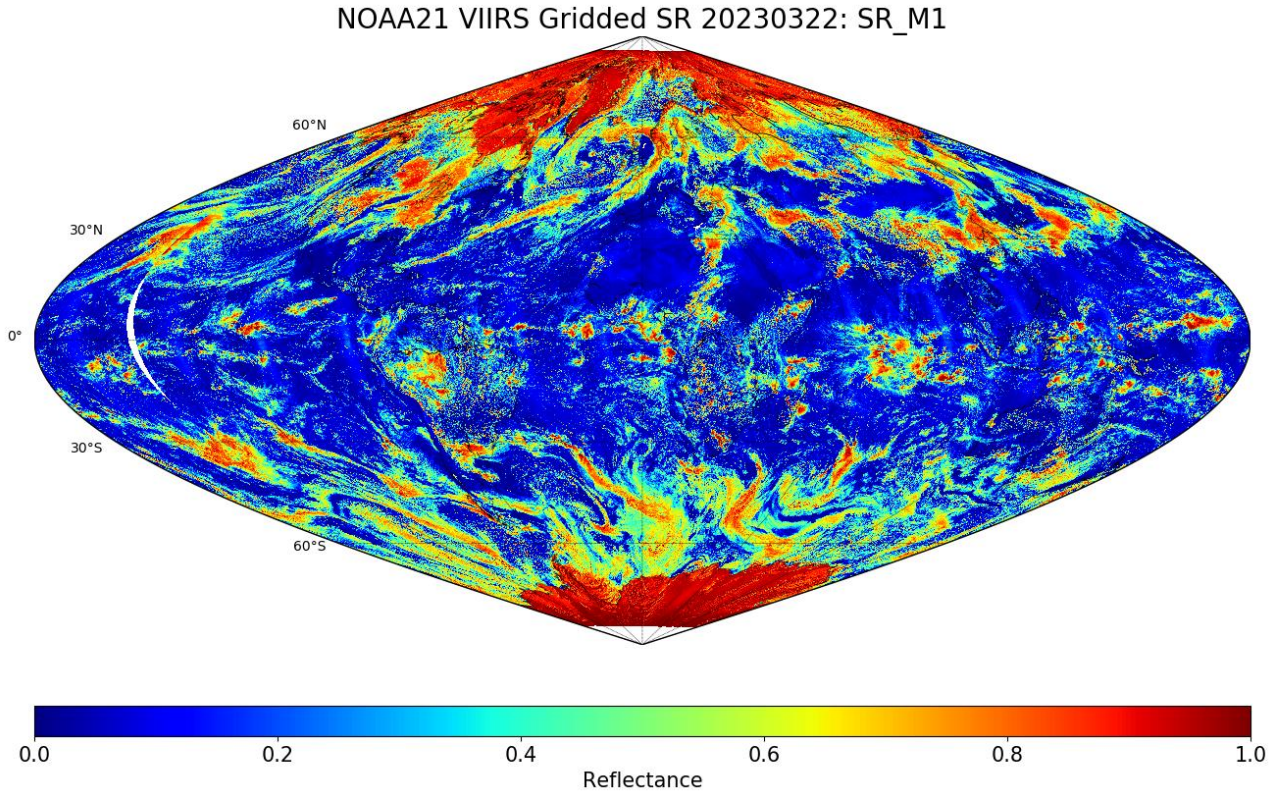
Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
SR LUT update and Test for SNPP, NOAA20 and J2	Oct-22	Nov-22	Dec-22	we generated two sets of LUTs for final decision
SNPP & N20 consistency analysis and correction.	Dec-22	Dec-22	Dec-22	
SR beta review for JPSS-2	Jan-23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

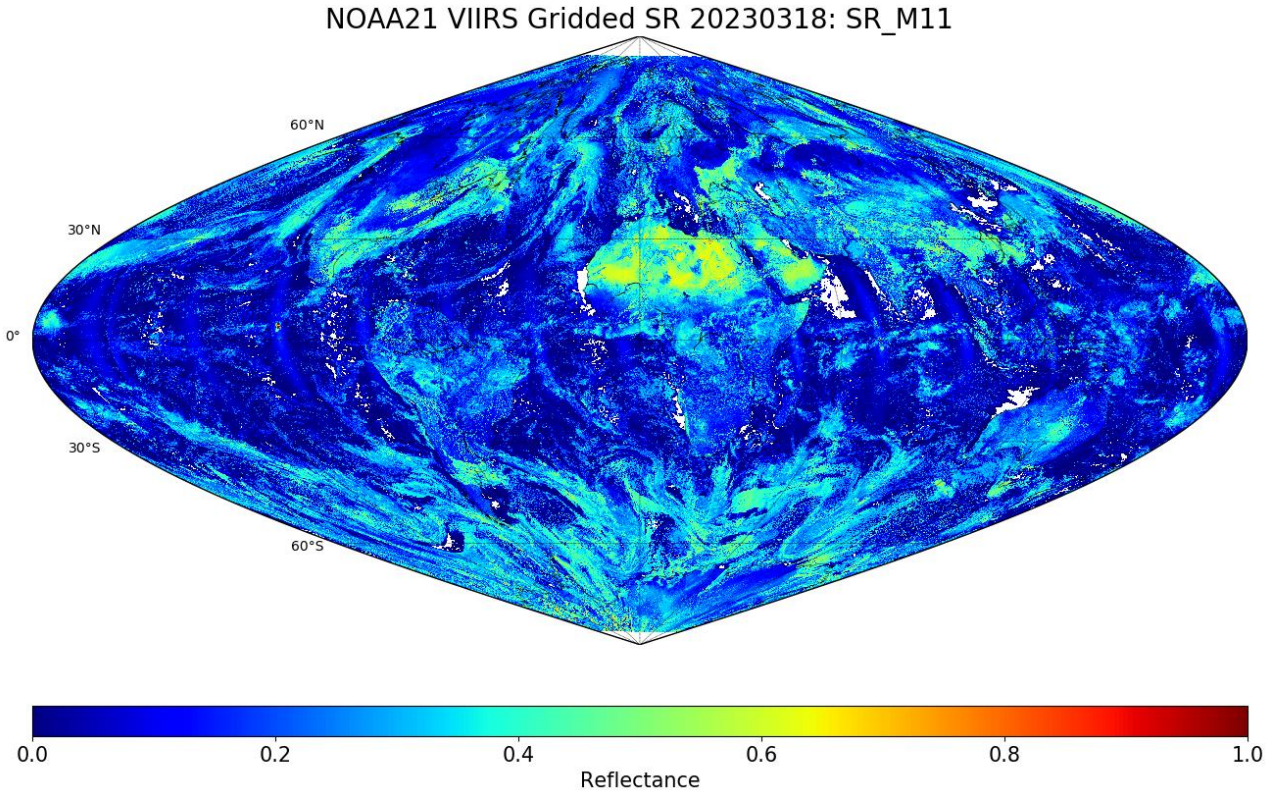
Highlights:



NOAA-21 IT data (Non-operational) preliminary check: True color image of March 18, 2023

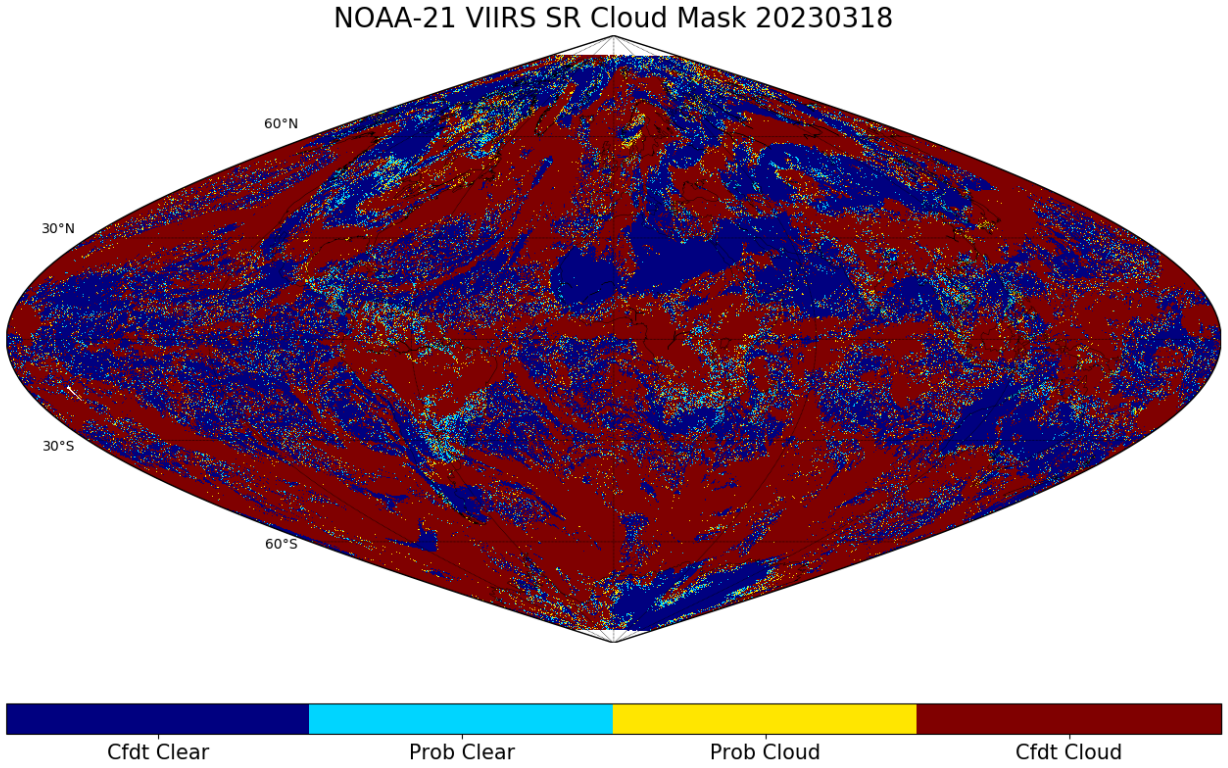
NOAA21 Global Surface Reflectance Check

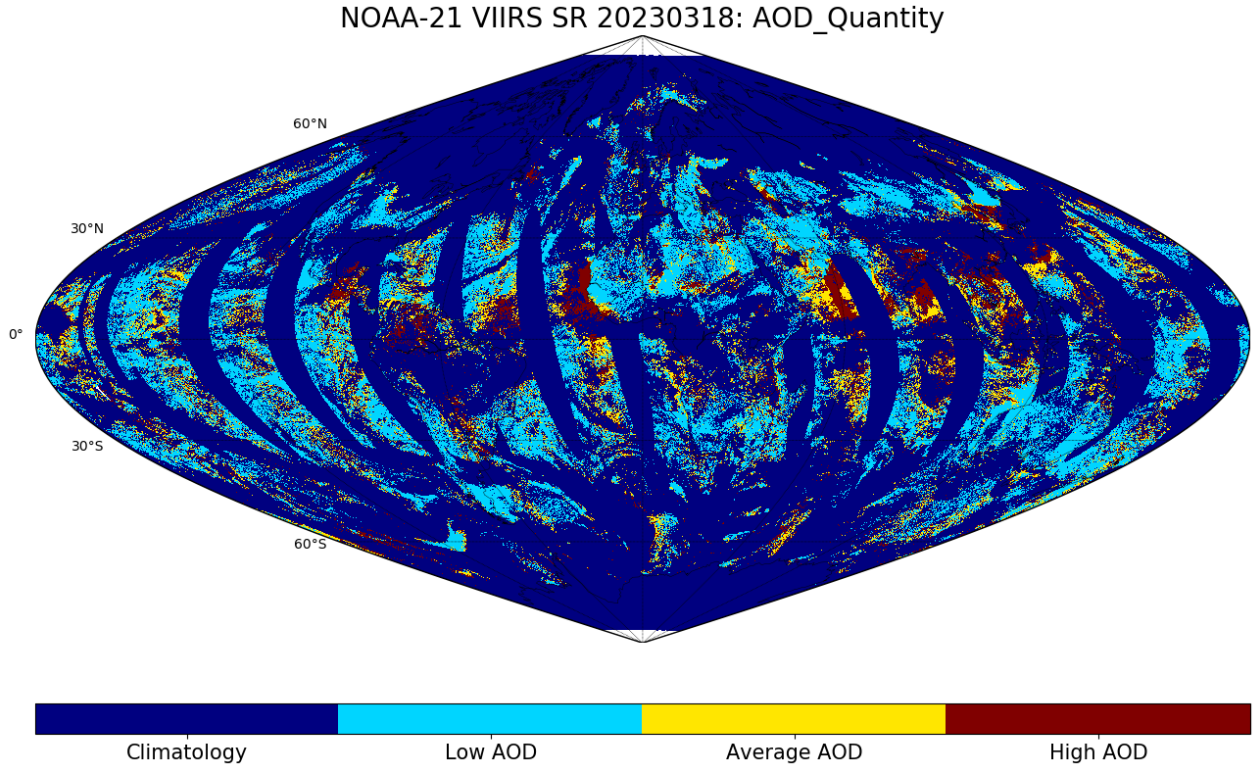




Check all of the 12 SR bands of NOAA-21, visual check the SR coverage and value pattern.

NOAA21 Global Surface Reflectance Check (QFs)

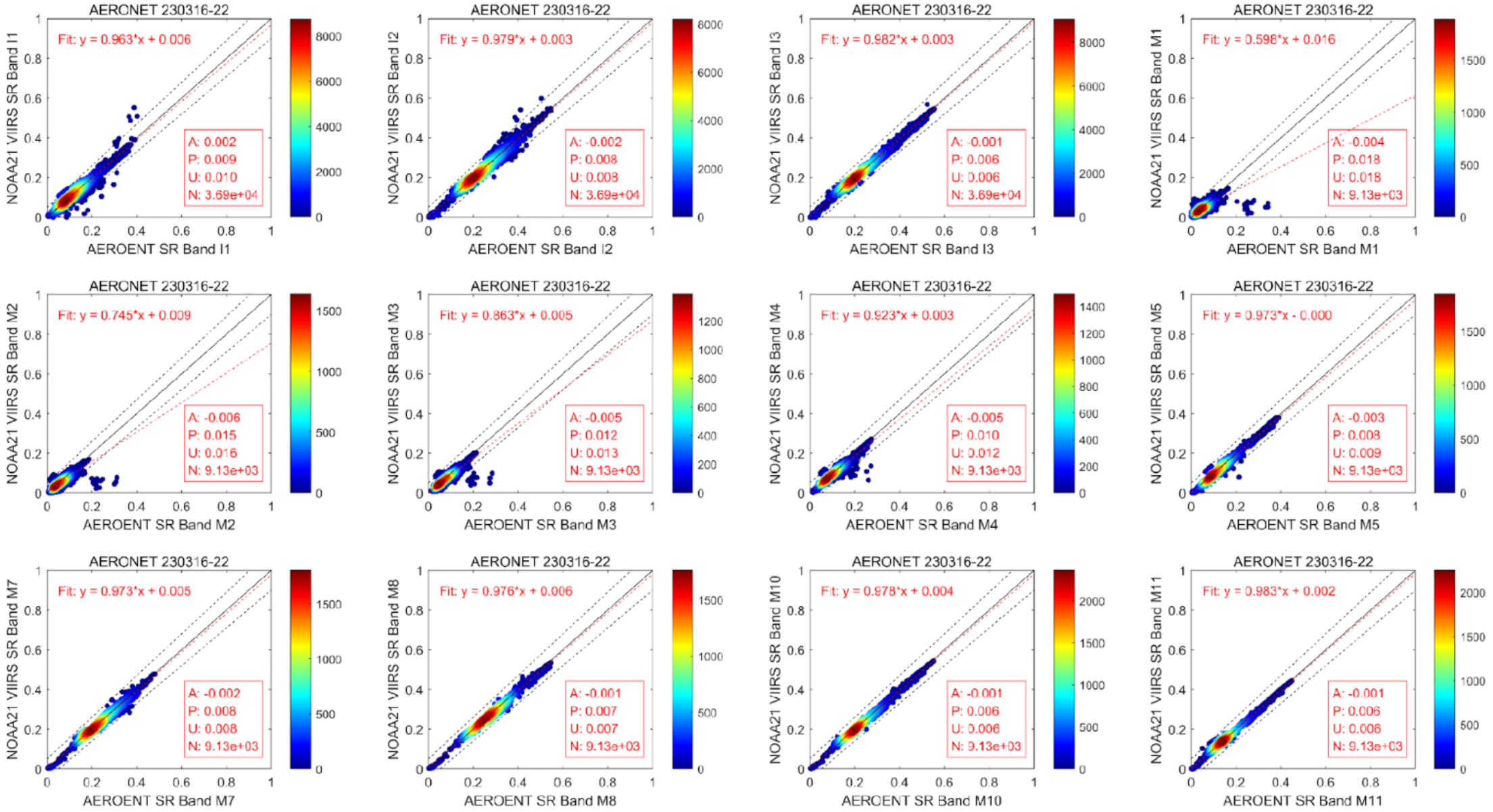




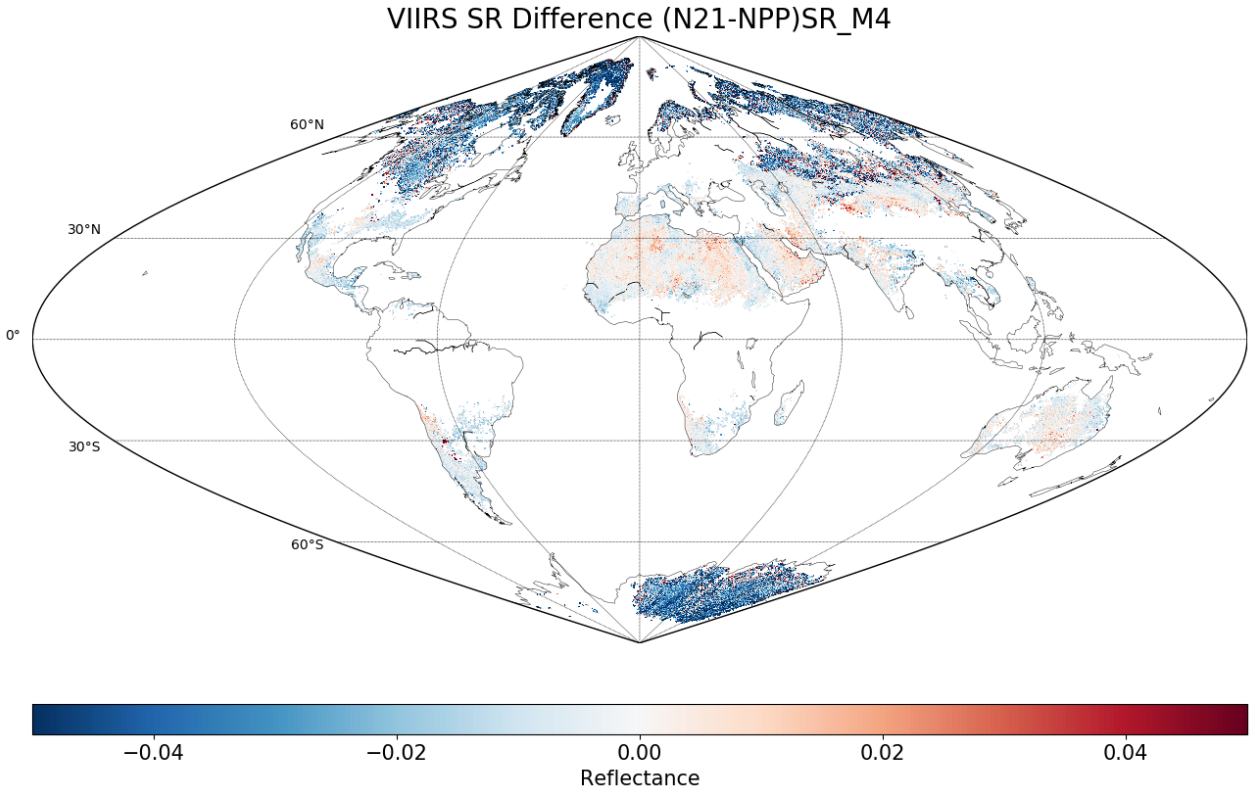
Check all of the Quality flag items of NOAA-21, and compared with SNPP and NOAA20.

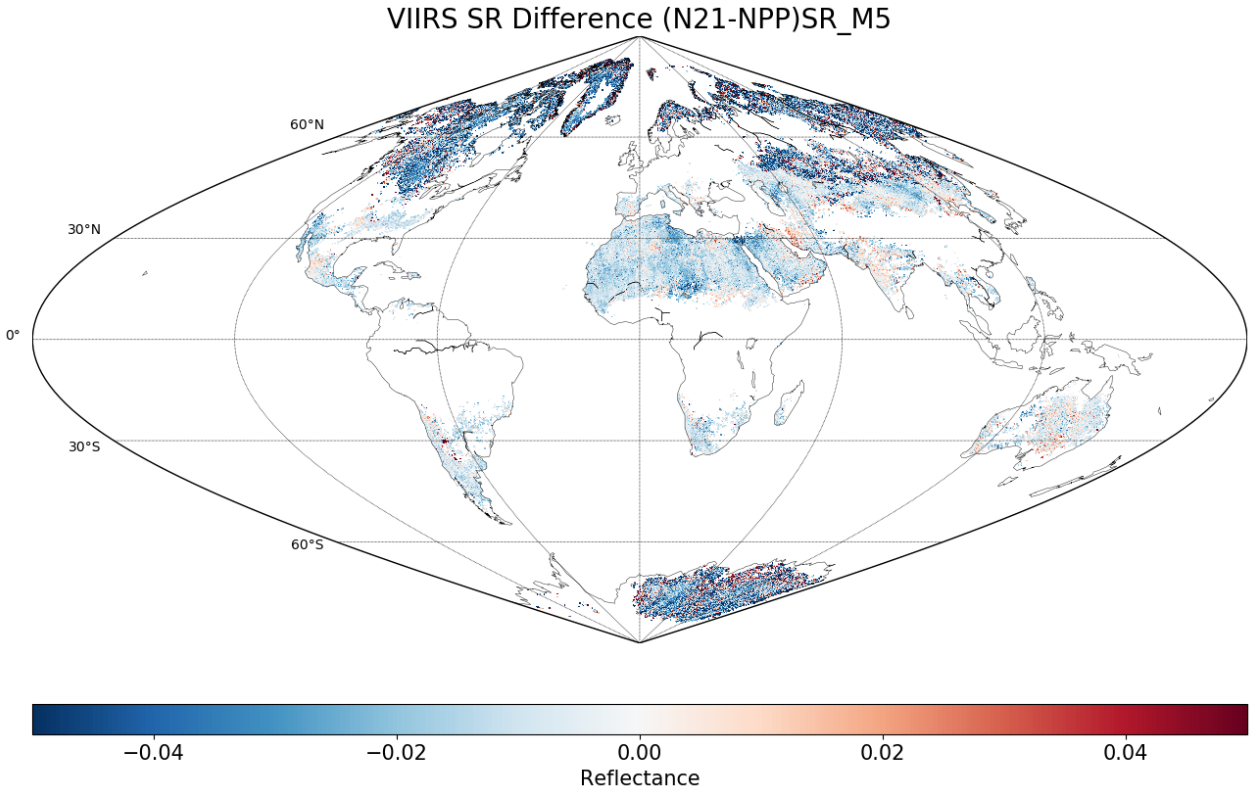
NOAA21 AERONET SR Validation

March 2023



Preliminary Inter-comparison with SNPP





A Multiday clear-sky data average method was used to a simple check the NOAA21 consistency with SNPP and NOAA20, the preliminary results show the overall similarity with NOAA20, the difference with SNPP is smaller compared with NOAA20

Land Surface Temperature

March, 2023

Accomplishments / Events:

- Attended the NOAA CISESS mini-conference.
- Completed CISESS task annual report and slide.
- Prepared the user's guide for L2 VIIRS LST product.
- Found and fixed a software bug and modified the emissivity settings in the radiance based validation module. Updated the radiance based validation results. The ground measurements from six stations of the SURFRAD network were used for the test. Highlights, slides 2-3 present the updated site wide validation results.
- Investigate the altitude difference between calculation and GDAS geopotential height(HGT) and its impact on the validation result(slide 4)
- Examined the criteria used for profile quality control. Six thresholds options were tested. The result shows a slight impact on the validation statistics, but the stricter criteria greatly decreases the valid sample size for the validation particularly over Desert Rock Station. (slide 5)
- Investigated the profile exclusion over DRA site through statistical test methods such as two-sample Welch's t-test and Kolmogorov-Smirnov test(Ks-test). (slide 6-7)
- Work on the anomaly study for land surface temperature and surface air temperature using ERA5 data as the data source for air temperature. The 5 year air temperature climatology is built and anomaly is calculated for 2022. The minimum, maximum temperature as well as the diurnal temperature range are under analysis.

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Annual products performance report for L2 and L3 VIIRS LST	Dec-22	Dec-22	Dec-22	
Beta review of the NOAA-21 LST	**Mar-23**	**Mar-23**		**Postponed. Data is not available yet.**
All weather LST update	May-23	May-23		
FY24 Program Management Review	Jun-23	Jun-23		
Routine monitoring tool and its update	Jul-23	Jul-23		
DAP for NOAA-21 if needed	Aug-23	Aug-23		
Provisional review of the NOAA-21 LST	Sep-23	Sep-23		

Overall Status:

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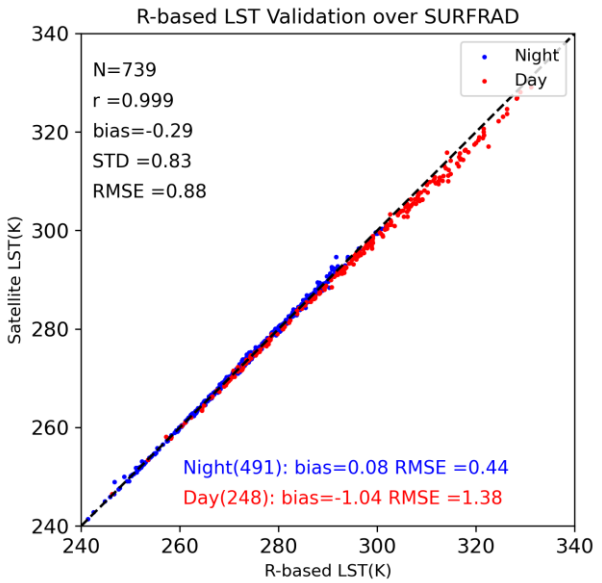
Issues/Risks:

None

Highlights:



R-based validation result without any profile quality control over six SURFRAD stations

- Overall a nearly 1.0 correlation is achieved between Satellite LST and r-based LST with a bias of -0.3 K and RMSE of 0.9 K.
- The nighttime statistics indicates a fairly good agreement between the satellite LST and r-based LST; bias close to zero
- The daytime result shows a negative bias of 1 K. The cold bias increases with the temperature value.

Land Surface Temperature

March, 2023

Accomplishments / Events:

- Attended the NOAA CISESS mini-conference.
- Completed CISESS task annual report and slide.
- Prepared the user's guide for L2 VIIRS LST product.
- Found and fixed a software bug and modified the emissivity settings in the radiance based validation module. Updated the radiance based validation results. The ground measurements from six stations of the SURFRAD network were used for the test. Highlights, slides 2-3 present the updated site wide validation results.
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Beta review of the NOAA-21 LST	**Mar-23**	**Mar-23**		**Postponed. Data is not available yet.**
All weather LST update	May-23	May-23		
FY24 Program Management Review	Jun-23	Jun-23		
Routine monitoring tool and its update	Jul-23	Jul-23		
DAP for NOAA-21 if needed	Aug-23	Aug-23		
Provisional review of the NOAA-21 LST	Sep-23	Sep-23		

Overall Status:

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Technical / Programmatic		X			
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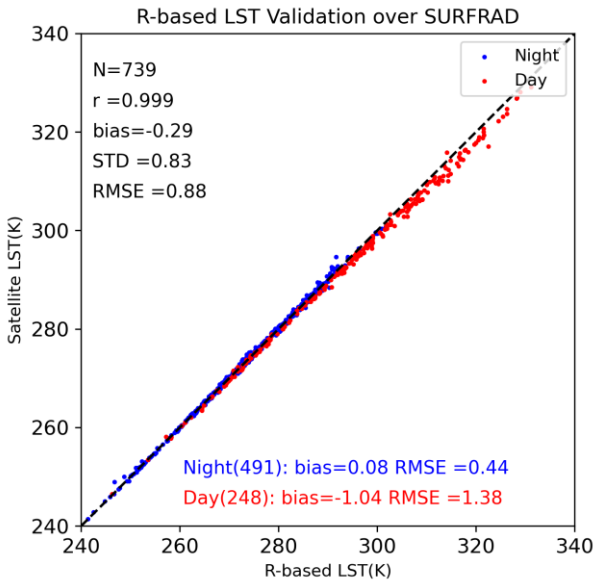
Highlights:



R-based validation result without any profile quality control over six SURFRAD stations

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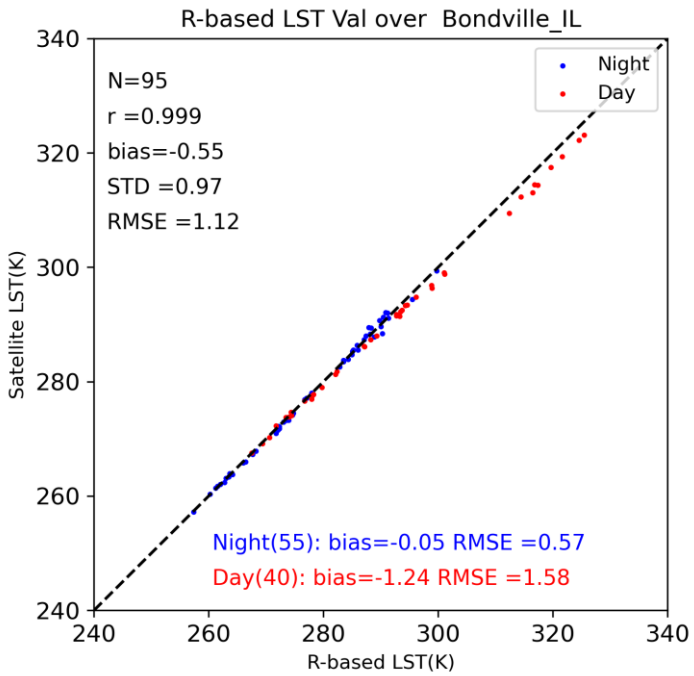
- The nighttime statistics indicates a fairly good agreement between the satellite LST and r-based LST; bias close to zero
- The daytime result shows a negative bias of 1 K. The cold bias increases with the temperature value.

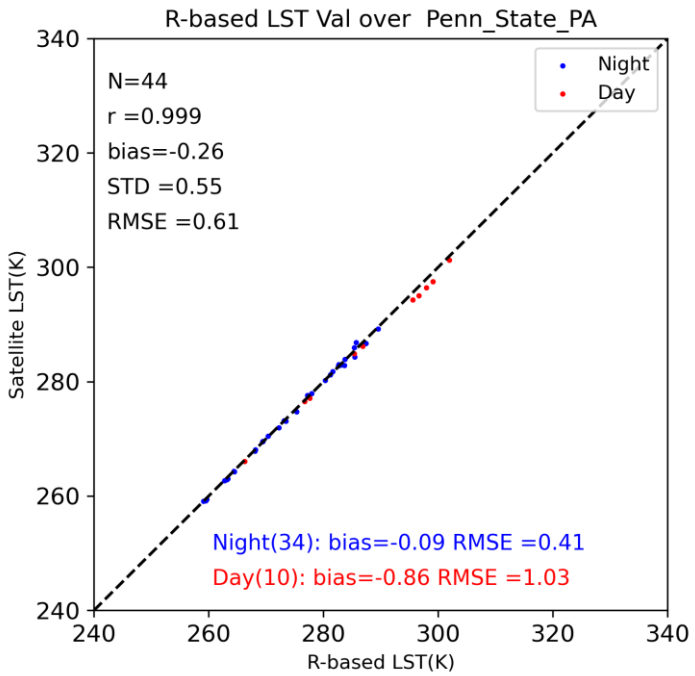
Updated r-based validation result

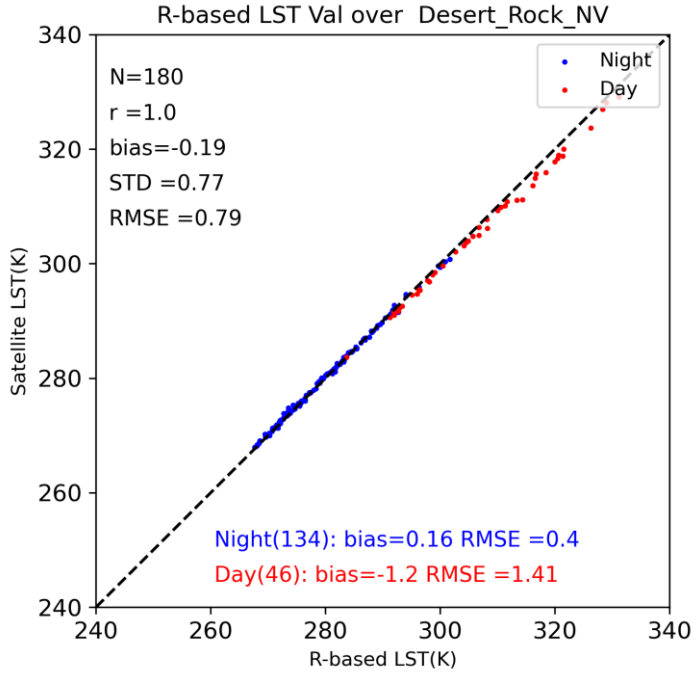
SNPP VIIRST LST vs SURFRAD
01/01/2022 ~ 06/30/2022

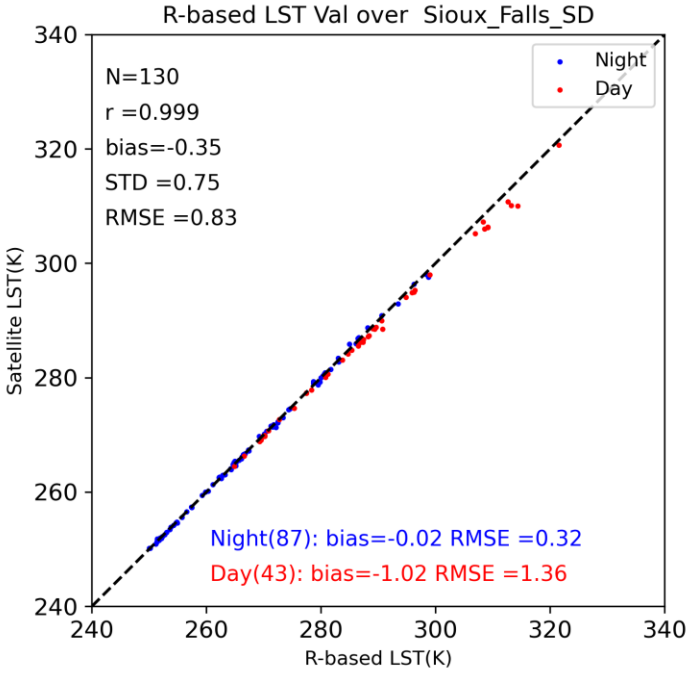
*Abs($BT12_{satellite}$ - $BT12_{simulated}$) <= 0.5 K

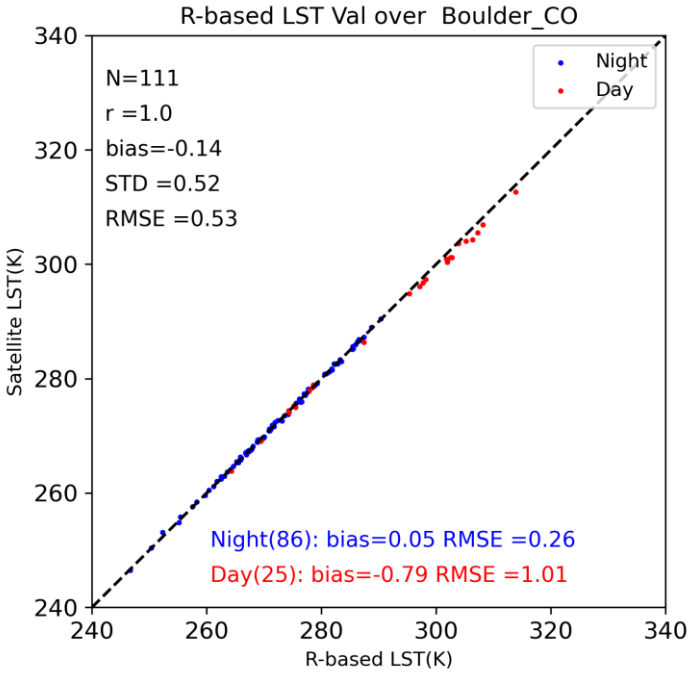
- A nearly 1.0 correlation is achieved between Satellite LST and r-based over all sites.
- The nighttime statistics indicates a fairly good agreement with RMSE mostly less than 0.5 K
- The daytime result shows a negative bias beyond 1 K over BON, DRA and SXF stations.

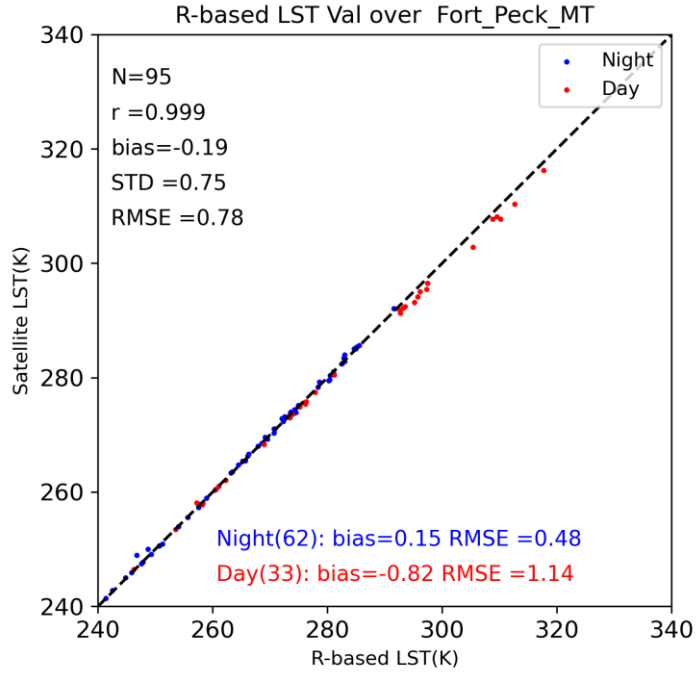




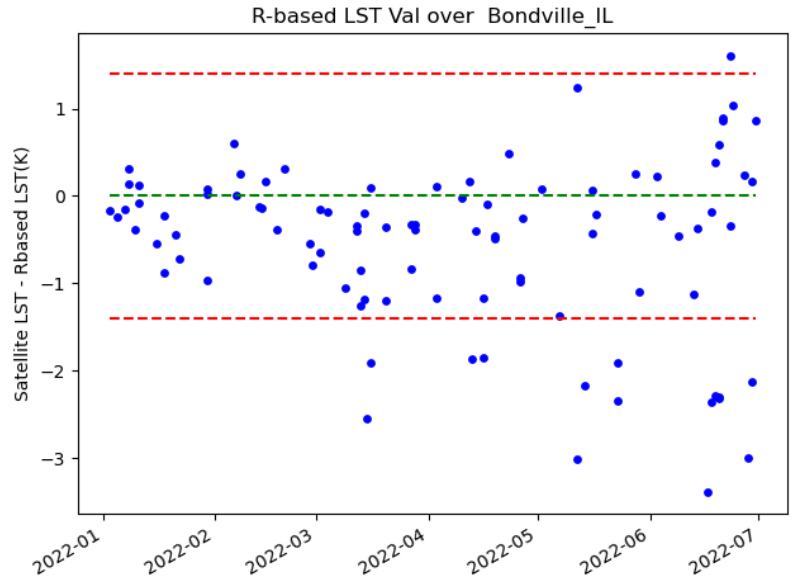


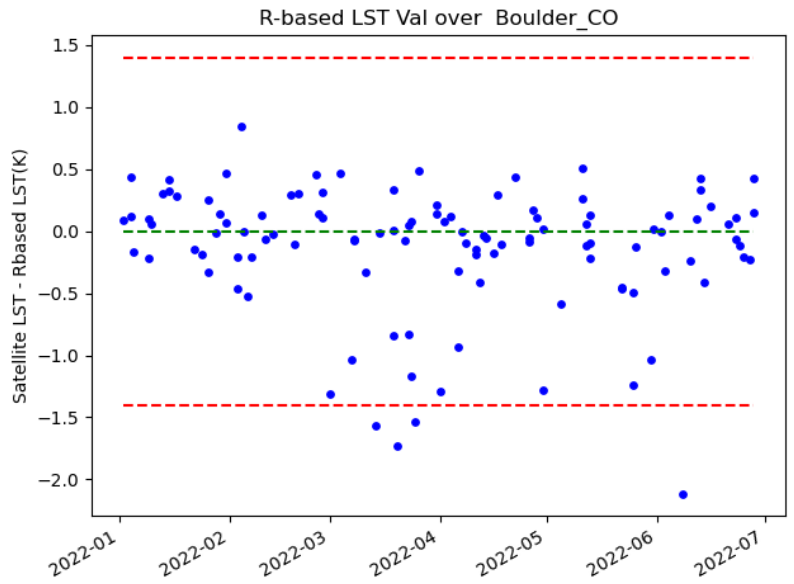


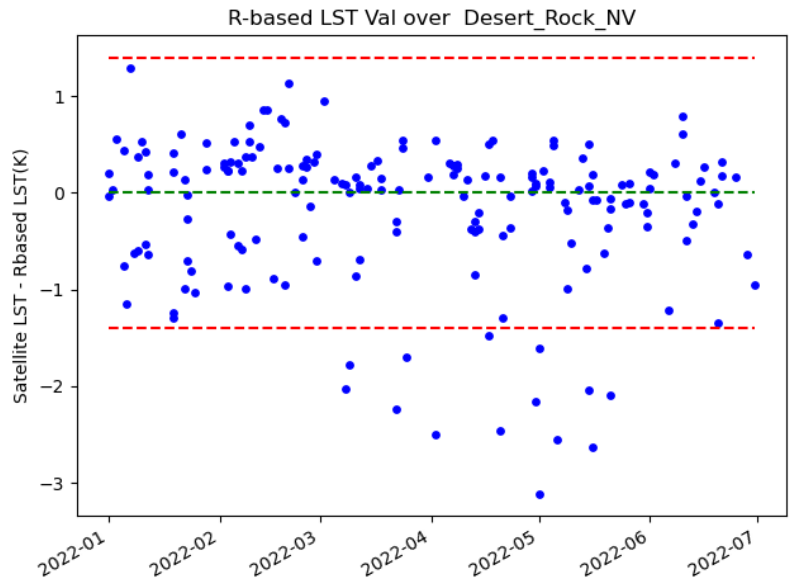


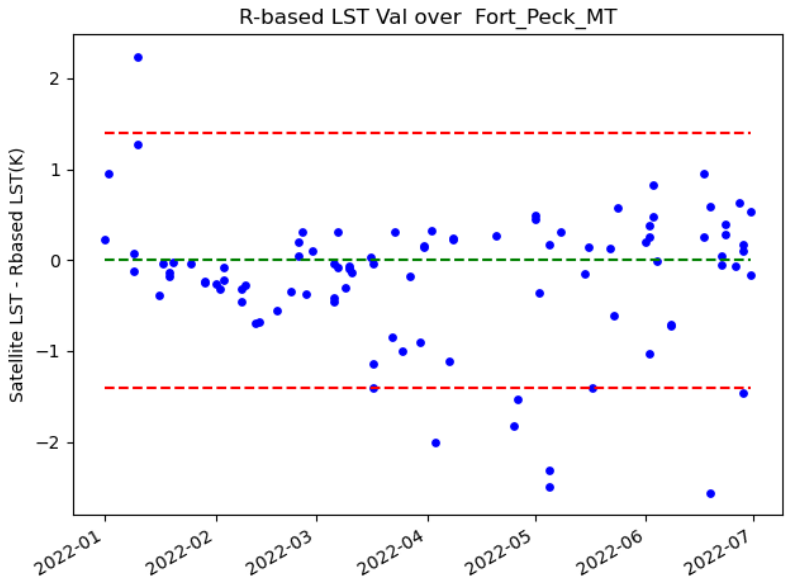


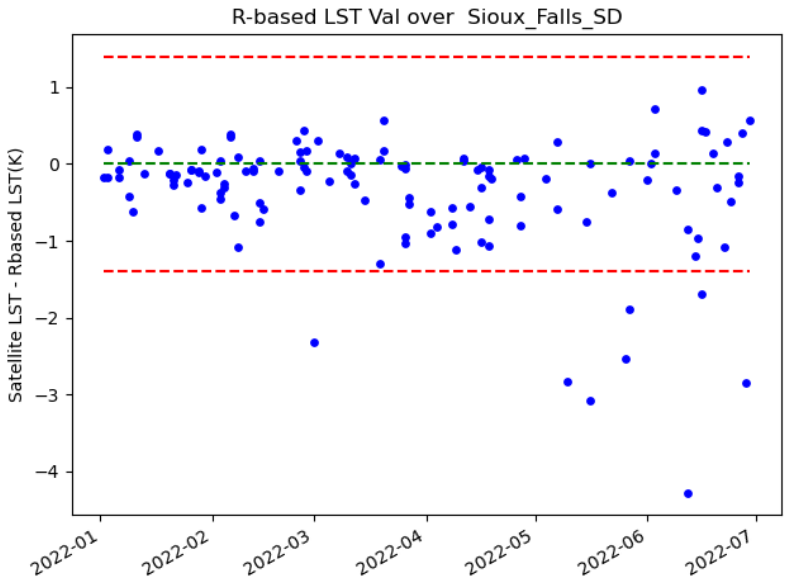
R-based validation timeseries

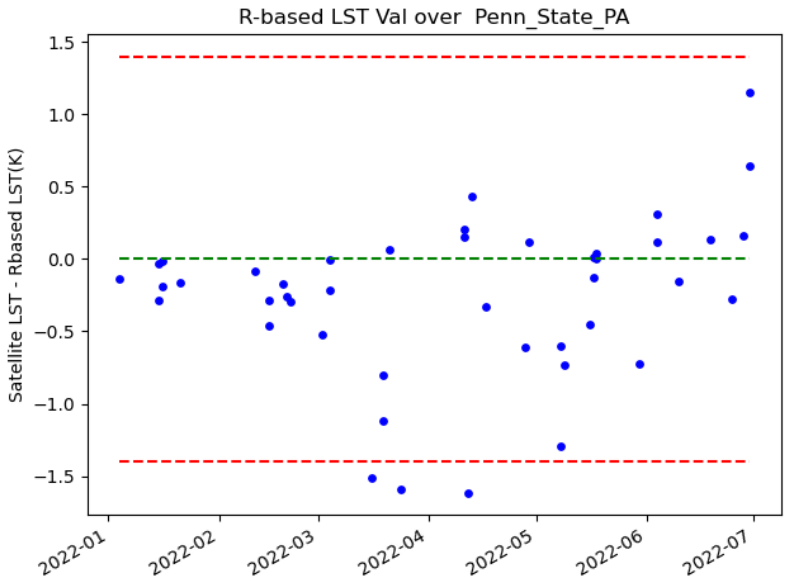






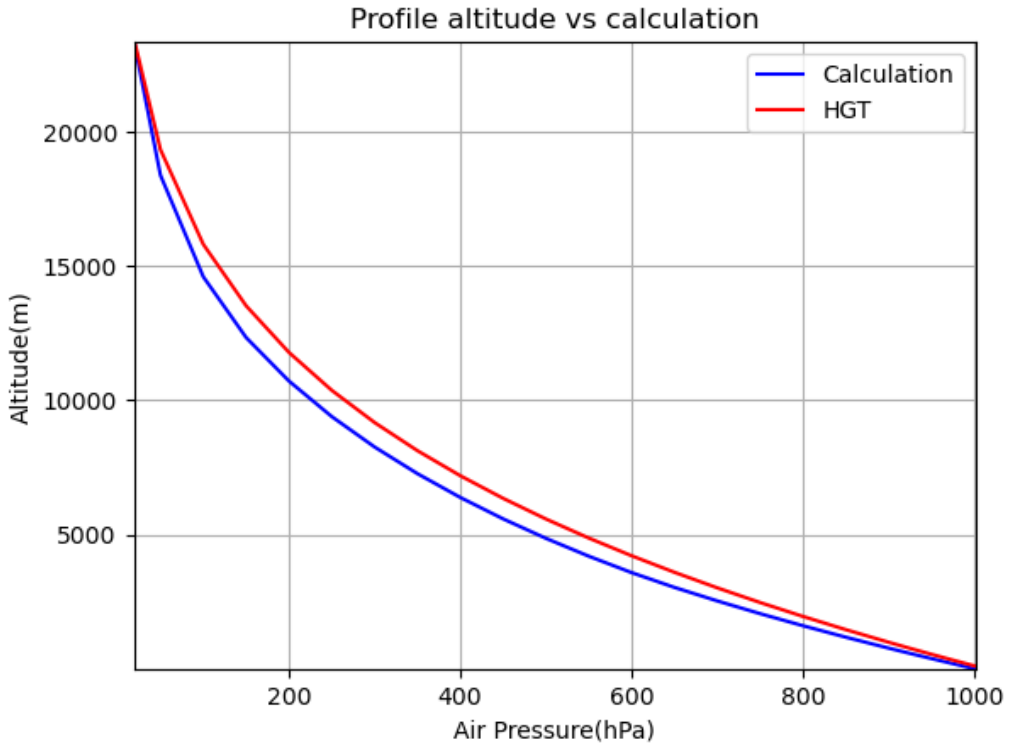


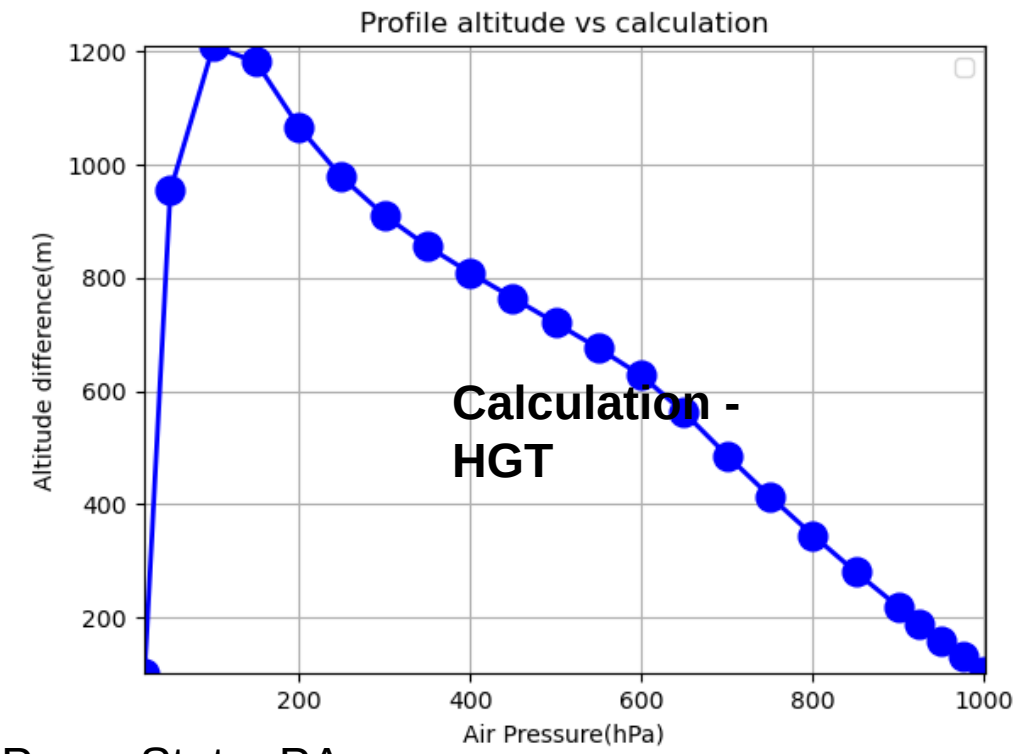




The time series shows the LST difference over six SURFRAD stations, with the red line indicating the required accuracy for LST. Large negative differences are observed in each station, possibly due to cloud contamination.

Altitude in vertical profile





202207041755 over Penn_State_PA station

- GDAS provides the HGT (geopotential height) associated with each air pressure level. The altitude can also be calculated at given air pressure. The method relates height to the international standard atmosphere i.e. assumption of 1013.25 at Mean sea level, 15° at mean sea level
- It has been observed that altitude differences generally increase with decreasing air pressure, particularly when the air pressure is below 200 hPa, which mostly impacts the higher altitude layers of the atmosphere. The altitude difference between the two can reach over 2000 meters.
- The impact of these altitude differences on validation was investigated, and the results show no significant impact on validation statistics.

Profile quality control filtering

Abs(BT12 simulated – satellite BT12) < = 1.0K

StationName	Samples	Remainng	Exclusion Percentage
Total	739	735	0.54
Bondville_IL	105	105	0
Boulder_CO	126	124	1.59
Desert_Rock_NV	215	215	0
Fort_Peck_MT	101	101	0
Penn_State_PA	56	54	3.57
Sioux_Falls_SD	136	136	0

Abs(BT12 simulated – satellite BT12) < = 0.75K

StationName	Samples	Remainng	Exclusion Percentage
Total	739	731	1.08
Bondville_IL	105	104	0.95
Boulder_CO	126	124	1.59
Desert_Rock_NV	215	215	0
Fort_Peck_MT	101	100	0.99
Penn_State_PA	56	52	7.14
Sioux_Falls_SD	136	136	0

Abs(BT12 simulated – satellite BT12) < = 0.5K

StationName	**Samples**	Remaining	Exclusion Percentage
Total	739	655	11.37
BON	105	95	9.52
TBL	126	111	11.9
DRA	215	180	16.28
FPK	101	95	5.94
PSU	56	44	21.43
SXF	136	130	4.41

Abs(BT12 simulated – satellite BT12) < = 0.3K

StationName	**Samples**	Remaining	Exclusion Percentage
Total	739	466	36.94
BON	105	71	32.38
TBL	126	91	27.78
DRA	215	71	66.98
FPK	101	84	16.83
PSU	56	41	26.79
SXF	136	108	20.59

- To ensure the accuracy of r-based land surface temperature (LST) validation, it's crucial to perform profile quality control based on the difference between simulated and observed brightness temperature at 12 microns.,
- In this study, we tested six different thresholds (1.0K, 0.75K, 0.6K, 0.5K, 0.4K, and 0.3K) for profile quality control and measured the resulting exclusion percentages. Our findings show that the exclusion percentages range from 0.54% to 36.94%, with the highest exclusion rates observed at the DRA site.

T-Test result

Features	Night		Day	
	Statistic	pValue	Statistic	pValue
Satellite LST	2.579	0.011	1.027	0.307
Satellite BT11	2.381	0.019	0.981	0.33
Satellite BT12	2.322	0.022	0.89	0.376
(3 by 3) BT11 STD	0.659	0.511	-1.525	0.131
Sensor zenith	4.659	0	1.849	0.068
Sensor Azimuth	-0.617	0.538	1.342	0.183
Solar zenith	-2.627	0.009	-1.001	0.32
Soalr Azimuth	-0.407	0.684	-1.916	0.058
Emissivity at 11μm	-10.062	0	-5.174	0
Emissivity at 12μm	-8.714	0	-4.646	0
Total precipitable water -GFS	2.264	0.025	0.382	0.704
Simulated BT11	2.381	0.018	0.981	0.33
Simulated BT12	2.605	0.01	1.074	0.286
R-based LST	2.712	0.007	1.138	0.258

To investigate the exclusion over DRA site, two-sample Welch's t-test was performed on two groups with unequal sample sizes: one group comprised of selected records and the other group comprised of excluded records, for both daytime and nighttime.

- Emissivity related features exhibit high statistics and zero p-value indicating a significant mean difference between two groups for both day and night
- Geometry related features show different result for day/night. Nighttime solar_z and sensor_z have p-value less than 0.05 and relatively large statistics, indicating the two groups are statistically different, while daytime shows no significant statistical difference. Nighttime sensor_a and solar_a present small statistics and p-values above 0.05, indicating a similar mean between two groups.
- TPW at night exhibit a large statistic and a p-value less than 0.05, meaning they are statistically different. TPW at daytime show a smaller statistics and a slightly higher p-value, indicating a less statistical difference compare to nighttime.

Ks-test result

Features	Night		Day	
	Statistic	pValue	Statistic	pValue
Satellite LST	0.236	0.004	0.172	0.387
Satellite BT11	0.236	0.004	0.158	0.488
Satellite BT12	0.233	0.004	0.146	0.586
(3 by 3) BT11 STD	0.137	0.229	0.198	0.233
Sensor zenith	0.322	0	0.245	0.077
Sensor Azimuth	0.158	0.115	0.293	0.02
Solar zenith	0.236	0.004	0.144	0.604
Soalr Azimuth	0.086	0.777	0.2	0.224
Emissivity at 11μm	0.566	0	0.422	0
Emissivity at 12μm	0.566	0	0.422	0
Total precipitable water - GFS	0.245	0.002	0.151	0.546
Simulated BT11	0.236	0.004	0.158	0.488
Simulated BT12	0.239	0.003	0.172	0.387
R-based LST	0.248	0.002	0.172	0.387

Kolmogorov-Smirnov test(Ks-test) was performed on two groups: one group comprised of selected records and the other group comprised of excluded records, for both daytime and nighttime.

- The spectral emissivity features exhibit similar statistics and zero p-values, indicating that the two groups (selected records and excluded records) have different distributions for both day and night.
- Geometry related features show different result for day/night. Nigthtime Sensor_z and solar_z have a small pvalue (< 0.05) and insignificant statistics, indicating they have the same distribution. Solar_a has a large pValue statistic indicating that the two groups are different. For daytime, the sensor_a presents small pValue(<0.05) indicating the same distribution between the two groups.
- TPW at night exhibits a p-value of 0.002, indicating that the two groups have different distributions. TPW during the daytime shows smaller statistics and higher p-values, indicating a less confident distribution compared to nighttime.

Surface Albedo

March 2023

Accomplishments / Events:

- Local processing the L3 **JPSS SURFALB** albedo products
  -- Communicated with the NDE team about the Issues that the cloudy pixels have not been successfully filled with offline output
  -- Doing local processing using the L2 SURFALB from PDA I&T to generate gap-filled L3 albedo to mimic the operational L3
  -- Added the L3 albedo monitoring in science team monitoring webpage
  -- Evaluated the **NOAA-21 L3 albedo** which looks good and consistent with the S-NPP and NOAA-20 counterparts when cloud condition is same
- Fixed bugs in v2 VIIRS BRDF code, which has increased efficiency relative to v1, but misunderstood some logic in v1 (all in local codes)
- Compare the NBAR between GOESR and VIIRS
  -- In progress: analyzing the difference

Overall Status:

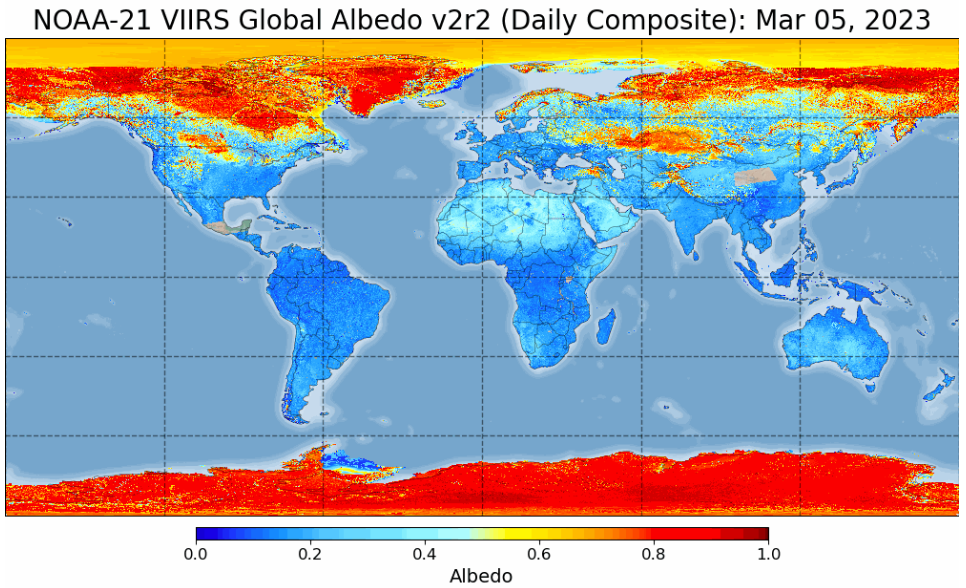
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		x			
Schedule		X			

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

Issues/Risks:

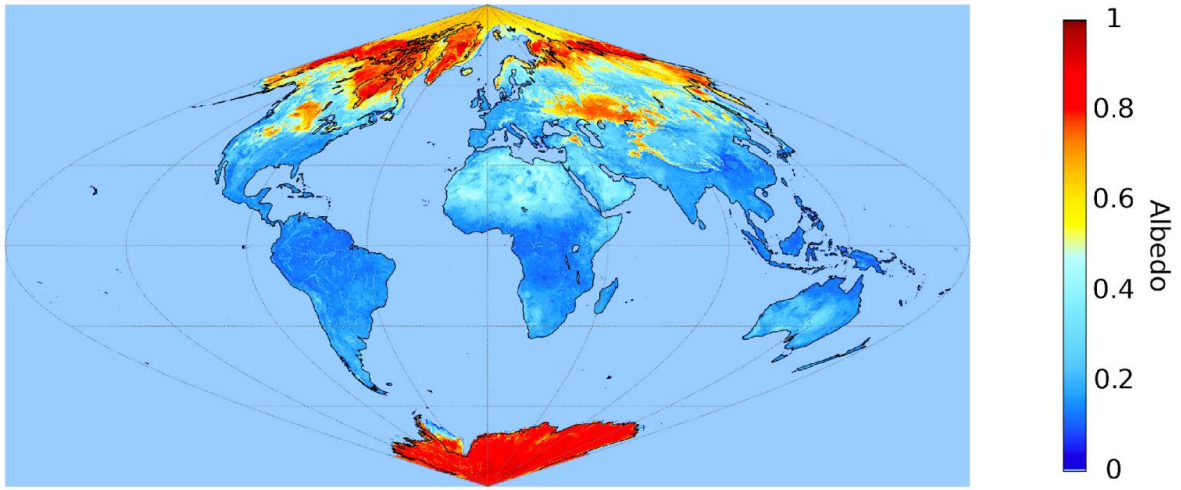
Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Beta review of the NOAA-21 albedo	Mar-23	May-23		JPSS project plan
PMR review	May-23			
mDAP for NOAA-21 if needed	Aug-23			
Provional review of NOAA-21 LST	Sep-23			

Highlights: The NOAA-21 v2r2 albedo Demo

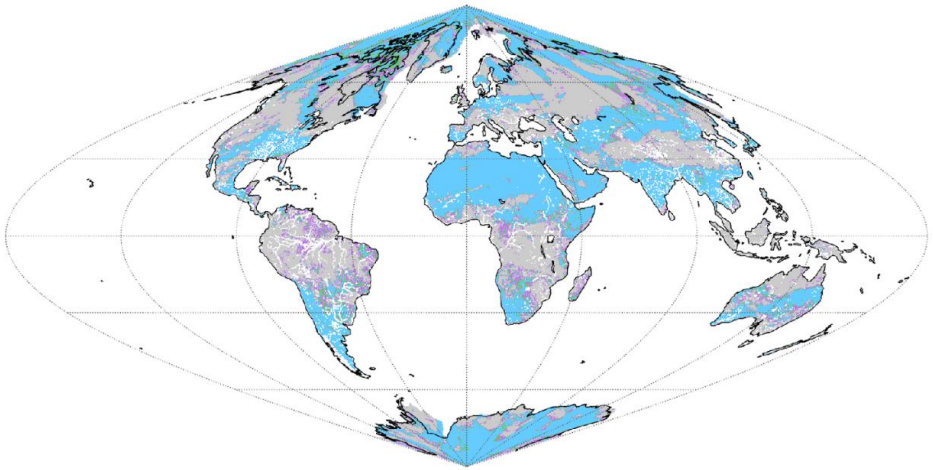


Demo of NOAA21 v2r2 albedo (L3 in local)

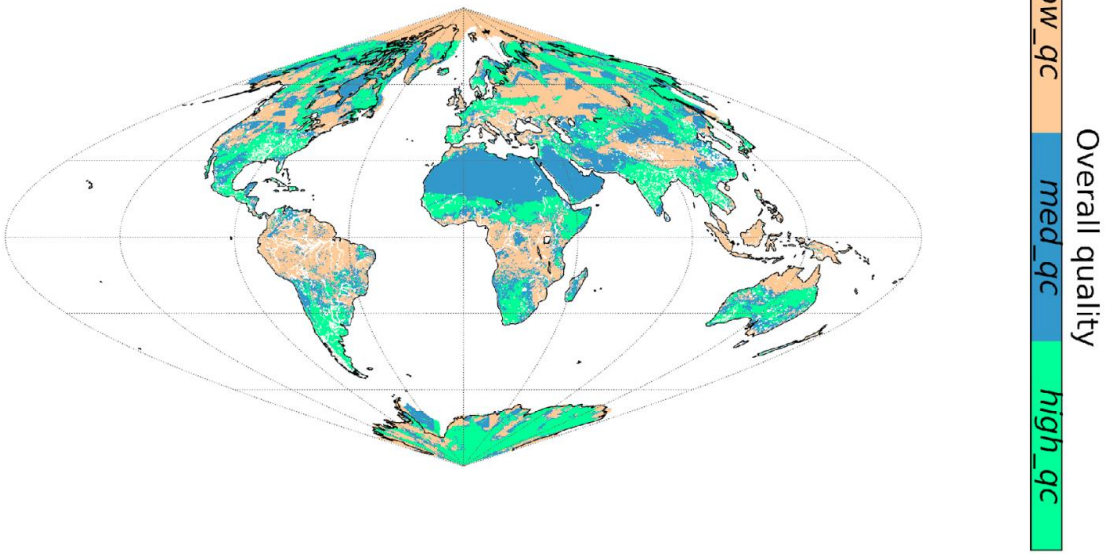
NOAA21 VIIRS v2r2 SURFALB Albedo Feb 28 2023



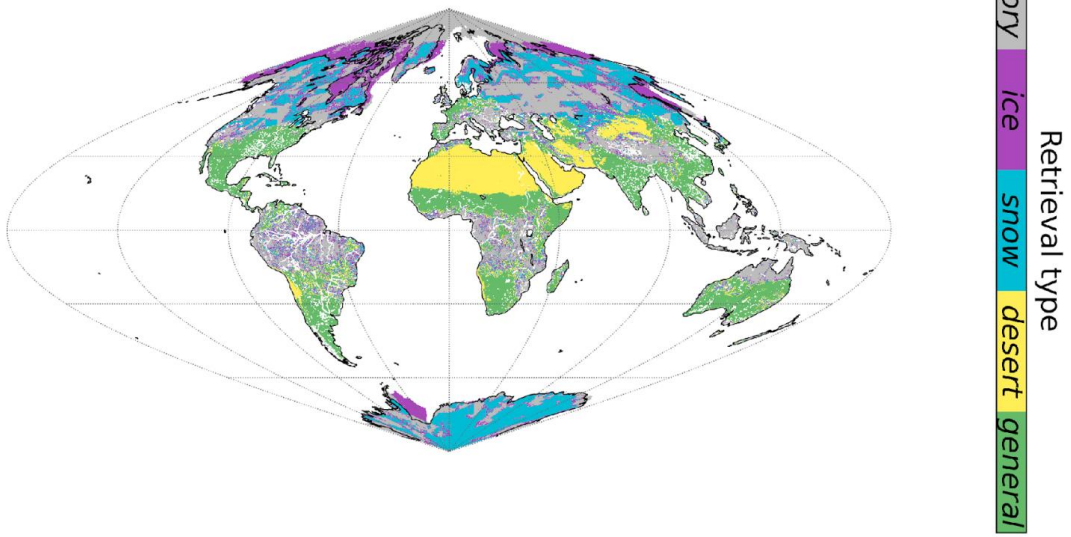
NOAA21 VIIRS v2r2 Albedo Cloud Flag: Feb 28 2023



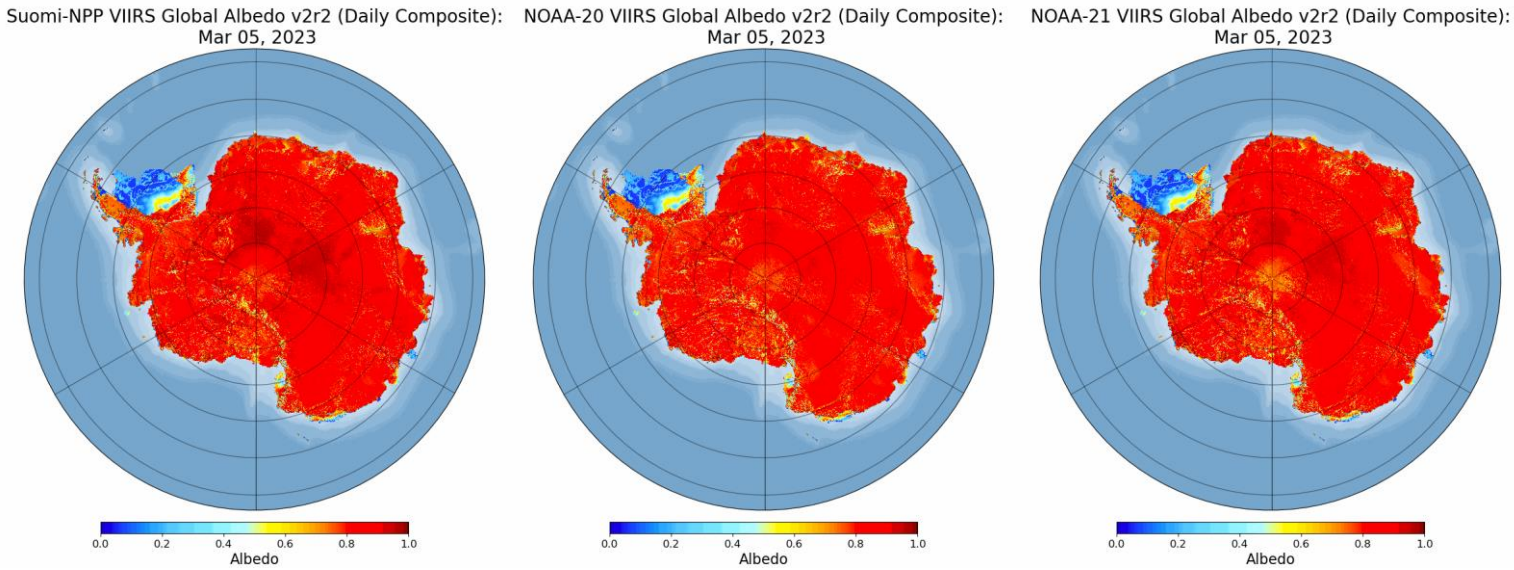
NOAA21 VIIRS v2r2 Albedo Overall Quality: Feb 28 2023

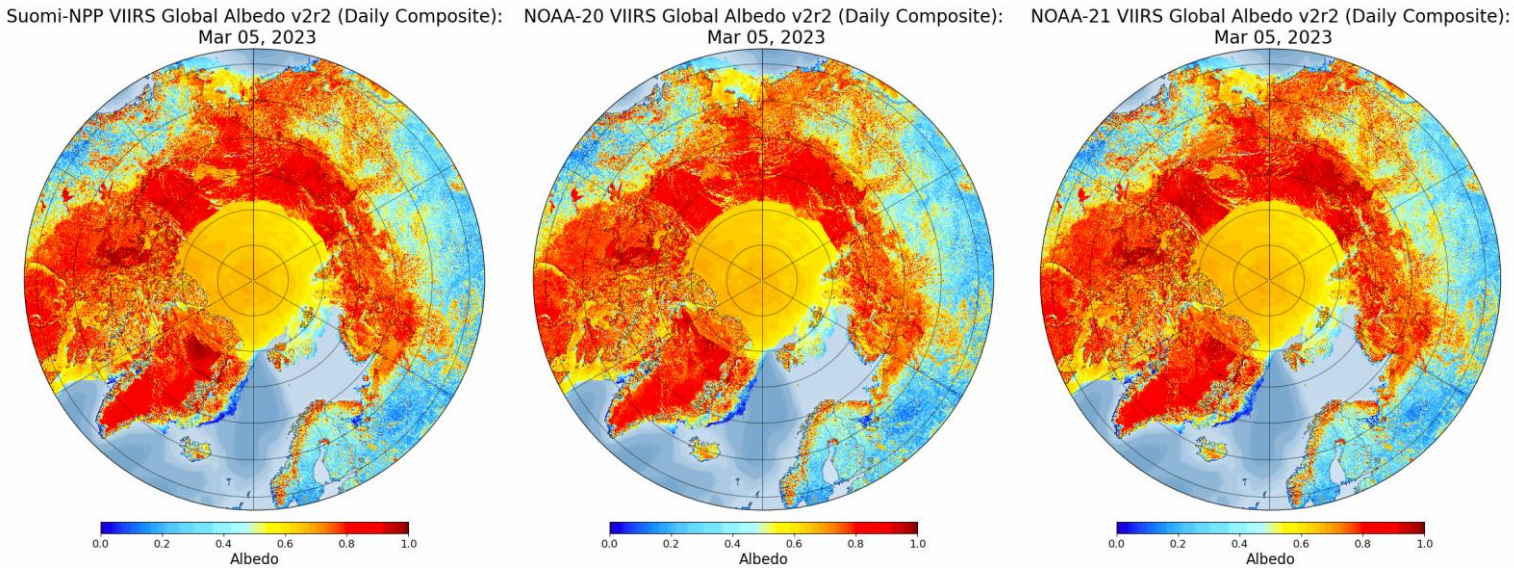


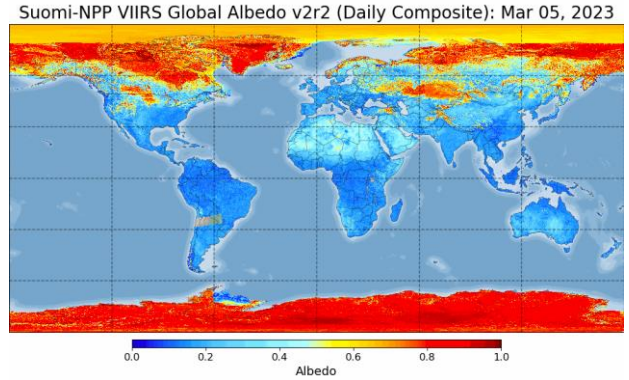
NOAA21 VIIRS v2r2 Albedo Retrieval Path: Feb 28 2023

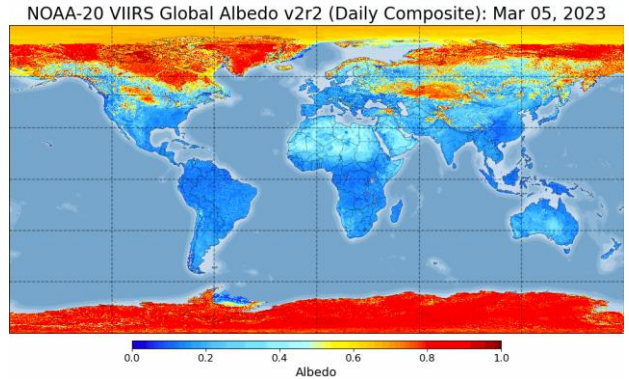


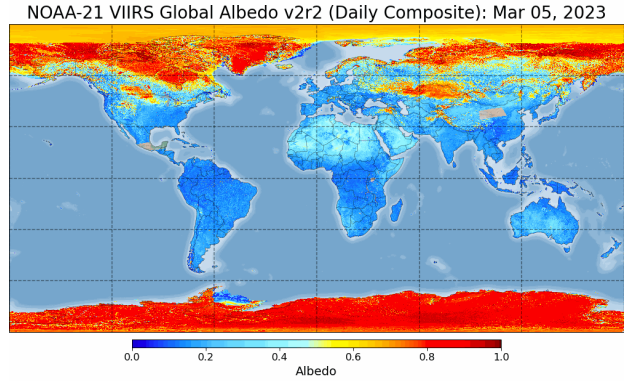
Demo of v2r2 albedo from S-NPP, NOAA-20, NOAA-21











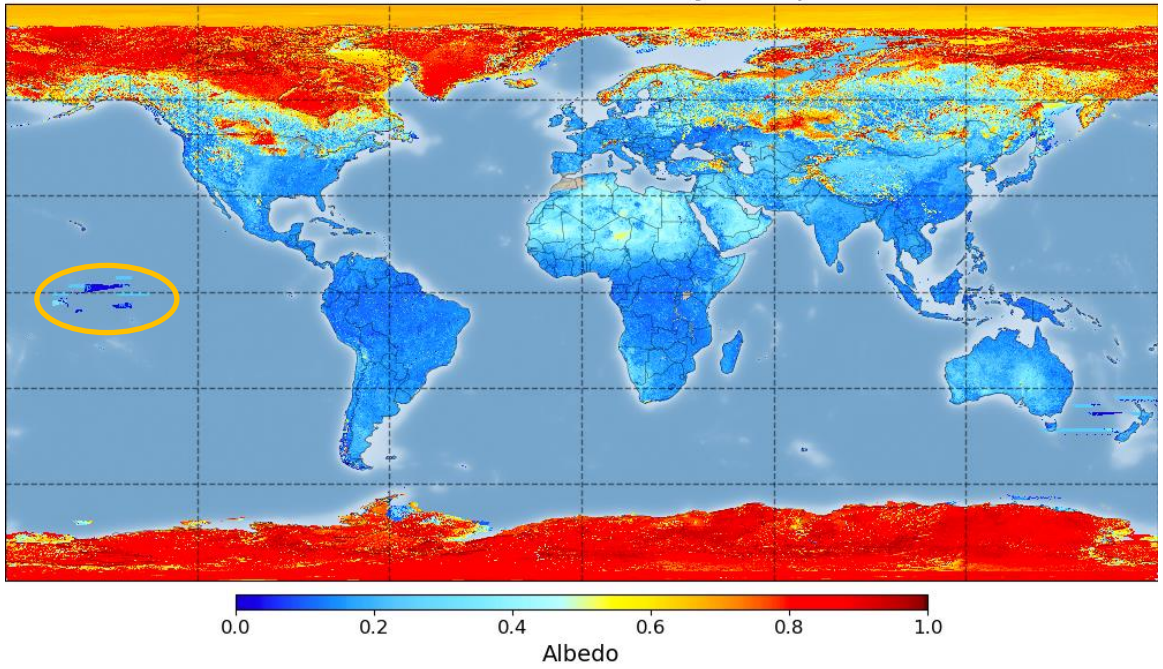
Some JPSS LSA v2r2 issues

Operational
- Missing granules

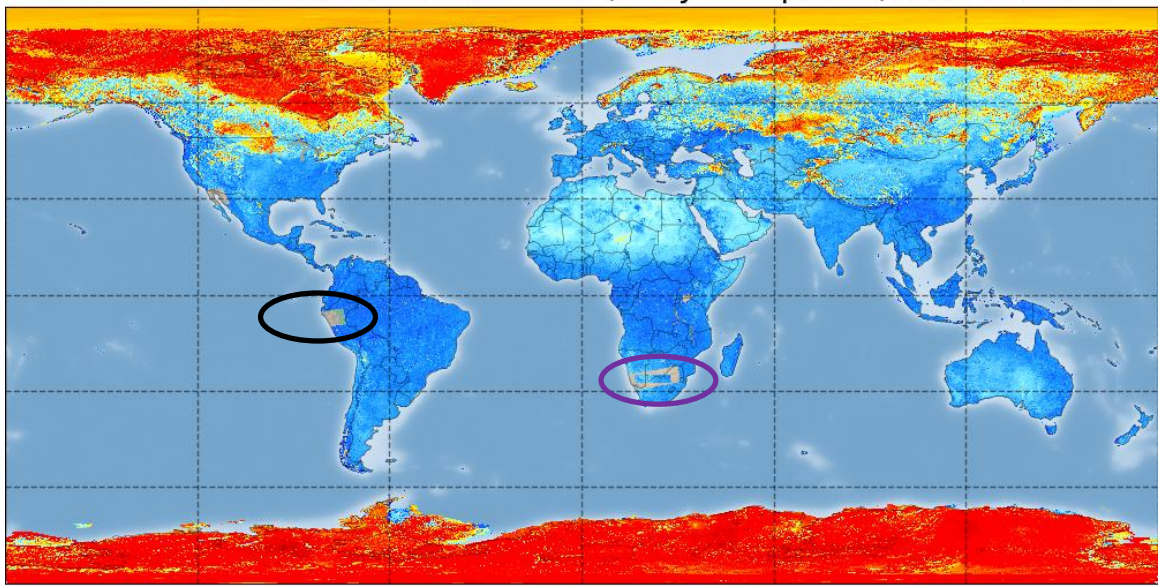
Future work
- Regional Discontinuity
  -- Snow
  -- Sea ice

Local processing issue
- Data in the ocean (due to gridding, solved and being test)

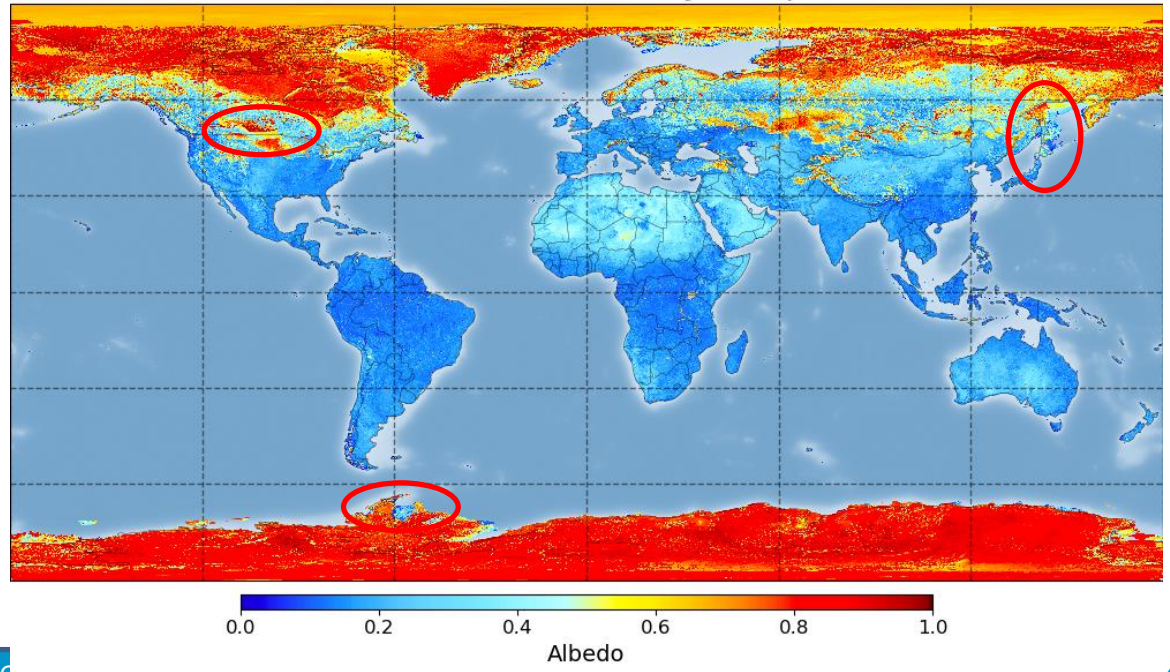
Suomi-NPP VIIRS Global Albedo v2r2 (Daily Composite): Mar 15, 2023



NOAA-20 VIIRS Global Albedo v2r2 (Daily Composite): Mar 15, 2023

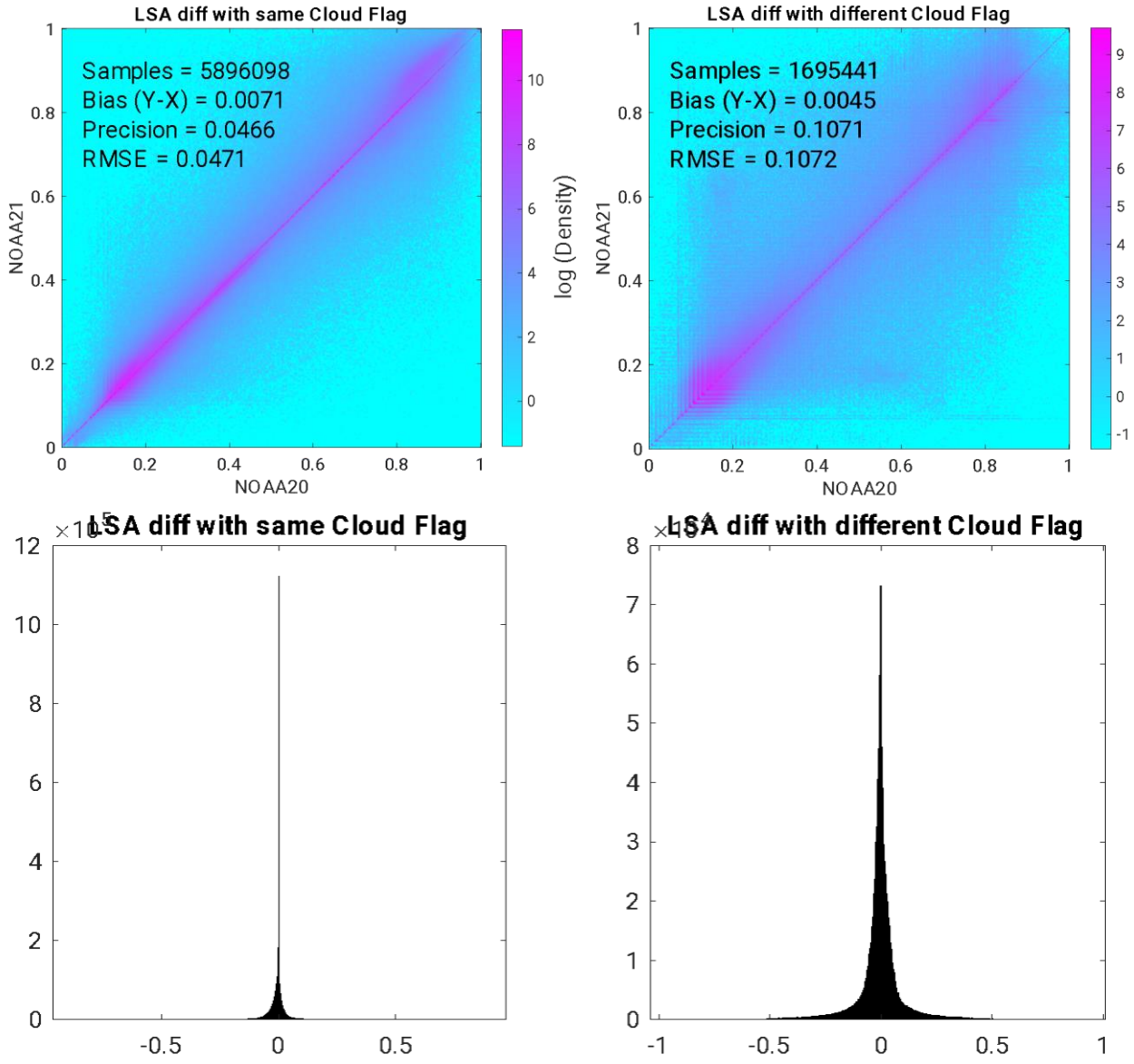


NOAA-21 VIIRS Global Albedo v2r2 (Daily Composite): Mar 15, 2023



NOAA-20 vs. NOAA-21 Compared in L3 LSA and QC (20230308)

Difference condition	Percentage
NOAA20 vs. NOAA21: different cloud mask	**4.22%**
Cloud difference: N20==0 & N21==1	0.33%
Cloud difference: N20==0 & N21==2	0.17%
Cloud difference: N20==0 & N21==3	0.87%
Cloud difference: N20==1 & N21==0	0.28%
Cloud difference: N20==1 & N21==2	0.11%
Cloud difference: N20==1 & N21==3	0.32%
Cloud difference: N20==2 & N21==0	0.16%
Cloud difference: N20==2 & N21==1	0.1%
Cloud difference: N20==2 & N21==3	0.37%
Cloud difference: N20==3 & N21==0	0.84%
Cloud difference: N20==3 & N21==1	0.3%
Cloud difference: N20==3 & N21==2	0.36%
NOAA20 & NOAA21: different retrieval path	**0.12%**



When the cloud condition is consistent, the LSA quality is far better than the requirements

Vegetation Index and Green Vegetation Fraction

March 2023

Accomplishments / Events:

- Planned and started work on updates to VI processing, including test runs
- Evaluated GVF input data in I&T GVF process control file (pcf) file and found improvements after NDE fix
- Verified the GVF intermediate data and found the phase 2 smoothing (weekly moving average) was implemented correctly in the NDE run
- Work towards resolving high TOC NDVI issue
- Finished report on improving consistency between ABI and VIIRS VI
- Investigated differences between global nadir BRDF-adjusted reflectance (NBAR) vegetation index and operational vegetation index for October 2022

Overall Status:

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

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

Issues/Risks:

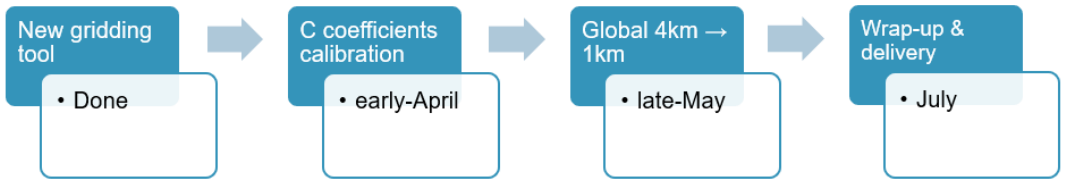
None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
1km global VIIRS VI and GVF code ready for delivery	Dec-22	Juy-22		Personnel not available for task
Report on methods for improving consistency between ABI and VIIRS VI	Feb-23	Mar-23	Mar-23	Delayed due to personnel sick leave
FY24 Program Management Review	Jun-23	Jun-23		
Annual algorithms/ products performance report	Aug-23	Aug-23		
Calibration/ Validation update for SNPP and NOAA20 VI and GVF products,	Sep-23	Sep-23		
Ongoing support for JPSS-2 pre- and post-launch testing	Sep-23	Sep-23		

Highlights:

Planned new VI delivery

- Three planed major updates
  - ✓ Implement the recently developed gridding tool
  - ✓ Implement the re-calibrated C coefficients for VA-SAVI composite
  - ✓ Use 1km to replace current 4km in the final global product as the spatial resolution
    - Tile-based product
    - Data size control
- Timeline



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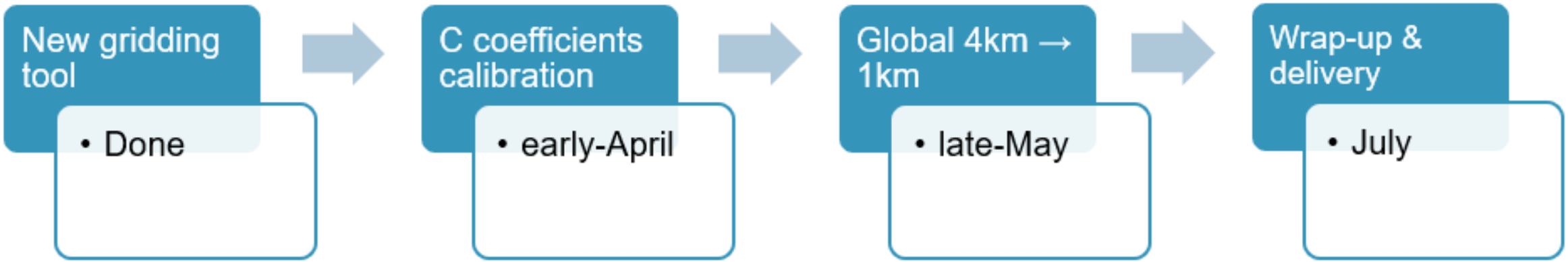
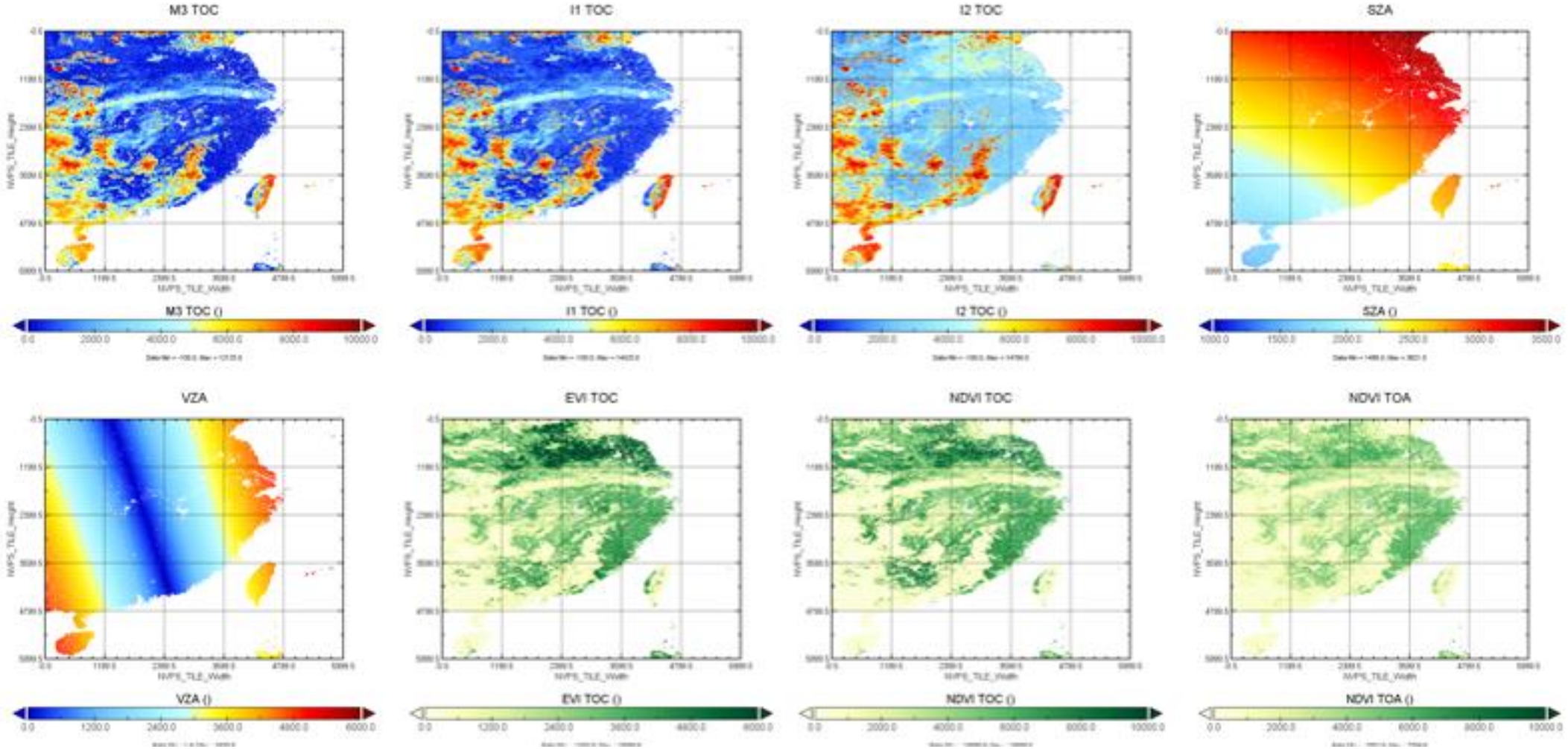


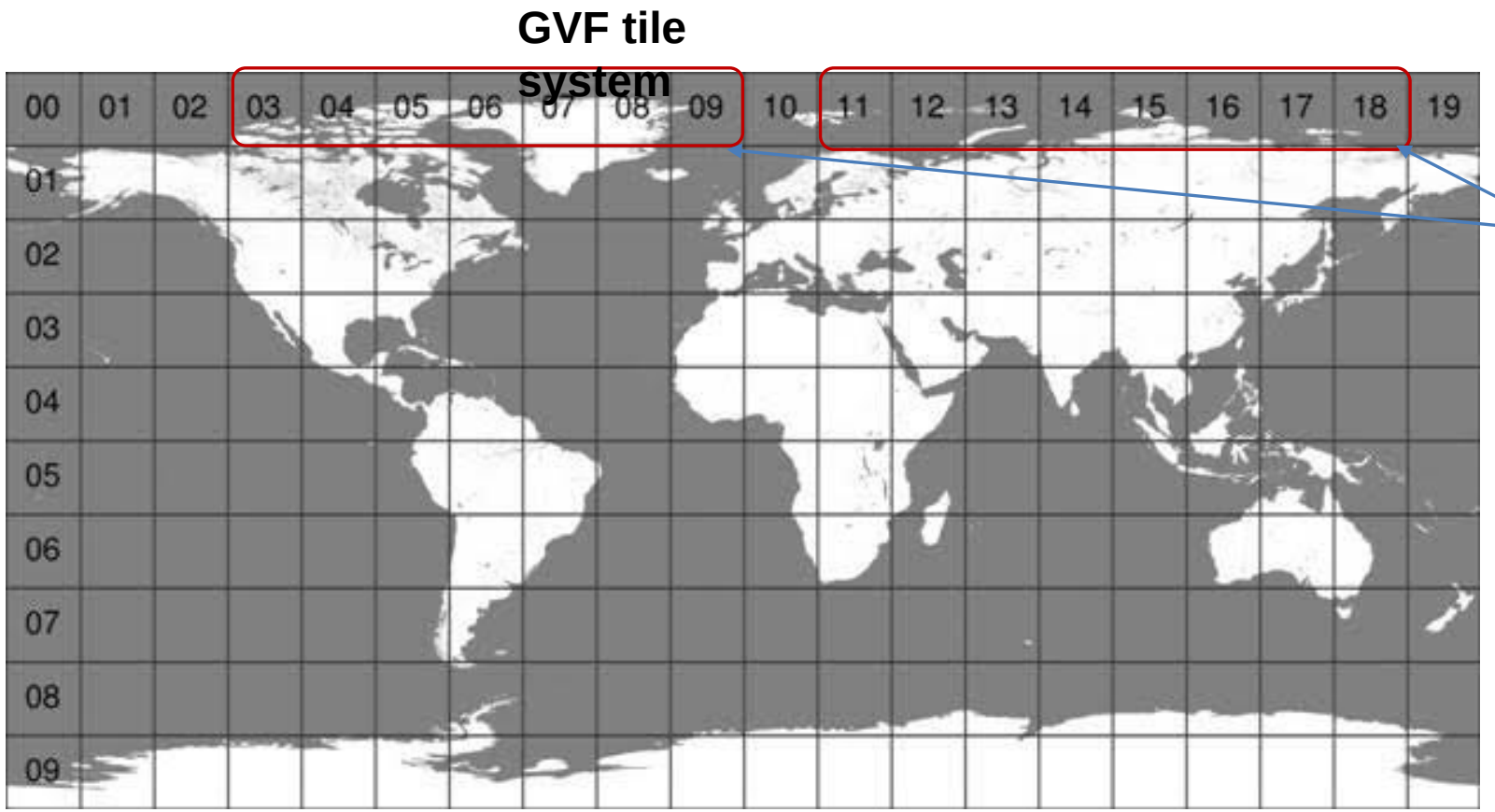
Preparing for new VI delivery

- Test run
  - *Output variables in the daily SR intermediate data*



Verification of number of tiles in the GVF v3r0

- OSPO noticed that the number of daily GVF-EVI tiles was as high as 121 after the fixing. The previous version of GVF (v2r2) only has 106 daily GVF-EVI tiles.
- OSPO was concerned with the possible impacts with higher number of tiles than 106 on final products.



- NDE run GVF (v3r0) produced GVF-EVI tiles over H03V00 - H09V00 and H11V00 – H18V00
- Local run GVF (v2r2) didn't produce GVF-EVI data over the 15 tiles because there is no vegetation in winter on the very high latitude tiles.
- It will not impact the GVF output even when GVF-EVI tiles over H03V00 - H09V00 and H11V00 – H18V00 are produced.

Verification of GVF input data in I&T GVF pcf file

GVF pcf file for GVF production on Mar 10, 2023

VIIRS_GVF - Notepad

File Edit Format View Help

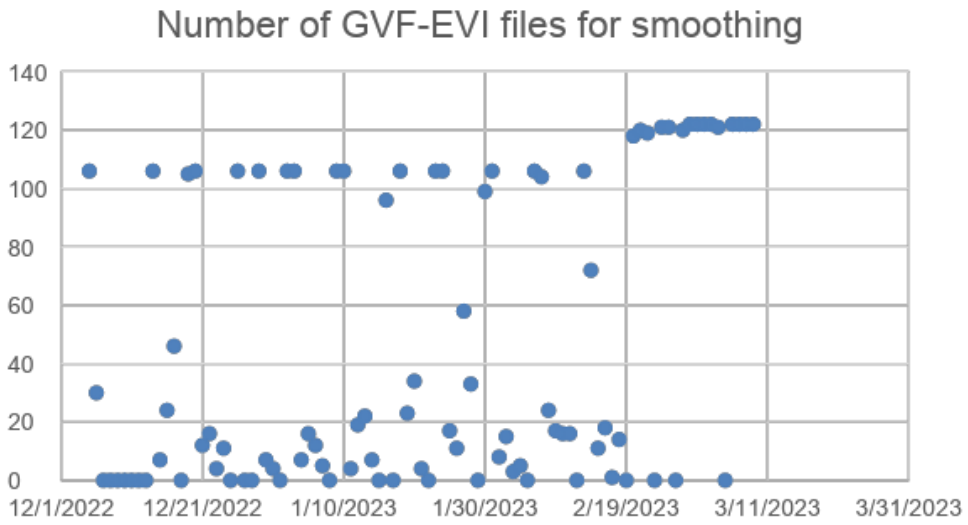
```
#
# onJobId:274304138
# working directory:
# ProdRuleName: null
#
working_directory=/opt/data/nde/NDE_IT/pgs/working/274304138
nde_mode=NDE_IT
job_coverage_start=202303100000000
job_coverage_end=202303110000000
production_site=NSOF
production_environment=ITE
WATERMASK_DIR=/opt/apps/nde/NDE_IT/algorithms/GVF/v3.0/watermask
GVFCLIMAT_GLOBAL=/opt/apps/nde/NDE_IT/algorithms/GVF/v3.0/gvfclimat/VIIRS_global_GVF_climatology.h5
GVFCLIMAT_REGIONAL=/opt/apps/nde/NDE_IT/algorithms/GVF/v3.0/gvfclimat/VIIRS_regional_GVF_climatology.h5
CODE_PAR_DIR=/opt/apps/nde/NDE_IT/algorithms/GVF/v3.0/GVFEXEDIR
BASH_DIR=/opt/apps/nde/NDE_IT/algorithms/GVF/v3.0/run
VIIRS_GVF_WORKDIR=.
NP_GVF=4
NWEEK=15
ndays_week=7
RUNNING_CHOICE=Daily,Weekly
SPATIALSCALE_01STR=11
SELECT_RUNNING_STEP=1111
VER_REV_GVF=v3r0
CHOICE_GEN_GEOTIFF=1
platform_name=J01
INPUT=VI-SR-J01_s20230310_e20230310_h00v02_c202303110415020.h5
INPUT=VI-SR-J01_s20230310_e20230310_h00v01_c202303110415020.h5
INPUT=VI-SR-J01_s20230310_e20230310_h01v01_c202303110415020.h5
INPUT=VI-SR-J01_s20230310_e20230310_h01v03_c202303110415020.h5
```

Ln 1, Col 1 | 100% | Unix (LF) | UTF-8

Verified

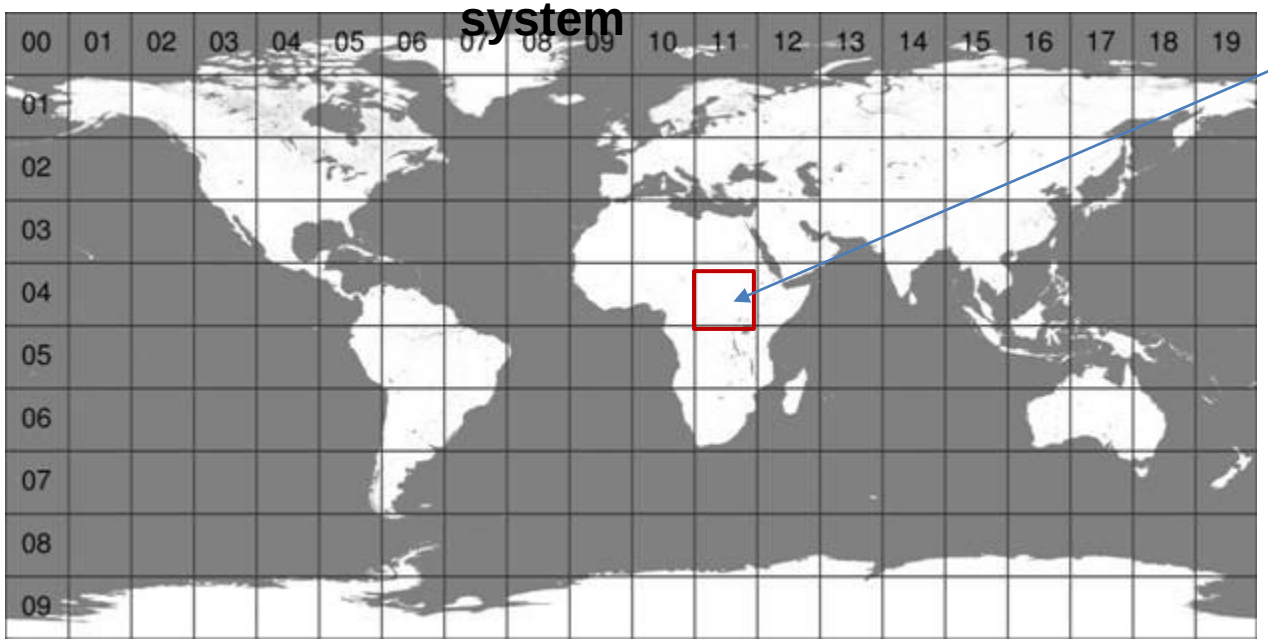
1. Number of the daily GVF input files (VI-SR) is correct in the NDE I&T run
2. Number of the GVF-ASEVI-P1 data in pcf is correct
3. Number of GVF-EVI files in the pcf seems not perfect. More investigation is needed.

- 122 VI-SR-J01 input files listed in the pcf file
- 6 days of GVF-ASEVI-P1 data were listed in the pcf file
- Number of GVF-EVI files for smoothing became normal after Mar 1st, 2023
- 95 days of GVF-EVI files on the pcf (should be 104)



Verifying GVF phase-2 smoothing

GVF tile system



- There are 20*10 tiles globally
- Each tile contains 6000*6000 0.003° grids, covering a 18° *18° area

1. A land tile at H11V04 is selected for testing

2. A week of NPP and J01 GVF intermediate data (after smoothing EVI) were obtained from OSPO

- GVF-ASEVI-P1-J01_s20230223_e20230301_h11v04_c202303020837050
- GVF-ASEVI-P1-J01_s20230224_e20230302_h11v04_c202303030829510
- GVF-ASEVI-P1-J01_s20230225_e20230303_h11v04_c202303040845460
- GVF-ASEVI-P1-J01_s20230226_e20230304_h11v04_c202303050838120
- GVF-ASEVI-P1-J01_s20230227_e20230305_h11v04_c202303060828020
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- GVF-ASEVI-P1-NPP_s20230223_e20230301_h11v04_c202303021048240
- GVF-ASEVI-P1-NPP_s20230224_e20230302_h11v04_c202303030852560
- GVF-ASEVI-P1-NPP_s20230225_e20230303_h11v04_c202303040841530
- GVF-ASEVI-P1-NPP_s20230226_e20230304_h11v04_c202303050841140
- GVF-ASEVI-P1-NPP_s20230227_e20230305_h11v04_c202303060937020
- GVF-ASEVI-P1-NPP_s20230228_e20230306_h11v04_c202303070916360
- GVF-ASEVI-P1-NPP_s20230301_e20230307_h11v04_c202303080900370

3. Selected a 12*12 box at h11v04 corresponding to the 0.036° GVF in the global map at (5500, 2499)
4 .Read in a week of GVF-ASEVI-P1 data and do phase-2 smoothing

Verifying GVF phase-2 smoothing (GVF calculation)

(1) Before aggregation GVF (ba_GVF) calculation

Ba_GVF = (EVI-0.09)/(0.6406-0.09)

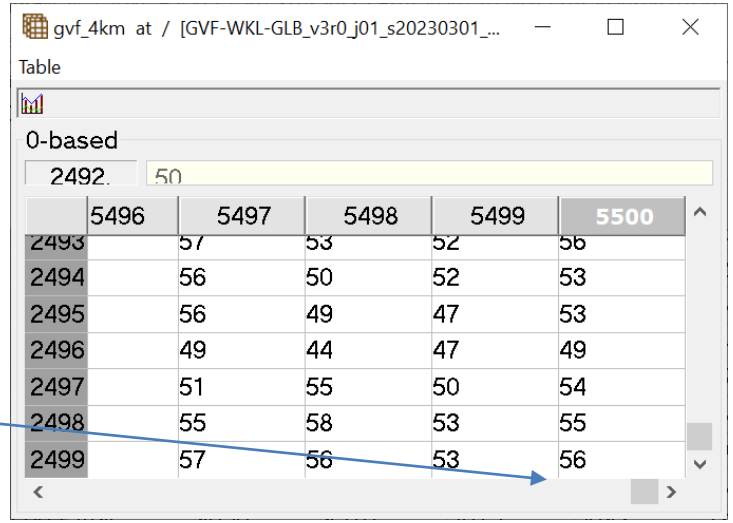
0.003° before aggregation GVF over a 12*12 box

0.559	0.542	0.507	0.581	0.578	0.552	0.532	0.496	0.494	0.503	0.876	0.501
0.581	0.583	0.597	0.604	0.503	0.545	0.476	0.435	0.556	0.563	0.743	0.466
0.570	0.599	0.565	0.509	0.565	0.566	0.469	0.477	0.521	0.533	0.622	0.618
0.631	0.547	0.576	0.489	0.547	0.556	0.586	0.540	0.573	0.547	0.612	0.489
0.596	0.568	0.594	0.687	0.569	0.681	0.741	0.335	0.466	0.449	0.451	0.460
0.556	0.436	0.474	0.649	0.382	0.343	0.586	0.208	0.670	0.700	0.645	0.699
0.521	0.582	0.459	0.547	0.673	0.464	0.574	0.269	0.621	0.596	0.399	0.611
0.473	0.300	0.641	0.351	0.562	0.387	0.499	0.404	0.671	0.359	0.365	0.623
0.480	0.517	0.647	0.417	0.647	0.337	0.348	0.463	0.684	0.688	0.678	0.576
0.556	0.503	0.667	0.588	0.587	0.643	0.601	0.643	0.649	0.708	0.656	0.642
0.616	0.655	0.657	0.723	0.643	0.608	0.621	0.691	0.639	0.619	0.635	0.604
0.681	0.666	0.610	0.699	0.681	0.609	0.618	0.705	0.633	0.644	0.520	0.579

(2) GVF aggregation

0.036° After aggregation GVF = Averaging ba_GVF over 12*12 box

Aggregated GVF=0.56



It verified

1. The phase 2 smoothing was implemented in the operational run
2. The GVF value was calculated corrected in the operational run

High TOC NDVI issue

- *Sensitivity analysis of the C1 coefficient*

$$VA\text{-}SAVI = SAVI - C \times SZ^2$$

$$C = C_1 - C_2(SAVI_{max} - 0.5)^2$$

A too small C: insufficient to consider SZA effect;
A too large C: only near-nadir observation can be selected

An appropriate C needs to be determined
(Current C1 is set as 8e-5)

For C1 between (8e-5, 20e-5) with step of 0.5e-5:
{
Produce daily and weekly VI produce as usual;

Find the percentage of abnormal TOC NDVI;

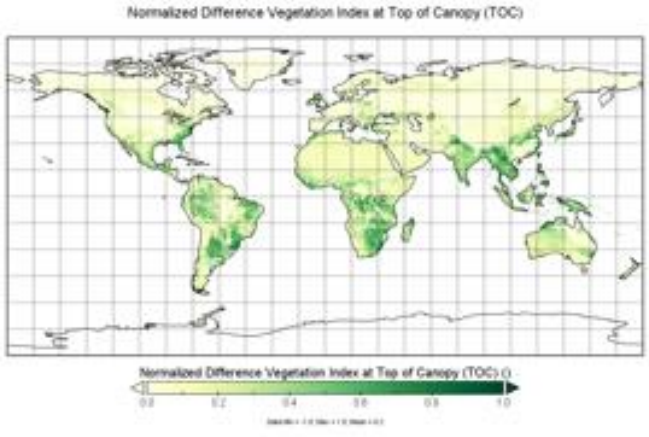
Find the percentage of changed composited TOC NDVI;
}

Do integrated comparisons to achieve the balance.

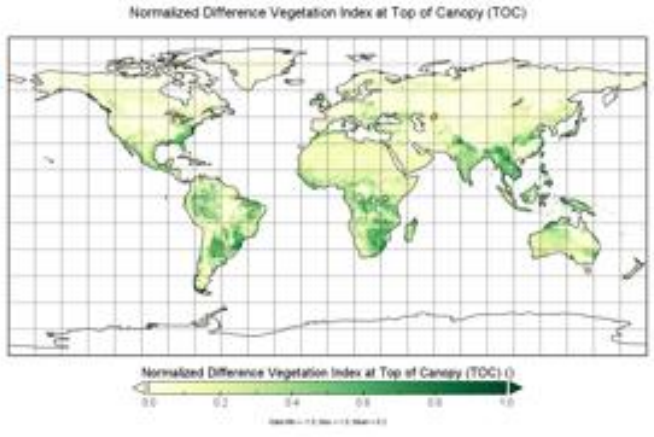
High TOC NDVI issue

- *Sensitivity analysis of the C1 coefficient*

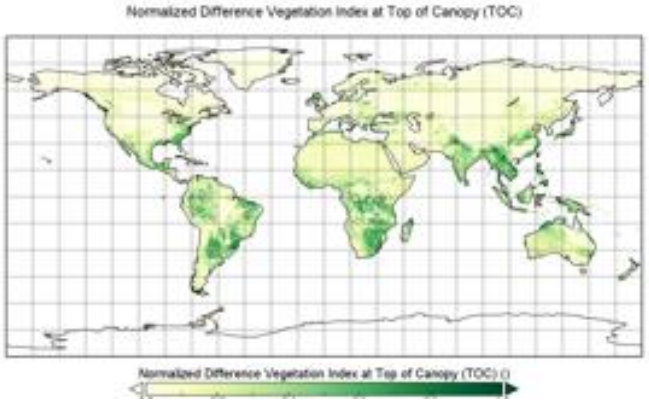
C1=8e-5
Ab% = 0.203%



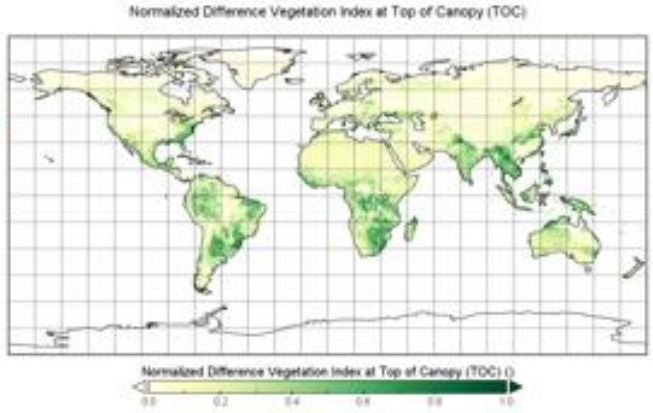
C1=12e-5
Ab% = 0.197%



C1=16e-5
Ab% = 0.191%



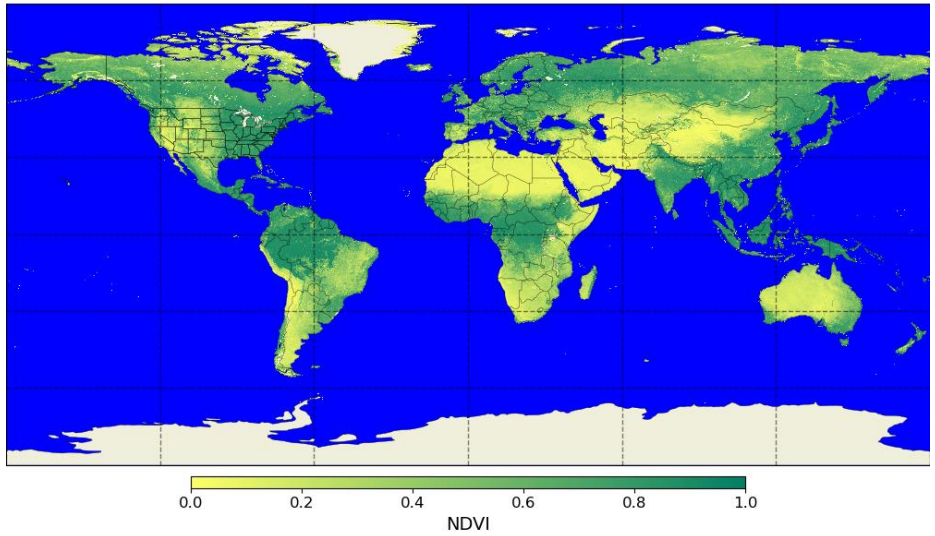
C1=20e-5
Ab% = 0.188%



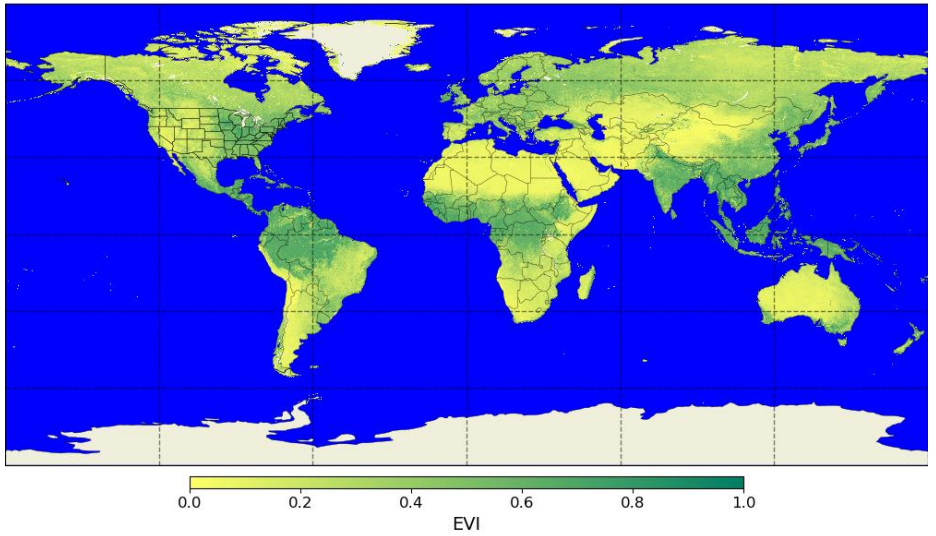
- Ab% is the percentage of abnormal pixels (TOC NDVI – TOA NDVI > 0.4)
- Sensitivity is relatively modest.

Nadir BRDF-adjusted reflectance (NBAR) VI and operational VI for September 2022 period

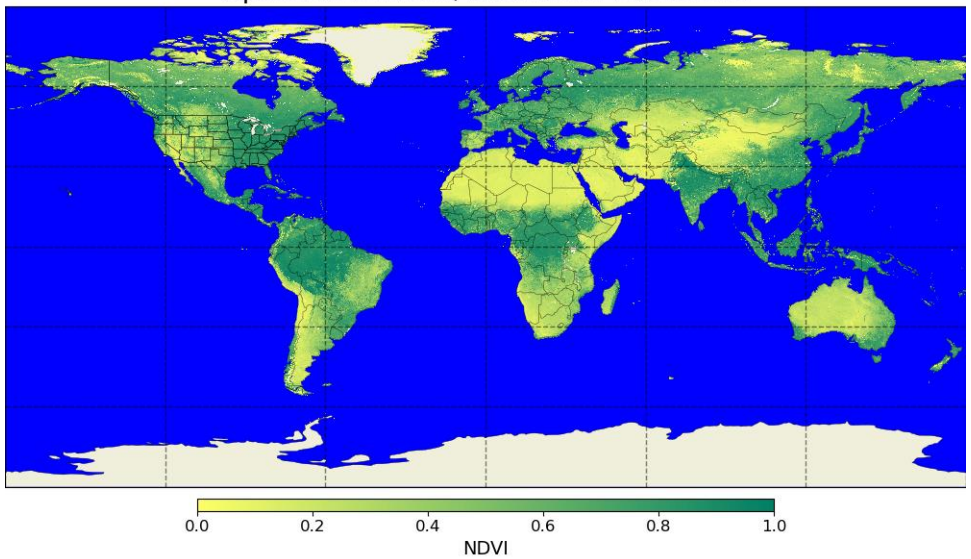
NDVI from NBAR, 20220906 - 20220921



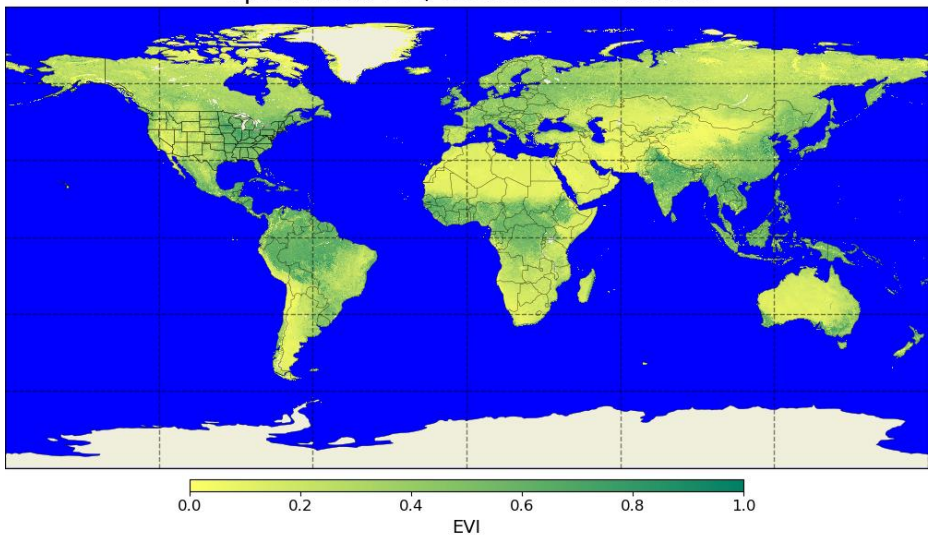
EVI from NBAR, 20220906 - 20220921



Operational NDVI, 20220906-20220921



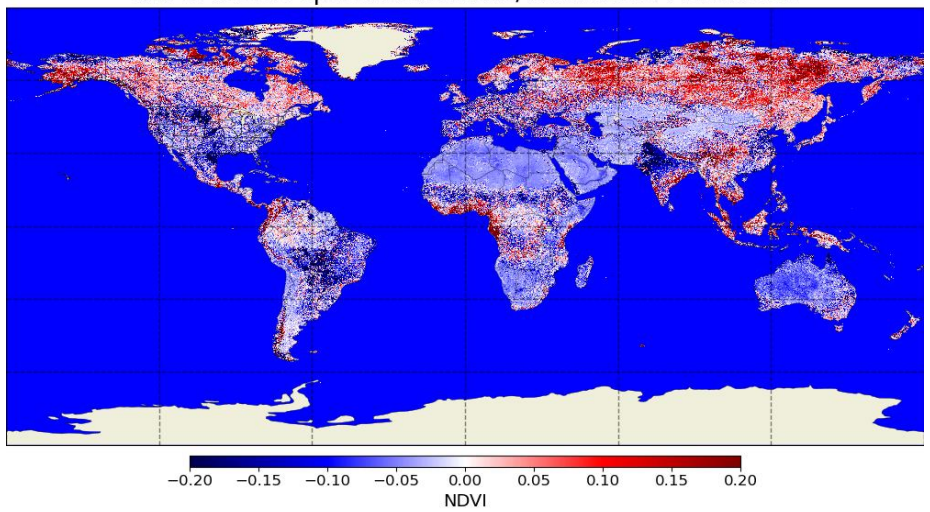
Operational EVI, 20220906-20220921



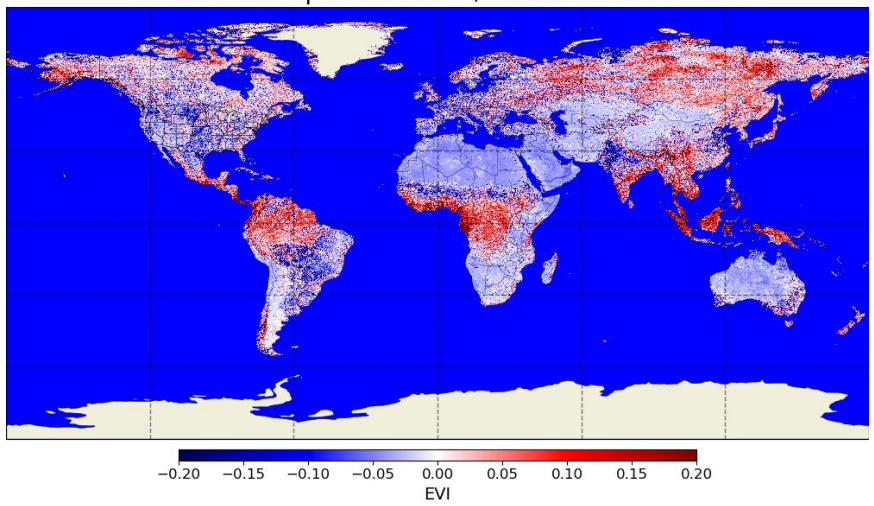
NBAR minus operational VI differences, operational solar and view angles

- Difference magnitude and pattern are different from what was expected.
- Reason for differences is under investigation.

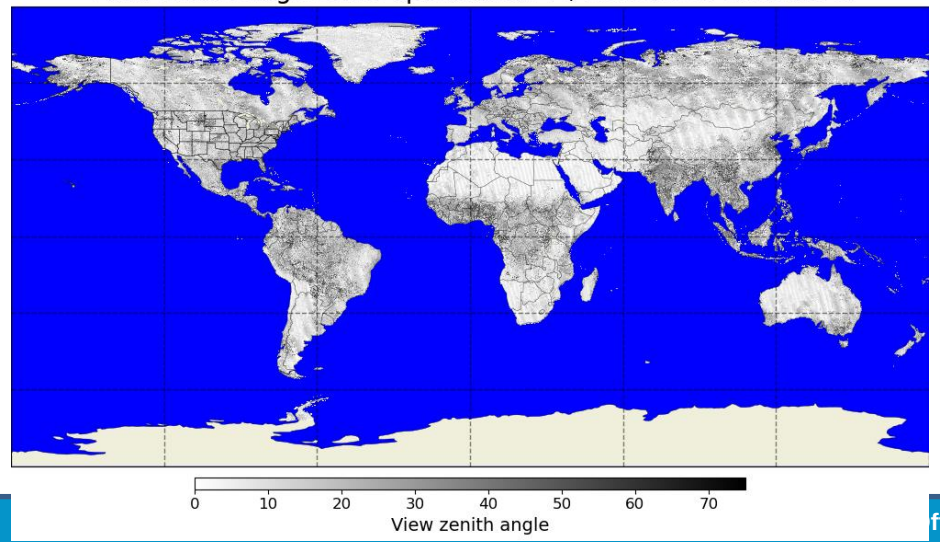
NBAR minus operational NDVI, 20220906-20220921



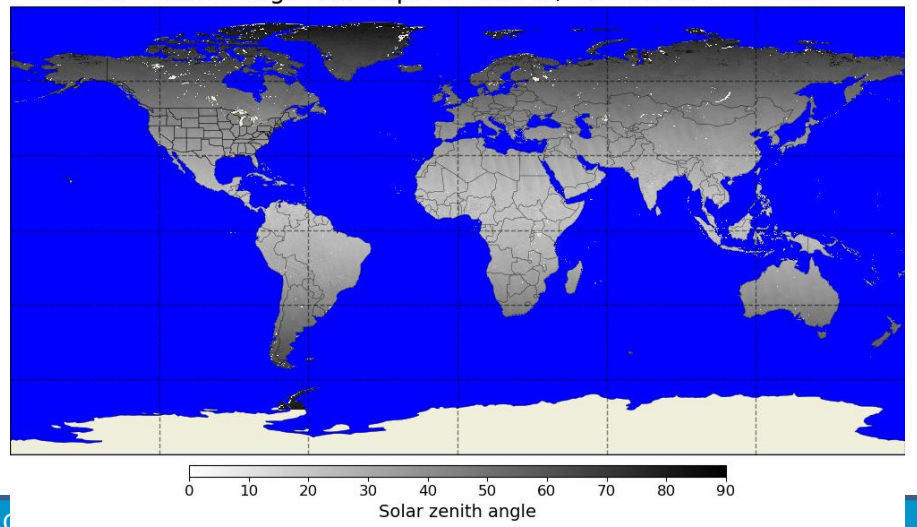
NBAR minus operational EVI, 20220906-20220921



View zenith angle from operational VI, 20220906-20220921



Solar zenith angle from operational VI, 20220906-20220921



MiRS Products

March 2023

Accomplishments / Events:

- The MiRS science team, under funding from the JPSS Proving Ground Risk Reduction (PGRR) program is currently reprocessing JPSS ATMS mission (SNPP and NOAA-20) data through 2020 using a single up to date version (v11.8) of MiRS. To date, SNPP/ATMS data through early 2020 have been reprocessed. Additional data from MiRS STAR daily processing extends the time record through 2022. A preliminary analysis of the data has been initiated. The highlight figure shows the time series of monthly global mean total precipitable water (TPW) from January 2012 through October 2022. In addition, the departure from the monthly mean value is also plotted. The time series shows a positive trend in TPW of 0.27 mm/decade, and in particular highlights the significant positive anomalies during 2015-2016, which correspond to a very strong El Nino event. The analysis is continuing and comparisons will be made with other reference data sets.
- In consultation with the JSTAR management, maturity review dates have been shifted to account for the nearly 2-month gap in data due to the transmitter anomaly. Beta and provisional maturity are now scheduled for May and October 2023, respectively. The table below has been updated to reflect this change. Note that discussions with JSTAR management are ongoing and this schedule may change.

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

Overall Status:

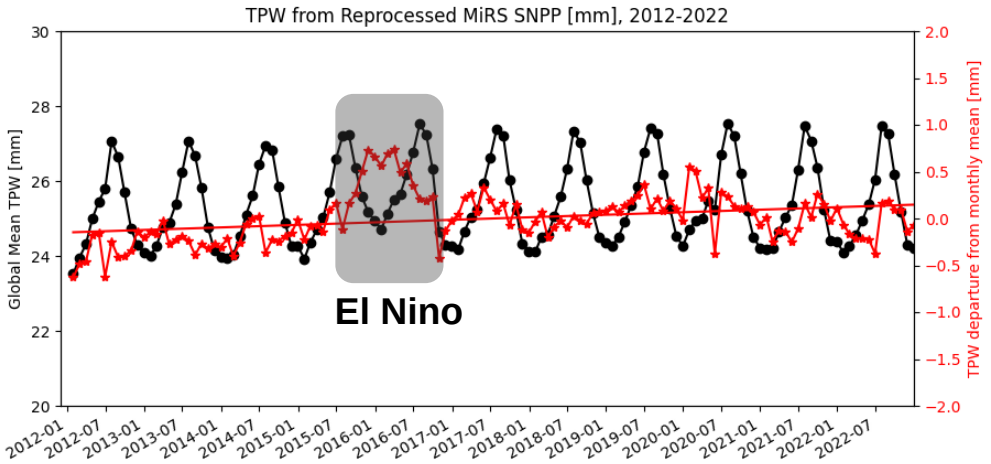
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

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:



Time series of monthly global mean TPW (mm) from reprocessed MiRS SNPP/ATMS data for the period January 2012 – October 2022. Both the absolute TPW (black) and departure from the monthly mean (red) are shown. The trend line slope is 0.27 mm/decade. The large positive anomaly associated with the strong 2015-2016 El Nino event can be seen.

NUCAPS Products

March 2023

- Supported the CrIS SDR Provisional maturity review by providing NOAA-21 NUCAPS products. Processed NOAA-21 NUCAPS products covering: (a) two focus days (02/16, 02/20) that used CrIS SDRs generated with EP v210 cal/val update, and (b) two other focus days (02/27, 03/24) that used CrIS SDRs generated with EP v211 cal/val updates. Produced statistical metrics for temperature, water vapor, and ozone with collocated ECMWF matches (NOAA-20 vs. ECMWF; NOAA-21 vs. ECMWF). Evaluated NOAA-21 OLR product with NOAA-20 products and found to be very consistent. Evaluated NOAA-21 trace gas products with matched TROPMI and OCO-2 data sets. The results of the evaluation revealed very similar performance between NOAA-20 and NOAA-21 EDR products.
- Continued preparations for NOAA-21 Beta maturity review scheduled in May 2023. These include further evaluation of NOAA-21 NUCAPS products with collocated truth measurements, augmentation of the VALAR data matches for temperature and water vapor validations, cloudy and clear regression exercises, and bias tuning of microwave and IR radiances.
- Continued preparations of validation data for the upcoming NUCAPS (JPSS, MetOP) NCCF Operational Readiness Review. These include sanity checks of the NUCAPS offline version runs with the ASSISTT integrated HEAP version runs, and validation of the NUCAPS NOAA-20 and MetOp-B/C products using a compilation of 12 focus day runs and matched ECMWF, TROPOMI/OCO, and TCCON in-situ measurements.

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			

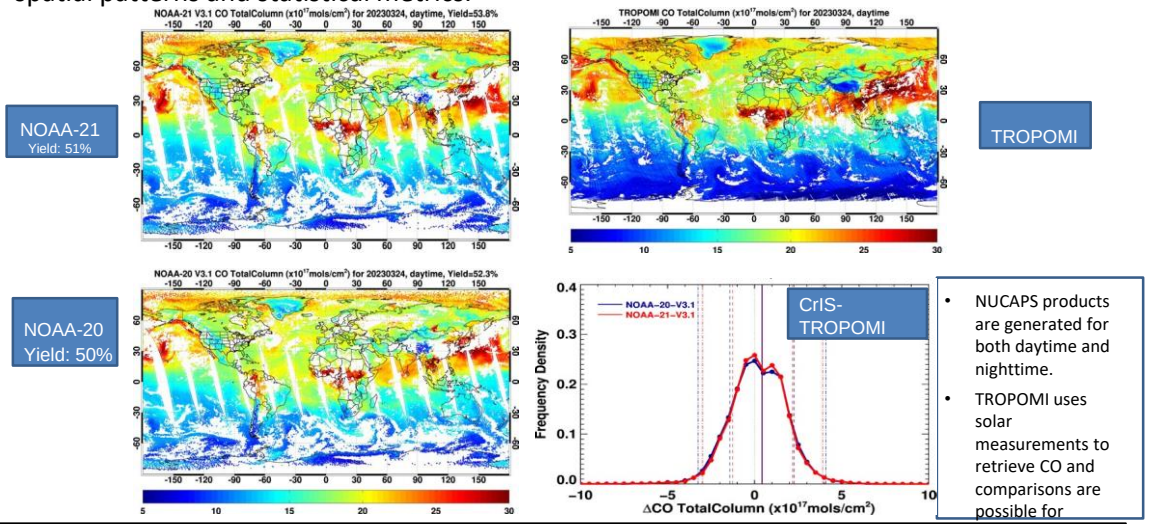
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

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

Evaluation of NOAA-21 vs. NOAA-20 NUCAPS CO products with matched TROPOMI observations. In general, NOAA-20 and NOAA-21 NUCAPS retrievals show very similar characteristics in terms of spatial patterns and statistical metrics.



NOAA-21 NUCAPS CO product retrieval from J2-Ready algorithm matches very well both qualitatively and quantitatively with the NOAA-20 operational NUCAPS products. Retrieved CO profile (100 layers) span from surface to 0.01 hPa. Shown here is the total column CO *vs* TROPOMI.

OMPS SDR

March 2023

Accomplishments / Events:

- Derived and delivered NOAA-21 OMPS NM/NP weekly dark rate LUTs
- Derived and delivered SNPP/NOAA-20 OMPS NP solar irradiance bi-weekly LUTs.
- Successfully completed the NOAA-21 OMPS NM and NP SDR provisional maturity review on 30 March 2023 by conducting intensive J2 OMPS early-orbit data analysis,, including but not limited to
  - Delivered and implemented the updated NOAA-21 OMPS NM tables to fix the 3-pixel-wavelength-shift issue.
  - Identified two new calibration problems in the NOAA-21 OMPS NM and NP SDR (12-pixel-shift error for the NP and the wavelength shit discontinuity at the 84th to 86th CT for the NM).
  - Delivered two updated LUTs to fix the two new calibration problems.
  - Reprocessed the NOAA-21 OMPS NM/NP SDR data sets by using the updated LUTs.
  - Continued analyzing the NOAA-21 OMPS dark LUT and LED gain performance.
  - Assessed the operational and reprocessed NOAA-21 SDR data quality using multiple methods (NM and NP consistency, three satellite data comparison, inter-sensor comparison with NASA TropOMI, CRTM O-B the CRTM OMPS simulation accuracy issues.
  - Conducted the SNR and geolocation accuracy assessment in support of the NOAA-21 provisional maturity review.
- Presented the presentation about OMPS SDR cal./val. update at the 2023 GSICS 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.*

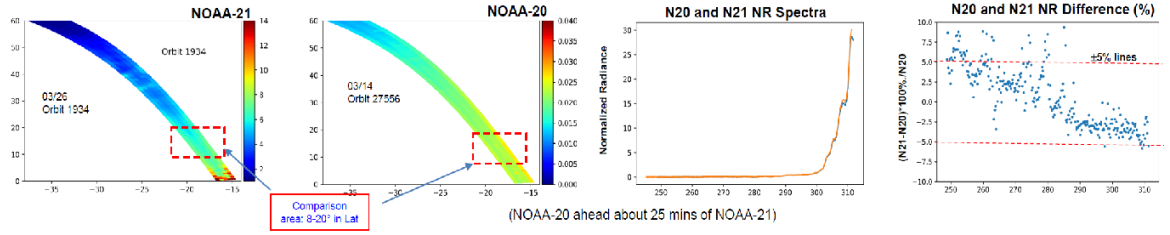
Issues/Risks:

None

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

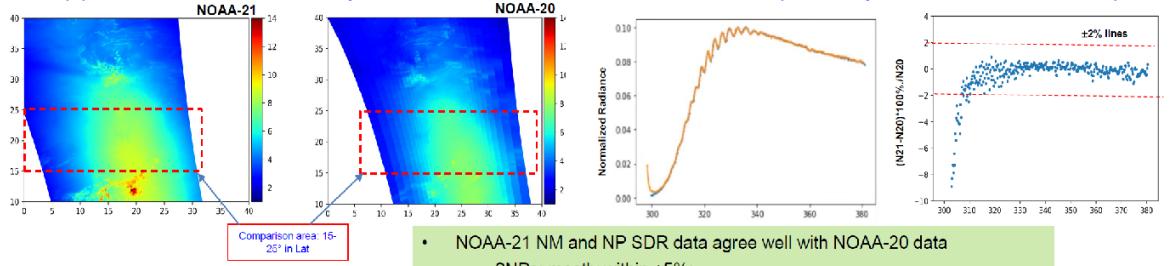
Comparison of OMPS NP and NM Radiance between NOAA-21 and NOAA-20 (after the implementation of the updated LUTs)

(a) Normalized Radiance Comparison between NOAA-21 and NOAA-20 NP (03/26; new NP wavelength LUT)



(NOAA-20 ahead about 25 mins of NOAA-21)

(b) Normalized Radiance Comparison between NOAA-21 and NOAA-20 NM (03/23; 3-pixel-shift issue was fixed)



- NOAA-21 NM and NP SDR data agree well with NOAA-20 data
  - 2NPs: mostly within ±5%;
  - 2NMs: mostly within +2% above 305nm

OMPS Ozone (V8Pro, V2Limb & V8TOz)

March 2023

Accomplishments / Events:

- L. Flynn gave the OMPS V8Pro and V8TOz Beta Maturity presentations with contributions from the Ozone Team. The figure below on the right shows a comparison of the Layer 15 V8Pro ozone retrieval values for S-NPP (left track), NOAA-20 (right track) and NOAA-21 (middle track) for March 12, 2023.
- R. Lindsay continued work to use the new V2.7Limb Level 1 codes to process the NOAA-21 OMPS Limb RDR and use their output as input for the Level 2.
- J. Niu is working on Metop-C GOME-2 soft calibration. He began validation work on the NOAA-21 V8TOS SO_2 products. He also started troubleshooting problems with using the new NUCAPS as input for L-/N-TOAST.
- Z. Zhang processed the NOAA-21 SDRs offline the V8TOz. He found an error and created a corrected radiative transfer instrument table, and has begun working on soft calibration to force agreement with NOAA-20 V8TOz.
- E. Beach continued to work on the monitoring figures for NOAA-21. He has begun transferring ancillary files we will need to process the NOAA-21 OMPS Limb Profiler. He is capturing the NOAA-21 OMPS data as it arrives at SCDR.

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

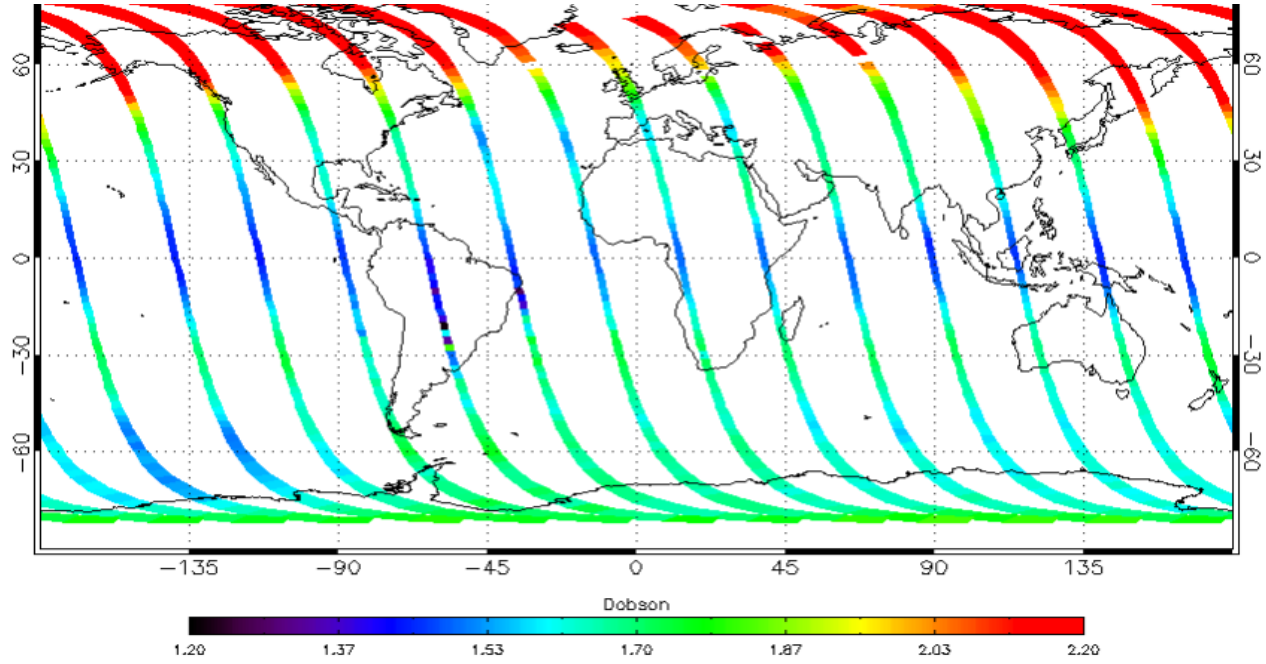
Overall Status:

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

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

Layer 15 Ozone from updated SDR, NPP\N21\N20 V8Pro v4r2, 3/12/2023



SDR and EDR Reprocessing

March 2023

Accomplishments / Events:

- The official transition of the reprocessed SNPP SDRs to CLASS/NCEI started on December 1, 2021.
- The transition of the reprocessed SNPP ATMS (V1 and V2), CrIS, and OMPS (V1 and V2) data was completed in December 2021, February 2022 and March 9, 2022, respectively. These data are available at CLASS website now.
- The transition of the reprocessed SNPP VIIRS started on March 15, 2022.
- The reprocessed SNPP VIIRS SDR data from 1/2/2012 to 11/03/2017 (**1118.0T, 69.22%** of total) has been completed as of March. 30, 2023.
- It's expected that the VIIRS data transition will complete in October 2023.
- The SNPP EDR algorithm package was obtained from the ASSIST team. The RWG started to look at the algorithm package
- Likun Wang has replaced Lin Lin as the coordinator of the Reprocessing Working Group (RWG) starting from February 2023

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

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic			X		The UMD IT would not implement the docker for EDR reprocessing. The RWG is looking at the EDR package to see if it can be executed without a docker. Execution delay is expected.
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 **69.22**%
Total				1764.65	

Sea Surface Temperature

March 2023

Accomplishments / Events:

- ACSPO updates to ACSPO 2.80 delivered to ASSISTT on 7 Mar 2023, ahead of schedule, to leave ASSISTT time to deliver updates to NDE and meet the GMODO retirement deadline Nov 2023.
- The product and output granules use the same version/file naming convention, v2.80. Testing suggests only minor effect on Lat-Lon, and only for high-altitude lakes (Titicaca, Tahoe etc).
- N21 SST Cal/Val continues. Three passes through data from 11 Feb – 30 Mar 2023 show improved NPP/N20/N21 consistency. Clear-sky fraction is ~20% at night, and ~21% during the daytime, for all 3 VIIRSs. Performance statistics wrt in situ SSTs are also close: at night, mean biases are -0.03-0.05K and RMSD~0.32-0.33K. Daytime statistics (shown in Figure), which were degraded for N21 in initial Cal/Val, are now more consistent: -0.09-0.12 K and RMSD~0.36-0.37K (larger than at night, due to diurnal thermocline). All are within NOAA specs: ±0.2K for bias, and 0.6K fro RMSD.
- Cal/Val continues and Beta Review is now planned for May 2023, ahead of Jul-23 schedule. The major remaining challenge is to reconcile the three sensitivities to true SST, which are syll a little lower for N21 compared with NPP and N20.
- All other activities and milestones are also on schedule.

Overall Status:

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

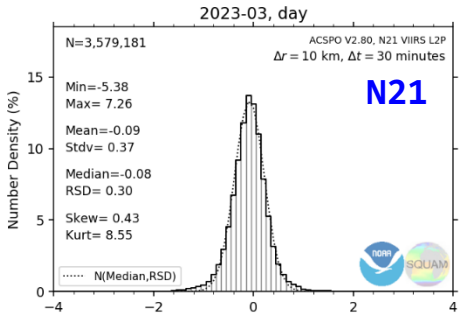
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

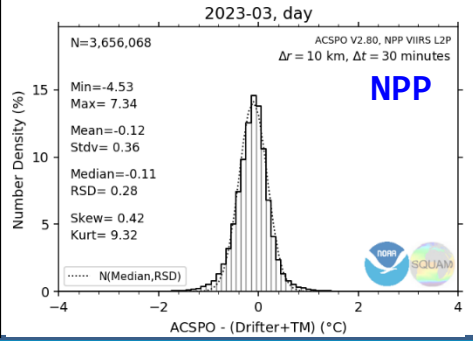
Issues/Risks:

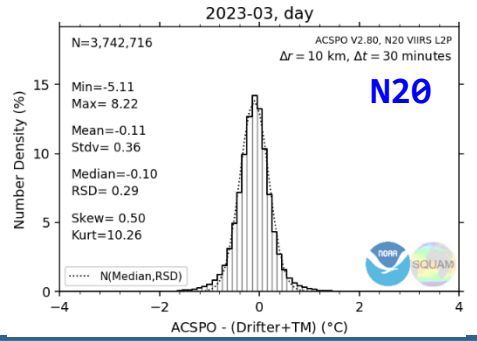
Delay with opening cryoradiator doors on N21 VIIRS pushes back the reviews by approximately 2 months.

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

Highlights: Ongoing N21 Cal/Val (Results from 11-28 Feb 2023)







Daytime global histograms of N21 – in situ SST: Near-Gaussian, centered at ~0K and narrow, as expected.

N21 validation statistics comparable with NPP/N20. Mean biases within ~-0.09-0.12K for all 3 VIIRSs. The SDs are 0.37K for N21 vs 0.36K for NPP/N20.

Work is underway to prepare for the N21 SST Beta Review in May 2023.

Snowfall Rate

March 2023

Accomplishments / Events:

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

Overall Status:

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

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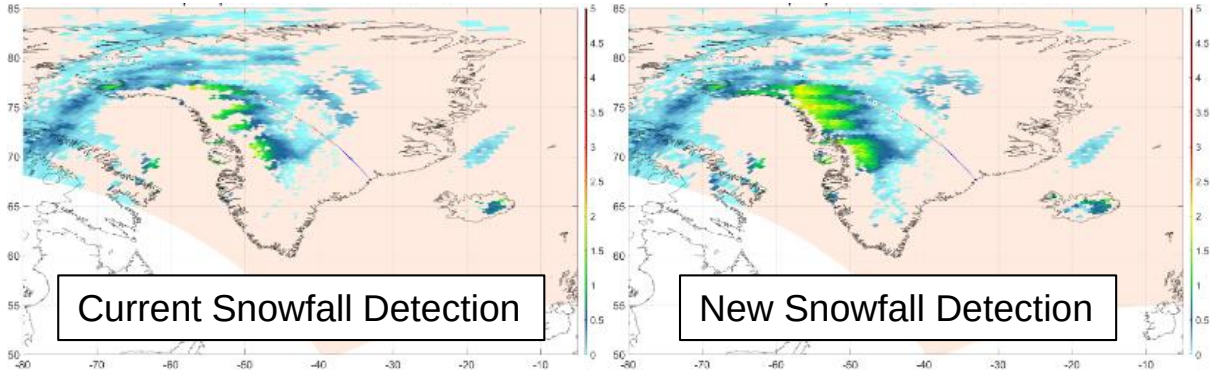
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

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

Highlights: New ML Snowfall Detection Improves Coastline Performance



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

Surface Type

March 2023

Accomplishments / Events:

- STAR-UMD VIIRS Surface Type team has downloaded and processed S-NPP and NOAA-20 VIIRS daily granule surface reflectance data acquired in March of 2023 for the production of AST-2023.
  - VIIRS observations acquired in late March revealed that 2022 and 2023 represented two extremes of snow cover in western U.S. (see highlight)
- The team is on track in calculating annual metrics using the 2022 monthly composites, which are needed for producing the AST2022 global surface type classification map.
- The team presented a poster describing the VIIRS surface products and high-resolution water surface fraction products at the NOAA-UMD Mini-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			
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Issues/Risks:

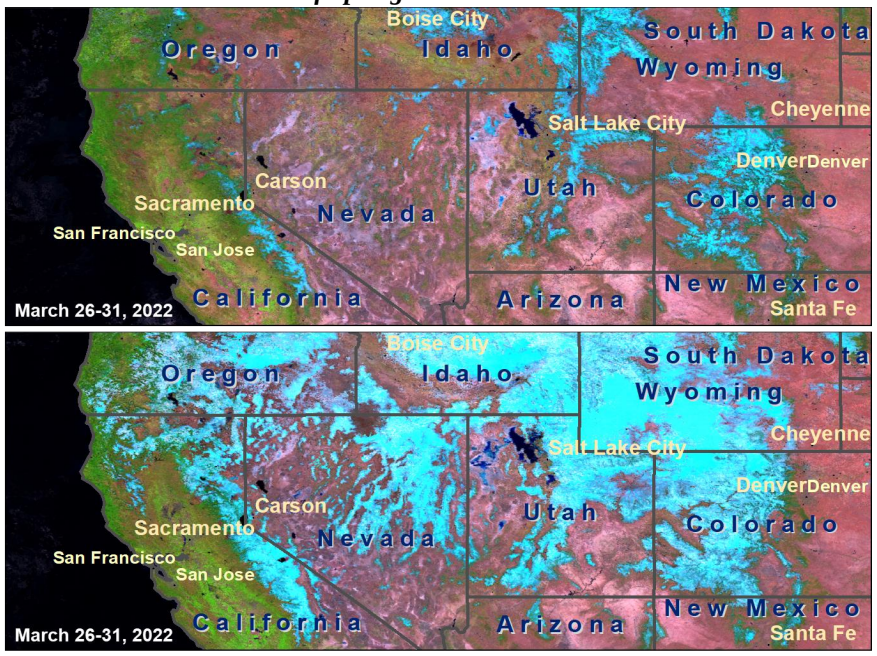
None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Develop a 250m global water surface fraction product	Feb-23	Feb-23	Feb-23	
Complete global monthly composites for each of 2022 months	Each M.	Each M.	Each M.	
Generate global annual classification metrics	May-23	May-23		
AST22 of IGBP 17 type map	Aug-23	Aug-23		
AST22 for EMC 20 type map	Aug-23	Aug-23		
AST22 Validation Statistics and delivery to JSTAR and users	Sept-23	Sept-23		

Highlights:

Snowpack is an important water source for a vast region in western U.S. spanning from Colorado to California. Water availability in this region is directly affected by the amount of spring snow cover. Following an extremely low snow cover in 2022, the 2023 snowpack in many regions in western U.S. might be the largest on record. Weekly composites created using VIIRS observations acquired during the last week of March in 2022 and 2023 captured the two extremes. These composites were created as part of the surface type processing flow using daily observations acquired by S-NPP and NOAA-20. Snow/Ice appears in different shades of cyan. Other colors indicate areas without snow cover.

Two Extremes of Spring Snow Cover in Western U.S.



VIIRS SDR

March 2023

Accomplishments / Events:

- Participated in the NOAA-21 VIIRS SDR Provisional Maturity Review on 3/30/2023 and presented sensor performance during the post-launch testing, including:
  - Pitch maneuver on 3/10/2023 to verify the prelaunch TEB Response Versus Scan-angle (RVS) LUT and update the DNB onboard offset tables (uploaded on 3/17/2023)
  - Yaw maneuvers on 3/6-7/2023 to improve monitoring of the solar diffuser reflectance
- Created, tested and submitted for deployment in the IDPS operations the NOAA-21 VIIRS SDR F-PREDICTED and LGS-GAINS LUTs updated for the SWIR bands and DNB after the SWIR detector temperature setpoint change to 80 K on 3/3/2023
- Created, tested, and submitted for deployment in the IDPS operations the first (out of 12) NOAA-21 VIIRS SDR DNB STRAY-LIGHT-CORRECTION LUT that was created based on data acquired around the new moon on 3/21/2023
- Created, tested and submitted for deployment in the IDPS operations updated NOAA-21, NOAA-20 and Suomi NPP VIIRS SDR DNB DN0 and GAIN-RATIOS LUTs generated using the new moon calibration data from 3/21/2023

Overall Status:

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

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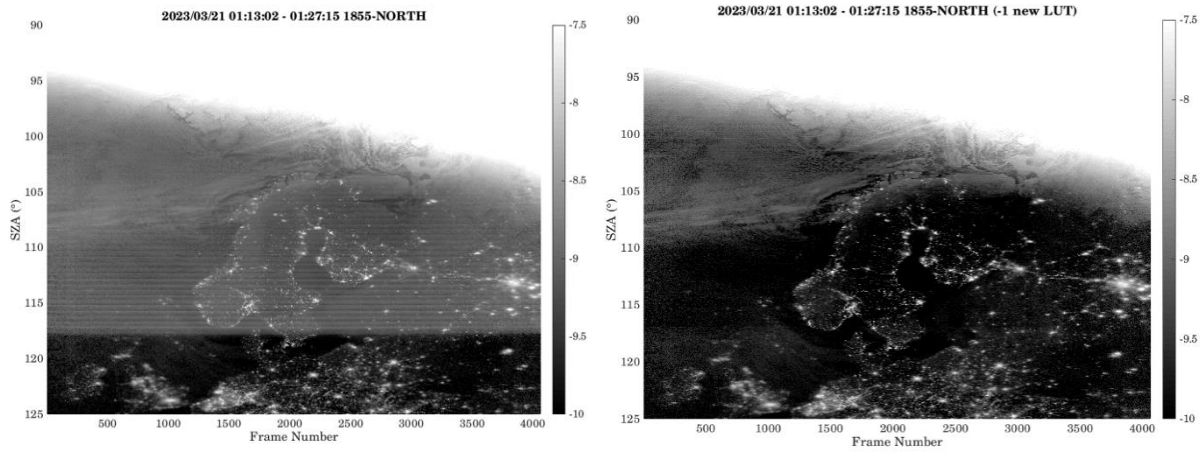
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Post-launch Cal/Val for J2 (from First light to VIIRS SDR Beta Maturity)	Dec-22	Feb-23	2/23/2023	KaTX anomaly
VIIRS SDR Provisional Maturity	Feb-23	Mar-23	3/30/2023	KaTX anomaly
VIIRS SDR Validated Maturity	May-23	Jul-23		KaTX anomaly
Monthly lunar calibration (predictions and analyses)	Jul-23	Jul-23		
Monthly delivery of VIIRS DNB calibration LUTs	Sep-23	Sep-23		
Geolocation monitoring using CPM (for NPP, N20 and N21)	Sep-23	Sep-23		
J2 on-orbit calibration LUT development	Sep-23	Sep-23		

Highlights:



NOAA-21 VIIRS SDR DNB images (3/21/2023 1:13-1:27 UTC) processed without (left) and with (right) the DNB straylight correction for the Northern Hemisphere

Volcanic Ash

March, 2023

Accomplishments / Events:

- Routine validation of existing JPSS volcanic ash EDRs from current sensors and JPSS-2 will continue as needed, including support for ASSISTT/NDE evaluations.
- With the VIIRS SDRs obtaining provisional status, the volcanic ash science team is now able to obtain NOAA-21 VIIRS SDRs and EDRs. As such, the science team has began to identify volcanic cloud emissions for data collection and analysis in preparation for upcoming Beta/Provisional/Full Maturity reviews. The Popocatepetl volcano in Mexico produced an ash emission on April 3, 2023. The attached figure demonstrates the science team's visualization of the NOAA-21 on-orbit data from 0738 UTC 03 April 2023–Ash RGB from VIIRS SDRs on the left and the Volcanic Ash EDR Ash Height variable on the right. The science team will evaluate if this case qualifies for a wind-height validation (requires sufficient vertical wind shear) and if so perform the analysis. Additionally the science team will compare Volcanic Ash EDR Ash Height and Mass Loading variables from NOAA-20 overpass at 0855 UTC for the same ash cloud. VOLCAT results will also be generated and analyzed. These analyses will continue as additional volcanic cloud emissions occur across the globe.
- Quality/Oversight Continued to ensure high quality Volcanic Ash retrievals from EDR algorithms and VOLCAT. Routine validation of existing JPSS volcanic ash EDRs from current sensors and JPSS-2 will continue as needed, including support for ASSISTT/NDE evaluations. VOLCAT is long-term plan.

Overall Status:

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

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

Issues/Risks:

None

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

Highlights: NOAA-21 VIIRS Ash RGB (left) and Ash Height EDR (right) from an eruption of Popocatepetl in Mexico on 0738 UTC 03 April 2023. The volcanic ash science team will collect volcanic cloud cases for validation analyses needed for upcoming maturity reviews.