NOAA JPSS Monthly Program Office

AMP/STAR FY22 TTA

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December, 2021

Highlights from the Science Teams (November)

VIIRS Capability Demonstrated in Detecting Shipping Container Backlog at Port in light of Supply-Chain Challenges

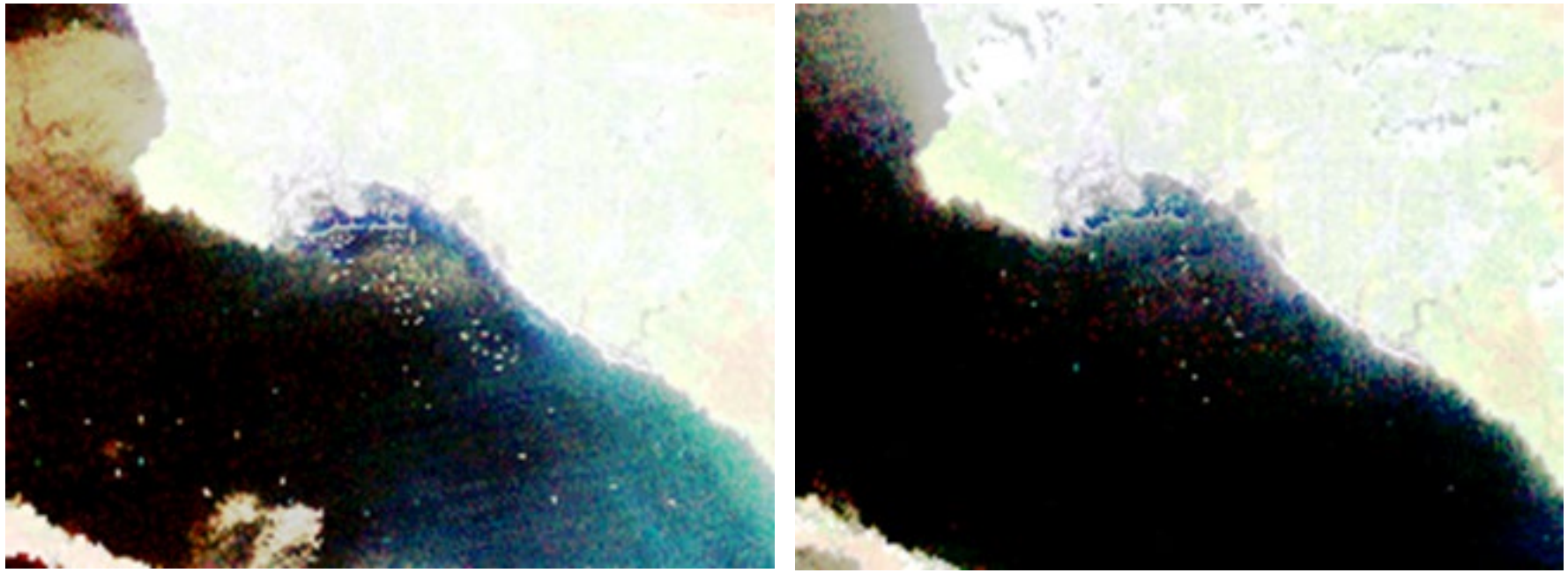
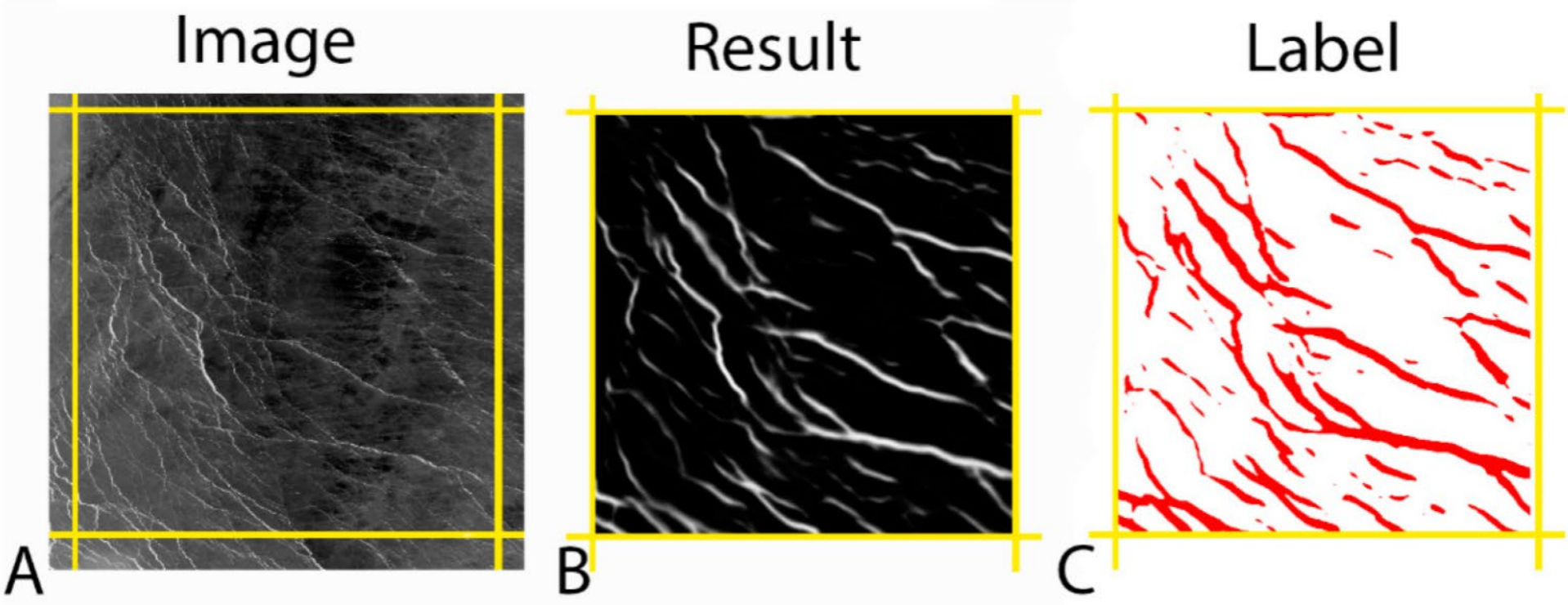


Figure. More than 50 ships were detected at the Port of Los Angeles on 2021-10-01 (Left), compared to a dozen ships on the same day in 2019 (Right), demonstrating the potential capability of VIIRS to monitor backlogs and other port activities.

STAR scientists found that VIIRS imaging bands can detect shipping containers at ports under clear sky conditions. This may enable us to monitor the port activities such as shipping container backlog in light of supply-chain challenges as widely discussed in the media.

Highlights from the Science Teams (November)

New machine learning detection for sea ice leads (fractures) in VIIRS imagery



A novel approach has been developed using artificial intelligence (AI) to detect sea ice leads using satellite thermal infrared window data from MODIS and VIIRS. A manuscript entitled "Application of a Convolutional Neural Network for the Detection of Sea Ice Leads", has been published in Remote Sensing (2021, 13(22), 4571; https://doi.org/10.3390/rs13224571). Authors are Jay Hoffman (CIMSS), Steve Ackerman (CIMSS), Yinghui Liu (ASPB), Jeff Key (ASPB), and Iain McConnell (SSEC). The paper discusses the use of machine learning to detect sea ice leads (fractures) in MODIS and VIIRS data. More information on the project is available at https://www.ssec.wisc.edu/leads and in highlight.

Highlights from the Science Teams (November)

New retrieval method for estimating thermodynamic sea ice thickness

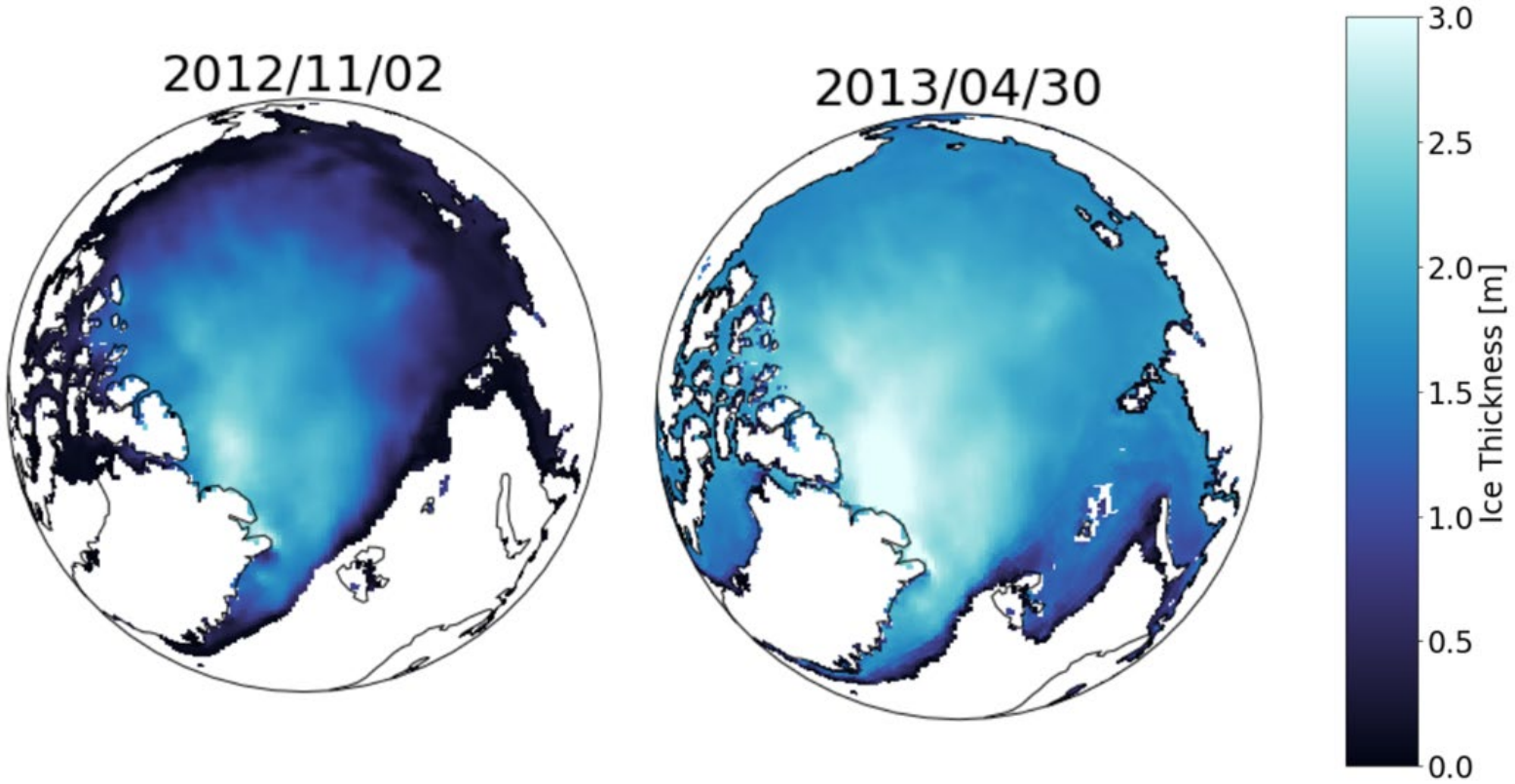
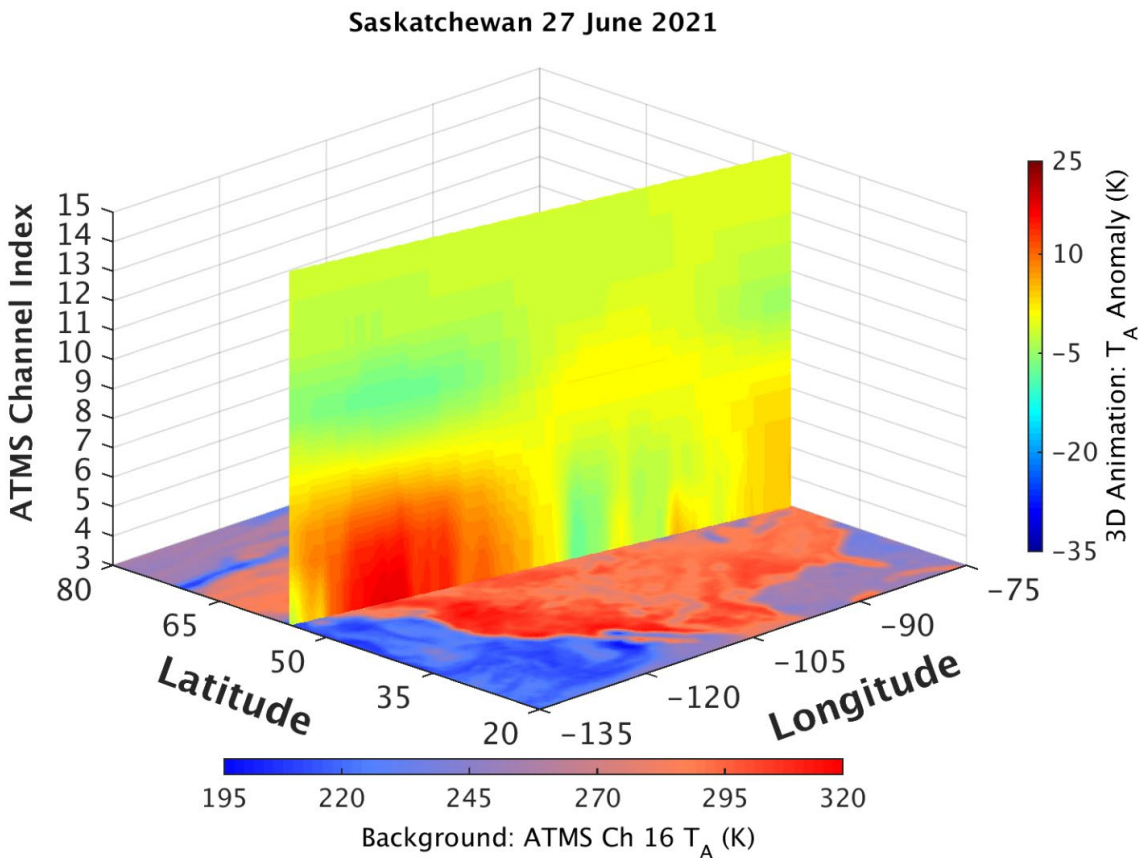


Figure. Arctic Ocean sea ice thickness using SLICE in November 2012 (left) and April 2013 (right).

A paper describing a new retrieval method for estimating thermodynamic sea ice thickness with passive microwave data was submitted to *The Cryosphere* (https://tc.copernicus.org/preprints/tc-2021-333/). The method, known as Stefan's Law Integrated Conducted Energy (SLICE), allows for daily basin-wide coverage and a potential for use beginning in 1987.

Highlights from the Science Teams (November)

ATMS captures Canadian heatwave



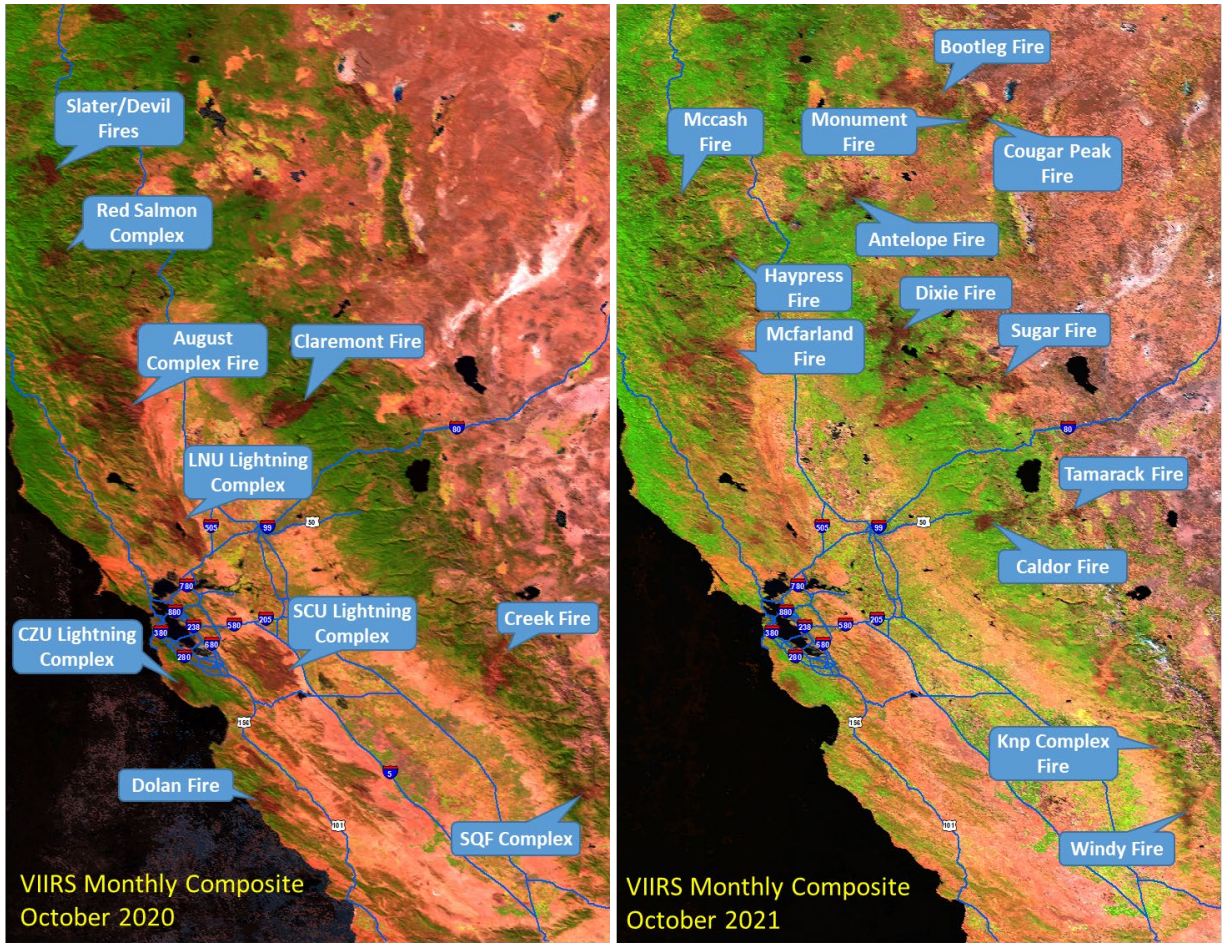
During the early summer in 2021 a historically strong heat wave took hold across southwestern Canada. This heat wave caused the mass death of aquatic animals in the waters off of the coast of British Columbia and sparked large wildfires throughout the Canadian Rockies.

Previous work by the STAR ICVS team creating 3D animations depicting hurricane warm cores has been extended to depict the 3D structure of last June's heat dome event.

Figure. An oblique 2D slice of gap-filled antenna temperature anomalies over North America measured by NOAA-20 ATMS on June 27, 2021. Anomalies are with respect to the mean NOAA-20 ATMS observations over 21 days in the past 3 years. The map below shows the ATMS Ch 16 (window channel) gap-filled Antenna Temperature observations from the same domain on June 27 is depicted

Highlights from the Science Teams (November)

Historical fire seasons left San Joaquin Valley surrounded by burn scars



Fueled by drought and extreme heat, fires burned more land in 2020 than in any other year in California's modern history according to the California Department of Forestry and Fire Protection. The 2021 fire season added many more burn scars to the vast region surrounding the San Joaquin Valley. A cloud free imagery record of these burn scars is provided by the VIIRS monthly composites.

Accomplishments

- Delivery Algorithm Packages (DAPs) - Mission Unique Products:
  - 12/06/2021: 'SNPP CrIS engineering packet v42' was uploaded
  - 11/12/2021: OMPS SDR team delivered DAP (ADR9633/CCR5577 OMPS Nadir Mapper geolocation code change for off-nadir geolocation error correction) to ASSISTT
  - 12/03/2021: ASSISTT team delivered DAP (ADR9633/CCR5577) to DPMS

    List of changed codes (1 file):
    - ProSdrOmpsTcEarth.cpp

    List of changed LUT/PCT (2 LUTs):
    - OMPS-TC-FAM-LUT_j01
    - OMPS-TC-FAM-LUT_npp

- DAPs – Enterprise Products:
  - 12/09/2021: OMPS Ozone team delivered updated enterprise Cal/Val plan to include OMPS LP SDR & EDR Cal/Val
  - 12/06/2021: STAR delivered VIIRS Super DAP JRR v3.1 patch to NDE (for Cloud Height impact)
  - 11/26/2021: OMPS Ozone team re-delivered V8TOz_v4r2 package to ASSISTT (CCed NDE). Main updates:
    - V8TOz_v4r2 can process input OMPS S-NPP, N20 and J02 SDRs from both Mx3 and Mx4
    - Updated soft-calibration and look-up tables, and filenames
  - 11/29/2021: OMPS Ozone team delivered one day retrievals of V8TOz_v4r2 with Mx4 input SDR data to ASSISTT and NDE for them to use as input data for V8TOs testing
  - 12/8/2021: OMPS team tested V8TOS with the one day V8TOz_v4r2 output as input, confirmed: there is no issue with new input data files ==> no need to update V8TOS with the new V8TOz_v4r2
  - 11/17/2021: MiRS team delivered MiRS v11r8 patch DAP (no code changes. Aral sea region surface type has been changed: the surface type database is updated over the Aral Sea based on the recent VIIRS NDVI data and the spurious rain rate is removed) to ASSISTT team

- IDPS Builds Checkouts / JPSS-2 Pre-Launch Testing events:
  - 11/23/2021: JSTAR submitted Imagery review/checkout result for Mx5 SOL deploy regression to DPMS/RTN

Accomplishments – JPSS Cal Val Supports

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

S-NPP	Weekly OMPS TC/NP Dark Table Updates	11/02/21, 11/09/21, 11/16/21, 11/23/21, 11/30/21, 12/07/21
NOAA-20	Weekly OMPS TC/NP Dark Table Updates	11/02/21, 11/09/21, 11/16/21, 11/23/21, 11/30/21, 12/07/21
S-NPP	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	11/09/21, 11/23/21, 12/07/21
NOAA-20	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	11/02/21, 11/16/21, 11/30/21
S-NPP	Monthly VIIRS LUT Update of DNB Offsets and Gains	11/09/21
NOAA-20	Monthly VIIRS LUT Update of DNB Offsets and Gains	11/09/21

- ***9/27/2021: VIIRS Global Annual Surface Type (AST-2020)***: The new VIIRS Annual Surface Type 2020 product (AST-2020, spatial resolution: 1km) based on 2020 whole year surface reflectance data is now ready for users to download at STAR FTP sites. There are three products:
  - 2020 AST IGBP types in Sinusoidal projection
  - 2020 AST IGBP types in Lat/Long
  - 2020 AST 20 types in Lat/Long

- 11/30/2021: NDE release 2.0.28 operational, includes: OMPS LP, and Blended Hydro updates
- 11/18/2021: CLASS ORR for Reprocessed SNPP Data. The official transition of the reprocessed SDRs scheduled to start at 12 PM EST on Nov. 29, 2021.
- The CIRA team introduced a new aviation website (https://aviation.cira.colostate.edu) to participants of the JPSS Aviation Initiative, which is used for the AK Cloud Demo (fall-winter). The data latency was improved by ingesting VIIRS SDRs directly from the GINA direct broadcast system, and missing data processing/display in 3D gridded cloud fields was refined. The research and user-engaged improvements were presented at Southwest Aviation Weather Safety Workshop (11/5-6) and JPSS Science Seminar (11/15)

Upcoming Milestones/Deliveries

- JSTAR Code/LUT/Product Deliveries:

DAP to DPMS:

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

NOAA-20/JPSS-2 Algorithm DAP to NDE/CoastWatch:

- Dec-21: Final J2 NUCAPS DAP (include NPP/N20 updates)
- Dec-21: Final NVPS J2 DAP (VI & GVF)
- Dec-21: Initial/Final Vegetation Health J2 DAP (include NPP/N20 updates)
- Jan-22: Final J2 Active Fires DAP (include NPP/N20 updates)
- Jan-22: Final OMPS Ozone V8TOz DAP
- Jan-22: Final OMPS Ozone V8Pro DAP
- Jan-22: Global Gridded LST/LSA DAP
- Jan-22: Final J2 Super DAP (Clouds, Aerosol, Volcanic Ash, Cryosphere, VPW, LST, LSA)
- Jan-22: Final MiRS J2 DAP (include SFR)
- Mar-22: J2-ready Ocean Color DAP to ASSISTT (CoastWatch □ ASSISTT)
- Jun-22: J2-ready Ocean Color DAP to Cloud (ASSISTT □ NCCF)

FY22 STAR JPSS Milestones

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Algorithm Updates DAPs				
Final launch-ready JPSS-2 ATMS PCT/MM-coef DAP	May-22	May-22		
Final launch-ready JPSS-2 CrIS PCT/MM-coef DAP	May-22	May-22		
Final launch-ready JPSS-2 VIIRS LUTs/MM-coef DAP	May-22	May-22		
Final launch-ready JPSS-2 OMPS LUTs/MM-coef DAP	May-22	May-22		
Final J2 ready Super DAP (include NPP/N20 updates), Clouds/Aerosol/VolcanicAsh/Cryosphere/LST/LSA/VPW	Jan-22	Jan-22	**12/06/21 (v3.1 patch)**	
Final J2 ready Active Fires DAP (include NPP/N20 updates, I-Band)	Jan-22	Jan-22		
Surface Reflectance: Final J2 ready DAP	Oct-21	Oct-21	10/07/21	
NVPS (VI & GVF): Final J2 ready DAP	Dec-21	Dec-21		
Vegetation Health: Initial/Final (combined) J2 ready DAP	Dec-21	Dec-21		
SST: Final J2 ready DAP (ACSPO 2.80)	Dec-21	Dec-21	Initial/Final DAP: 09/16/21	If needed
NUCAPS: Final J2 ready DAP	Dec-21	Dec-21		
MiRS & SFR: Final J2 ready DAP	Jan-22	Jan-22		
OMPS Ozone V8Pro: Final J2 ready DAP	Jan-22	Jan-22		
OMPS Ozone V8TOz: Final J2 ready DAP	Jan-22	Jan-22		**11/26/21 V8TOz v4r2 to ASSISTT**
L3 Global Gridded LST/LSA	Jan-22	Jan-22		
Reformatting Toolkit	Jan-22	Jan-22		
AMSR-3 ready DAP (include AMSR-2 updates)	Sep-22	Sep-22		

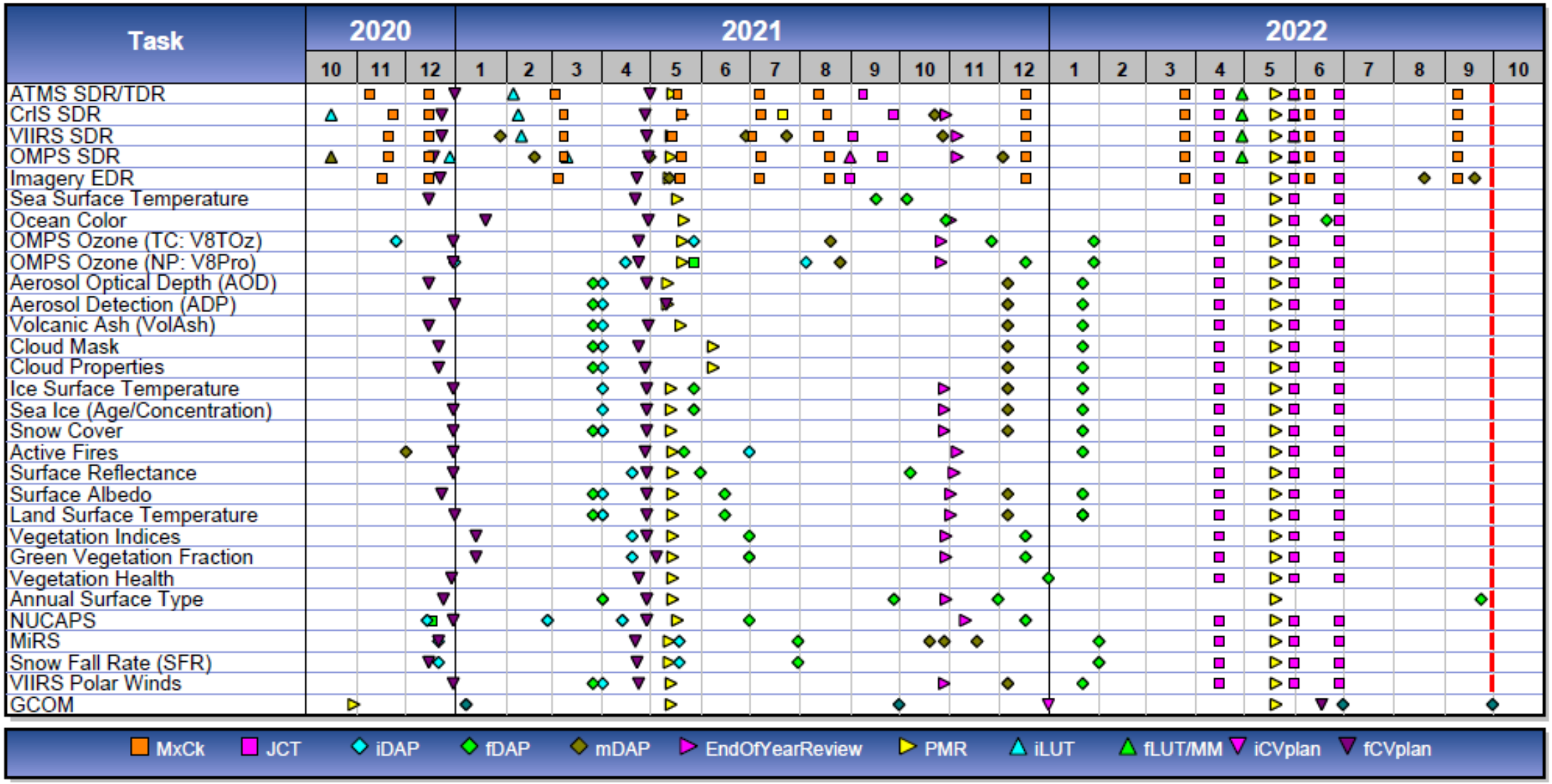
FY22 STAR JPSS Milestones

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

FY22 STAR JPSS Milestones

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

STAR JPSS Schedule: TTA Milestones



Color code:

Green: **Completed Milestones**

Gray: **Non-FY22 Milestones**

ATMS SDR

November, 2021

Accomplishments / Events:

- Reviewed the JPSS-3 ATMS Pre-Ship Review (PSR) science team inputs about the JPSS-3 ATMS pre-launch performance based on the calibration Thermal Vacuum (TVAC) test datasets.
- Updated the IDPS ATMS NEDT calculation code to apply the newly updated scan level NEDT calculation algorithm described in ATBD. Preliminary results showed that the updated algorithm can less dependent on the number of scans used in the calculation and can separate thermal noise and 1/f noise from the total noise. The scan to scan variation of NEDT has significantly decreased while the orbital mean NEDT is closer to the NEDT calculated by TVAC data.
- Updated the JPSS-2 Processing Coefficients Table (PCT) to include the new instrument health status limits provided by NG. This PCT will be submitted before launch after the mounting coefficients are updated later.
- Kept updating JPSS-2 spacecraft telemetry and diary RDR data decoder using the latest format change with NASA Flight Project POC. Tested the updated J2 spacecraft telemetry data decoding program using JCT2a DSE data to verify ATMS related spacecraft telemetry parameters.
- Reviewed the JPSS-2 data format book with the updated APs in spacecraft RDR data.
- Kept updating ATMS SDR User's Guide document

Overall Status:

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

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

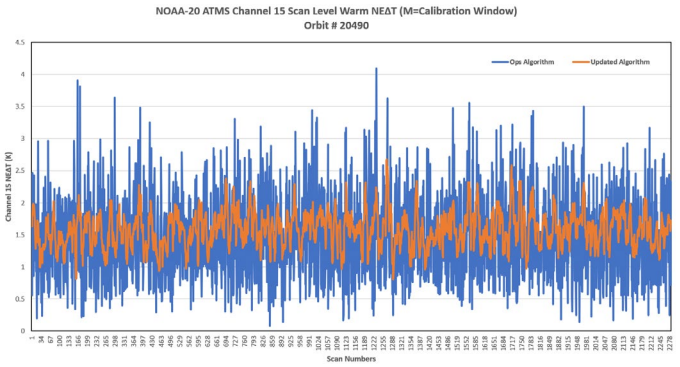
Issues/Risks:

None

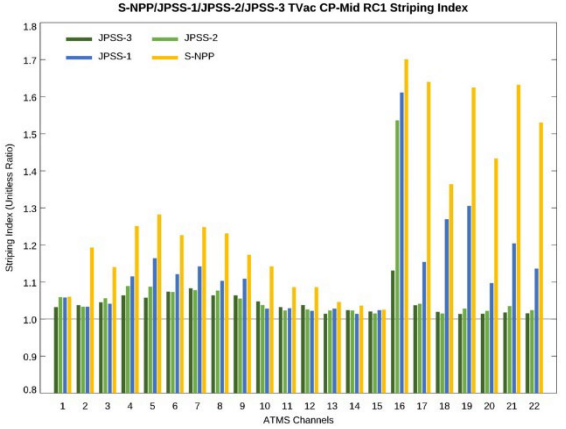
Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
Generate JPSS-2 ATMS mounting matrix coefficients (MM-coef) based on the JPSS-2 pre-launch instrument interface alignment measurements report	Mar-22	Mar-22		
Update of ATMS non-linearity correction coefficients after applying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

Highlights:

NOAA-20 ATMS channel 15 warm NEDT comparison between current (blue) and proposed (orange) algorithms



JPSS-3 ATMS Striping Index comparison against S-NPP/JPSS-1/JPSS-2 based on TVAC data analysis



CrIS SDR

November, 2021

Accomplishments / Events:

- Participated in the FSWWG Meeting on November 16, 2021 to support the approval of the SNPP CrIS Calibration Table v42 upload. This calibration table contains optimized mapping angle parameter to improve the sensor geolocation.
- Both SNPP and NOAA-20 CrIS experienced scene selection module (SSM) position count errors on November 27 and 28 due to a data receiving and processing protocol error. Thus the whole calibration moving window was skipped without processing. This caused the loss of about 35 granules on both sensors. The root source of these anomalies is being investigated.
- The NOAA-20 CrIS has shown the presence of the noise increase event #14 for MWIR FOV5. The start day of the noise increase was November 23, 2021 **(Fig.1)**. This anomaly ended on November 27, 2021. Noise is still within requirements.
- Demonstrated a new PC Score approach which calls for the subdivision of the globe into 3,000 geographically equal areas. For each area, 64 spectra are collected and averaged. From these spectra, the eigenvector ensemble was collected. As a result, the difference between the original SDR radiance and the PC score reconstructed CrIS spectra is presented in **Fig.2** for the LWIR band over the orbit 18035 on 5/12/2021. The residuals are within noise level.
- Completed ADL tests with the spike detection/correction algorithm enabled for NOAA-20 CrIS between April and October 2021. The CrIS SDR quality flags related to the spike algorithm were examined. The number of detected spikes in the CrIS ICT MWIR band interferograms increased continuously in the past two years (most are false alarms) and occurring in only a few select FOVs **(Fig.3)**. It was determined that the ZPD location does not appear to be the root cause of this.
- Installed the newly updated Harris JPSS-3 CrIS SDR Generator Software tool for the purpose of processing JPSS-3 CrIS TVAC data and converting them into nonlinearity-corrected SDR radiance spectra.

Overall Status:

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

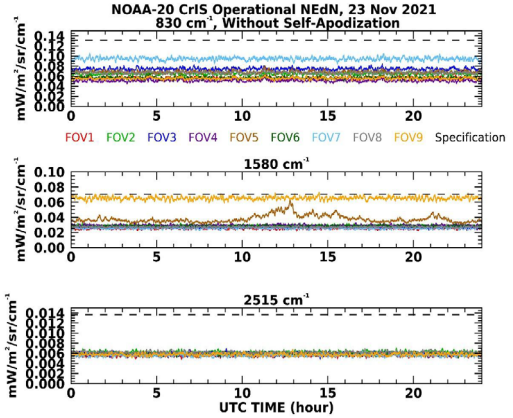
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

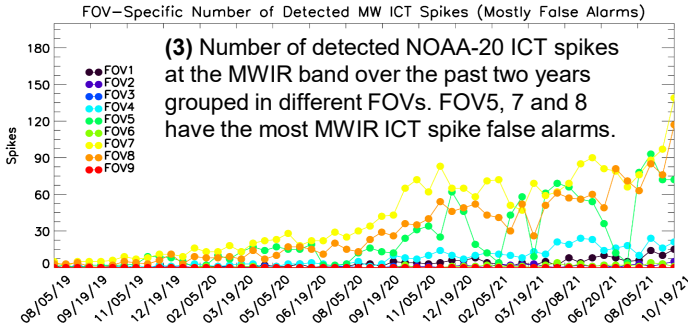
Dr. Zhipeng (Ben) Wang left the CrIS SDR team to work at NASA, he was mainly focused on the spectral calibration and CrIS/ABI intercomparison work. **The team is working on finding the corresponding support.**
Dr. Erin Lynch left the CrIS SDR team to work for NOAA/OPPA as a federal employee. She was mainly focused on the Geolocation calibration and the CrIS/IASI intercomparison work. **The team is working on finding the corresponding support.**

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

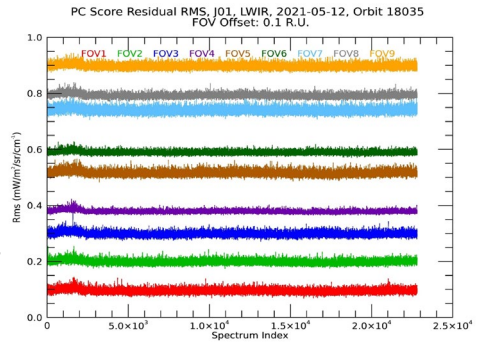
Highlights:



(1) NOAA-20 CrIS NEdN on 11/23/2021 showing the beginning of the noise increase event #14 for MWIR/FOV5.



(3) Number of detected NOAA-20 ICT spikes at the MWIR band over the past two years grouped in different FOVs. FOV5, 7 and 8 have the most MWIR ICT spike false alarms.



(2) Radiance residual of the CrIS SDR product minus CrIS reconstructed radiances on 5/12/2021 for LWIR as a function of FOV.

VIIRS SDR

November, 2021

Accomplishments / Events:

- Created and delivered for deployment in the IDPS operations updated NOAA-20 and Suomi NPP DNB offset and gain ratios LUTs generated using the new moon calibration data from November 4 for NOAA-20 and November 3 for Suomi-NPP.
- Supported scheduled lunar roll maneuvers on 11/14/2021 for SNPP and NOAA-20 VIIRS; Analysis of lunar data collections confirmed consistent sensor performance with operational calibrations.
- Developed and validated on-orbit pitch maneuver data-derived VIIRS TEB RVS and calibration offsets. Results indicate that radiometric performance of NOAA-20 VIIRS TEBs will be more in-family with CrIS and SNPP VIIRS if the updated calibration coefficients are used.
- SNPP VIIRS VNIR detector nonuniformity were estimated from the scheduled lunar and Solar Diffuser observation. The experimental lunar-based detector non-uniformity correction shows effective reduction in VNIR band striping and the performances are consistent with the DCC-based corrections.
- Monitored the impacts on geolocation accuracy during the SNPP Flying out of Nominal Ground Track Box (Nov. 5 to Nov. 27).
- Confirmed and monitored the operational implementation of the calibration update for NOAA-20 VIIRS RSBs since 18:46 UTC on 11/4/2021

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY21 End of Year Science Team Presentations (PMR)	Oct-21	Oct-21	11/05/21	
DAP delivery (ADR9760/CCR5724, N20 VIIRS-SDR-F-PREDICTED-LUT Update #7)			10/27/21	
Generate JPSS-2 VIIRS mounting matrix coefficients (MM-coef) based on the JPSS-2 pre-launch instrument interface alignment measurements report	Mar-22	Mar-22		
Verify and finalize JPSS-2 VIIRS lookup tables (LUTs) using JPSS-2 pre-launch JCT data (JCT-3 satellite TVAC data)	Mar-22	Mar-22		
Deliver final launch-ready JPSS-2 VIIRS LUTs/MM-coef DAP to ASSISTT	Apr-22	Apr-22		
Deliver final launch-ready JPSS-2 VIIRS LUTs/MM-coef DAP to DPMS	May-22	May-22		
FY23 Program Management Review	Jun-22	Jun-22		
NOAA-20 VIIRS TEB RVS and Offset change testing and validation	Dec-21	Dec-21		
RDR code change to handle anomalous packets(similar to DB anomaly over Mexico)	Mar-22	Mar-22		
Develop VIIRS Global Area Coverage (VGAC) production capabilities in collaboration with NCEI to meet user needs (ISSCP, EUMETSAT, and others)	Sep-22	Sep-22		
OnDemand reprocessing delivery to CLASS (SNPP recalibrated & reprocessed VIIRS SDR)	Sep-22	Sep-22		
NOAA-20 VIIRS recalibration & reprocessing (on CLOUD)	Sep-22	Sep-22		
Delivery of VIIRS RSB calibration LUTs to mitigate degradation, as needed	Sep-22	Sep-22		
Delivery of VIIRS DNB straylight LUTs, as needed	Sep-22	Sep-22		
NOAA-20 VIIRS as GSICS reference	Mar-22	Mar-22		Report 1
Absolute calibration using CEOS RadCalNet Sites	Jun-22	Jun-22		Report 2
Offline RSB/DNB/TEB Cal/Val analyses	Jun-22	Jun-22		Report 3
Continue cross-calibration and monitoring between NOAA-20 and SNPP VIIRS	Sep-22	Sep-22		Report 4
JPSS-3 VIIRS pre-launch measurement and test data review/analyze	Sep-22	Sep-22		
Participant/support JPSS-2 pre-launch testing events (Jan-22 JCT3-Ambient; Mar-22 & Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE)	Sep-22	Sep-22		
Block 2.3 Mx builds deploy regression review/checkout (Dec-21 Mx5; Mar-22 Mx6; Jun-22 Mx7; Sep-22 Mx8)	Sep-22	Sep-22		
Operational Support: VIIRS LUT update of DNB Offsets and Gains (S-NPP & NOAA-20)	Monthly	Monthly		

Overall Status:

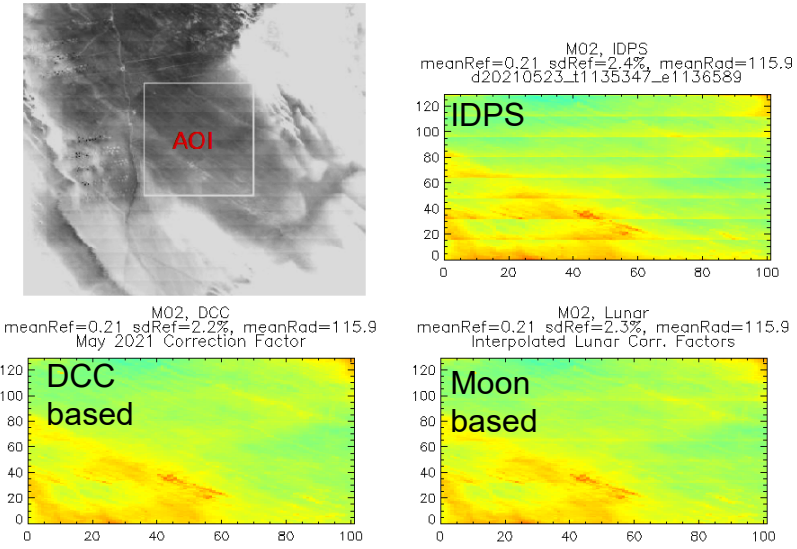
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule		X			

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

Issues/Risks:

None

Highlights:



Experimental striping corrections applied to SNPP VIIRS M2 band image near Libyan desert. The SDR imagery from IDPS has visible striping whereas Moon and DCC-based corrections both show improved image quality by reducing detector nonuniformity.

OMPS SDR

November, 2021

Accomplishments / Events:

- Delivered OMPS biweekly NP solar irradiance bi-weekly LUTs.
- Completed the ADL OMPS code change and verification regarding the OMPS NM geolocation error code change DR9633.
- Continued analyzing three versions of SNPP OMPS NP L1B datasets to assess NR changes over Antarctic ozone hole region.
- Reviewed the J2 OMPS waivers and potential impacts and JCT3 test details.
- Assessed the impact of the VIIRS lunar roll maneuvers (~-2.18° for N20 and 1.72° for SNPP) on the NP geolocation accuracy.
- Continued to assess OMPS NP SDR sensor degradation.
- Prepared the NOAA-20 bandpass data to produce transmittance coefficients used in the VCRTM.
- Developed the interface packages for the VCRTM OMPS-NP radiance simulations.
- Continued verifying the VCRTM OMPS NM radiance simulation performance (e.g., asymmetrical angular dependency)
- Continued examining the RDR to SDR process for OMPS dark and solar measurements.
- Prepared the briefing presentation about the DR9633 root cause, code changes and verification.

Overall Status:

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

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

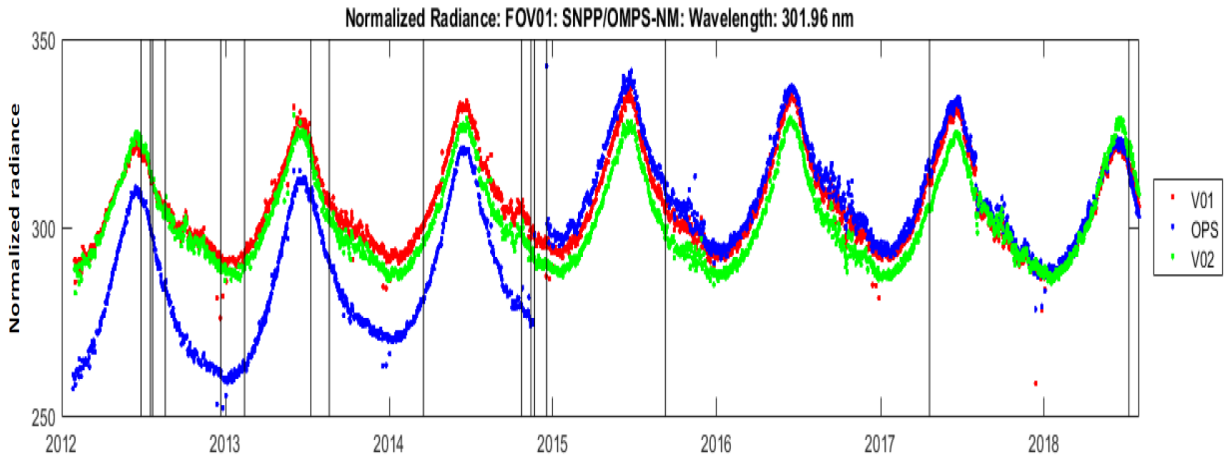
Issues/Risks:

None

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

LT Trend of SNPP OMPS SDR data (normalized radiance) within Antarctic Ozone Hole Region

Latitudes: 59°S ~ 61°S and Longitudes: -180° ~ 180°



The trends are computed using three versions of SNPP OMPS NM SDR data at off-nadir pixels within the Antarctic ozone hole region. The newly reprocessed SNPP OMPS NM SDR data ('V02') shows a much more consistent LT stability than the operational data (OPS) and preliminary reprocessing version ('V01'). The new data also have a more stable annual cycle pattern thus providing a more reasonable information for Antarctic ozone hole trend analysis.

SDR Reprocessing

November 2021

Accomplishments / Events:

- The post-processing of the reprocessed V2 SNPP OMPS SDR is completed.
- Preparation of the reprocessed VIIRS data for the official transition is ongoing.
- CLASS STAR Reprocessed Data Dataflow ORR Checklist was reviewed on Nov. 18. (Highlights)
- Data Submission Agreement between the NESDIS/STAR and the NESDIS/NCEI for the Suomi NPP SDR/TDR reprocessing from STAR has been approved.
- The official transition of the reprocessed SDRs scheduled to start at 12 PM EST on Nov. 29, 2021. At the time of this writing, the STAR firewall was correctly updated to allow the connection between STAR and CLASS.

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
FY23 Program Management Review	Jun-22	Jun-22		
Complete planning and testing on transition of S-NPP reprocessed SDR data to CLASS	Oct-21	Oct-21	Oct-21	
Complete transition of 1000 Tb of reprocessed S-NPP SDR data to CLASS	Sep-22	Sep-22		
Complete preliminary assessment of CrIS radiometric stability by comparisons with global AIRS observations	Sep-22	Sep-22		

Highlights: CLASS STAR Reprocessed Data Dataflow ORR Checklist Highlights

Data Description and Volume

- Total ATMS volume is expected to be 2.10 TB; 2,631,921 files.
- Total CrIS volume is expected to be 142.81 TB; 1,390,985 files.
- Total OMPS volume is expected to be 3.27 TB; 313,418 files.
- Total VIIRS volume is expected to be 1615 TB; 23,180,040 files.
- Total volume of all instruments is expected to be 1764.65 TB; 27,516,364 files.
- Data will be processed at a rate 3 TB/day when applicable. For the ATMS Reprocessed Data, the data flow will be sent at lower rate per day due to the high number of files at a low volume.

Summary of testing in the PAL environment

The STAR Reprocessed data was tested in the PAL from 09/20/2021 – 10/15/2021. The CLASS team and STAR team worked together to rectify some configuration issues that were discovered during testing. These issues have also been addressed and updated in CLASS Operations.

ICVS

November, 2021

Accomplishments / Events:

- Finished the development of S-NPP/NOAA-20 OMPS NM geolocation accuracy monitoring package. The NRT generation of monitoring products is under beta testing in ICVS beta web page.
- Started integrating the CrIS anomaly detection, analysis, and ground system update packages into ICVS Testbed framework to build a end-to-end science data quality improvement working flow.
- Responded to emergency ICVS data storage server crash issue. Migrated NRT ATMS/SC monitoring modules to provide continuous products to support JPSS missions. Updated monitoring packages to generate redundant long term trending data backup in distributed data servers to mitigate the monitoring service disruption risk.
- Kept updating JPSS-2 spacecraft RDR data decoding program using the update data format book from NASA flight project team.
- Host git tutorial working sessions for ICVS team members to facilitate the application of git in ICVS software development, collaboration, and version control.
- Provided near real time S-NPP and NOAA-20 spacecraft and instrument status and data quality monitoring report to support SDR team activities.
- Continue supporting the VIIRS SDR reprocessing verification check code development.
- Detected the impacts of an extra GPS record with an invalid time from Nov. 27 into Nov. 28 (CrIS, ATMS, etc.)

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

Overall Status:

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

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

Issues/Risks:

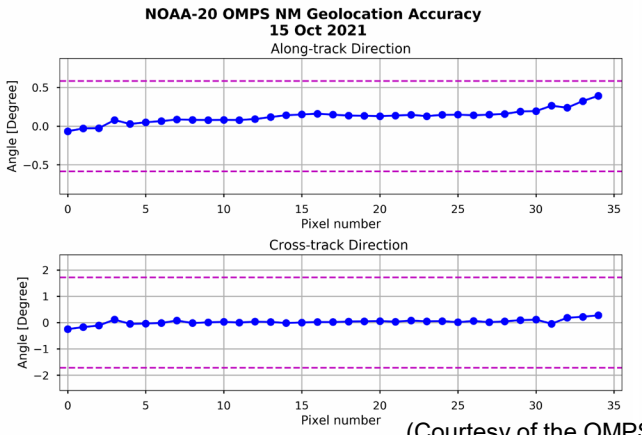
None

Highlights:

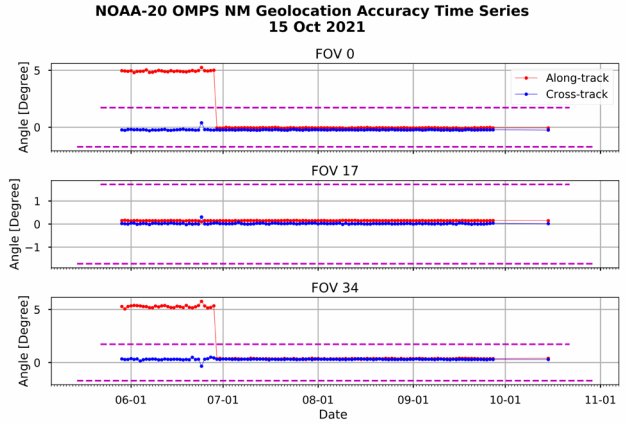
Significantly contribute to STAR SDR Teams

A new function for OMPS SDR is added to the ICVS-LTM Website

NOAA-20 OMPS NM Daily Along- and Cross-Track Geolocation Accuracy at Different Pixels



NOAA-20 OMPS NM Daily Mean Along- and Cross-Track Geolocation Accuracy Time Series at Selected FOVs



(Courtesy of the OMPS SDR Team L. Wang for the tool development)

VIIRS Imagery

November, 2021

Accomplishments / Events:

- CIRA's Imagery proposal is being prepared, addressing tasks that need to be accomplished in FY22 for the VIIRS Imagery Team, including preparations for JPSS-2 first-light imagery.
- Curtis Seaman and Steve Finlay checked VIIRS Imagery for a **STAR Review/Checkout for Block 2.3 Mx 5 SOL Deploy Regression.** Imagery EDRs looked fine; no issues.
- The Imagery Team is sill learning about **DQTTs and DQNs** and attending related meetings, even though these "flags" are not currently being used by Imagery Team members at CIRA.
- **Rob Williamson** will become the new Imagery JAM in January, replacing **Tim Dorman**, who has done a excellent job organizing online Imagery Monthly meetings and being an intermediary for the Imagery Team to the JPSS Program
- Reminder: **Bill Line** will be the **new StAR Imagery Team Lead** starting CY2022. Be sure to include Bill in Team Lead correspondence and meeting notices. Current Imagery Team lead **Don Hillger** is retiring from federal service at the end of CY2021.

Overall Status:

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

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

Issues/Risks:

Code-change solution for NCC banding over Antarctica and Greenland for both NPP and J01 will be followed thru into operations.

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

Highlights: Image

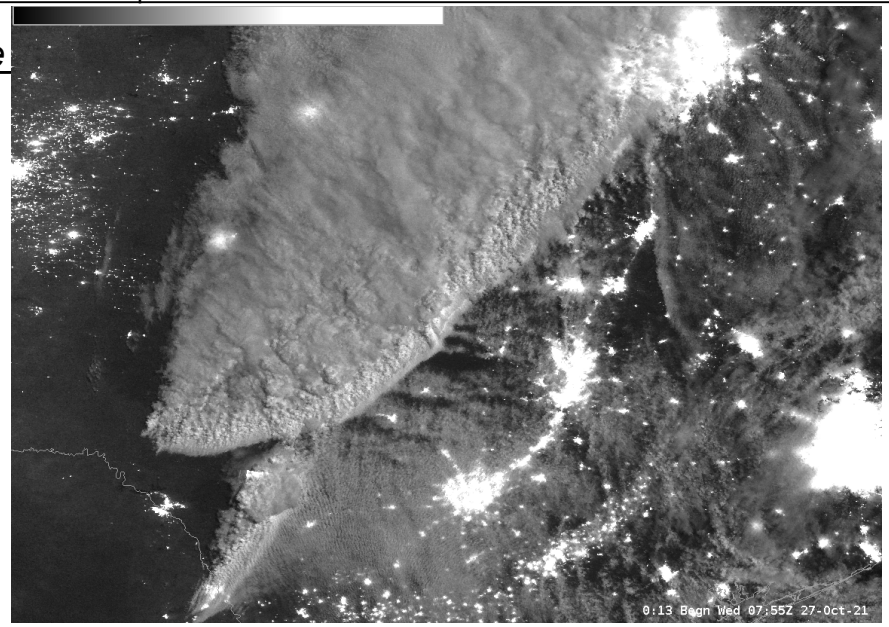


Figure: 27 Oct 2021 VIIRS DNB/NCC product captured convection developing in southern Texas heading towards the city lights of San Antonio and Austin.

Clouds

November, 2021

Accomplishments / Events:

- The CIRA team introduced a new aviation website (https://aviation.cira.colostate.edu) to participants of the JPSS Aviation Initiative, which is used for the AK Cloud Demo (fall-winter). User feedback will be collected through an online survey available on the website (being advertised to local pilots through the AOPA web story). The data latency was improved by ingesting VIIRS SDRs directly from the GINA direct broadcast system, and missing data processing/display in 3D gridded cloud fields was refined. The research and user-engaged improvements were presented at Southwest Aviation Weather Safety Workshop (11/5-6) and JPSS Science Seminar (11/15).
- In collaboration with CIRA, Cloud team has found several cases where VIIRS DNB can help in the cloud detection (ECM) at night. Figure 1 shows a low level cloud at night off the South-West coast of Australia, which is partially not detected by ECM. The new version of ECM allows to have 1D, 2D or 3D classifiers. We are exploring if DNB reflectance test would be more effective alone or in combination with some other tests to improve the cloud detection performance.

Overall Status:

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

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

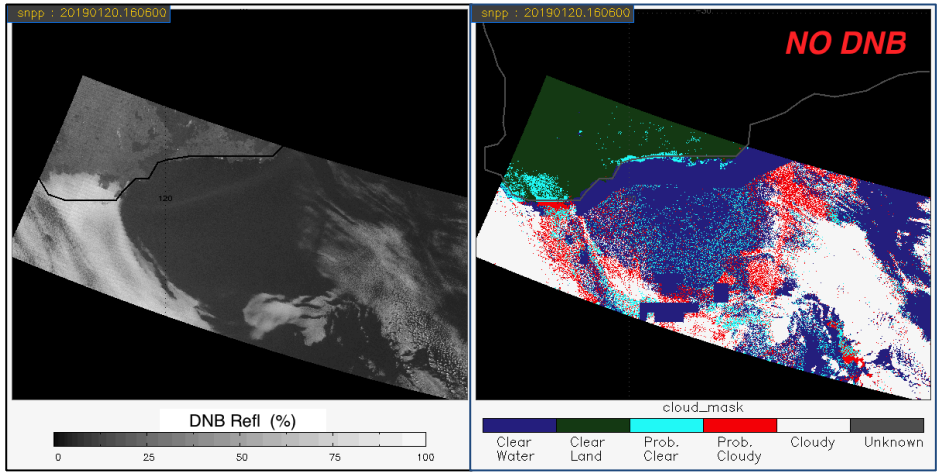
Issues/Risks:

None

Milestones:

- ***See next slides***

Highlights:



DNB Lunar Reflectance (%) ECM

Figure 1. Figure on the left shows VIIRS DNB Lunar reflectance, the ECM performance without DNB (right) is partially missing a low level cloud.
SNPP VIIRS 2019-01-20 16:06 UTC.

Clouds (Cloud Mask)

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

Clouds (Cloud Phase/Type)

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

Clouds (ACHA)

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

Clouds (DCOMP)

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

Clouds (NCOMP)

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

Clouds (Cloud Base Height)

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

Clouds (CCL)

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

Aerosol

November, 2021

Accomplishments / Events:

- Completed the generation of PM2.5 estimates from nine years of reprocessed SNPP VIIRS AOD data
  - The data are being assimilated into a high resolution WRF-Chem model by OAR and its affiliates to study air quality over Boulder
- Completed the migration of global granules of SNPP VIIRS AOD product to Amazon Web Services Big Data Project. Currently writing Python scripts to let users download data
- Completed the validation of reprocessed AOD product by comparing it to AERONET and found that product doesn't have any drift and is accurate at 0.017±0.11 over land and at 0.017±0.066 over ocean. The root mean square error differences are 0.111 and 0.069 over land and ocean respectively.
- Fall AGU presentation on PM2.5 estimates from GOES and VIIRS AODs
- Monitored smoke/smog conditions over India using ADP product to flag smoke from crop stubble burning

Milestones:

- ***See next slides***

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			

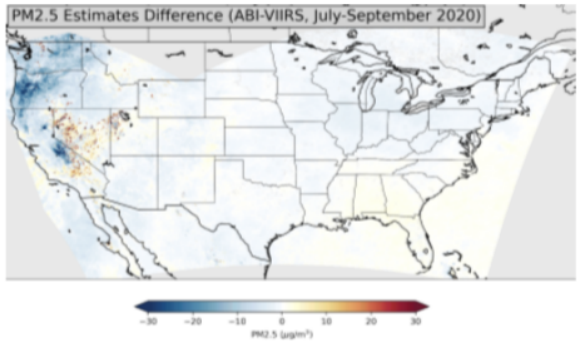
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

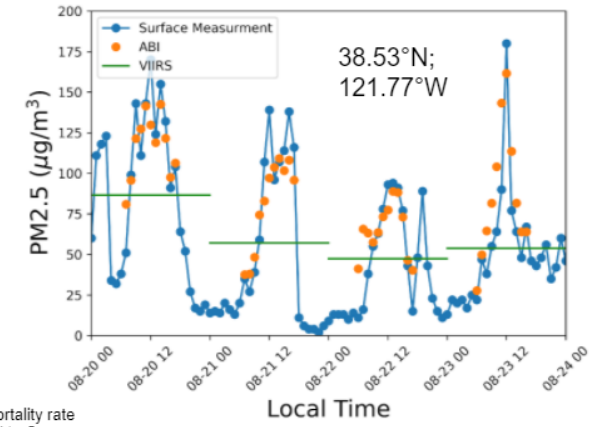
Issues/Risks:

No risks

Highlights:

Diurnal Variation of Surface PM2.5





These differences will lead to differences in estimates of human health impacts (mortality rate estimates). *Both VIIRS (daily) and ABI (hourly) estimates of PM2.5 will be provided to George Washington University (PI Susan Anenberg) to provide value assessment of geostationary observations in studying the health impacts of poor air quality.*

EPA PM2.5 standard is 35 ug/m^3 for 24-hr average. But health outcomes (asthma, cardiovascular, upper respiratory illnesses) are severe for exposures even on sub-daily time scales.

Epidemiologists have begun to argue that people do not breathe 24-hr average air and that acute exposure must be in the consideration when health impacts are assessed.

Aerosol (AOD)

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

Aerosol (ADP)

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

Volcanic Ash

November, 2021

Accomplishments / Events:

- Maintained and verified quality of S-NPP and NOAA-20 Volcanic Ash products (JPSS EDR and VOLCAT)
- Began distributing VOLCAT event files to OAR in support of volcanic ash forecasting (STAR AOP milestone)
- Successfully tested ultra low latency JPSS VIIRS data from near instantaneous stream of direct broadcast data (STAR AOP milestone)

Overall Status:

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

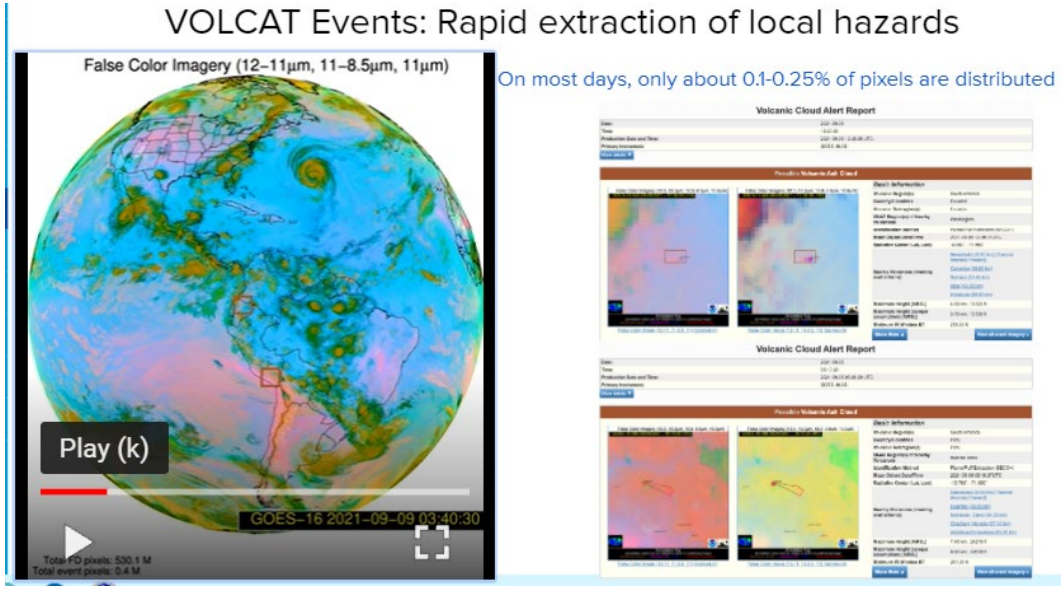
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

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

Highlights:



Cryosphere

November, 2021

Accomplishments / Events:

* Manuscript on Sea Ice leads published

A novel approach has been developed using artificial intelligence (AI) to detect sea ice leads using satellite thermal infrared window data from the Moderate Resolution Imaging Spectroradiometer (MODIS) and the Visible Infrared Imaging Radiometer Suite (VIIRS). A manuscript entitled "Application of a Convolutional Neural Network for the Detection of Sea Ice Leads", has been published in Remote Sensing (2021, 13(22), 4571; https://doi.org/10.3390/rs13224571). Authors are Jay Hoffman (CIMSS), Steve Ackerman (CIMSS), Yinghui Liu (ASPB), Jeff Key (ASPB), and Iain McConnell (SSEC). The paper discusses the use of machine learning to detect sea ice leads (fractures) in MODIS and VIIRS data. More information on the project is available at https://www.ssec.wisc.edu/leads and in highlight.

Overall Status:

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

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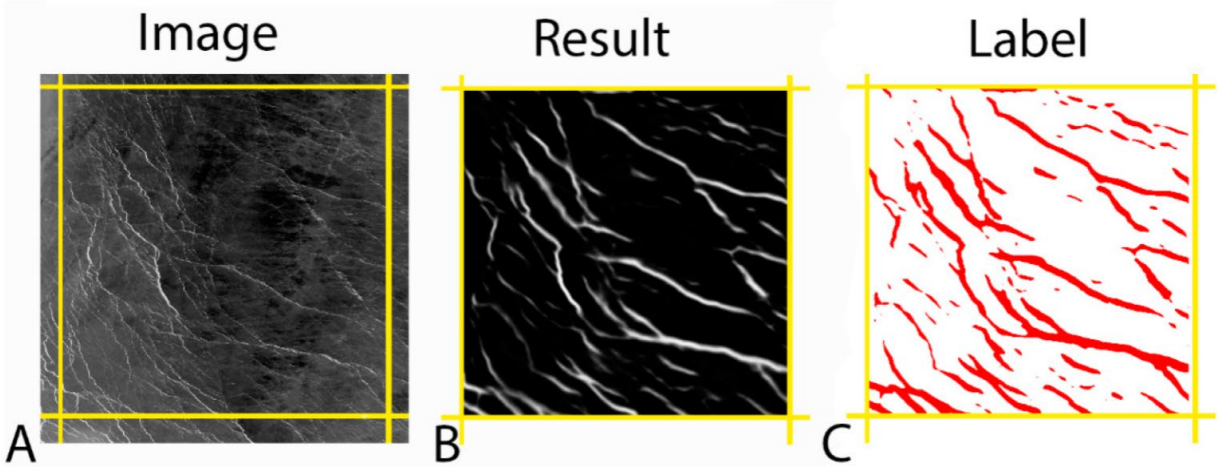
Issues/Risks:

None

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

Highlights: New machine learning detection for sea ice leads (fractures) in VIIRS imagery



A small 512 km × 512 km sample of the VIIRS 11 μm brightness temperature image from 0024 UTC on 1 January 2020 (warm features are bright) in panel (A). The corresponding U-Net greyscale image of segmentation results in panel (B). Where the segmentation results are above the detection threshold, the binary lead labels are shown in red in panel (C).

Active Fires

November, 2021

Accomplishments / Events:

- The team made advances in identifying possible pathways for improving detections under cloudy and heavy smoke conditions while avoiding false detections (see Highlights)
- The team continued working with ASSIST on the implementation of the fire radiative power (FRP) retrieval coefficient corresponding to the JPSS-2 VIIRS band M13 Spectral Response Function
- Ivan Csiszar worked with Amy Huff on training material for the upcoming AMS Virtual Short Course
- The team worked with external partners on the provision of tailored and/or pre-operational data for research and development purposes

Overall Status:

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

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

Issues/Risks:

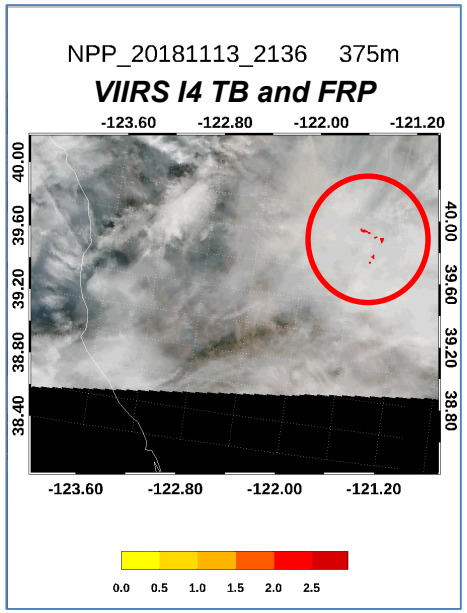
None

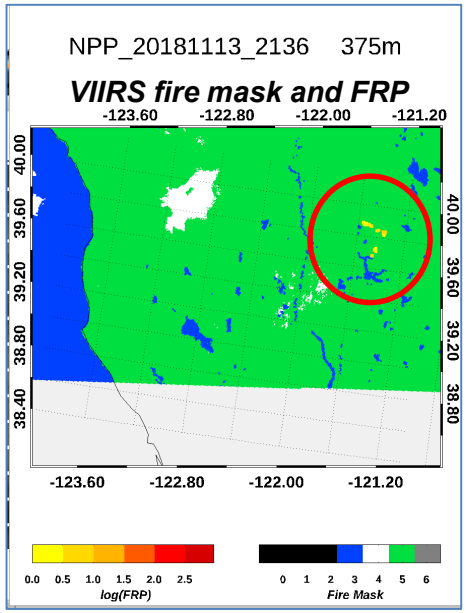
Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY21 End of Year Science Team Presentations (PMR)	Oct-21	Oct-21	11/05/21	
FY23 Program Management Review	Jun-22	Jun-22		
Final J2 ready DAP to NDE (include NPP/N20 updates)	Jan-22	Jan-22		
I-band algorithm improvements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

Highlight: Improving detections under cloudy conditions

Suomi NPP VIIRS I-band detections of the fire front of Camp fire on 11/13/2018. Pre-screening of pixels previously excluded detections in the presence of thin cirrus. No false detections appeared as a result of relaxed pre-screening procedure.

Marina Tsidulko, IMSG





Surface Type

November, 2021

Accomplishments / Events:

- STAR-UMD VIIRS Surface Type team has processed S-NPP and NOAA-20 VIIRS granule surface reflectance data acquired in November 2021 for the production of AST-2021.
- The team has started to generate monthly composites for 2021 using VIIRS data acquired thus far.
- The team explored VIIRS surface reflectance monthly composite for detection of burn scars around San Joaquin Valley left by fires in 2021.
- The team is developing a manuscript on the VIIRS multi-year surface type climatology product, which will be submitted for peer review.

Overall Status:

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

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

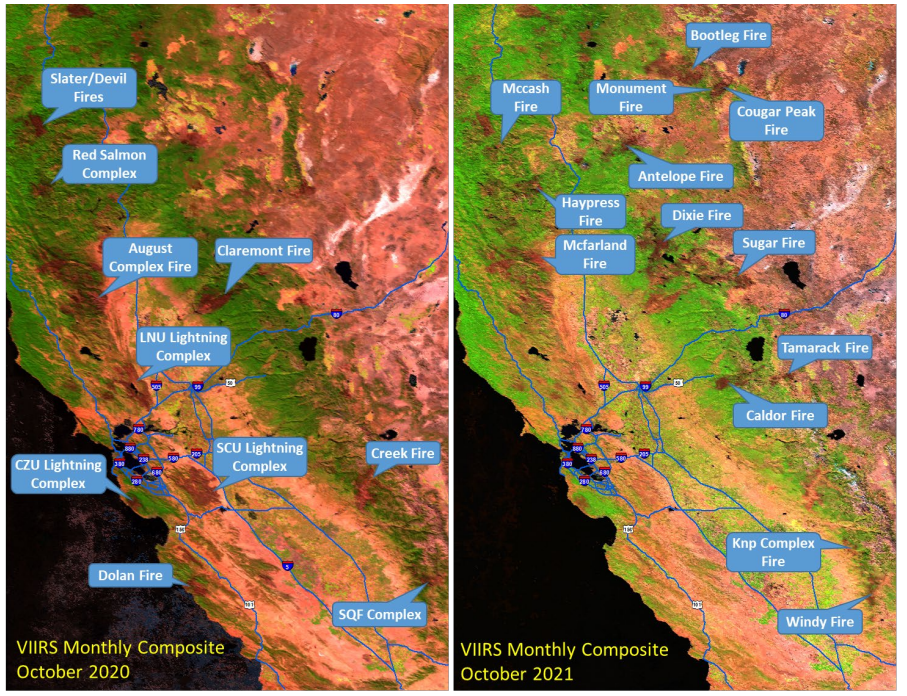
Issues/Risks:

None

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

Highlights:

Historical fire seasons left San Joaquin Valley surrounded by burn scars*: Fueled by drought and extreme heat, fires burned more land in 2020 than in any other year in California's modern history according to the California Department of Forestry and Fire Protection. The 2021 fire season added many more burn scars to the vast region surrounding the San Joaquin Valley. A cloud free imagery record of these burn scars is provided by the VIIRS monthly composites.*



Surface Reflectance

November, 2021

Accomplishments / Events:

- Keep monitoring the S-NPP and NOAA20 SR product by daily routine global true color image and display in the website with weekly animation.
- Improving the AERONET validation tool, including routinely double check data availability to collected as much data as possible, output the atmospherically corrected SR in the NetCDF format, accelerate 6S simulation.
- Evaluated the impact of spectral response function difference between SNPP, NOAA20 and J2 on SR product. The necessary of LUT update for J2 SR product.
- Provide AERONET corrected VIIRS surface reflectance test data for VI products validation.
- Start work on SR validation with the AERONET level 1.5 data using the protocol from NASA science team.

Overall Status:

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

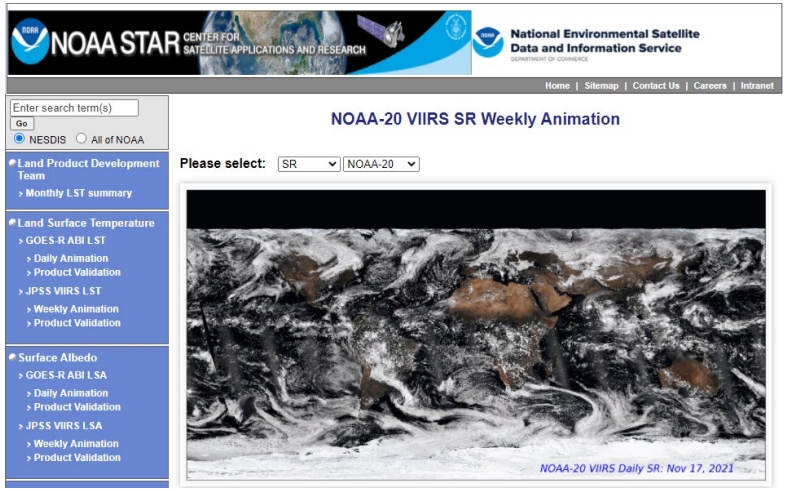
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

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

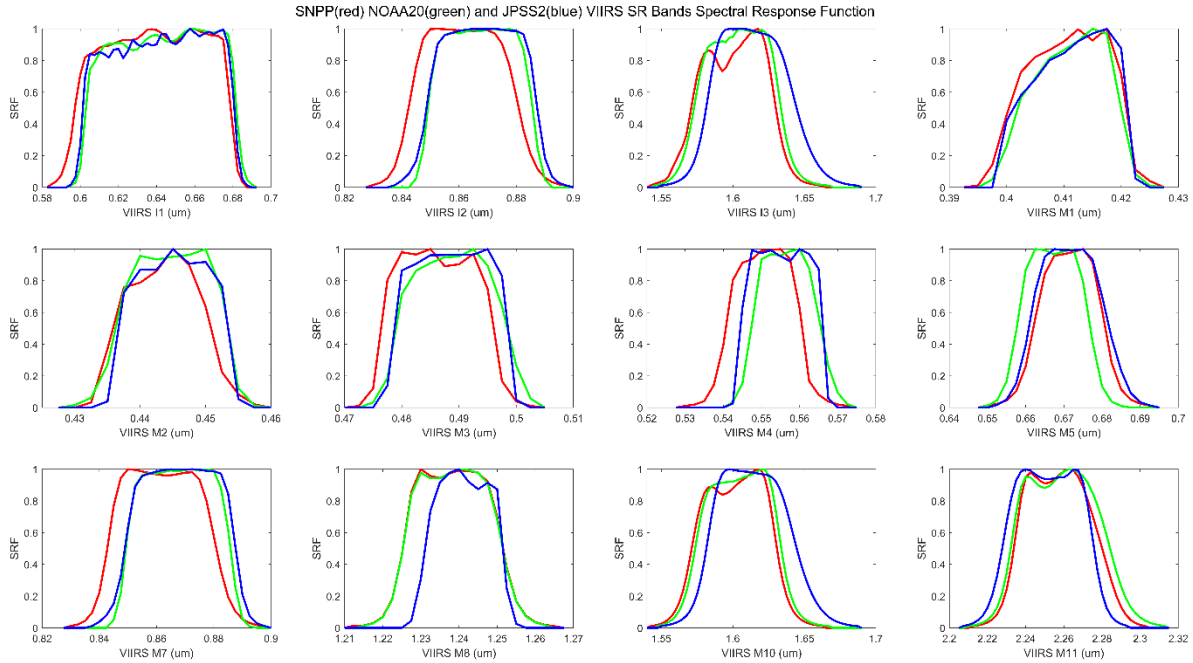
Highlights:



- VIIRS daily SR product in NOAA/STAR website.

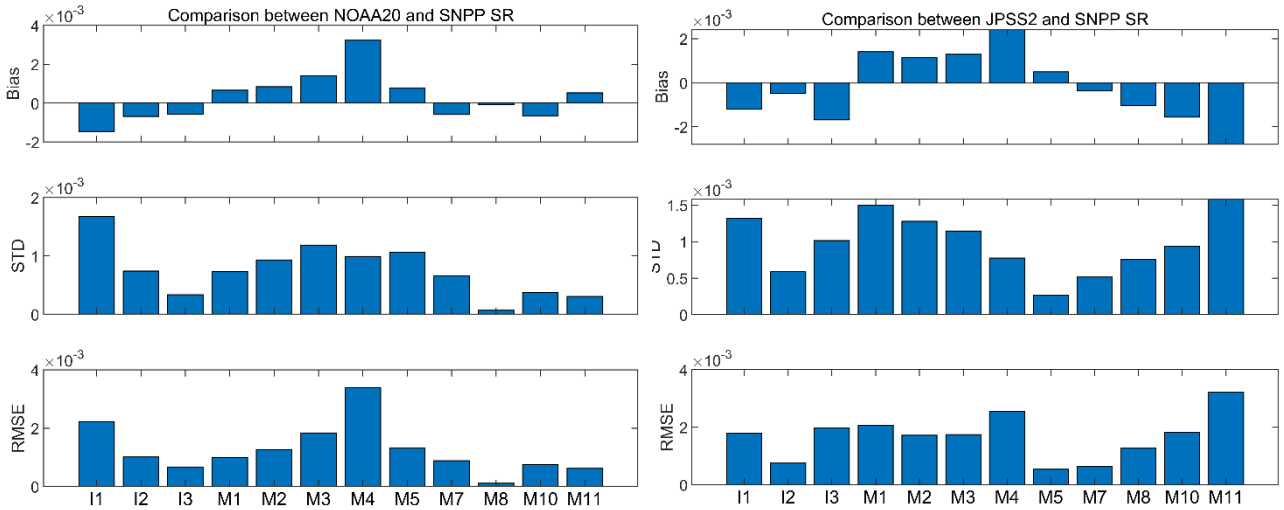
Surface Reflectance (Details)

SNPP, NOAA20 and J2 VIIRS Spectral Response Function (SRF)

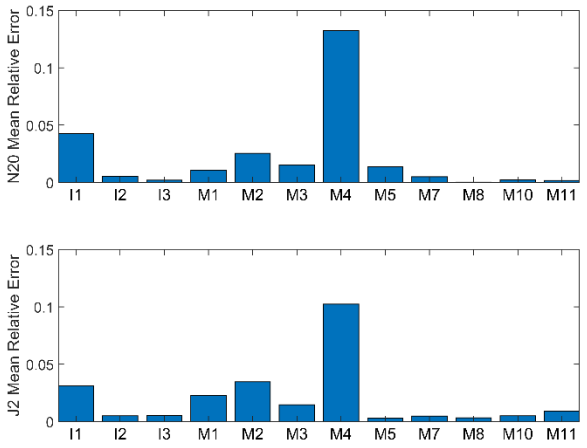


- Evaluation Method: Performing the Atmospheric Correction under various conditions using 6S
- Simulation database: AOD550 (0.05 : 0.2 : 1.05) , Aerosol model (Dust, Generic, Urban, Absorbing), TPW (0.5, 1.5, 2.5 g/cm2), O3(250, 350, 450 Dobson), VZA = 0, SZA = 30. TOA Reflectance: (0.05 : 0.1 : 0.55)
- Reference data: SR using NPP VIIRS SRF
- Comparison 1: SR using NOAA20 VIIRS SRF
- Comparison 2: SR using JPSS-2 VIIRS SRF

- SNPP, NOAA20 and J2 VIIRS SRF are slightly difference, to evaluate the SR difference if using same LUT (generated with SNPP SRF)



The absolute difference statistics shows the impact on NOAA20 and J2 SR, overall, J2 has larger difference.



The relative difference statistics shows both NOAA20 and J2 have significant impact on M4 SR, could up to 13% and 10% for NOAA20 and J2, respectively. I1, M2 SR difference are > 2%. As the left figure shows.

Land Surface Temperature

November, 2021

Accomplishments / Events:

- Ground and global evaluation of the new emissivity pairs based on the multi-year land surface emissivity climatology and related publications. (Highlights, slide 2 & 3)
- Collected the input data for all weather LST development including MIRS LST, a whole year of L3 VIIRS LST, and regional VIIRS NDVI data over CONUS etc. Started the data preprocessing such as MIRS LST data screening and mosaic, NDVI data extraction etc.
- Investigated the J2 relative spectral response function. It is found identical to the version used in the J2 DAP delivery. (slide 4)
- Completed the L2 VIIRS LST ATBD update and circulated for internal review
- Completed the L3 VIIRS product ATBD update and circulated for internal review.
- Attended the python workshop.
- Completed the review of the book chapter 19 on the SST validation. The review comments have been submitted to the editor and lead author.
- Finalized the book chapter regarding all figures file editing, contents and formatting. It has been submitted to EMSS journal website.
- Explore the NEON network for the LST ground validation

Overall Status:

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

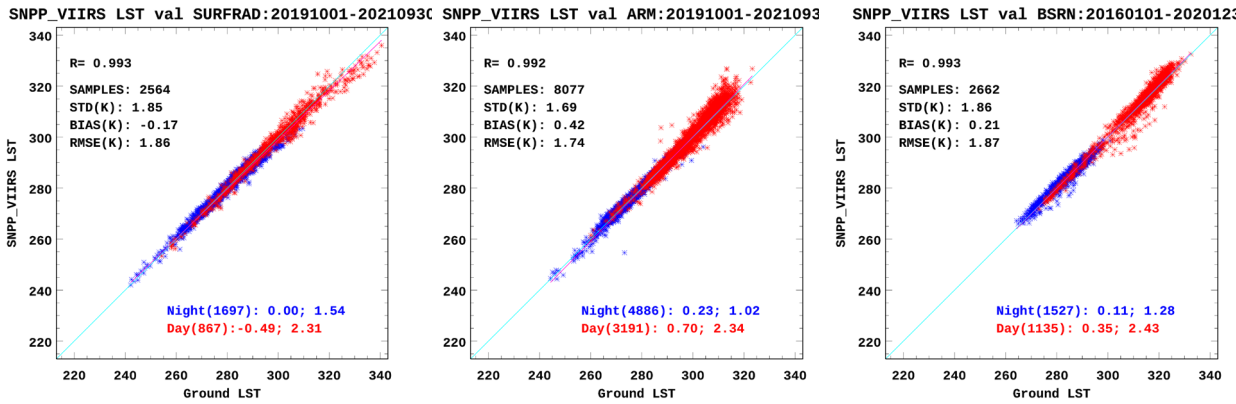
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

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

Highlights: Evaluation of LST LUT based on new emissivity pair

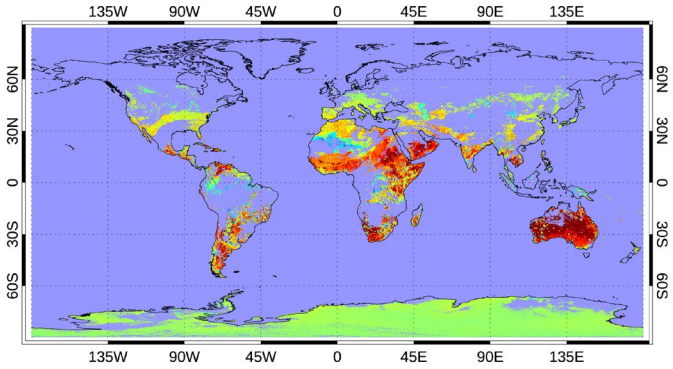


The new emissivity pair is generated based on the 5 year LSE climatology in sinusoidal projection. The LST LUT generated using the new emissivity pair is evaluated through the comparison with ground data from SURFRAD, ARM and BSRN.

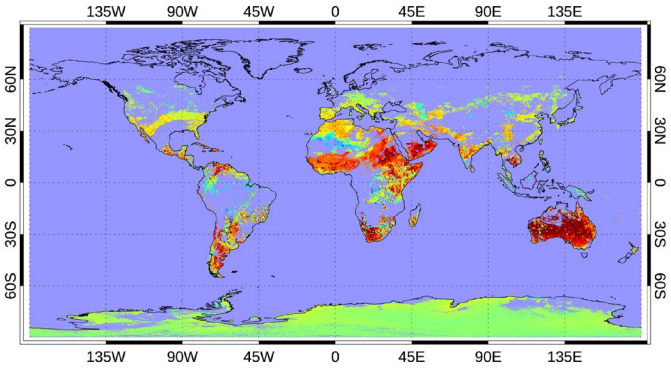
LUT based on the new emissivity pair-global evaluation

Daytime

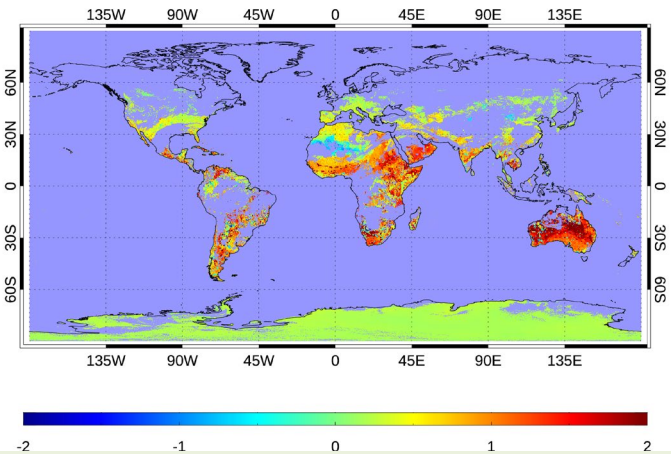
Emis_SEVIRI2010



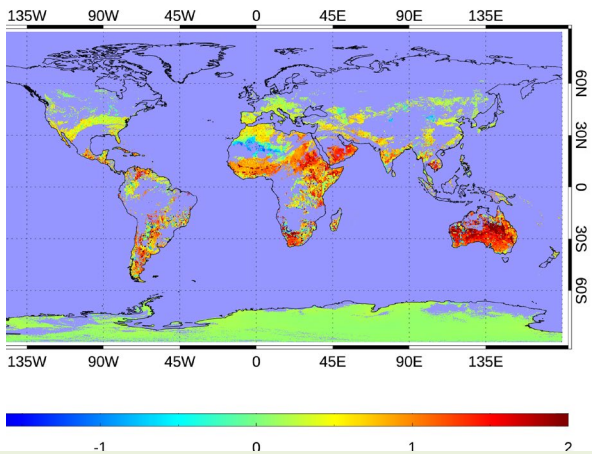
Emis_GSW2016



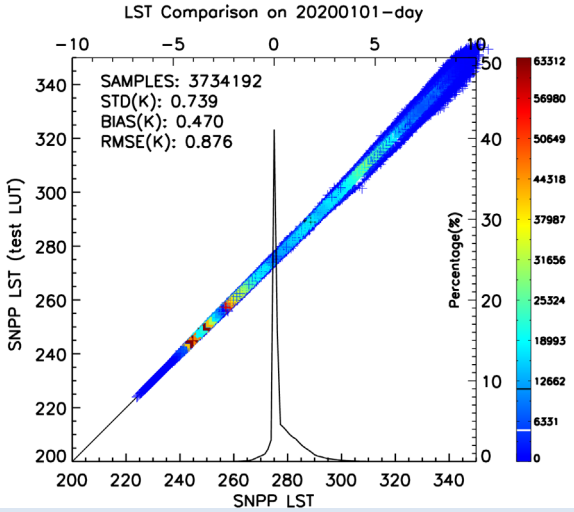
Emis_Climatology_Sin + SEVIRI2010



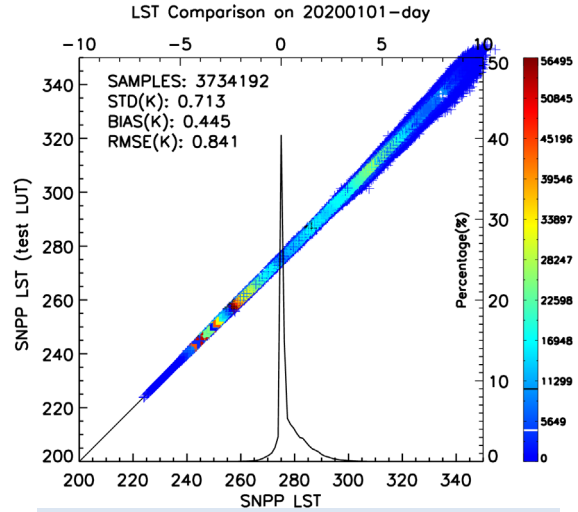
Emis_Climatology_Sin + GSW2016



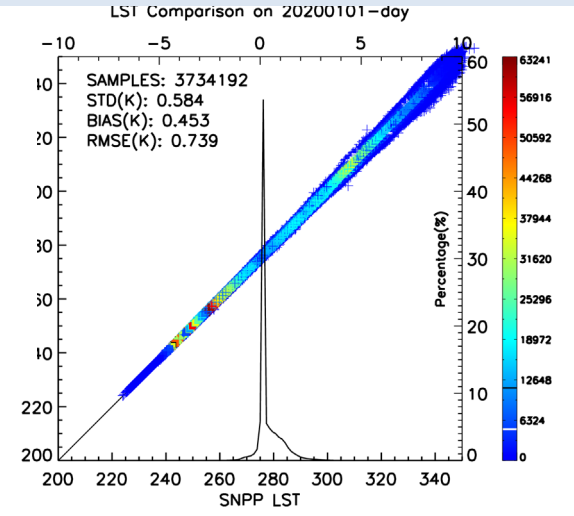
Emis_SEVIRI2010



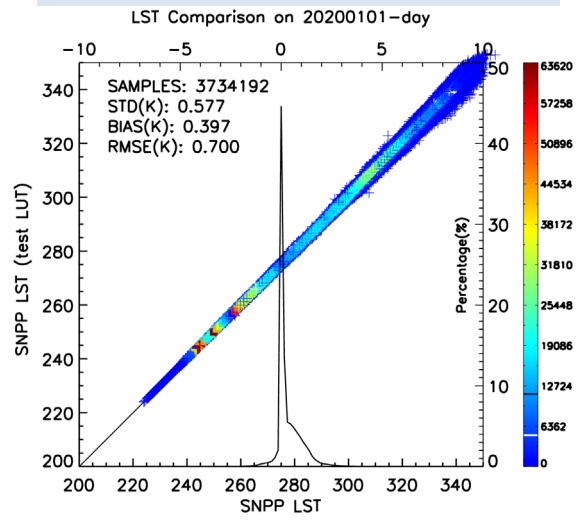
Emis_GSW2016



Emis_Climatology_Sin + SEVIRI2010



Emis_Climatology_Sin + GSW2016

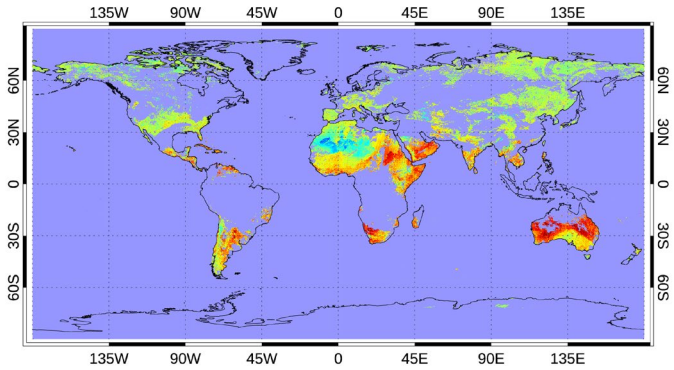


- Based on the emissivity climatology and emissivity pairs from publications, the LST LUT was generated and evaluated through the comparison with the operational VIIRS LST using the global data
- LST warm to cold: SEVIRI2010 > Climatology+SEVIRI2010 > GSW2016 > Climatology+GSW2016 > Climatology
- Regional patter is similar with more difference observed in the low latitude area

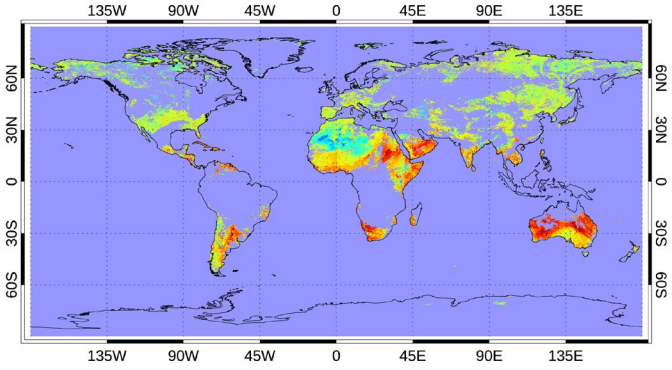
LUT based on the new emissivity pair-global evaluation

Nighttime

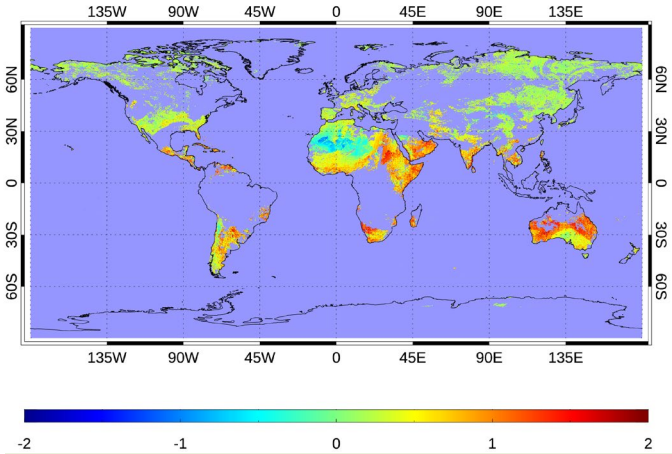
Emis_SEVIRI2010



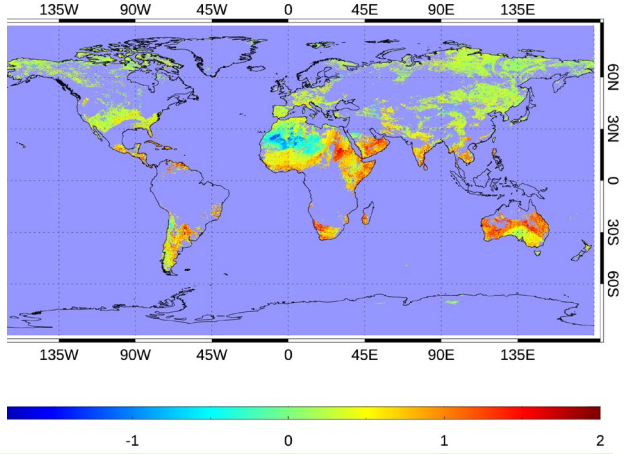
Emis_GSW2016



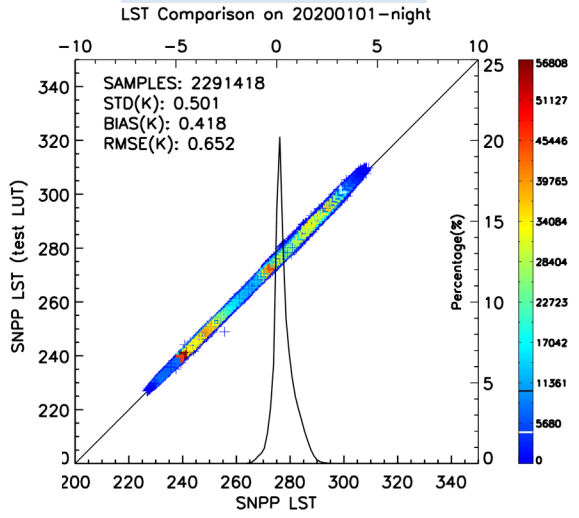
Emis_Climatology_Sin + SEVIRI2010



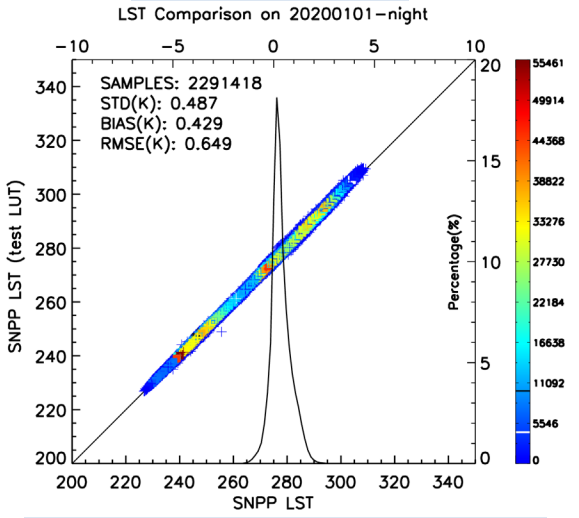
Emis_Climatology_Sin + GSW2016



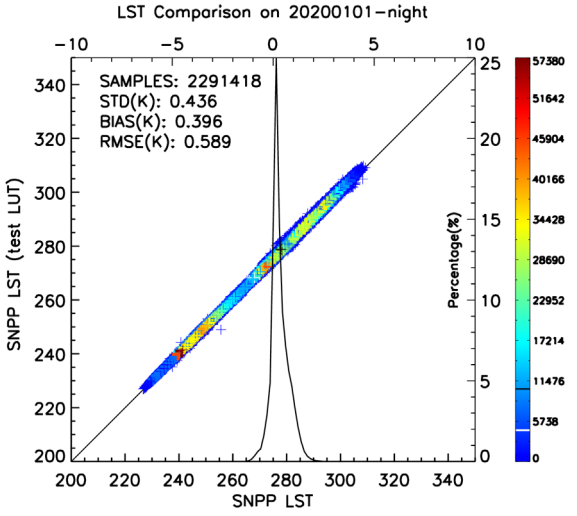
Emis_SEVIRI2010



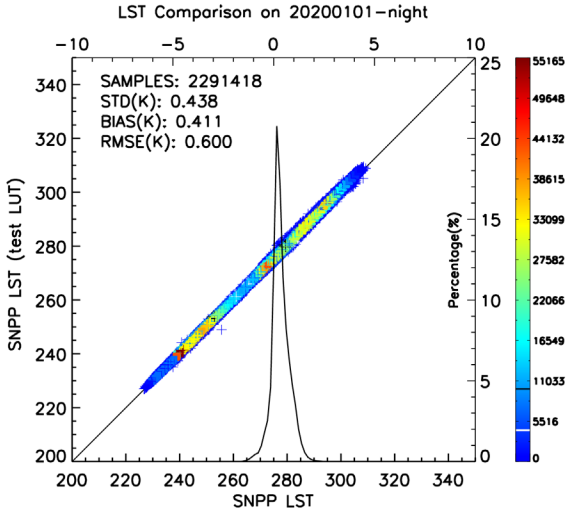
Emis_GSW2016



Emis_Climatology_Sin + SEVIRI2010

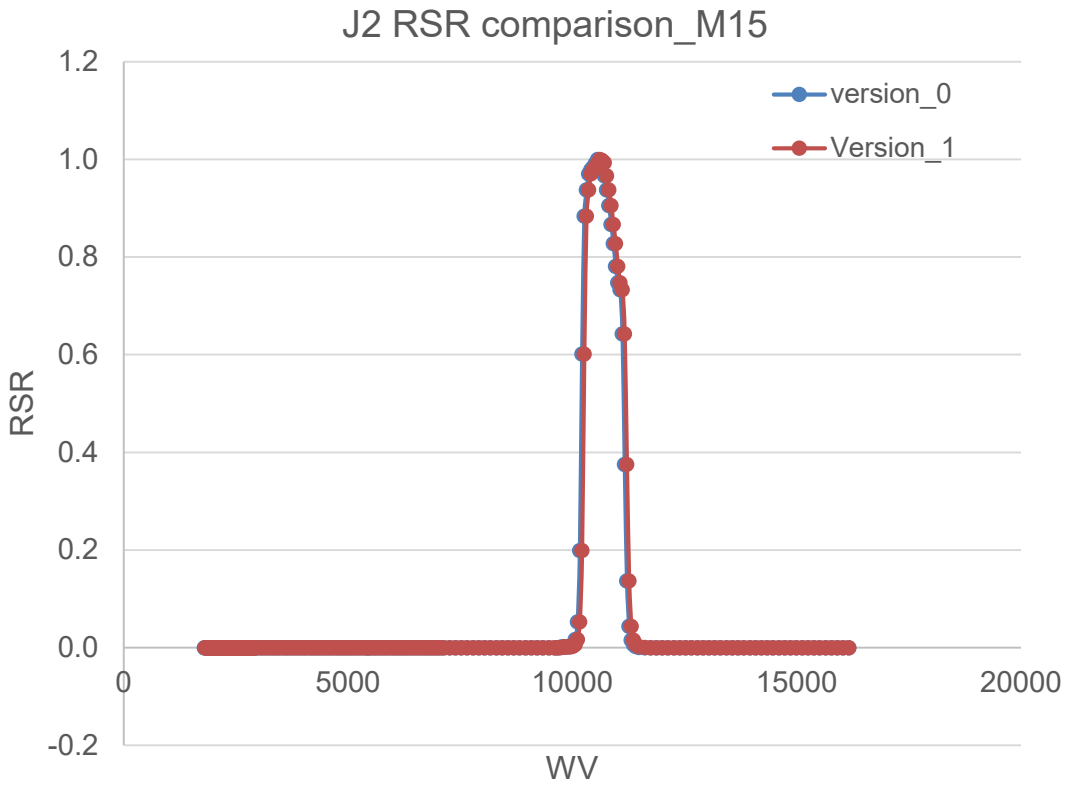


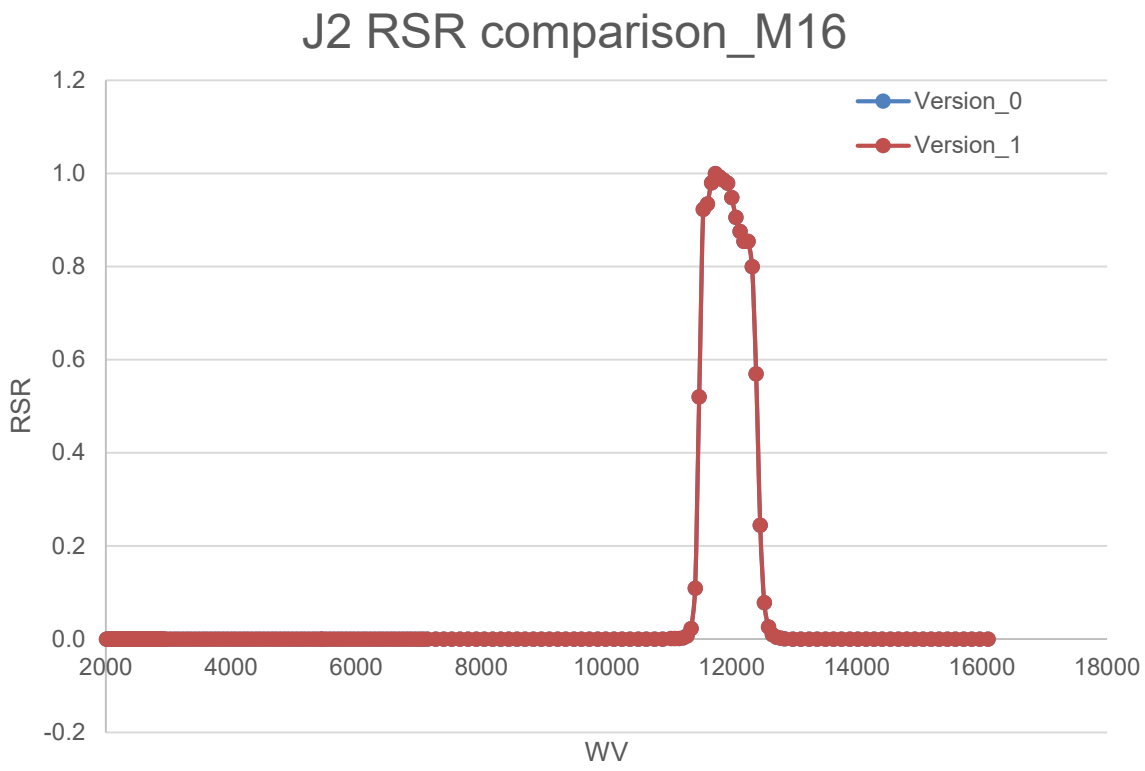
Emis_Climatology_Sin + GSW2016



- Based on the emissivity climatology and emissivity pairs from publications, the LST LUT was generated and evaluated through the comparison with the operational VIIRS LST using the global data
- LST warm to cold: GSW2016 > SEVIRI2010 > Climatology+GSW2016 > Climatology+SEVIRI2010 > Climatology
- Regional patter is similar with more difference observed in the low latitude area and the magnitude is less than daytime difference.

About J2 VIIRS Relative Spectral Response Functions (RSR)





- It is found that the current version is the same to what we used in the recent J2 DAP delivery
- No action is needed for LST

https://ncc.nesdis.noaa.gov/NOAA-21/J2VIIRS_SpectralResponseFunctions.php

Surface Albedo

November, 2021

Accomplishments / Events:

- Developed the magnitude algorithm and gap-filling algorithm for BRDF algorithm
  - Magnitude algorithm ready for cases with only 1~3 valid obs
  - Gap-filling algorithm ready for cases with 0 valid obs
- Improved the global BRDF calling script to be parallel-processed
- Global Evaluation of the VIIRS BRDF series product
  - Adapting the code for combining the tiles and reference data to global
  - Got the APU matrix over CONUS area
  - The snow-free pixels have high consistency with VNP43 retrievals

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

Overall Status:

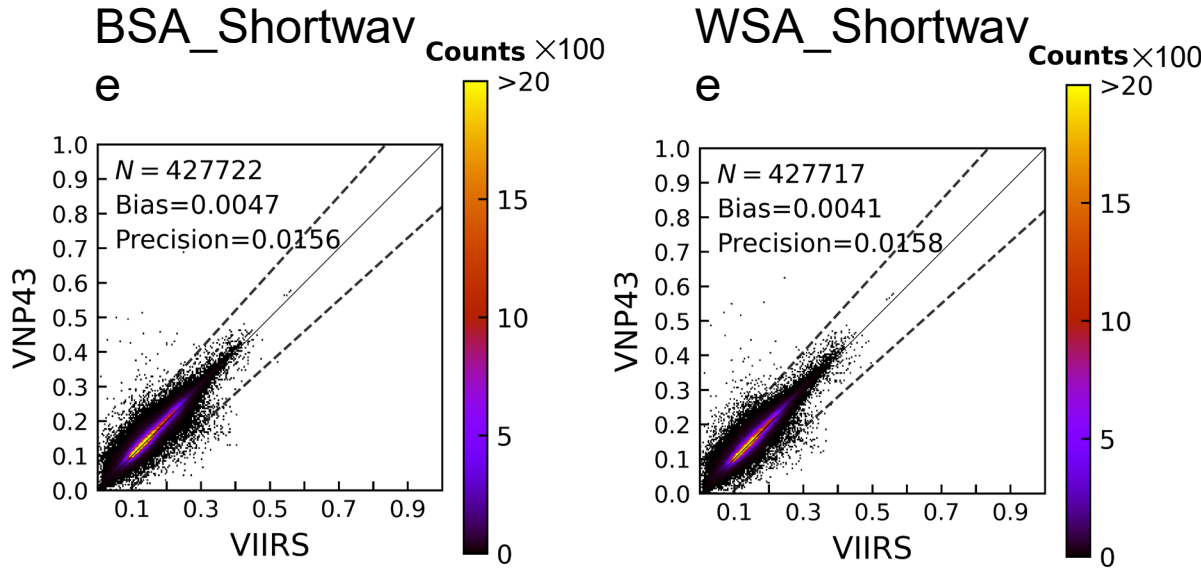
	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		x			
Technical / Programmatic		x			
Schedule		x			

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

Issues/Risks:

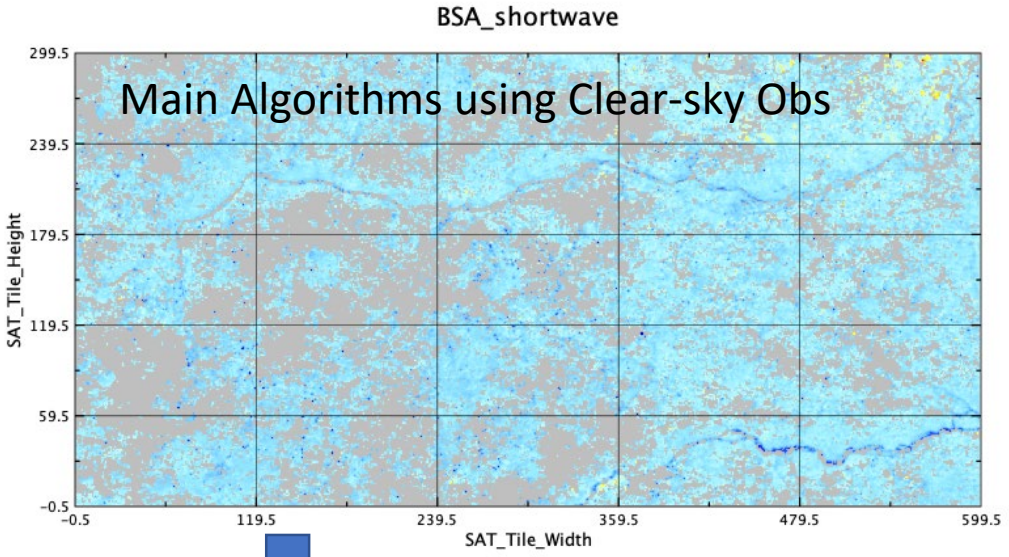
None

Highlights:

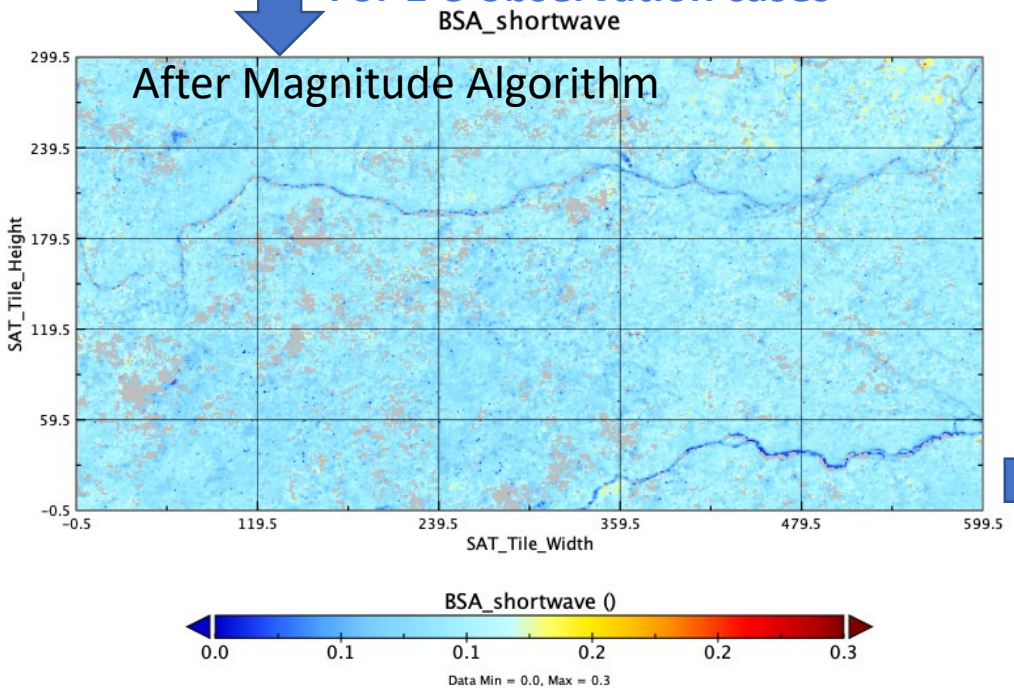


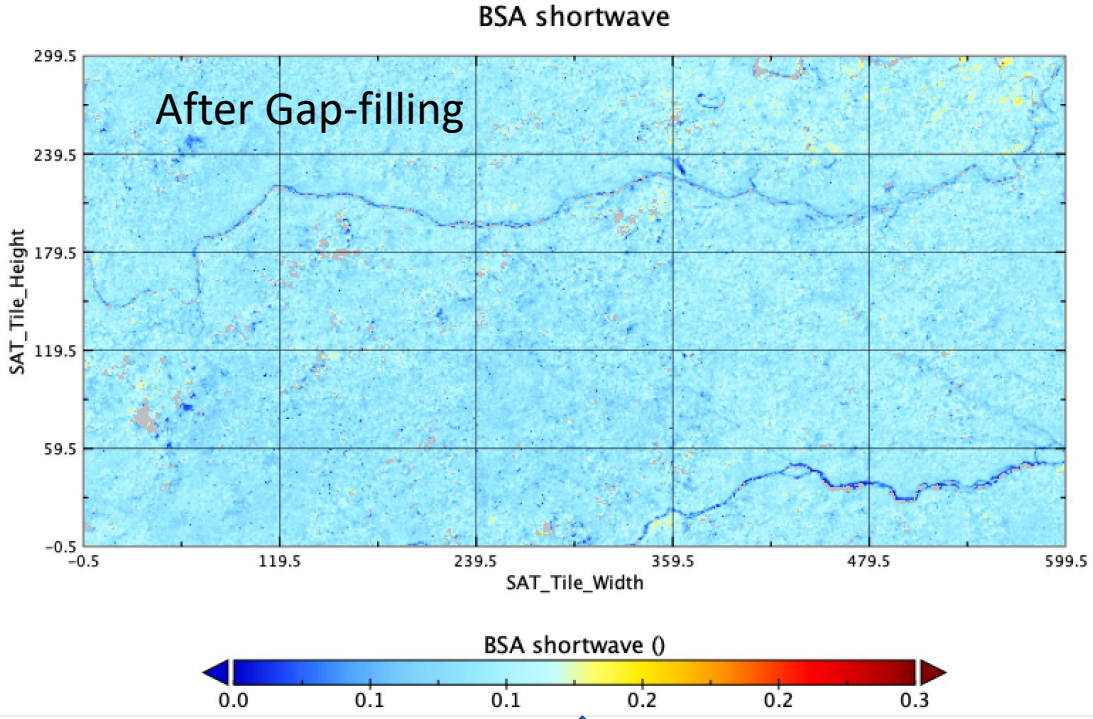
Validation of VIIRS LSA over CONUS using VNP43 counterpart

The magnitude algorithm and gap-filling h22v36 (in center Amazon)



For 1-3 observation cases

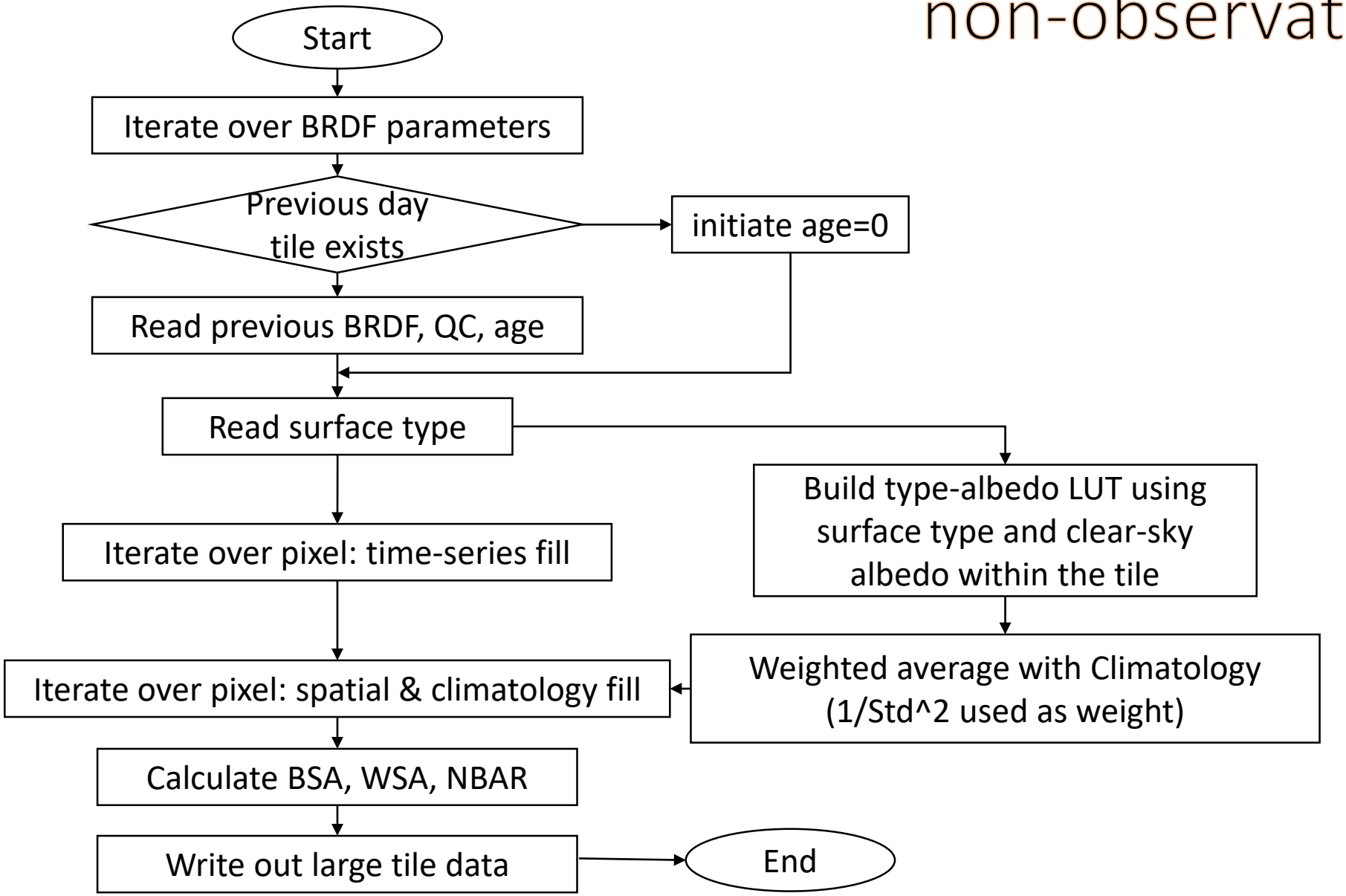




Gap filling with no observations

Newly designed and Implemented

Flowchart for Data filling over non-observation cases



-- BRDF data filling

❖ <u>Time-series filling:</u>
Using historical retrievals from up to one week

❖ <u>Spatial filling:</u>
Combining the information from Climatology (to reflect the texture) and the surrounding pixels with the same surface type (to reflect the current year's condition)

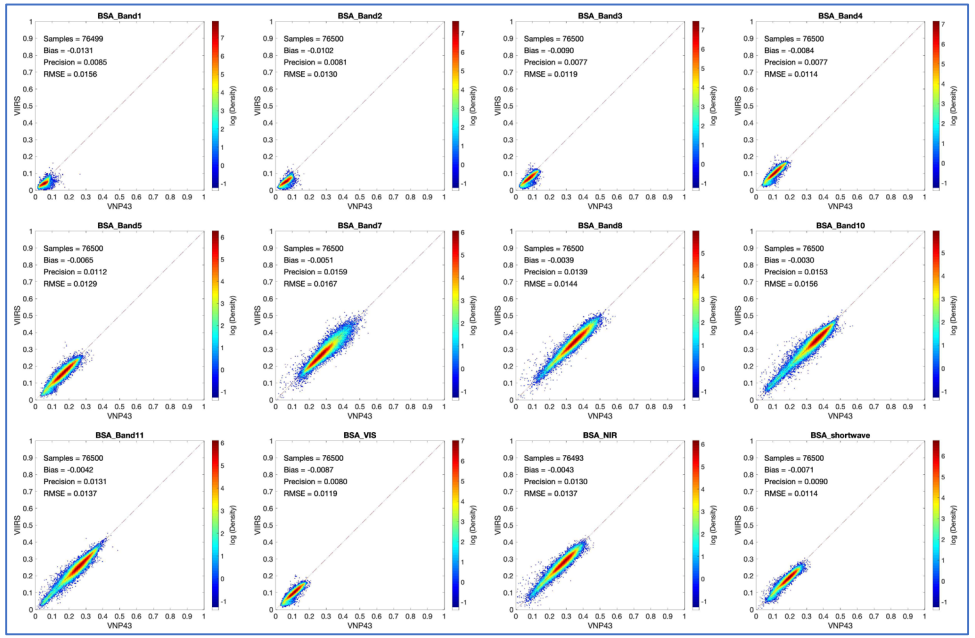
-- BSA, WSA, NBAR are calculated from filled BRDF

Evaluation of BSA using VNP43

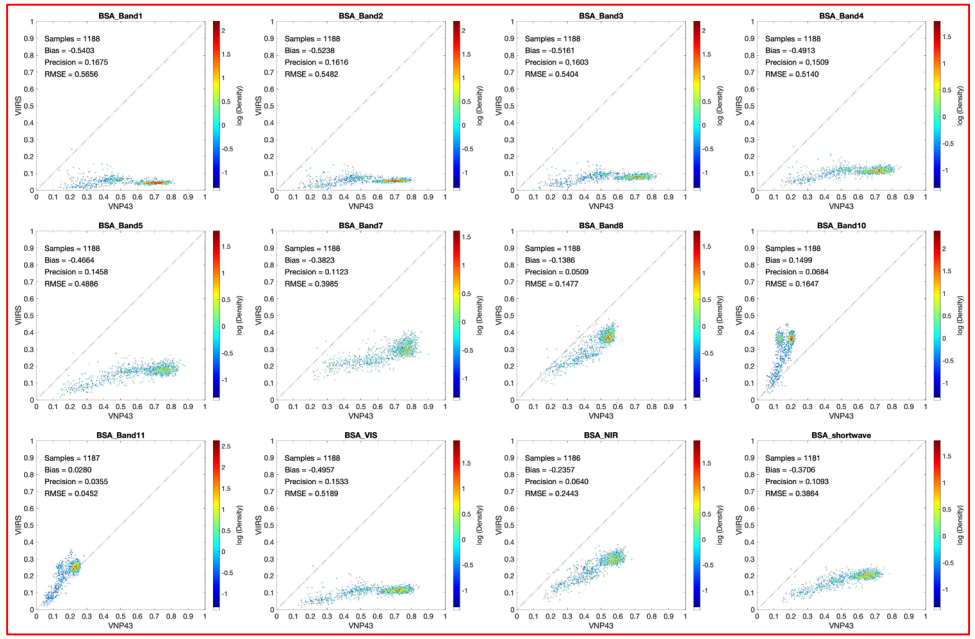
The snow mask error in VIIRS SR quality flags causes some scattered clusters in the black-sky albedo comparison

- When both NOAA VIIRS BRDF and VNP43 counterpart are snow-free, they are consistent (a)
- When VNP43 is snow-free and VIIRS is snow-covered, they are consistent, as they both provide snow-free BRDF (b)
- When VNP43 is snow-covered but VIIRS is snow-free, the difference is significant, as VNP43 provides snow BRDF but VIIRS provides snow-free BRDF under such case (c)

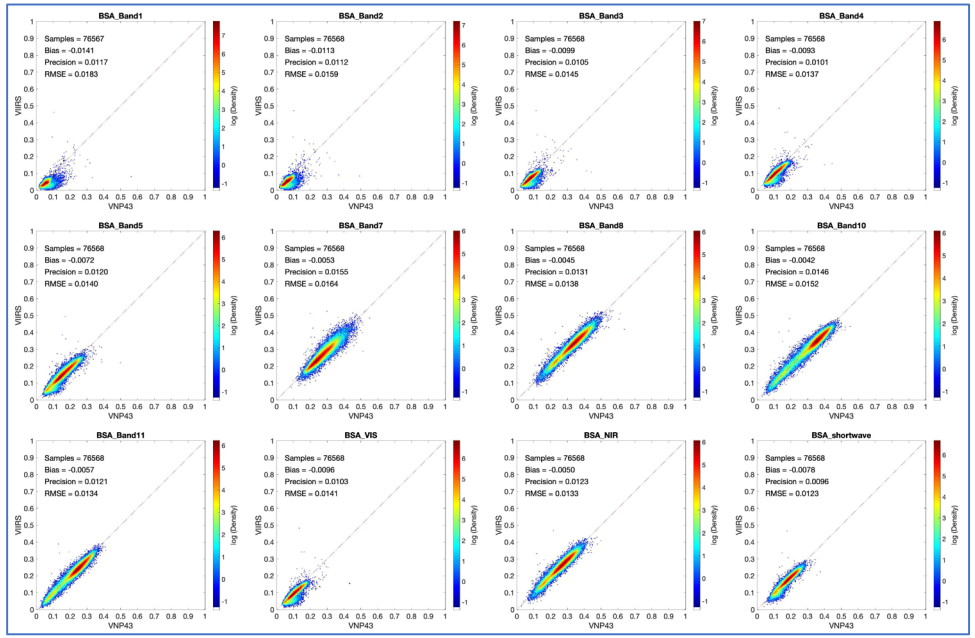
(a) Both valid value, both snow-free



(b) Both valid value, VNP43 snow-covered, VIIRS snow-free



(c) Both valid value, VNP43 snow-free, VIIRS snow-covered



APU of VIIRS snow-free NBAR over CONUS in December

Variable	N	Bias (A)	Precision (P)	RMSE (U)
NBAR_Band1	426436	0.0066	0.0138	0.0153
NBAR_Band2	426997	0.0051	0.0133	0.0142
NBAR_Band3	427264	0.0047	0.013	0.0138
NBAR_Band4	427454	0.0057	0.0131	0.0143
NBAR_Band5	427524	0.0049	0.0157	0.0164
NBAR_Band7	427741	0.0067	0.0255	0.0263
NBAR_Band8	427776	0.007	0.0263	0.0272
NBAR_Band10	427785	0.0058	0.024	0.0247
NBAR_Band11	427784	0.0059	0.0179	0.0188

- VNP43 counterpart is used as reference
- The current VIIRS NBAR in all the channels are generally consistent with VNP43 NBAR
- All channels are within requirement

Measurement accuracy	Required: Nadir reflectance is 0.08 (mean of channels) Expected: Nadir reflectance of 0.05 (mean of channels)
Measurement precision	Required: Nadir reflectance is 0.1 (mean of channels) Expected: Nadir reflectance of 0.08 (mean of channels)

APU of VIIRS snow-free WSA over CONUS in December

Variable	N	Bias (A)	Precision (P)	RMSE (U)
WSA_Band1	426466	0.0072	0.0156	0.0172
WSA_Band2	427011	0.0046	0.0149	0.0156
WSA_Band3	427273	0.0041	0.0144	0.015
WSA_Band4	427459	0.005	0.0141	0.015
WSA_Band5	427529	0.0035	0.0165	0.0169
WSA_Band7	427743	0.0027	0.0251	0.0253
WSA_Band8	427780	0.0021	0.0255	0.0256
WSA_Band10	427791	0.002	0.0236	0.0237
WSA_Band11	427795	0.0037	0.018	0.0183
WSA_VIS	427485	0.0037	0.0147	0.0151
WSA_NIR	427322	0.0026	0.0223	0.0224
WSA_shortwave	427717	0.0041	0.0158	0.0163

- VNP43 counterpart is used as reference
- The current VIIRS WSA in all the channels are generally consistent with VNP43 WSA
- All channels have met the requirement

Measurement accuracy	Required: Shortwave Albedo of 0.05 Expected: Shortwave Albedo of 0.03,
Measurement precision	Required: Albedo of 0.08 Expected: Albedo of 0.05

APU of VIIRS snow-free BSA over CONUS in December

Variable	N	Bias (A)	Precision (P)	RMSE (U)
BSA_Band1	426479	0.0075	0.0155	0.0173
BSA_Band2	427019	0.0047	0.0148	0.0155
BSA_Band3	427278	0.0042	0.0143	0.0149
BSA_Band4	427463	0.0053	0.0141	0.015
BSA_Band5	427531	0.0037	0.0164	0.0168
BSA_Band7	427743	0.0039	0.0241	0.0244
BSA_Band8	427780	0.0033	0.0248	0.0251
BSA_Band10	427791	0.003	0.0237	0.0239
BSA_Band11	427795	0.0042	0.0181	0.0186
BSA_VIS	427485	0.0049	0.0141	0.0149
BSA_NIR	427289	0.0037	0.0218	0.0221
BSA_shortwave	427722	0.0047	0.0156	0.0163

- VNP43 counterpart is used as reference
- The current VIIRS BSA in all the channels are generally consistent with VNP43 BSA
- All channels have met the requirement

Measurement accuracy	Required: Shortwave Albedo of 0.05 Expected: Shortwave Albedo of 0.03
Measurement precision	Required: Albedo of 0.08 Expected: Albedo of 0.05

Vegetation Index and Green Vegetation Fraction

November 2021

Accomplishments / Events:

- Developed a python package to estimate two important parameters-- EVI_max and EVI_min in NVPS GVF system based on any specified EVI dataset
- Used the python package and the smoothed weekly EVI data retrieved from NOAA-20 observations in the period from July 15 of 2020 to July 15 of 2021 to estimate the two parameters-- EVI_max and EVI_min.
- Compared the v2r2 GVF data with the modified v2r2 GVF data due to the difference in the sequence of cloud filtering and gridding and found the difference between them is relatively small.
- Investigated the high EVI values at very high latitude areas and found they are associated with the high view zenith angles
- Analyzed reflectances associated with GOES-R ABI VIs and compared to VIIRS VI reflectances. ABI reflectances are closer to VIIRS reflectances when using solar zenith angle adjusted SAVI compositing than when using maximum VI compositing.
- Further analysis of NOAA vs. NASA NPP VI concluded that solar zenith angle differences are not significant.

Overall Status:

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

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

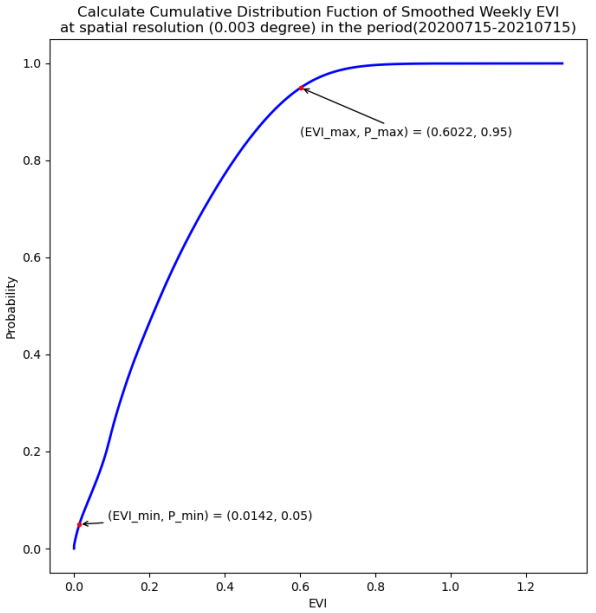
Issues/Risks:

None

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

Highlights:

A new Python package and the smoothed weekly EVI data retrieved from NOAA-20 observations in the period from July 15 of 2020 to July 15 of 2021 were used to estimate the two scaling parameters for GVF-- EVI_max and EVI_min.

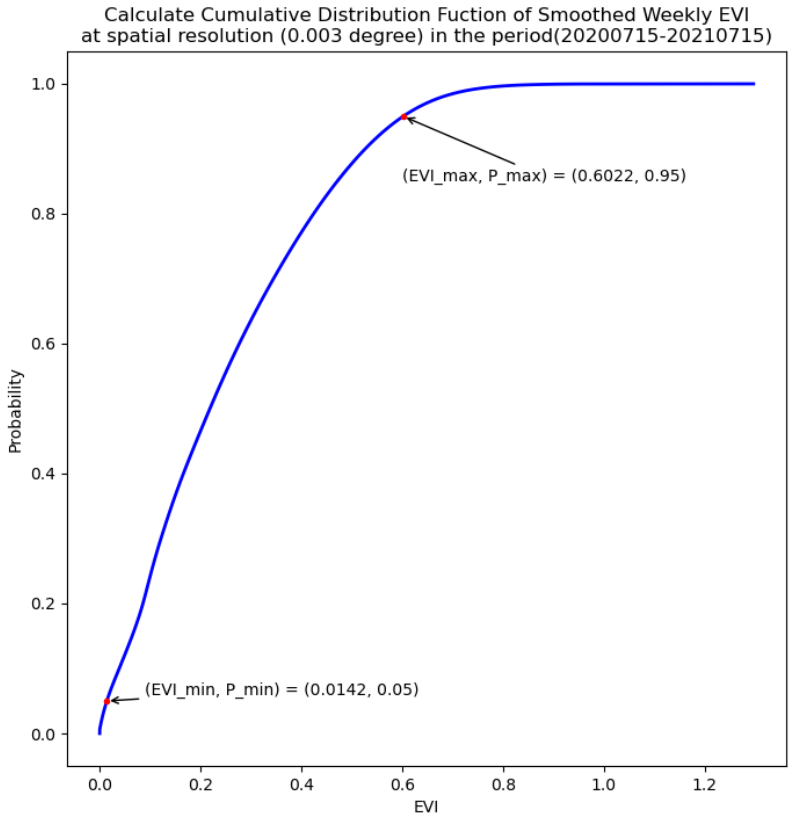


Developed a python package to estimate two important parameters-- EVI_max and EVI_min in GVF system based on any specified EVI dataset

- The python package has the following characteristics:
  - ✓ Being capable of extracting randomly any number of samples from a specified large number of populations (EVI data)
  - ✓ Embedding a sort algorithm to ascending sort the extracted samples
  - ✓ Embedding a Cumulative Distribution Function (CDF) algorithm to calculate the CDF of the EVI data
  - ✓ Plotting the figure of CDF and annotating the EVI_max and EVI_min
  - ✓ Identifying the two parameters EVI_max and EVI_min corresponding to probabilities of 95% and 5%, respectively

Using the python package to estimate the two parameters-- EVI_max and EVI_min

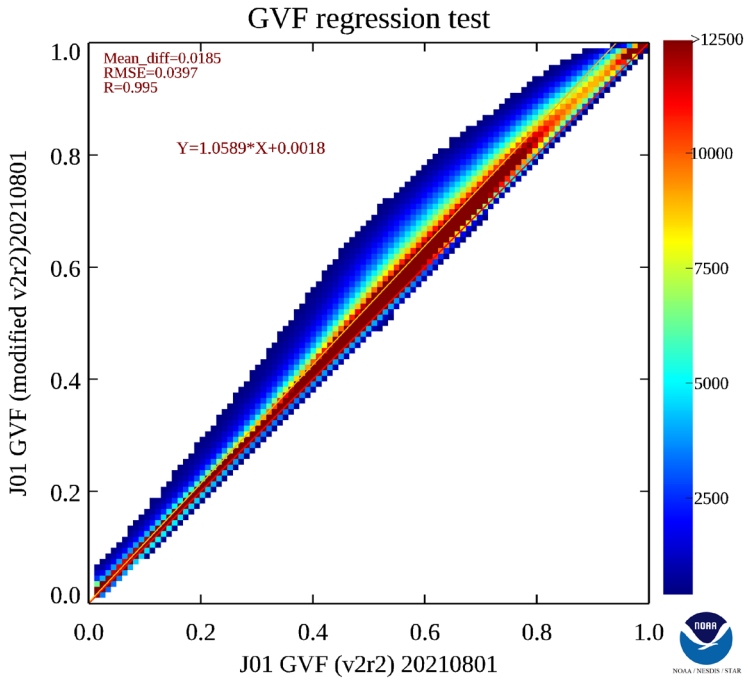
- Used the python package and the smoothed weekly EVI data retrieved from NOAA-20 observations in the period from July 15 of 2020 to July 15 of 2021 to estimate the two parameters-- EVI_max and EVI_min.



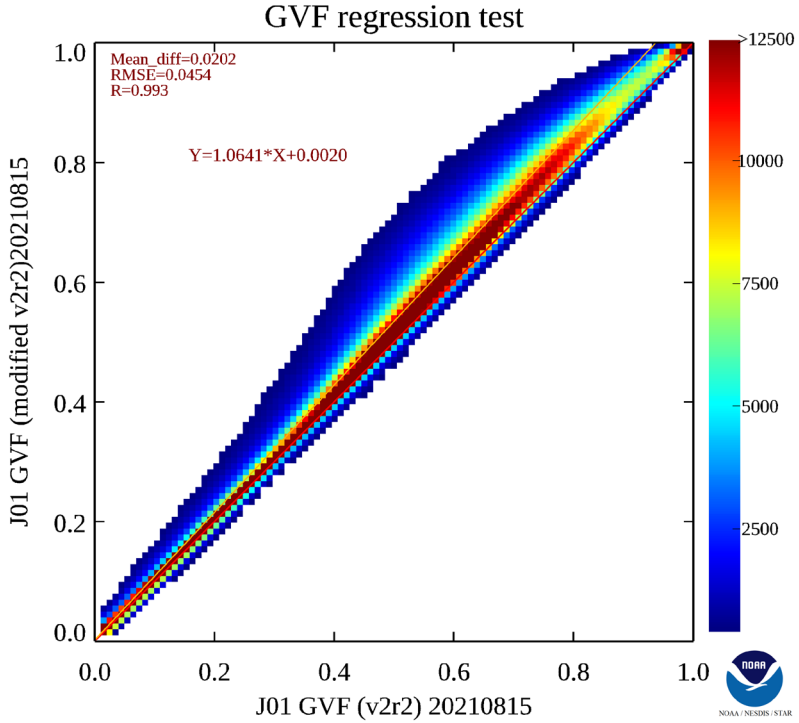
GVF comparison (v2r2 vs. modified v2r2)

- The modified v2r2 GVF does gridding first and then cloud filtering, whereas the original v2r2 GVF does cloud filtering first then gridding
- Produced and compared the two version of GVF data from Aug 1 to Aug 31, 2021

20210801



20210815



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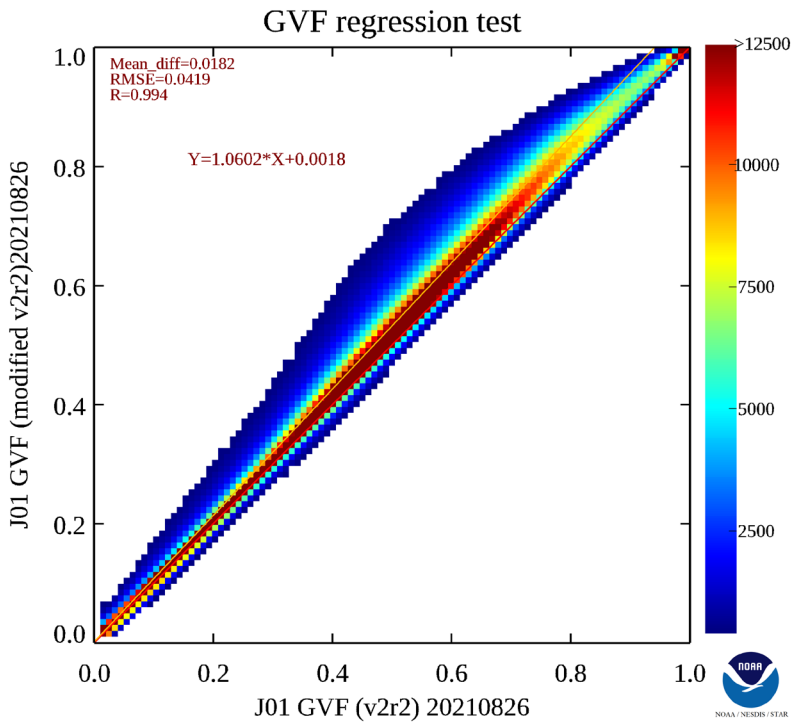
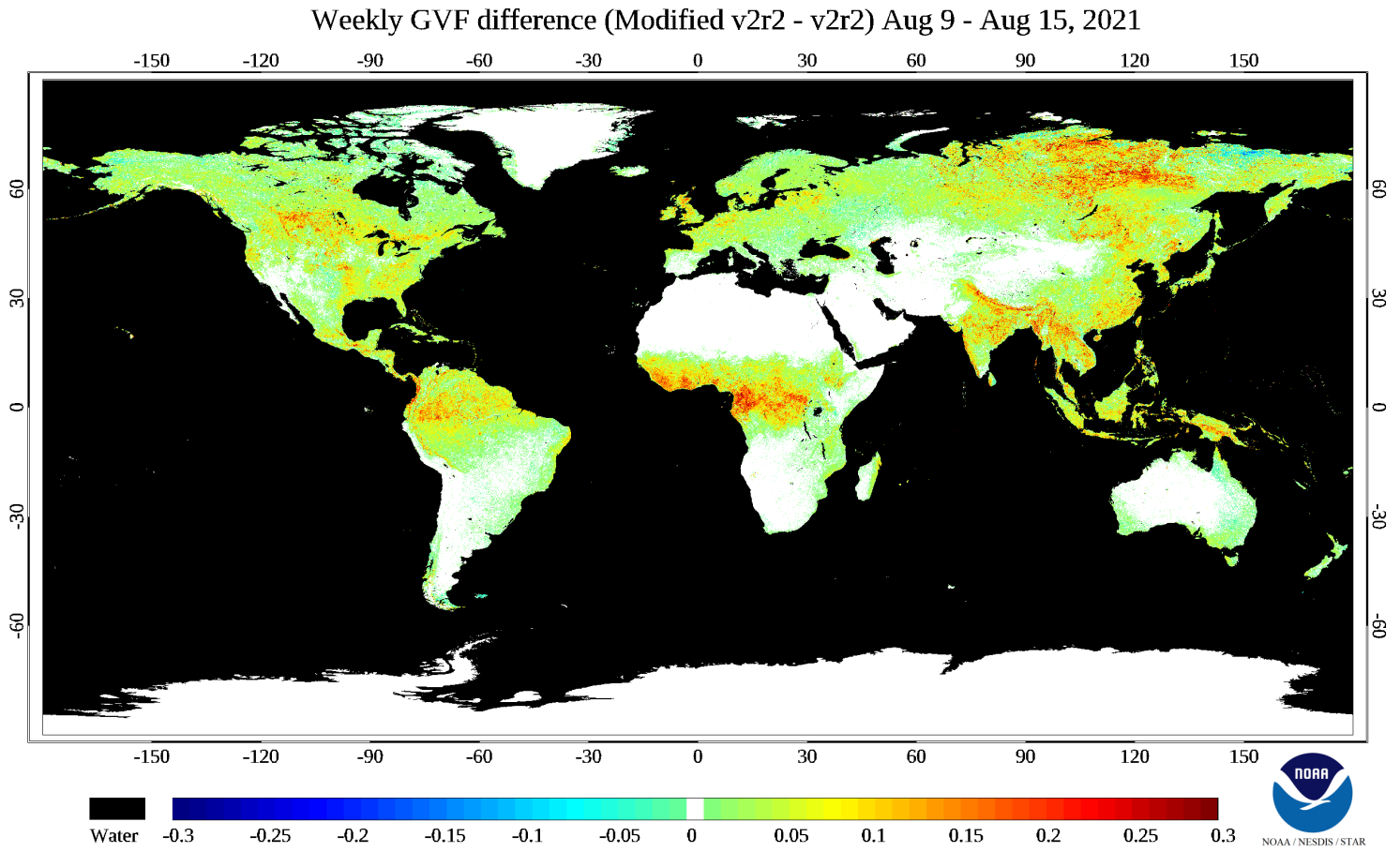


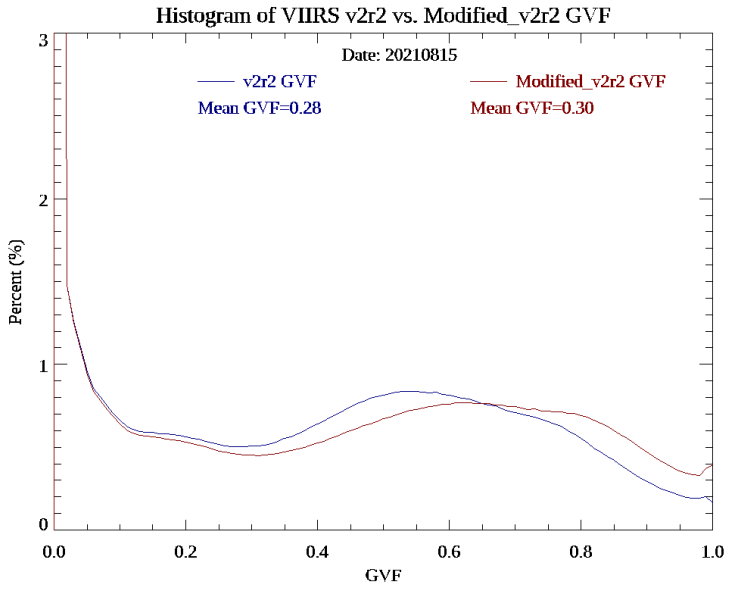
The slope between modified v2r2 and v2r2 is 1.06, compared to 1.04 in verification 1 and 1.15 in verification 2

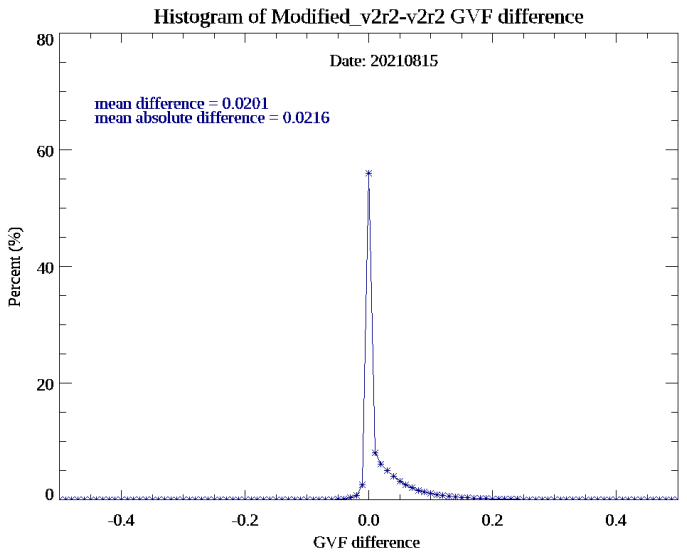
The scatter plot between modified v2r2 and v2r2 is consistent with the previous verification 1

GVF comparison (v2r2 vs. modified v2r2)

- The modified v2r2 GVF is slightly higher than the original GVF, particularly in Amazon, central Africa and northern Asia

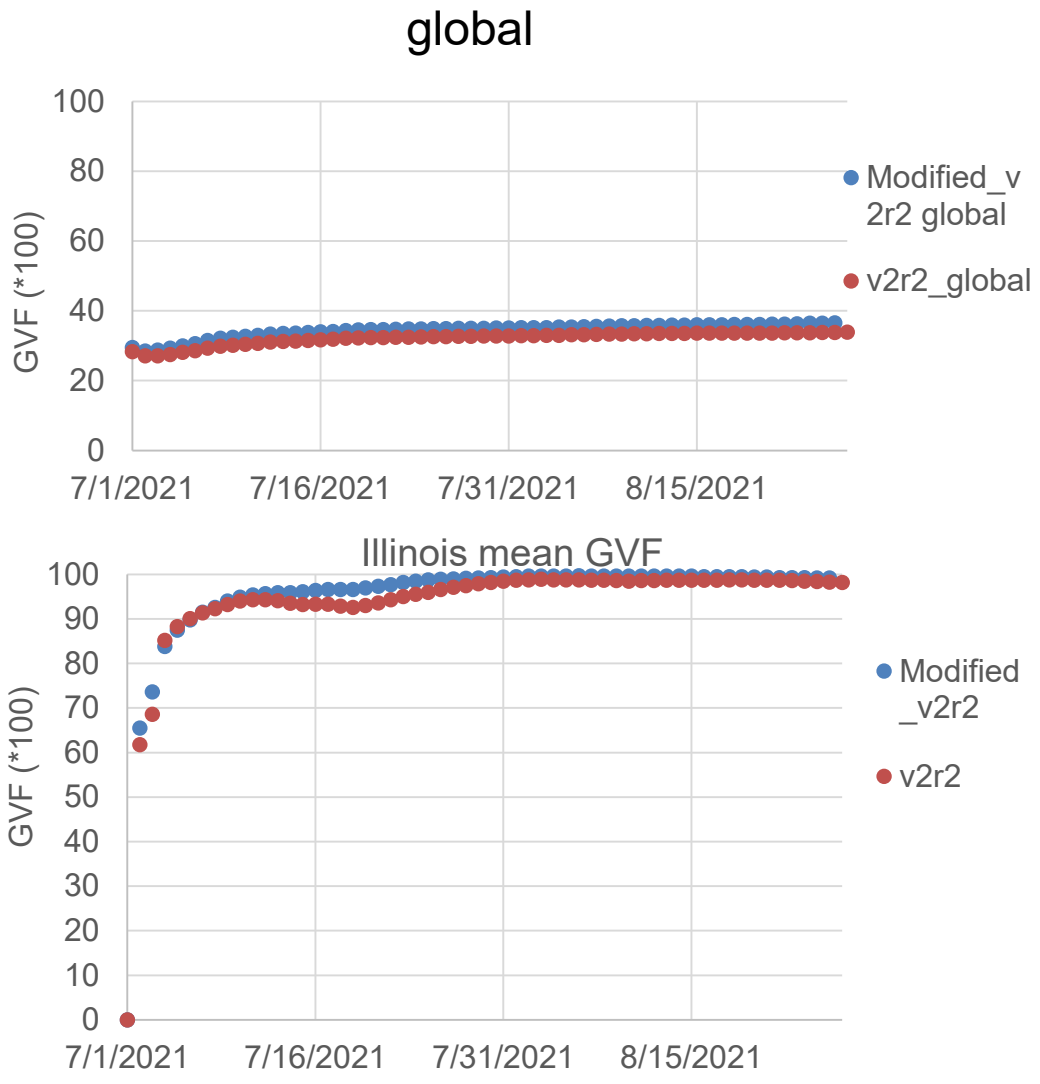


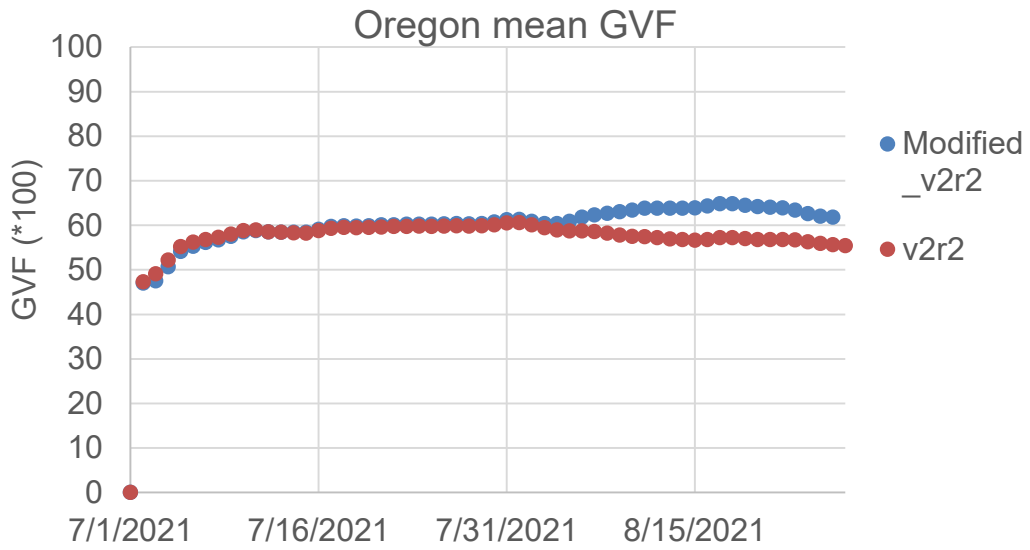


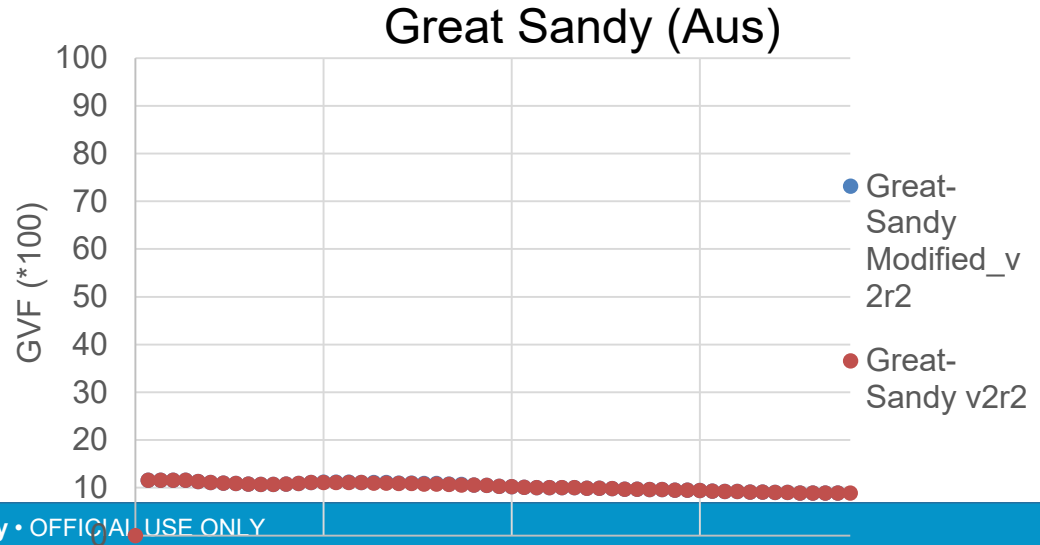


GVF time series comparison (v2r2 vs. modified v2r2)

- Time series of GVF showed the two version of GVF is consistent at some sites
- The modified GVF is slightly higher then the original GVF



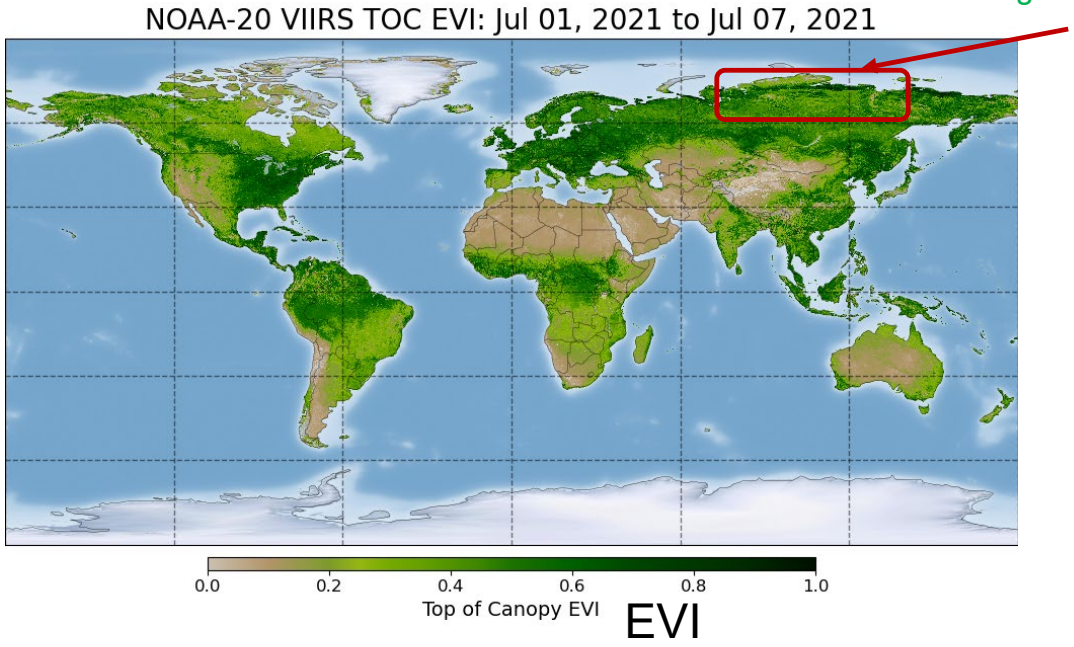




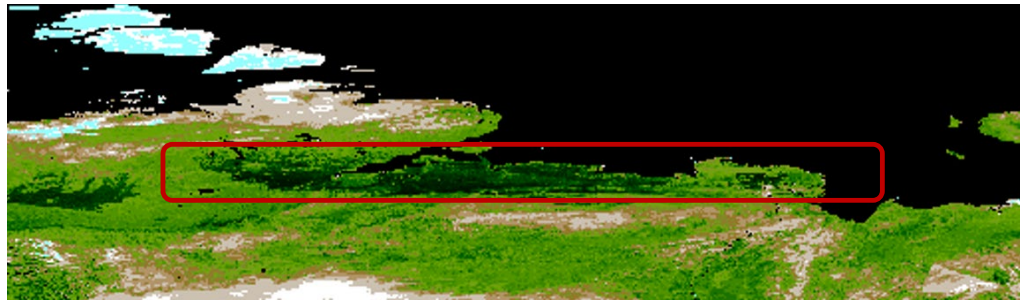
Investigation of the high EVI values at very high latitude areas

- High EVI values in northern Asia at 70°N seem unreasonable
- View zenith angle at he high EVI area is high, which resulted in high NIR reflectance and EVI

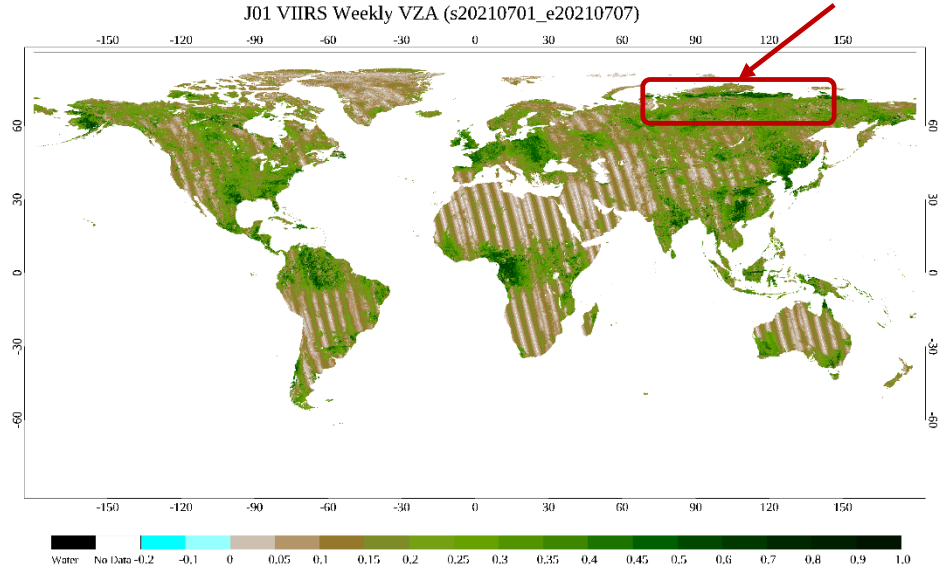
The high EVI at 70° N



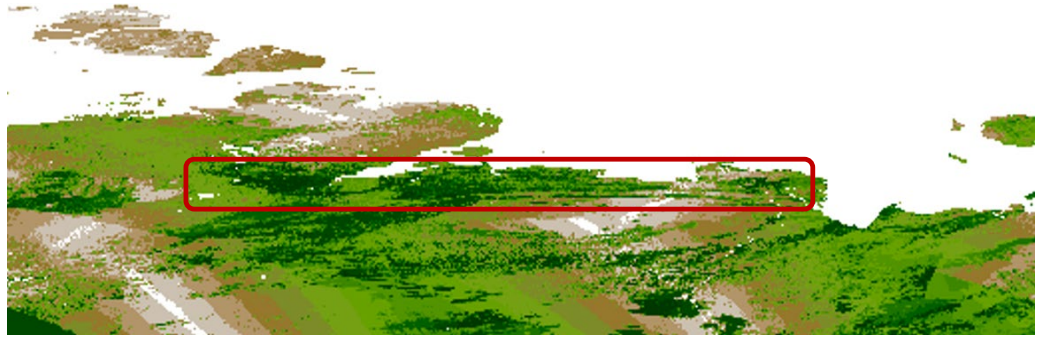
EVI



High view zenith angle

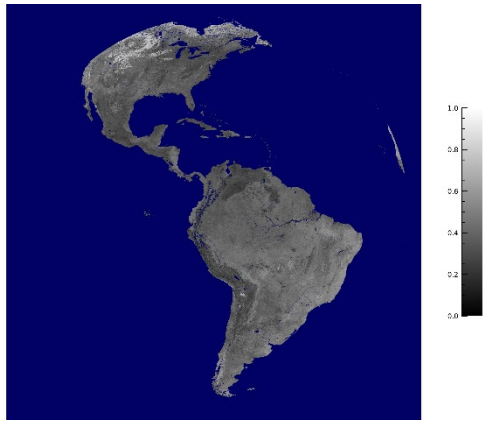


View zenith angle (*100)

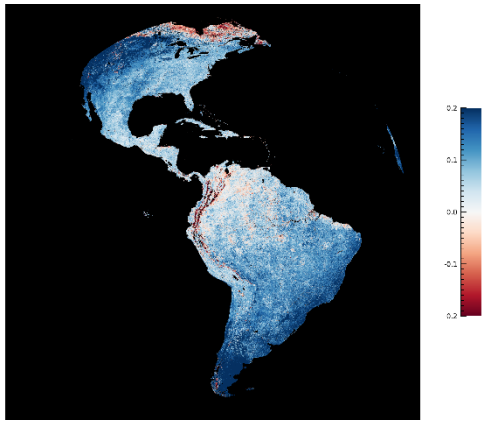


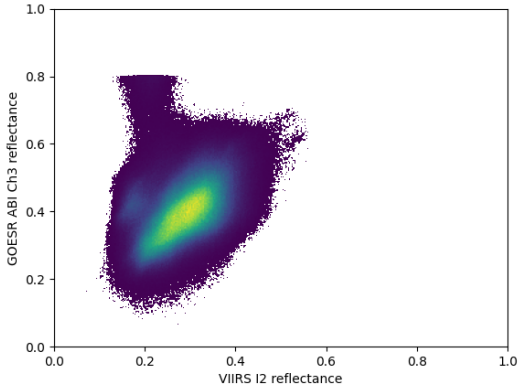
ABI vs. VIIRS NIR band (ABI Ch3, VIIRS I2) reflectances from VI 20200401-20200416

ABI max VI composite

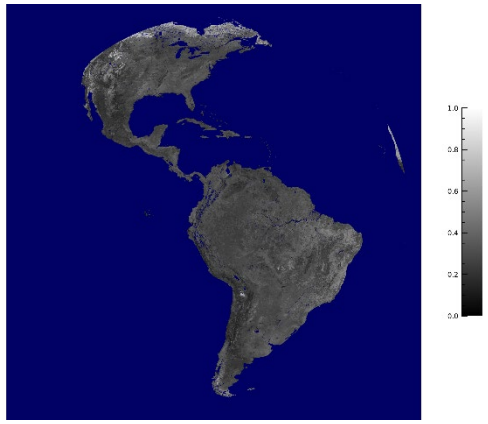


Max VI composite - VIIRS

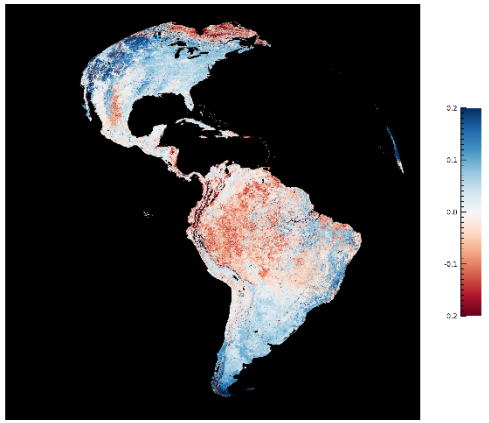


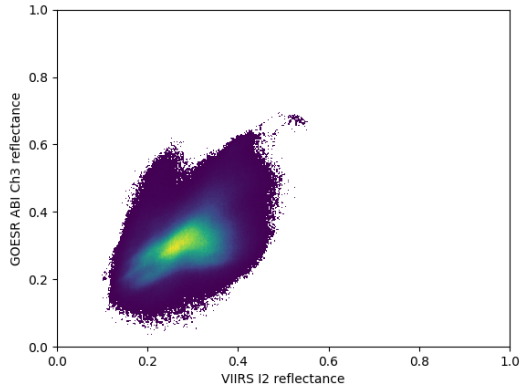


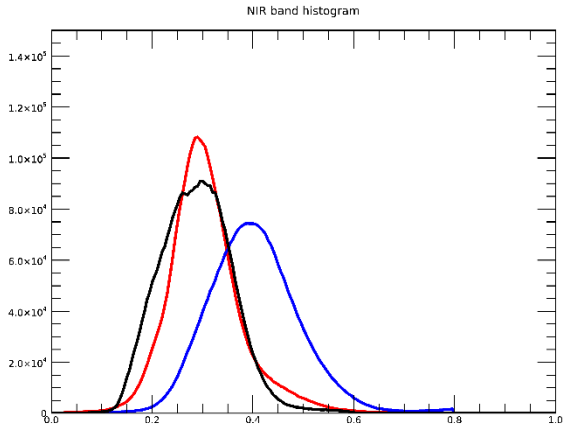
ABI SZA adj SAVI composite



SZA adj SAVI composite - VIIRS





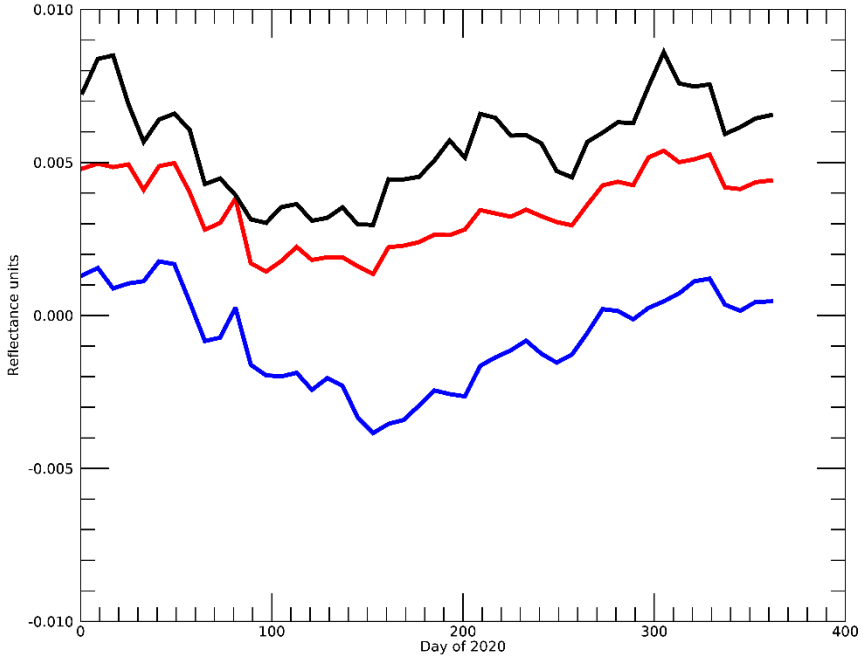


SZA adj SAVI
Max VI
VIIRS

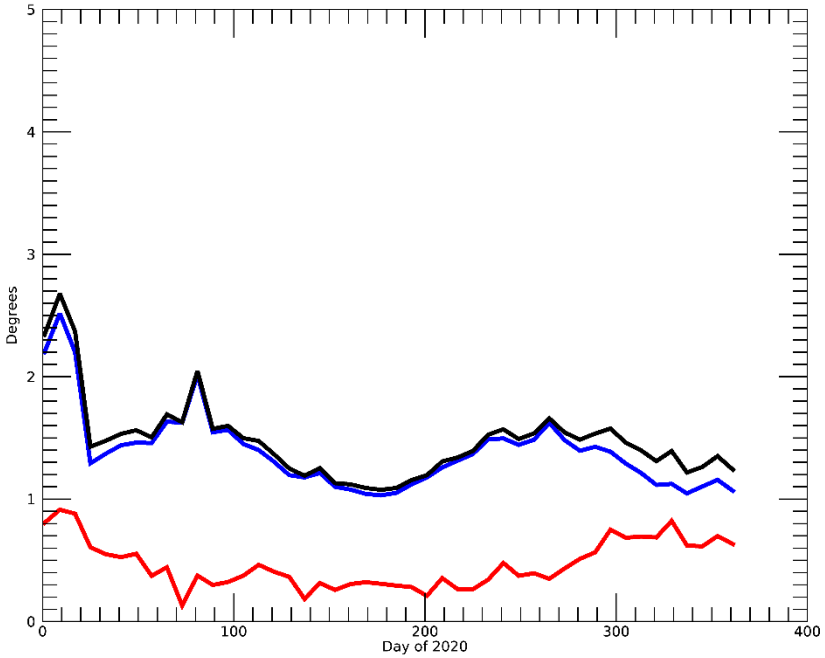
NOAA vs. NASA NPP VI bias investigation conclusions

- Investigation was undertaken to determine why NOAA NPP NDVI has a bias of 0.05 – 0.1 NDVI units relative to NASA NPP NDVI.
- Red reflectances tend to be higher in NOAA than NASA data, by about 0.005
- NIR reflectances tend to be higher in NOAA than NASA data, by about 0.007 – 0.008.
- Solar zenith angle values are similar between NOAA and NASA data
- This indicates that reflectance correction effects are more likely to be causing the NDVI bias than geometry difference effects
- This analysis is limited by the lack of availability of VZA in the NASA data

NOAA vs. NASA NPP VI:
Reflectance biases and SZA statistics time series



Blue reflectance (M3) bias
Red reflectance (I1) bias
NIR reflectance (I2) bias



SZA bias
SZA standard deviation
SZA RMS difference

Vegetation Health

November, 2021

Accomplishments / Events:

- Developed C++ code to create map tiles from NPP/NOAA-20 VH products;
- Developed new web pages to present administrative averaged VH and % of drought area for 42 crops;
- Literature review of higher resolution radiation data; and selected the Breathing Earth System Simulator (BESS) radiation dataset, at 5km resolution and daily interval, to derive a radiation condition index (RCI) data using an equation similar to VCI;
- Extracted RAD and RCI time series averaging from 1) whole land and 2) cropland from selected countries (Highlighted), and compared with CERES version;
- Generated a series of data and figures of VIIRS/VHP-1 and -4, -16 km resolution products, covering November 2021;

Overall Status:

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

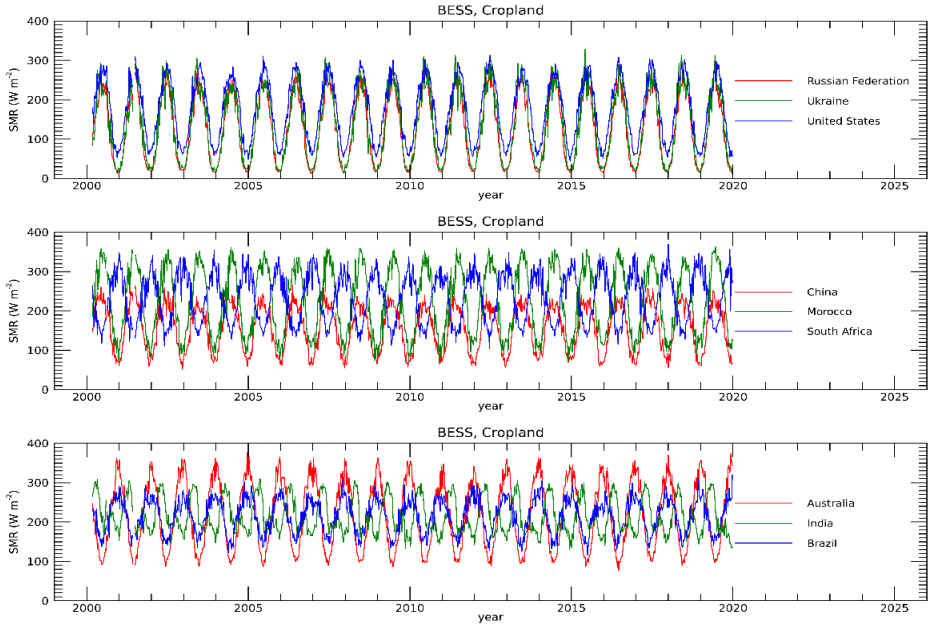
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

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

Highlights: BESS Radiation Time Series over Cropland of Countries



Ocean Color

November, 2021

Accomplishments / Events:

- A new paper published in Scientific Reports charactering biological variability modulated by the tropical instability wave (TIW) using VIIRS gap-free chlorophyll-a data. It shows that Chl-a in the central and eastern Equatorial Pacific Ocean were significantly affected by the TIW from late May to the end of 2020. The paper demonstrated usefulness of VIIRS gap-free Chl-a data for various studies and applications (see highlight)

Overall Status:

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

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

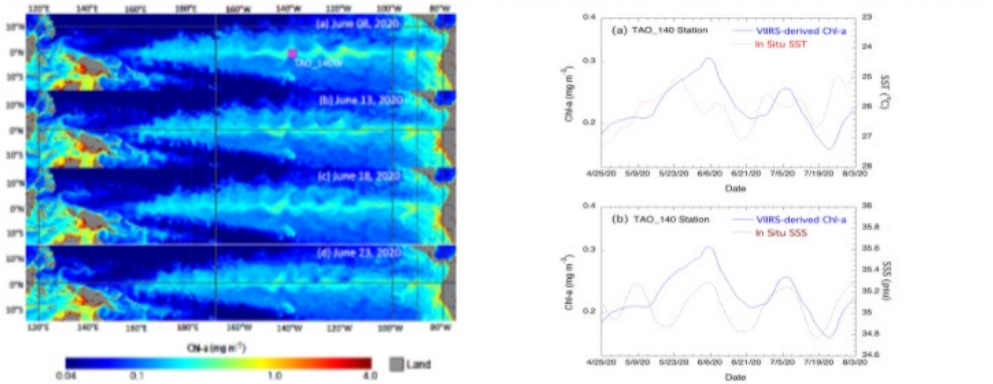
Issues/Risks:

None

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

Highlights:

A New Paper Published: Tropical instability wave modulation of chlorophyll-a in the Equatorial Pacific



- Biological variability modulated by the tropical instability wave (TIW) was characterized using VIIRS gap-free chlorophyll-a (Chl-a) data (**left**)
- Chl-a in the central and eastern Equatorial Pacific Ocean were significantly affected by the TIW from late May to the end of 2020.
- Time series of Chl-a along the equator was found to be in phase with sea surface salinity (SSS). This is attributed to the consistency in the change in nutrient with respect to the change of SSS (**right**).

Shi, W. and M. Wang (2021), "Tropical instability wave modulation of chlorophyll-a in the Equatorial Pacific", *Scientific Reports*, **11**, 22517. https://doi.org/10.1038/s41598-021-01880-5

Sea Surface Temperature

November, 2021

Accomplishments / Events:

- 3rd reprocessing (Reanalysis; RAN3) of VIIRS SST from NPP (1 Feb 2012-on) and N20 (5 Jan 2018-on) is underway. Negotiations with PO.DAAC are underway to have the reprocessed 2.80 data archived withy them. NCEI-AMS will be populated from PO.DAAC. The plan is to reprocess full time series with 2.80 before it is operational in NDE. The 2.80 is J2-ready. It will be initially used to process N21 data, once J2/N21 is launched in Sep 2021. Look-up-table may need to be updated for N21 once sufficient match-up statistics are collected.
- Working on two write-ups for the 10 years of VIIRS *Remote Sensing* special issue. Analyzing long-term stability of JPSS SST, and NPP/N20 cross-platform consistency. These analyses prompted the need for reprocessing Aqua MODIS and creating long-term time series, to check for consistency with VIIRS. This work is currently underway. Figure below shows time series of the global mean biases in NOAA new super-collated NPP/N20 SST wrt. 2 in situ data from the iQuam system www.star.nesdis.noaa.gov/socd/sst/iquam/: Drifters and Tropical Moorings; and Argo Floats.
- Monitoring of NPP/N20/L3S-LEO SSTs continues in the NOAA SST Quality Monitor (SQUAM; www.star.nesdis.noaa.gov/socd/sst/squam/). No significant anomalies identified in Nov 2021.

Overall Status:

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

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

Issues/Risks:

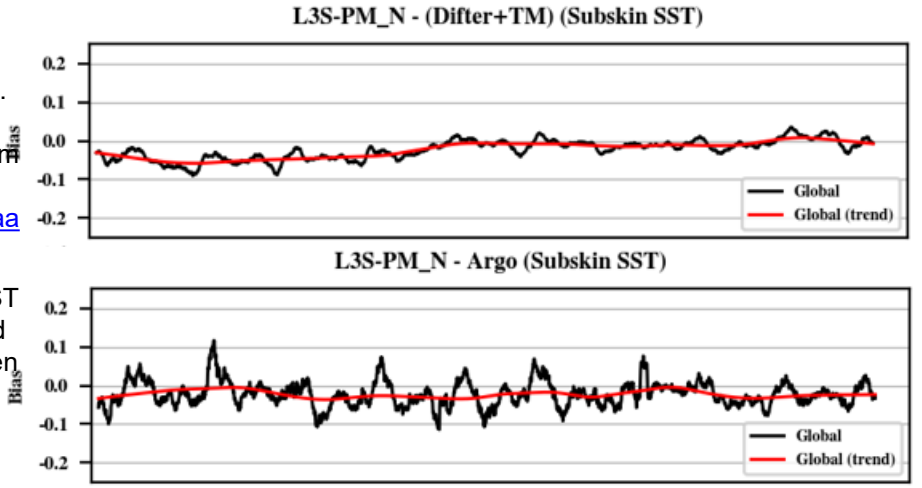
CAC badges of 4 main SST developers were let expired by the STAR Resource Management Division. Two were badged 3 weeks later, and two 6 weeks later. This delays deliverables by at least a month

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

Highlights:

Global mean biases L3S-LEO-PM nighttime SST wrt. iQuam Drifters & Tropical Moorings & Argo Floats from the NOAA iQuam system https://www.star.nesdis.noaa.gov/socd/sst/iquam/.

The y-axis shows JPSS SST specs for accuracy (defined as global difference between satellite and in situ SSTs).



Global biases are expected to be centered at zero and stable in time. This is indeed the case for both in situ references. Note that Argo Floats are two orders of magnitude sparser than Drifters & Tropical Moorings and their statistics are noisier. Also, AF measure at 6m depth (as opposed to D+TM which measure at 0.2-1m depth), hence small differences.

VIIRS Polar Winds

November, 2021

Accomplishments / Events:

- VIIRS winds comparison to ERA5 reanalysis and Rawinsondes indicates that the ERA5 reanalysis can be used in validation of the VIIRS winds when then availability of rawinsondes is limited.
- Experimental JPSS Day/Night Band winds show high quality

Overall Status:

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

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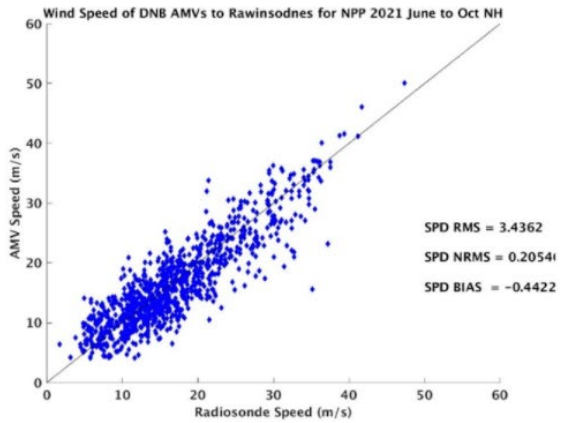
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

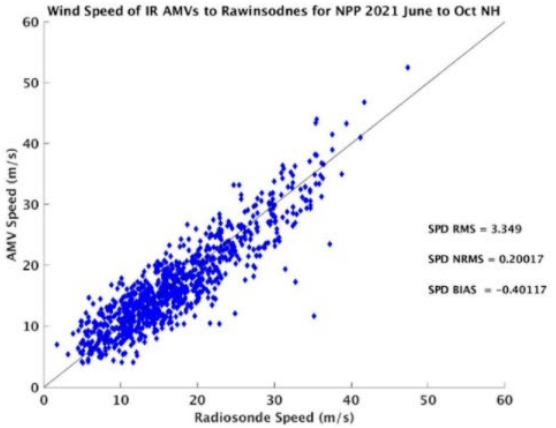
Issues/Risks:

None

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

Highlights: Initial results show high qualityJPSS Day/Night Band winds -simllar to IR winds - when compared to Rawinsondes





NUCAPS Products

November, 2021

Accomplishments / Events

- The NUCAPS team participated at the NOAA-GML quarterly workshop (Nov.12) and presented major accomplishments on Theme 1 (trace gases), and Theme 2 (ozone, water vapor) collaborations.
- The NUCAPS team outlined an R&D foci plan and submitted to the STAR external review team on the planned NUCAPS algorithm improvements towards: (a) Land, Snow/Ice and Ocean Spectral Emissivity Improvements, (b) first guess improvements using CAMEL, (c) use of alternate technologies for certain NUCAPS modules, and (d) additional trace gas retrievals (HNO3, N2O, NH3).
- The NUCAPS team submitted the S-NPP (LW/SW) mini-validation package to the JPSS Program for their assessment and for decision making on the future plans of operational implementation.
- Continued work on the NUCAPS implementation for the NCIS Cloud infrastructure.
- Continued work on the Elsevier reference book on Field Measurements.
- Continued work on three major updates, (a) averaging kernels, (b) ozone climatology improvements, and (c) implementation of surface corrections to the NUCAPS V3.1 for mission long reprocessing of S-NPP products through NCIS Cloud infrastructure. .

Overall Status:

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

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

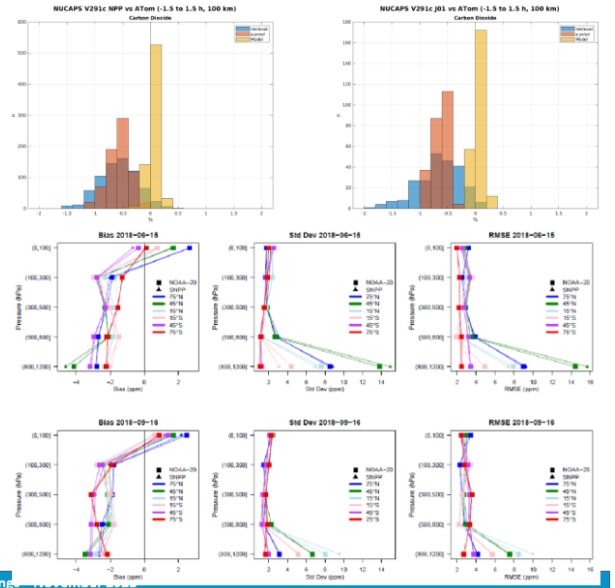
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY21 End of Year Science Team Presentations (PMR)	Oct-21	Oct-21	11/10/21	
FY23 Program Management Review	Jun-22	Jun-22		
Final J2 ready DAP to NDE (include NPP/N20 updates)	Dec-21	Dec-21		
NUCAPS Averaging Kernels (AK) and improved stability indices. S-NPP Mission long reprocessing version (NUCAPS v3.1)	Dec-21	Dec-21		
Addition of Ammonia product to NUCAPS operational retrievals (NUCAPS v3.2)	May-22	May-22		
NUCAPS augmentation for EPS-SG (NUCAPS v3.3)	Jul-22	Jul-22		
NUCAPS IR-only retrieval for risk mitigation and conceptual GEO-CrIS retrieval products (NUCAPS v3.4)	Jan-22	Jan-22		
Land, Snow/Ice and Ocean Spectral Emissivity Improvements	Mar-22	Mar-22		
Reactive maintenance and Improvements to surface emissivity first guess using CAMEL, temperature lower-tropospheric bias improvements over land, optimized cloud clearing and Local Angle Corrections (LAC) for S-NPP/NOAA-20 NUCAPS	Sep-22	Sep-22		
NOAA-GML Theme 1: NUCAPS trace gas product validation with corroborative data sets and collaboration with GML and other stakeholders in support of NOAA/NESDIS initiatives	Mar-22	Mar-22		
NOAA-GML Theme 2: NUCAPS ozone and water vapor products validations with CLIMCAPS and O3SNDS, and collaboration with GML and other stakeholders in support of NOAA/NESDIS initiatives	Mar-22	Mar-22		
Routine monitoring of trace gas products, T(p) and q(p) bias improvements	Sep-22	Sep-22		
Support ASSISTT/NDE evaluation as required/needed	Sep-22	Sep-22		
Participant/support JPSS-2 pre-launch testing events (Mar-22 & Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE)	Sep-22	Sep-22		

NOAA-GML Collaborations on Theme 1 (Carbon Trace Gases) and PGRR Emissivity Work

- **CarbonTracker-ATom-NUCAPS merged dataset** was created for 3-way statistical analyses of the NUCAPS and GML CarbonTracker CO2 versus ATom GML truth collocations. **CarbonTracker was found to agree well with ATom** (top right plots), verifying it is a reliable asset for global NUCAPS CO2 validation, *a priori*, tuning and routine monitoring.
- **Global profile error statistics** were subsequently obtained for **NUCAPS CO2 retrievals versus the CarbonTracker model** for 4 Focus Days spanning the seasonal cycle, Jun 2018, Sep 2018, Dec 2018, and Jan 2019. The vertical profile statistics are shown in the figure on the bottom right, stratified by zone and satellite.
- **Continued work on edited Elsevier reference book** *Field Measurements for Passive Environmental Remote Sensing: Instrumentation, Intensive Campaigns, and Satellite Applications*, scheduled for publication in May 2022
- Presentation given on NUCAPS IR sounder trace gas validation at the **NOAA-JAXA Meeting on GOSAT-GW and GHG**, 7 July 2021.
- Continued development on **IR sea-surface emissivity model** (IRSSE v2.2); performed data archeology and rescue of temperature-dependent IR optical constants of water.



MiRS Products

November, 2021

Accomplishments / Events:

- Investigation of MiRS retrievals in the vicinity of the Aral Sea located on the Kazakhstan/Uzbekistan border have shown a tendency for spurious rainfall retrievals. This has been traced back to the land surface type database used, which is based on data from about 2000 and earlier. Since that time the Aral Sea has dramatically shrunk in size due to a combination of regional climate change and questionable water diversion projects. Sensitivity tests have been conducted using an updated surface type database, using VIIRS surface types, reflectances and NDVI maps from 2020. See highlights. With updated surface type database spurious rainfall has been largely eliminated. This updated land/water database has been implemented as a patch to the current version (v11.8) of MiRS.
- Delivered above patch to ASSISTT.

Overall Status:

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

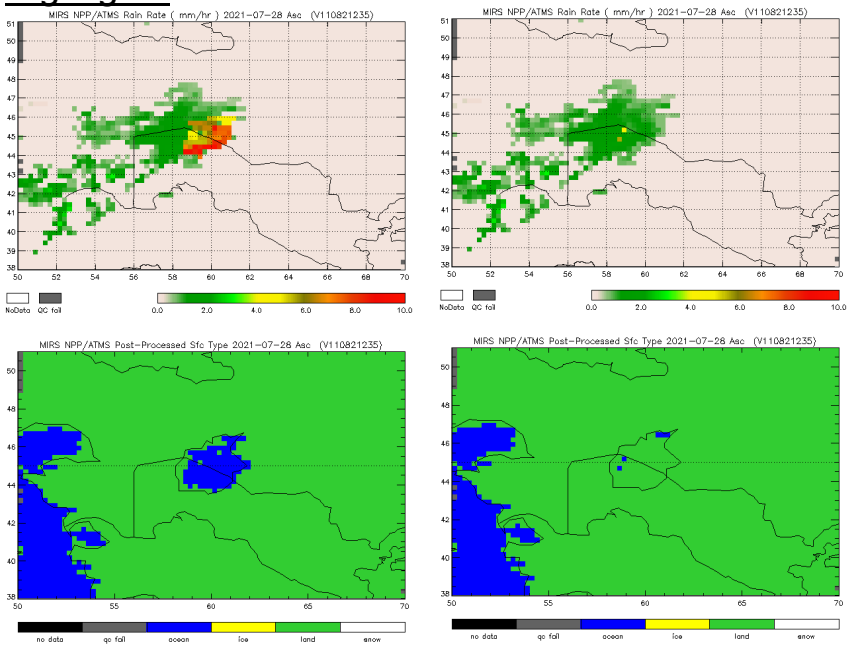
1. *Project has completed.*
2. *Project is within budget, scope and on schedule.*
3. *Project has deviated slightly from the plan but should recover.*
4. *Project has fallen significantly behind schedule, and/or significantly over budget.*

Issues/Risks:

None

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

Highlights:



MiRS SNPP/ATMS rain rate retrieval (top) and derived surface type (bottom) on 2021-07-28. Left side shows results with current surface database, and right shows results with updated database, indicating that all spurious rainfall has been eliminated.

Snowfall Rate

November, 2021

Accomplishments / Events:

- Finalized the XGB machine learning snowfall detection (SD) algorithms for the operational snowfall rate (SFR) from NOAA-20, S-NPP, NOAA-19, MetOp-B and MetOp-C.
- Exploring using ECMWF ERA5 reanalysis data in combination with Stage IV radar and gauge snowfall data to train SFR bias correction model
- At the request of a senior forecaster from the NWS Sterling, VA Weather Forecast Office (LWX), a webpage was set up to display near real-time SFR images for the LWX county warning area (CWA): http://cics.umd.edu/sfr/lwx/

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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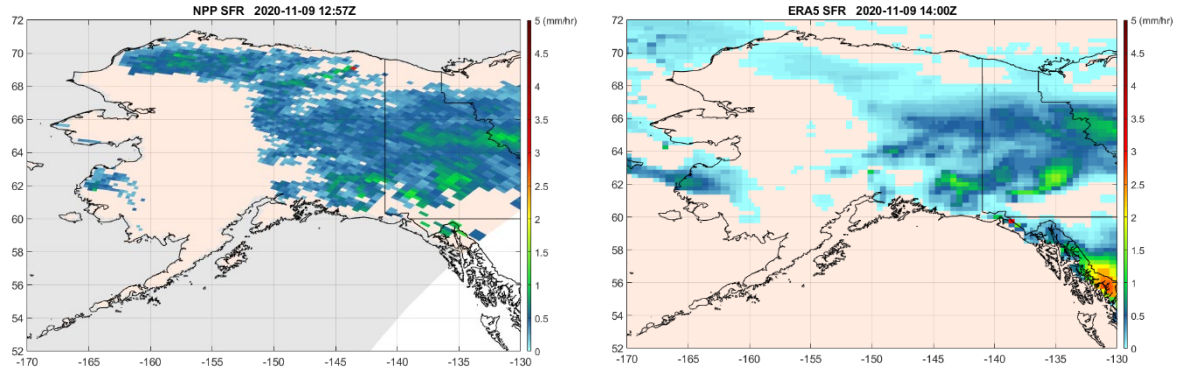
Issues/Risks:

None

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

Highlights: Machine Learning Snowfall Detection Performs Well Compared to ERA5 Reanalysis



S-NPP SFR (left) and the corresponding ERA5 reanalysis snowfall rate on November 9, 2021. The S-NPP snowfall detection uses a XGB machine learning algorithm which performs well compared to ERA5.

OMPS Ozone (V8Pro, V2Limb & V8TOz)

November, 2021

Accomplishments / Events:

- Assessed the J2 OMPS LP NASA Code against what is currently running in NDE.
- Reviewing schedule for planned tasks for J2 OMPS LP Cal/Val and associated JCT tests, will update Cal/Val plan next month to include milestone dates.

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
FY21 End of Year Science Team Presentations (PMR)	Oct-21	Oct-21	10/26/21	
FY23 Program Management Review	Jun-22	Jun-22		
Final J2 ready DAP to NDE (include NPP/N20 updates), V8TOz	Jan-22	Jan-22		
Final J2 ready DAP to NDE (include NPP/N20 updates), V8Pro	Jan-22	Jan-22		
Revise Cal/Val Plan to include JPSS-2 Limb and draft schedule	Dec-21	Dec-21	12/09/21	
Update Versin 2.5Limb, three improved Climatologies, Cloud Top, Repaired	Jan-22	Jan-22		
Version 2.7 Limb Profile SDR and EDR	Sep-22	Sep-22		
J2 Radiative Transfer & Bandpass Tables for V8Pro and V8TOz	Sep-22	Sep-22		
Soft calibration adjustments and reprocessing for V8Pro & V8TOz	Nov-21 May-22	Nov-21 May-22	11/26/21 (TC)	Nov-21 N20 May-22 NPP
Limb Darks and Orbital Definition files: Weekly ancillary file deliveries to PDA / NDE	Sep-22	Sep-22		ongoing
Overpass data sets and comparisons to GB and MERRA2	Sep-22	Sep-22		ongoing
Support ASSISTT/NDE evaluation as required/needed	Sep-22	Sep-22		As Needed
Participant/support JPSS-2 pre-launch testing events (Mar-22 & Apr-22 JCT3-TVAC; Maybe: May-22 JCT4; Jun-22 JCT4-DSE)	Sep-22	Sep-22		

7=Year analysis for OMPS-LP shows drift 3-5% for specific layers to Umkehr results at Boulder CO.

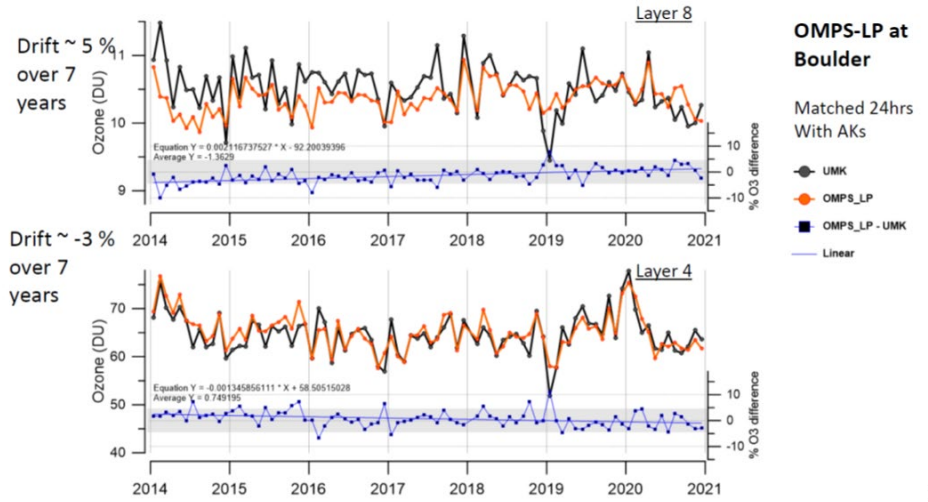

Figure 11. Comparison of OPMPS V2Limb profiles for specific layers to Umkehr results at Boulder CO.

GCOM-W1 Products

November, 2021

Accomplishments / Events:

- A paper describing a new retrieval method for estimating thermodynamic sea ice thickness with passive microwave data was submitted to *The Cryosphere* (https://tc.copernicus.org/preprints/tc-2021-333/). The method, known as Stefan's Law Integrated Conducted Energy (SLICE), allows for daily basin-wide coverage and a potential for use beginning in 1987.
- Continued drafting of AMSR3 cal/val plan.
- Continued product O&M, keeping abreast of GOSAT-2 AMSR3 activities so plans can be developed for use at STAR.
- Continued development of all-weather wind speed retrieval algorithm
- Recovery from GCOM/AMSR2 R&D real-time processing system crash – ongoing

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

Highlights:

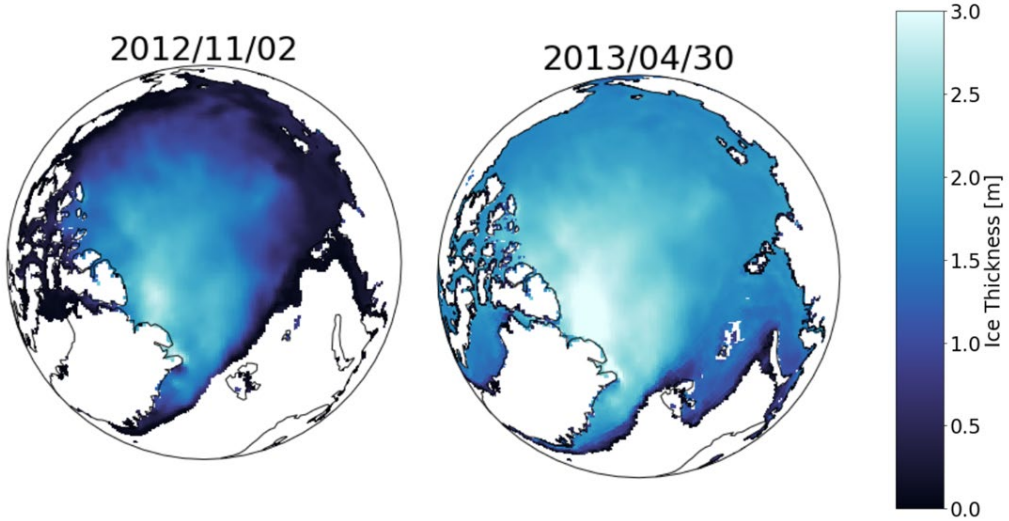

Figure: Arctic Ocean sea ice thickness using SLICE in November 2012 (left) and April 2013 (right).

NOAA Products Validation System (NPROVS) and Environmental Data Record (EDR) Long Term Monitoring (LTM)

November, 2021

Accomplishments / Events:

- The NPROVS team provided assessments of NUCAPS v3 for MetOp-B and C. The datasets used were 10-days (Oct 18-28, 2021) of Operational versus NUCAPS v3 Hyper-spectral Enterprise Algorithm Package (HEAP) global soundings provided by the Algorithm Scientific Software Integration and System Transition Team (ASSISTT). Results showed good agreement between the NUCAPS v3 and current operational products (**Highlight**).
- NPROVS staff welcome new team member Ms Cassandra Calderella who joined us on November 1. Cassandra has Master degree in atmospheric physic and successfully completed a 3-month mentor program with NPROVS team this past summer
- NPROVS staff Bomin Sun and Tony Reale attended (virtual) and presented at the 13th GCOS Reference Upper Air Network (GRUAN) Implementation and Coordination Meeting (ICM-13) from Nov 15-19

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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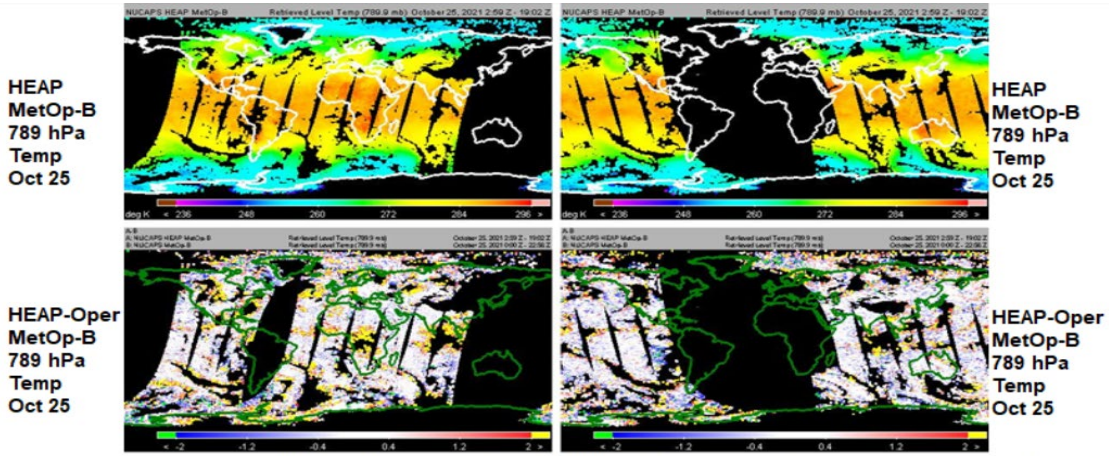
Issues/Risks: None

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

Highlight: NPROVS shows MetOp-B v3 and operational IR+MW soundings (which pass QC) are overall very close



Results showing global differences (lower panels) between Operational and v3 NUCAPS (HEAP) for descending (left, night) and ascending (right, day) indicate overall agreement within 0.5K at 800 hPa across the globe; black areas indicate missing HEAP observations due to ASSISTT processing problem, *not critical in the context of assessment*.