NOAA JPSS Monthly Program Office

AMP/STAR
FY22 TTA

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November, 2021

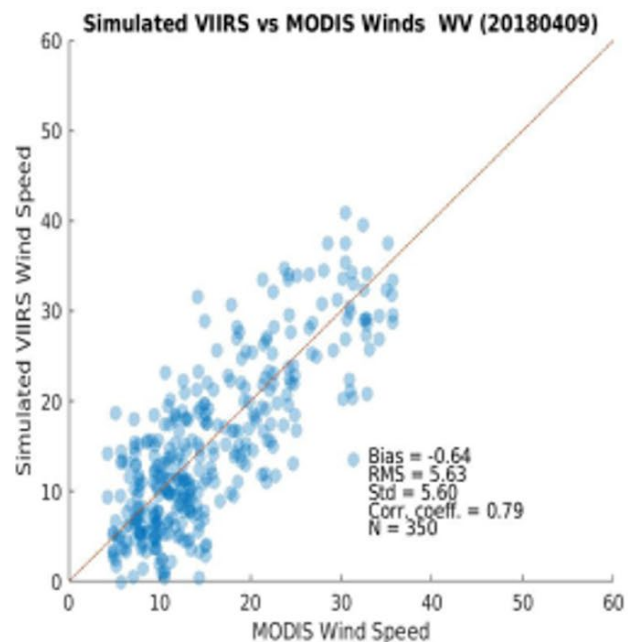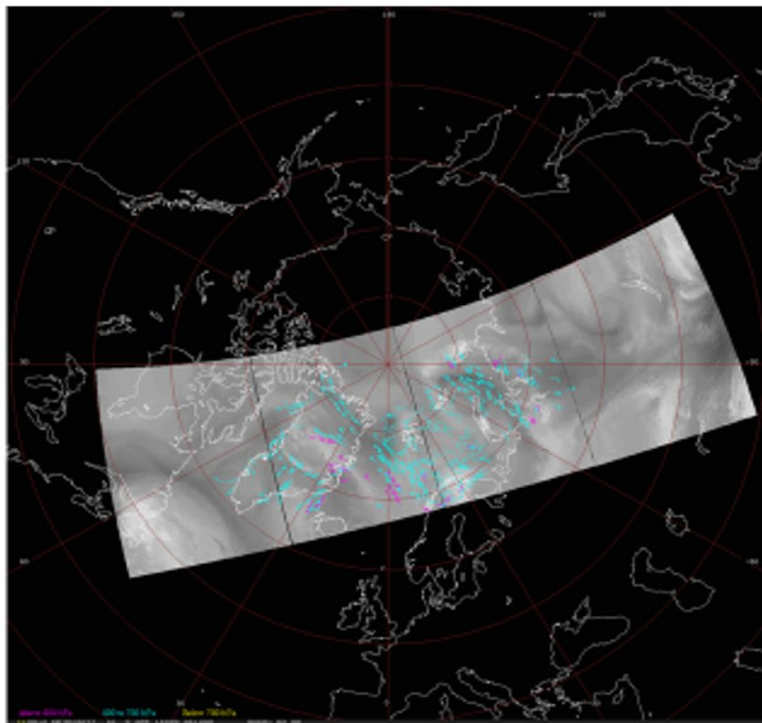**Polar water vapor feature tracking with VIIRS/CrIS fusion**

Figure. Polar VIIRS/CrIS fusion water vapor winds for 9 April 2018 and the statistical comparison with those from MODIS.

The 'imager plus sounder' fusion method was originally developed to create the missing CO_2 absorption band at 13.3 microns for VIIRS to complement the existing IR window bands. Subsequently it was shown that any desired IR absorption band radiance could be constructed by merging high spatial resolution imager data with high spectral (but coarse spatial) resolution sounder data. MODIS spectral bands are replicated in VIIRS/CrIS fusion with brightness temperatures within 0.5 C (1.0 C) for CO_2 (H_2O) sensitive bands. The addition of CO_2 absorption bands (essential for cloud top height and phase, as well as temperature soundings) and water vapor absorption bands (important for tropospheric moisture determinations and polar water vapor feature tracking) enables the continuity of the data records established by HIRS and MODIS.

Adjustment to OMPS South Atlantic Anomaly LUT may be needed
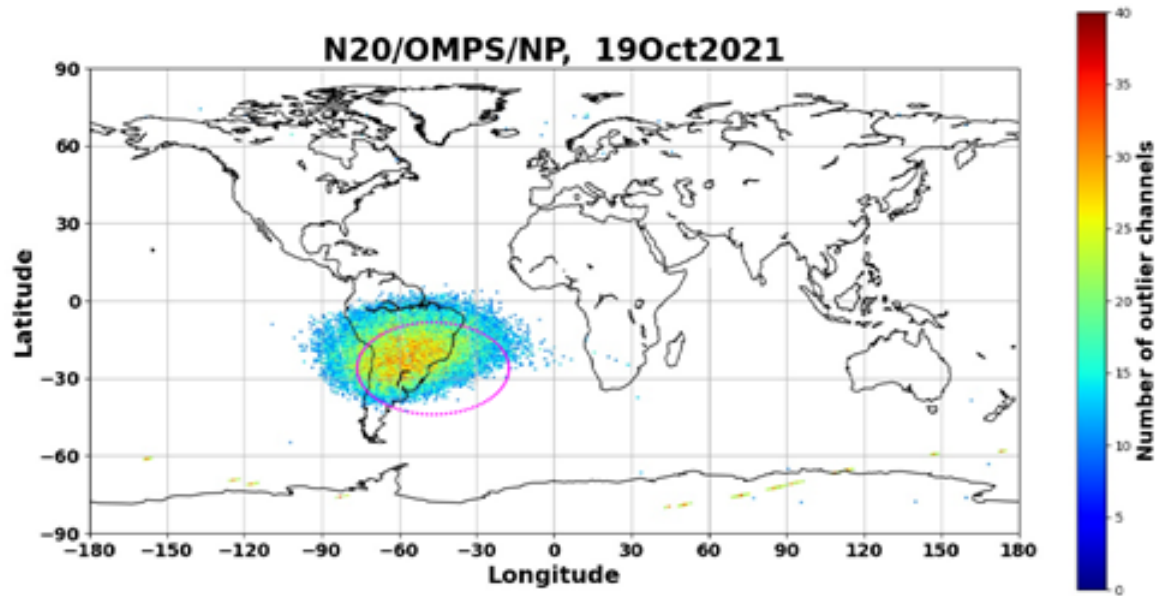

N20/OMPS/NP, 19Oct2021

Figure. ICVS map of high-energy particle hits detected in the NOAA-20 OMPS Nadir Profiler data on 10/19/2021 and preceding 16 days, with the overlaid magenta ellipse defined by parameters in the Common Geo SAA LUT

The South Atlantic Anomaly is a region above eastern South America where the Van Allen radiation belt that surrounds Earth comes closest to the surface. High energy protons from this region can impact the quality of JPSS data. Various mitigation techniques are in place to deal with this anomaly. Recently, the OMPS team compared the recently created ICVS maps of high-energy particle impacts on the OMPS Nadir Profiler data over the SAA area with the area defined for VIIRS quality flagging in the Common Geo SAA LUT: preliminary results suggest that an adjustment to the SAA location specified in the LUT may be needed

Category 5 Atmospheric River hits California
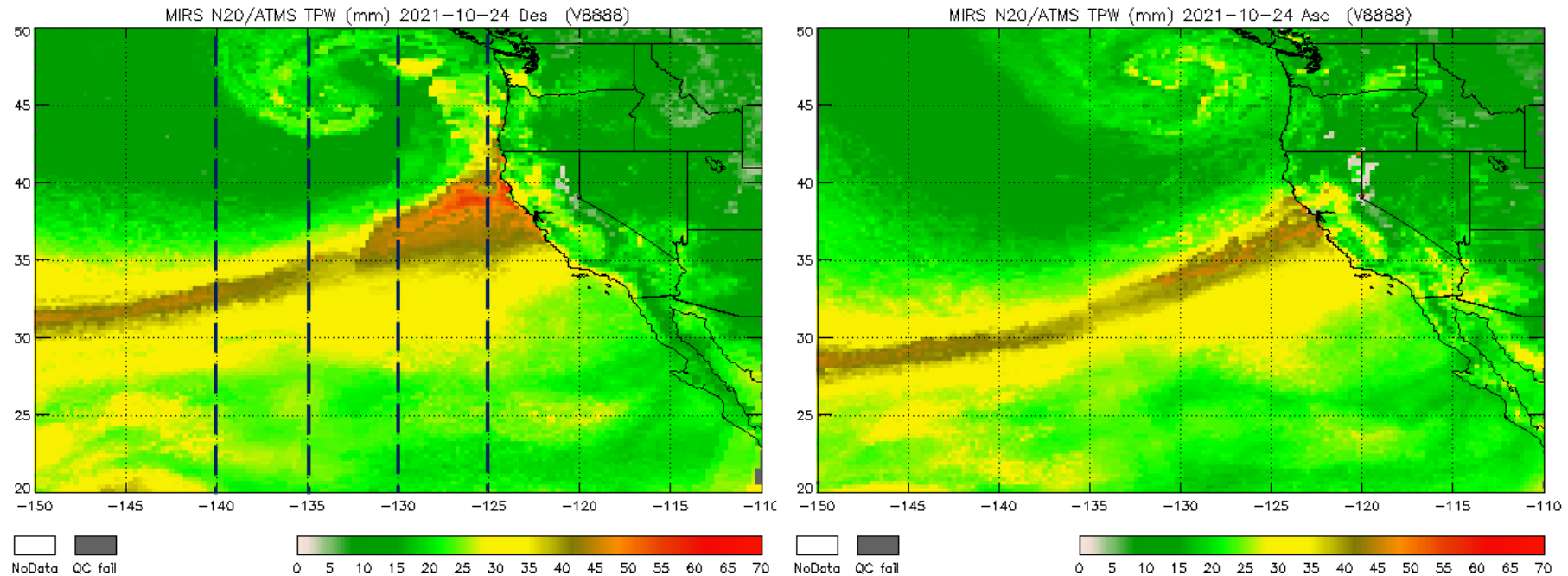
On 24 October, a powerful Category 5 (the maximum possible) atmospheric river (AR) occurred over the northern and central parts of California. The storm system featured record breaking precipitation, leading to flooding and mudslides in some locations, along with dangerous winds exceeding 70 miles per hour at higher elevations. San Francisco recorded its fourth highest single-day rainfall amount of over 4 inches. Satellite passive microwave measurements are one of the observational tools that allow depiction of these extreme events, since microwaves are less affected by clouds and precipitation. MiRS water vapor retrievals from NOAA-20/ATMS on this day were used to visualize the structure of the AR off of the California coast.

GVF/Active Fires annual animation created
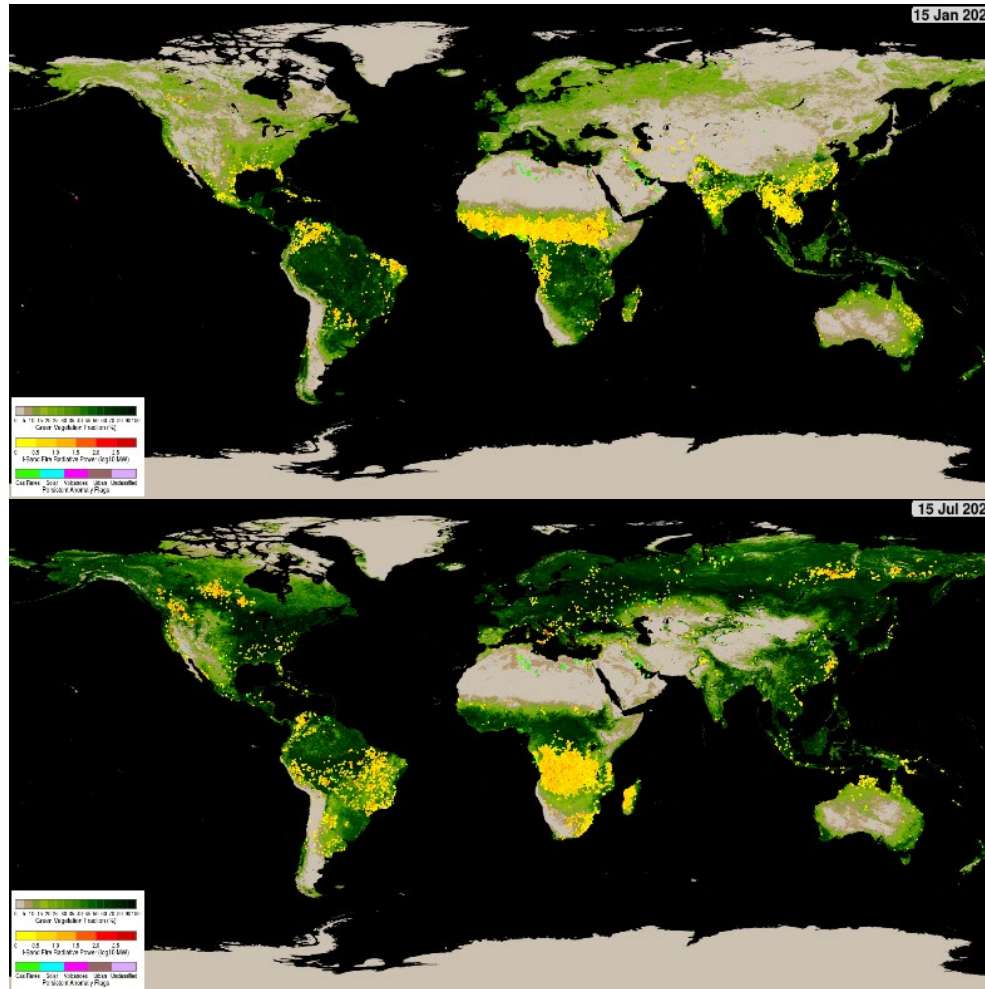
The Active Fires team, working together with EDR LTM team lead Tom Atkins, created an animation of one full year of fire activity over a background of green vegetation fraction. The animation illustrates well the seasonality of fire activity across the globe. The animation featured Suomi NPP data to celebrate the 10-year anniversary of the launch of the satellite. The daily global images were extracted from JSTAR Mapper.

Figure. Two frames showing the annual changes in active fires from new animation.

The NOAA/NASA Story on ATMS
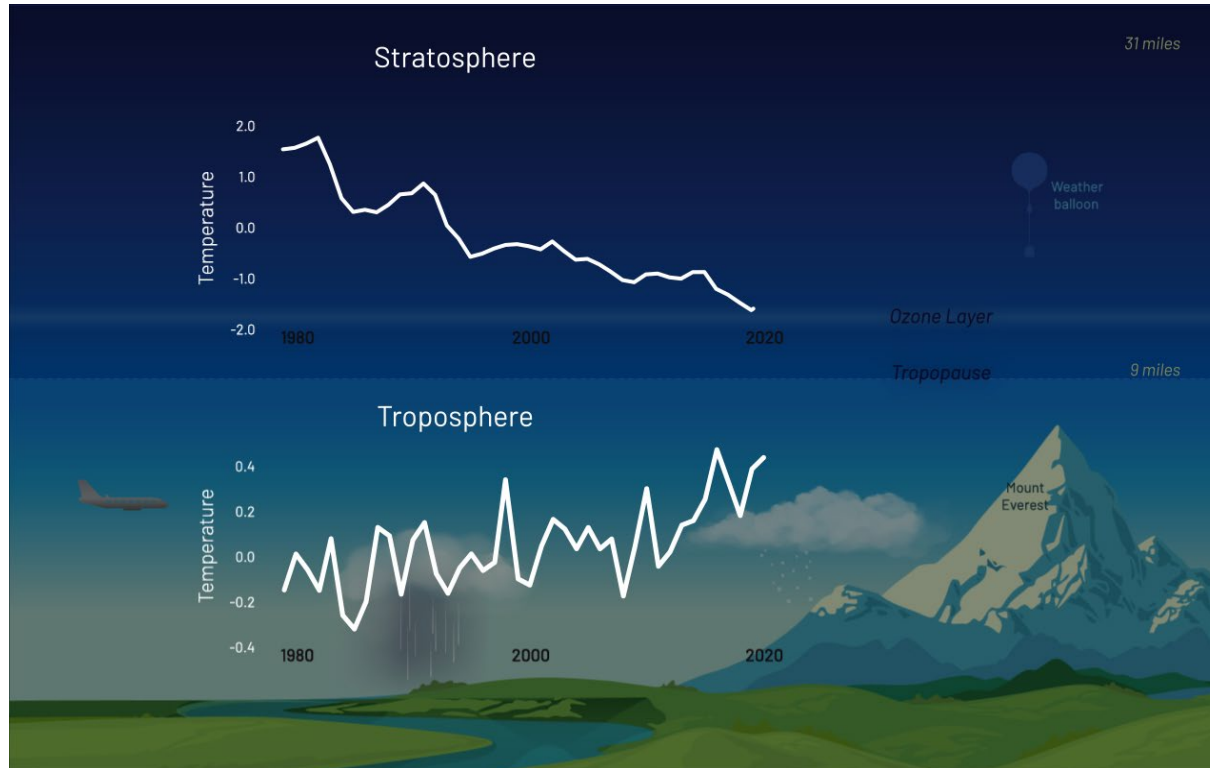
NOAA/NASA released a multimedia story on 10/07/2021 on the S-NPP and NOAA-20 ATMS entitled 'The most important instrument you've never heard of'. In the story, the STAR satellite microwave sounder CDRs were used to describe the long-term warming trend in the tropospheric temperature and cooling trend in the stratospheric temperature

Figure. Anomaly time series of the mid-tropospheric (lower) and upper-stratospheric temperatures during 1979 to 2020. Both of the mid-tropospheric and upper-stratospheric temperature time series were developed by STAR/SMCD

Accomplishments

- **Delivery Algorithm Packages (DAPs) - Mission Unique Products:**
  - 10/22/2021: CrIS SDR team delivered 'SNPP CrIS engineering packet v42' to Flight team
    A new Engineering Packet, v42, for SNPP CrIS including the new mapping parameters for improved Geolocation accuracy was prepared and delivered to the SNPP Mission Operation Team
  - 10/27/2021: STAR delivered VIIRS DAP (ADR9760/CCR5724, N20 VIIRS-SDR-F-PREDICTED-LUT Update #7 -- FT) to DPMS
    The following LUTs will be updated: VIIRS-SDR-F-PREDICTED-LUT

- **DAPs – Enterprise Products:**
  - 10/05/2021: STAR re-delivered the ACSPO SST (v2.80) VIIRS DAP to NDE, along with the sample input and output files (per NDE's request)
  - 10/07/2021: STAR delivered final J2 VIIRS Surface Reflectance DAP to NDE, and to OSPO (for software code review)
  - 10/15/2021: STAR delivered VIIRS Flood Mapping CCAP to NCCF
  - 10/19/2021: MiRS team delivered MiRS v11r6 patch DAP (for metadata updates) to ASSISTT team
  - 10/28/2021: MiRS team delivered MiRS v11r8 patch DAP (for metadata updates) to ASSISTT team
  - 10/29/2021: Ocean Color team delivered J2 Ocean Color DAP (MSL12) to CoastWatch (cc ASSISTT)
  - Received three MiRS end-of-year reports:
    - MiRS NOAA-20 Annual Validation Update (10/04/2021)
    - MiRS ATMS Recalibration Assessment and Reprocessing Verification (10/04/2021)
    - MiRS Preliminary Experiments with Machine Learning Based Sounding for Tropical Cyclones (10/07/2021)

- **IDPS Builds Checkouts / JPSS-2 Pre-Launch Testing events:**
  - 10/04/2021: JSTAR submitted data request for Mx5 SOL deploy regression review/checkout to DPMS
  - 10/06/2021: JSTAR submitted summary report for JCT2a-DSE review/checkout to DPMS
    - ***SDR and Imagery teams:*** Checked available data files and verified the data format
    - ***ICVS team:*** Verified JPSS-2 JCT2a-DSE data using ICVS LTM modules. Generated sample images from ATMS TDR, CrIS RDR, OMPS RDR, and SDR/GEO to verify the data format. Sample images are pushed to NOAA SSO protected ICVS-beta website for demonstration purpose

Accomplishments – JPSS Cal Val Supports

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

S-NPP	Weekly OMPS TC/NP Dark Table Updates	10/05/21, 10/13/21, 10/19/21, 10/26/21, 11/02/21, 11/09/21
NOAA-20	Weekly OMPS TC/NP Dark Table Updates	10/05/21, 10/13/21, 10/19/21, 10/26/21, 11/02/21, 11/09/21
S-NPP	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	10/13/21, 10/26/21, 11/09/21
NOAA-20	Bi-Weekly OMPS NP Wavelength & Solar Flux Update	10/05/21, 10/19/21, 11/02/21
S-NPP	Monthly VIIRS LUT Update of DNB Offsets and Gains	10/12/21, 11/09/21
NOAA-20	Monthly VIIRS LUT Update of DNB Offsets and Gains	10/12/21, 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](#)

- 10/7/2021: IDPS Block 2.3 Mx4 TTO, includes following updates:

    - 474-CCR-21-5172 (PCR072564): JPSS-2 OMPS Code Change and Initial LUT Update - ADR 9095 & 9501
    - 474-CCR-21-5473 (PCR072671): DPGD: OMPS-TC Field Angle Map (FAM) LUT Update - ADR 9361
    - 474-CCR-21-5415 (PCR072670): PRO: VIIRS NCC Imagery Banding (Tri-Linear Interpolation) - ADR 9466
    - 474-CCR-19-4631 (PCR072177): PRO: Implement all 16 M-Band EDRs

- 10/20/2021: SPSRB briefing: Declaring OMPS Limb Profiler Products (V2Limb) Operational

- 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:
  - Nov-21: Final J2 NUCAPS DAP (include NPP/N20 updates)
  - Nov-21: Final NVPS J2 DAP (VI & GVF)
  - Dec-21: Initial/Final Vegetation Health J2 DAP (include NPP/N20 updates)
  - Dec-21: Final J2 Active Fires DAP (include NPP/N20 updates)
  - Nov-21: Final OMPS Ozone V8TOz DAP
  - Dec-21: Final OMPS Ozone V8Pro DAP
  - Dec-21: 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		
Final J2 ready Active Fires DAP (include NPP/N20 updates, I-Band)	Dec-22	Dec-22		
Surface Reflectance: Final J2 ready DAP	Oct-21	Oct-21	10/07/21	
NVPS (VI & GVF): Final J2 ready DAP	Nov-21	Nov-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	Nov-21	Nov-21		
MiRS & SFR: Final J2 ready DAP	Jan-22	Jan-22		
OMPS Ozone V8Pro: Final J2 ready DAP	Dec-21	Dec-21		
OMPS Ozone V8TOz: Final J2 ready DAP	Nov-21	Nov-21		
L3 Global Gridded LST/LSA	Dec-21	Dec-21		
Reformatting Toolkit	Nov-21	Nov-21		
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		
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**
S-NPP: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	**10/13/21, 10/26/21, 11/09/21**
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**
NOAA-20: Bi-Weekly OMPS NP Wavelength & Solar Flux	Bi-Weekly	Bi-Weekly	**10/05/21, 10/19/21, 11/02/21**
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	
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

October, 2021

Accomplishments / Events:

- Analyzed the JPSS-4 ATMS antenna pattern measurement data sets delivered by NASA. Evaluate the impact of the channel 2 beamwidth out-of-spec situation. Results indicate that the impact is negligible. NOAA ATMS SDR team has concurred the waiver.
- Estimated the updated NEdT calculation algorithm using space view counts. Compared the difference using warm calibration counts. Assess the improvements from current operational NEdT outputs in SDR data products. 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 update of IDPS cold is on-going.
- Analyzed the impact of footprint size of different bands on the orbit-to-orbit gaps near equator. Due to the different footprint sizes, K/Ka band observations can well cover the whole global area due to the large footprint sizes at both edges of scan. V/W/G band observations show a small gap between consecutive orbits near equator. The FOV level ATMS global map generation package has also been updated to reflect the real footprint size.
- Updated JPSS-2 spacecraft telemetry 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.
- Evaluated ATMS geolocation, satellite scan angle, and satellite zenith angle changes and impacts by applying updated experimental ATMS beam pointing angle correction coefficients.
- 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

Highlights:

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		

JPSS-4 ATMS Channel 2 Antenna Pattern at Different beam position

Bp1   Bp48   BP96
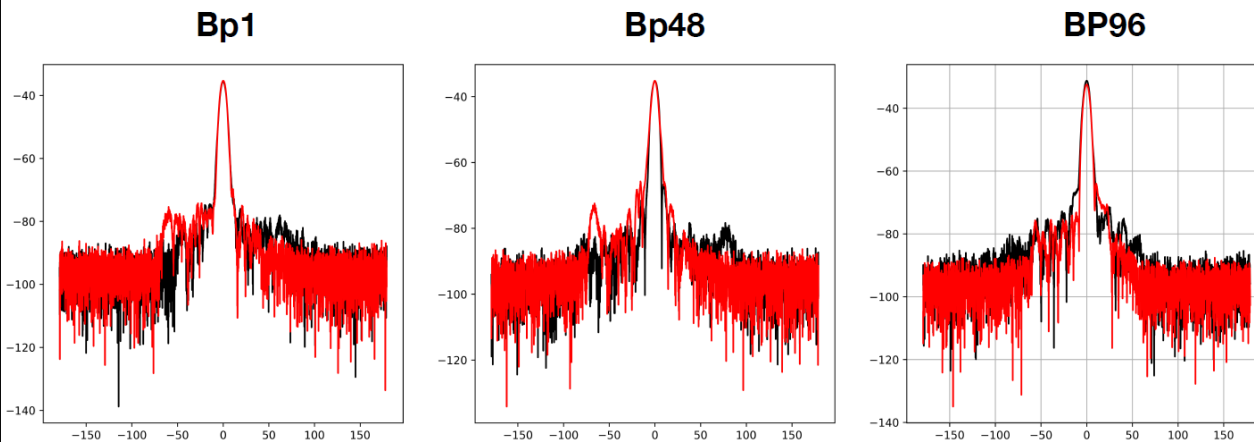
Accomplishments / Events:

- A new Engineering Packet, v42, for SNPP CrIS including the new mapping parameters for improved Geolocation accuracy was prepared and delivered to the SNPP Mission Operation Team.
- Prepared and gave an oral presentation at the GSICS IR Working Group Meeting about the long-term quality performance of the SNPP and NOAA-20 CrIS SDR products, including the recovery efforts for the recent SNPP CrIS anomalies. A recommendation to use the NOAA-20 CrIS as observational infrared reference was provided.
- SNPP CrIS experienced an SSM module anomaly, resulting in a loss of about 4 hours of data on October 9th **(Fig. 1)**. The SSM module entered in safe mode condition. The instrument has fully recovered since then. Because most of these events are false alarms, permanent sensor configuration changes are going to be implemented in the next few weeks.
- NOAA-20 CrIS experienced a 10th noise event between October 12th and October 15th impacting the MWIR FOV5 detector only **(Fig. 2)**. This behavior has similar characteristics compared to other observed noise events on NOAA-20 CrIS.
- Provided support to the GRAVITE data quality team for the DQTT/DQN analysis for JPSS instruments.
- The manuscript entitled: "Recalibration and Assessment of the SNPP CrIS Instrument: A Successful History of Restoration After Midwave Infrared Band Anomaly" has been published in IEEE TGRS Journal.
- The manuscript entitled: "Intercomparison of CrIS and ABI IR Bands and its Application in their Calibration" has been submitted to the IEEE TGRS Journal.
- Updated the ECMWF model data reader due to a newer version of the "wgrib2" tool. Proper verification was carried out to ensure consistency of simulated data with respect to previous CrIS validation results as shown in **(Fig. 3)**.

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:
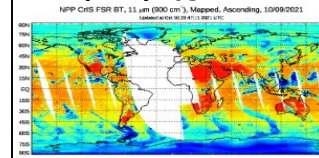
(1) Map of lost granules from recent SNPP CrIS SSM module error anomaly on October 9th, 2021.
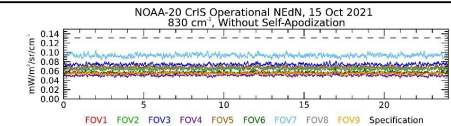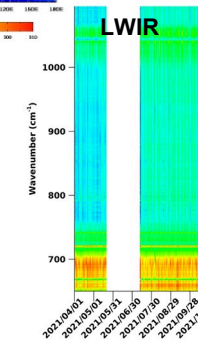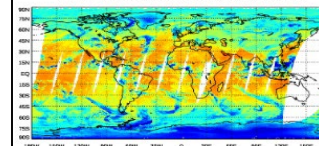
(2) Time Series of NOAA-20 10th noise event for MW FOV5. The root source is under investigation.
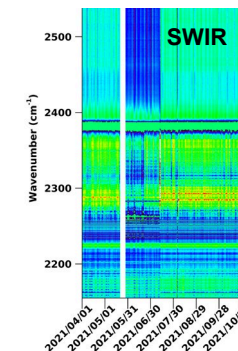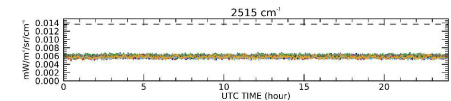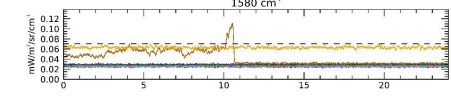
(3) Radiometric consistency between SNPP and NOAA-20 CrIS instruments in the past six months, (left) LWIR and (right) SWIR. These results assessed the correct generation of CRTM simulations after updating the tools used to extract ECMWF model geophysical data.

VIIRS SDR

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 October 6, 2021
- Created and delivered for deployment in the IDPS operations an updated NOAA-20 F-Predicted LUT that adds small upward trends to the F factor values reflecting the slight radiometric response degradation observed since launch
- Assessed whether the Suomi NPP Risk Mitigation (collision avoidance) Maneuver on Oct. 14, 2021, had any effects on the VIIRS SDR products: only geolocation was not generated for less than 1 min. because spacecraft rotation exceeded threshold defined in IDPS; radiance products were not affected
- Made available to the user community a one-month sample of the VGAC products
- Analyzed Suomi NPP VIIRS DNB nighttime data on Oct. 20, 2021 to capture early stages of cyclogenesis and atmospheric river near the Northwest coast, heading toward Seattle

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
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1. Project has completed.
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Issues/Risks:

None

Highlights:

Examples of the anticipated F factor increases for the NOAA-20 VIIRS bands I1 and M1 after the LUT update in October/November 2021: the increases are not larger than 0.3% per year, in line with the VIIRS Level 1 requirements

| 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		
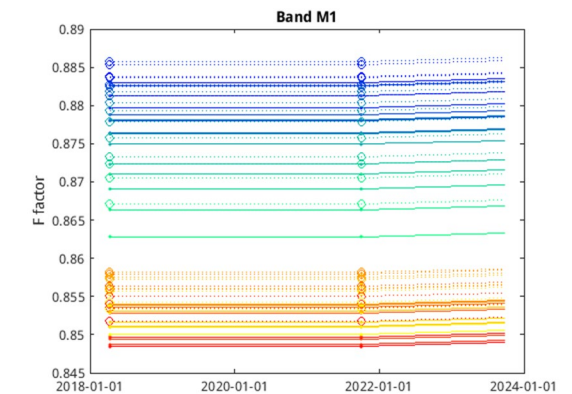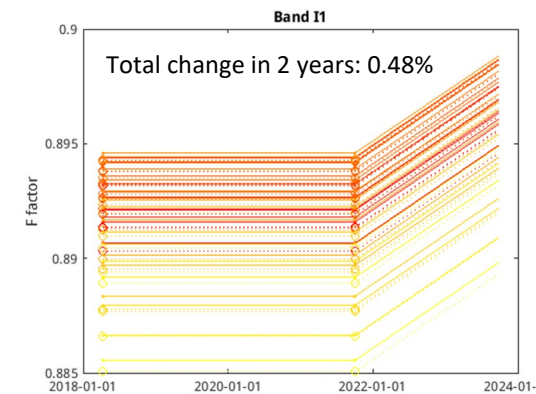
Accomplishments / Events:

- Delivered OMPS biweekly NP solar irradiance bi-weekly LUTs.
- Prepared the OMPS SDR PMR presentation.
- Changed the ADL code regarding the OMPS NM geolocation error code change (DR9633).
- Assessed OMPS NP SDR sensor degradation for a new DR correcting the degradation.
- Developed medium resolution of LUTs to produce corresponding NOAA-20 OMPS NM SDR.
- Improved the JPSS-02 initial Stray Light LUT for JPSS-02 OMPS NM 177-CT.
- Analyzed and compared three versions of SNPP OMPS NP L1B reflectance datasets.
- Improved the JPSS-02 OMPS NM backup resolution macro table after fixing a bug.
- Started updating the VCRTM interface package to run for SNPP OMPS-NM data.
- Examined differences between NOAA and NASA Dark LUTs to support J2.
- Improved the version 2 reprocessed OMPS SDR processing to checking the missing data.
- Investigated the OMPS NM linear correction algorithm principle to support J2.
- Started to reprocess NOAA-20 SDR data.
- Reanalyzed differences in NOAA (139CT) and NASA (140CT) SL values for OMPS-NM.

Overall Status:

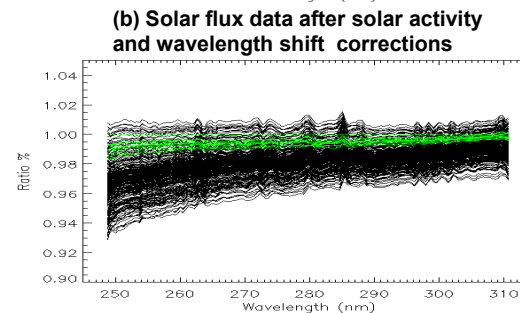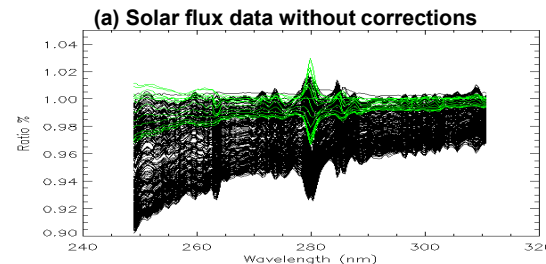|	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		X			
Technical / Programmatic		X			
Schedule			x		

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	
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		

I. Solar flux measurement data analysis to quantify the degradation rate for SNPP-NP (Preliminary Results)

(a) Solar flux data without corrections

(b) Solar flux data after solar activity and wavelength shift corrections

II. Verification of NOAA-20 OMPS NM geolocation accuracy against VIIRS data between code change and FAM LUT Update: Very Comparable!

New Code + Old Table   Old code + New Table
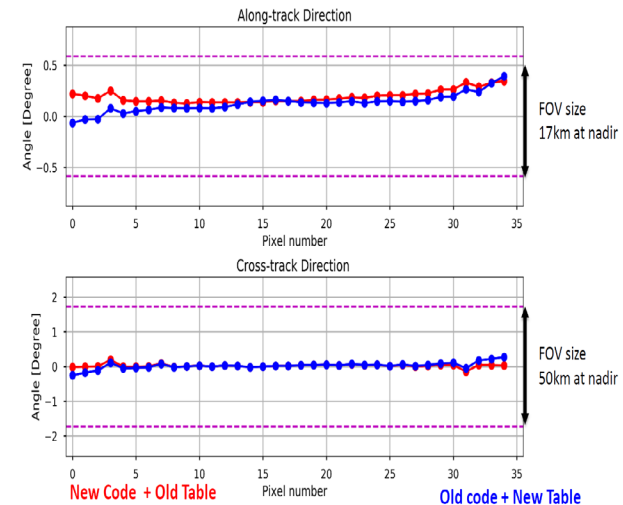
(Courtesy of the UMD L. Wang)

SDR Reprocessing

Accomplishments / Events:

– The test transition of the reprocessed SDRs from STAR to CLASS is almost complete, and based on the test results, we are ready for the official data transition. (Highlights)

– The reprocessing of V2 SNPP OMPS SDR is completed.

– Preparation of the reprocessed VIIRS and OMPS-V2 data for the official transition is ongoing.

– The official transition of the reprocessed SDRs will likely start in 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

Highlights:

Summary of the Test Transition

- Tested with around 5.2 terabytes of data, including all SDR data products.
- Found performance issues, we reduced the number of manifest files and RECON reports at STAR side by increasing the number of files in each manifest and RECON file, CLASS revised system and database configurations to improve the performance of data ingestion. The data transition worked well after these changes.
- The data transition workflow worked correctly, could generate manifest files and recon reports, and push files to CLASS correctly.
- The data transition speed can meet our expectation at 3 Terabytes per day.
- The retransmission request test looks good up to now.
- Based on the test results, we are ready for operational data transition.

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		

Accomplishments / Events:

- Prepared the ICVS annual year PMR presentation.
- Kept updating JPSS-2 spacecraft RDR data decoding program using the update data format book from NASA flight project team.
- Developed S-NPP spacecraft and onboard sensors life time performance demonstration animations to support S-NPP 10-year anniversary celebration activities.
- Improved the OMPS NP 32-day inter-sensor comparison module and prepared for the near real time operational execution for ICVS-LTM
- Reported the NOAA-20 CrIS MW FOV5 NEDT and S-NPP CrIS SSM anomaly events based on the ICVS-LTM monitoring warning message and products
- Worked with GRAVITE and STAR SCDR manager to fix the VIIRS DNB LUT data delivery glitch so as to provide reliable life time VIIRS DNB operational coefficients trending products
- Improved the ICVS-LTM top product metrices web pages with the support from STAR web master.
- Kept organizing ICVS LTM module Git repository to let all modules are version and history control to meet the operational program development requirements.
- Provided near real time S-NPP and NOAA-20 spacecraft and instrument status and data quality monitoring report to support SDR team activities.

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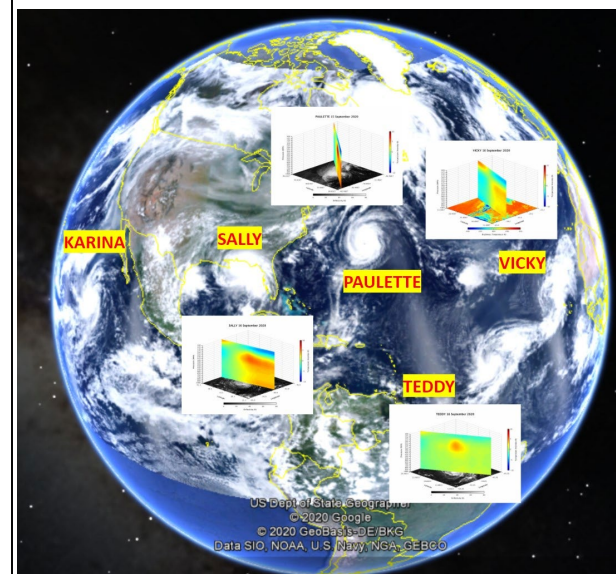4. Project has fallen significantly behind schedule, and/or significantly over budget.

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
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		
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		

Highlights:

Significantly contribute to STAR SDR Teams

S-NPP VIIRS RGB Map Showing 5 Hurricane Cases on 2020-09-04

N20 CrIS MW FOV5 NEDN Anomaly Event

VIIRS Imagery

October, 2021
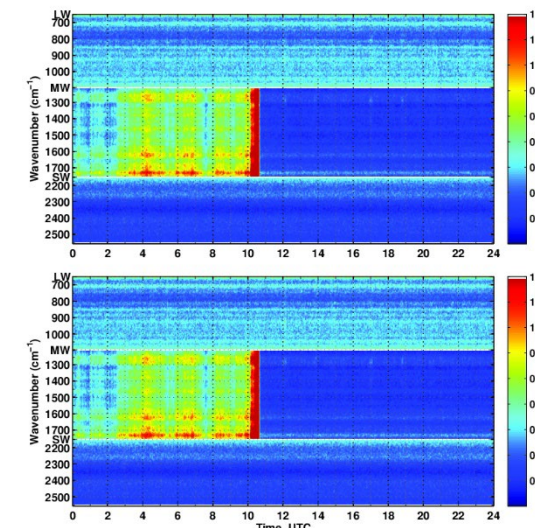
Accomplishments / Events:

- **Two VIIRS updates** are now operational in the Mx4 build, as of **7 Oct 2021**:
  - **NCC banding anomaly fix** affecting otherwise homogenous Arctic scenes.
  - **All 16 M-band EDR Imagery** for the first time in 10 years of VIIRS imagery!
- **The FY22 budget from the JPSS Program looks good,** allowing good level of Imagery Team activity to continue. CIRA and CIMSS have been notified to start preparing their grant proposals for FY22 based on the cal/val allocations from the Imagery Team.
- The Imagery Team is interested in learning about **DQTTs and DQNs,** even though they are not currently being used by Imagery Team members at CIRA.
- 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 Hillger is retiring from federal service at the end of FY21.

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	Oct-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		

Highlights:
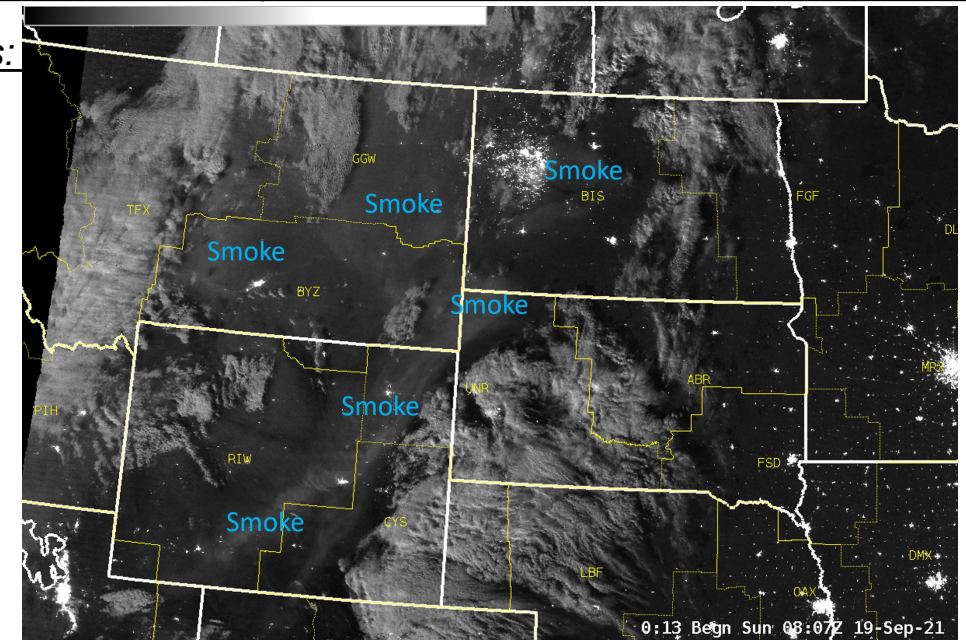
Figure: 0800 UTC 19 Sep 2021 VIIRS DNB NCC with smoke detected and labeled.

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Clouds

Accomplishments / Events:

- The ECM team continued further analysis and training of the DNB thresholds for usage as various classifiers
- The CIRA team publicly launched a new aviation website with a user interface for custom cross-sections based on 3D gridded cloud fields (derived from NOAA Enterprise cloud products and supplementary data for aviation users), https://aviation.cira.colostate.edu. "Manual Entry" for the airport selection and a layered feature for icing/turbulence data were added with updated user docs. Supporting the AK cloud demo, user feedback will be collected through an online survey revised with help from Alaska pilots.

Overall Status:

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

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

Issues/Risks:

None

Milestones:

- ***See next slides***

Highlights:

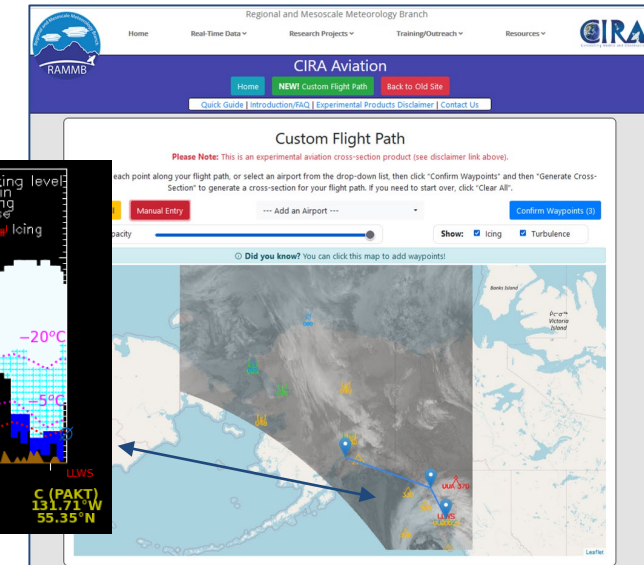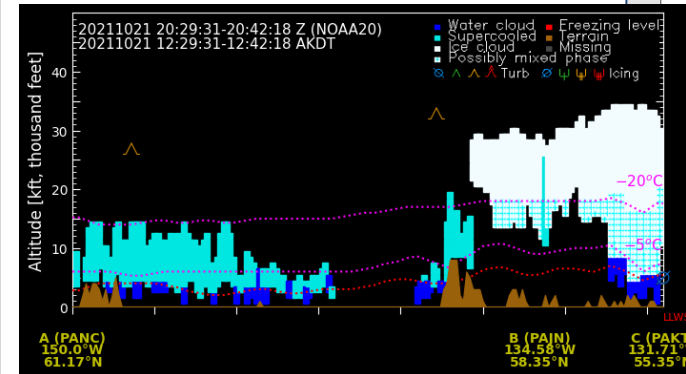Figure 1. The new aviation website for custom cloud cross-sections over Alaska (based on 3D gridded cloud fields) is publicly available at https://aviation.cira.colostate.edu. The new capability to select your own flight path is available in the menu, "Custom Flight Path", and a user can directly click the satellite image to add waypoints or select airports using the dropdown list or "Manual Entry".

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		
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		
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		
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		
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		
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		
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 82° (degraded between 75-82° 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 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		
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

Accomplishments / Events:

*Team member Shobha Kondragunta recognized with multiple awards over 2021:

- The NOAA Administrator's Award "For developing a critical capability using NOAA satellite assets to benchmark the impact of COVID-19 pandemic on economic activity and air quality."

- Two group DOC Bronze Medals, "For the development of the Global Ensemble Forecast System – Aerosols (GEFS-Aerosols) model to support air quality alerts and visibility forecasts." and "For expeditiously and skillfully coordinating research that leveraged the unique scientific opportunity resulting from the COVID-19 global pandemic."

- The 2021 NESDIS Collaboration Award for her work in support of GeoXO User Engagement.

- Eight journal articles were published, and four others are currently under 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.
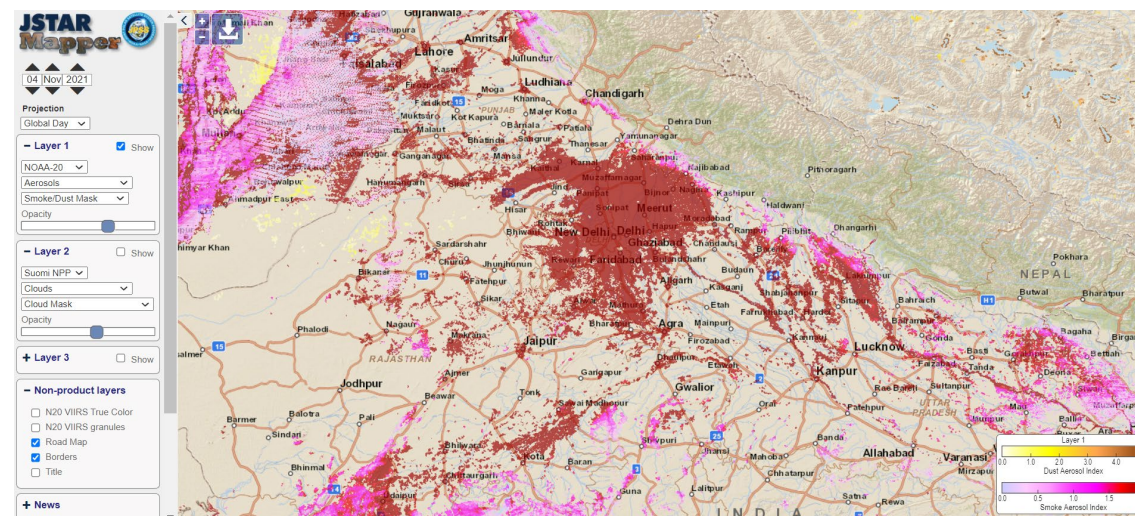4. Project has fallen significantly behind schedule, and/or significantly over budget.

Issues/Risks:

No risks

Milestones:

- **_See next slides_**

Highlights: Aerosol/Smoke index over Delhi on Nov 4, 2021 (Dewali) from JSTAR Mapper.

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		
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		
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

Accomplishments / Events:

- Lessons learned presentation given to STAR regarding agile techniques used with VOLCAT
- Maintained and verified quality of S-NPP and NOAA-20 Volcanic Ash products (JPSS EDR and VOLCAT)

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

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		
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: VOLCAT will soon be distributed via GEONETCast Americas Rebroadcast users (Target date November 2021)

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What is GEONETCast Americas?

GEONETCast Americas (GNC-A) is the Western Hemisphere component of GEONETCast, a near real time, global network of satellite-based data dissemination systems designed to distribute space-based, air-borne and in situ data, metadata and products to diverse communities.

This user-driven, user-friendly and low-cost information dissemination service aims to provide global information as a basis for sound decision-making in a number of critical areas, including Biodiversity and Ecosystem Sustainability; Disaster Resilience; Energy and Mineral Resources Management; Food Security and Sustainable Agriculture; Infrastructure and Transportation Management; Public Health Surveillance; Sustainable Urban Development and Water Resources Management. Accessing and sharing such a range of vital data will yield societal benefits through improved human health and well-being, environment management and economic growth.

Cryosphere
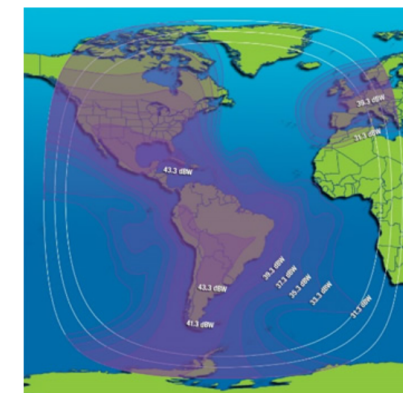
Accomplishments / Events:

 * Monitoring the yearly changes of the minimum snow extent over Greenland with VIIRS snow cover observations, see Highlight

* Held PMR

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

Issues/Risks:

None

Highlights: Monitoring minimum snow extent over Greenland, 2019, 2020 and 2021 are 3 lowest years between 2014-2021.
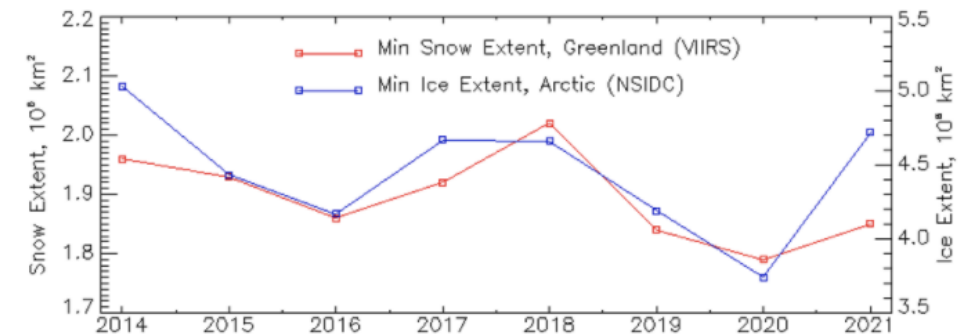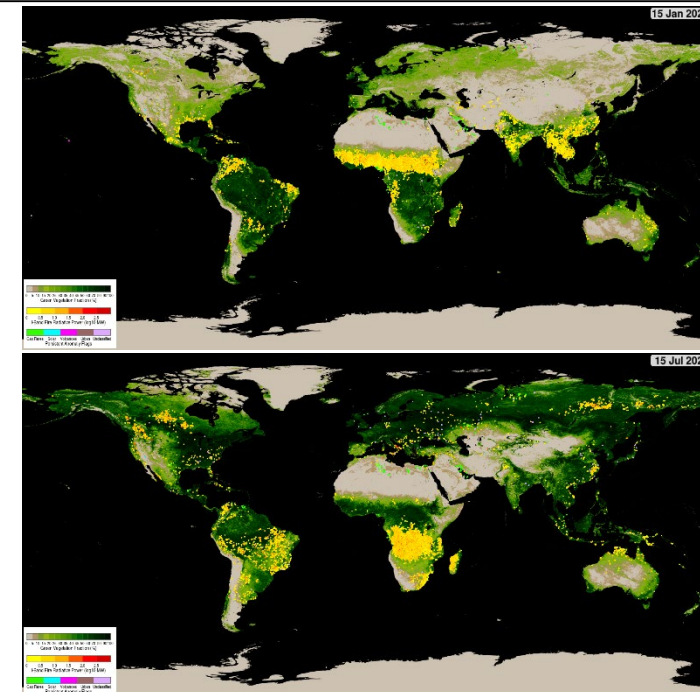

Figure 2. Times series of yearly minimum snow extent in Greenland compared to corresponding changes of the yearly minimum ice extent in the Arctic for 2014-2021.

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		
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		
Ice concentration from Day-Night-Band	Sep-22	Sep-22		
Implement the I-band ice products	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		

Active Fires

Accomplishments / Events:

- The team has worked 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 (STAR), Wilfrid Schroeder (OSPO), Louis Giglio (UMD) and Christopher Schmidt (CIMMS/SSEC/UW-Madison) are among the co-authors of the paper "Satellite remote sensing of active fires: History and current status, applications and future requirements", published in Remote Sensing of Environment (https://doi.org/10.1016/j.rse.2021.112694)
- The EDR fire team, working together with Tom Atkins, created an animation of one full year of fire activity over a background of VIIRS green vegetation fraction. The animation illustrates well the seasonality of fire activity across the globe. The animation featured Suomi NPP data to celebrate the 10-year anniversary of the launch of the satellite. The daily global images were extracted from JSTAR Mapper (see highlight)

Overall Status:

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

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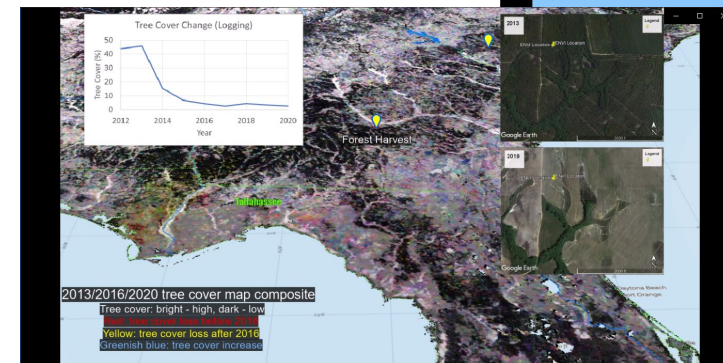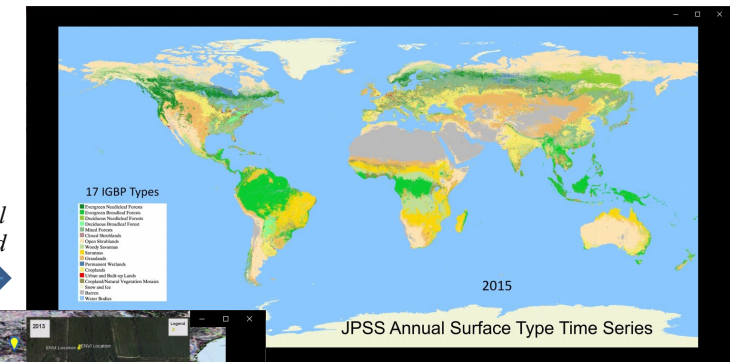
Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY21 End of Year Science Team Presentations (PMR)	Oct-21	Oct-21	11/05/21	
FY23 Program Management Review	Jun-22	Jun-22		
Final J2 ready DAP to NDE (include NPP/N20 updates)	Dec-21	Dec-21		
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: Seasonality of global fire activity as shown by the VIIR I-band active fire product

Global Suomi NPP VIIRS I-band fire radiative power data over a Green Vegetation Fraction (GVF) background from January 15, 2021 (top) and July 15, 2021 (bottom). The snapshot images show marked seasonality of fire activity both in the tropics (e.g. sub-Saharan Africa) and extratropics (e.g. Siberia, North America).

Surface Type

Accomplishments / Events:

– STAR-UMD VIIRS Surface Type team has processed S-NPP and NOAA-20 VIIRS granule surface reflectance data acquired in October 2021 for the production of AST-2021.

– In support of the SNPP 10 Years Anniversary, the team created videos to highlight the time series of Annual Surface Type (AST) maps that have been derived from VIIRS data acquired since 2012.

– The team will present an end of year achievement summary for FY21 at the Fall program management review meeting.

Overall Status:

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

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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	10/29/21	
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:

To celebrate the 10-year's anniversary of SNPP, the team created videos to highlight surface type products derived from VIIRS.

Video 1: Time series of global annual surface type (AST) maps developed from 2012 to 2020

Video 2: A prototype tree cover product developed using VIIRS data for CONUS can capture forest changes due to fire, logging and other large scale disturbance events.

Surface Reflectance

Accomplishments / Events:

- Keep monitoring the S-NPP and NOAA20 SR product by daily routine global image. Working on promoting the images to the Land Product team website to display the product.
- Validated the SR product using the new updated data (July to September, 2021) for both AERONET validation and cross-comparison with VNP09GA at BELMANIP2 sites.
- Local test the final J2 DAP delivered from NASA science team.
- Improve the local experimental L3 SR to make it more configurable, and efficient in quick check of the single band SR and QF.
- Generated daily I1, I2 and I3 global gridded 500m SR dataset for LAI algorithm test.

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

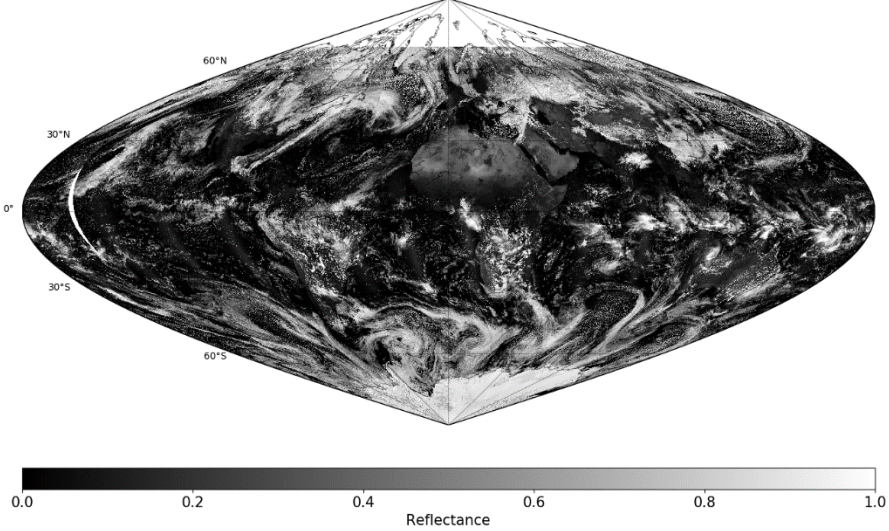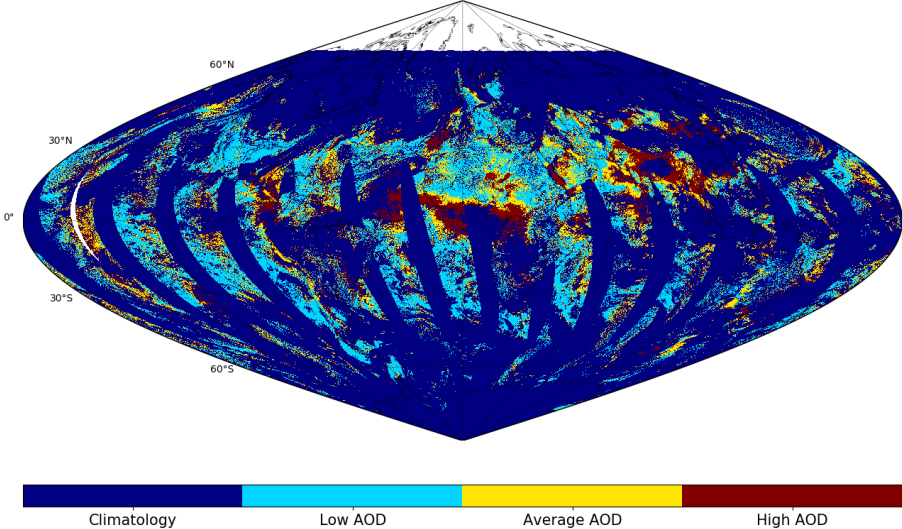| Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY21 End of Year Science Team Presentations (PMR)	Oct-21	Oct-21	11/03/21	
FY23 Program Management Review	Jun-22	Jun-22		
Final J2 ready DAP to NDE (include NPP/N20 updates)	Oct-21	Oct-21	10/07/21	
Continue to validate 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:

Oct 01, 2021
by Suomi-NPP
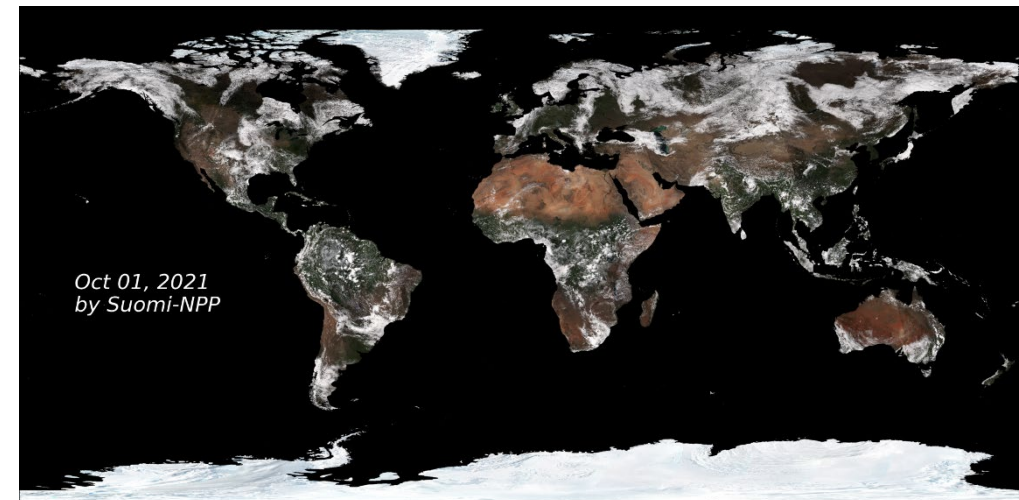
- SNPP VIIRS daily SR product for website.

L3 experimental SR monitoring and quick check

True color image for NOAA land product team website:
Land surface only in Lat/Lon projection (upper). and global in sinusoidal projection (bottom).

NOAA20 VIIRS Gridded SR I1 20200207

Reflectance

NOAA-20 VIIRS v1r1 AOD QF 20200207

Climatology   Low AOD   Average AOD   High AOD

Oct 01, 2021
by Suomi-NPP

S-NPP VIIRS Daily SR 20210807

Land Surface Temperature
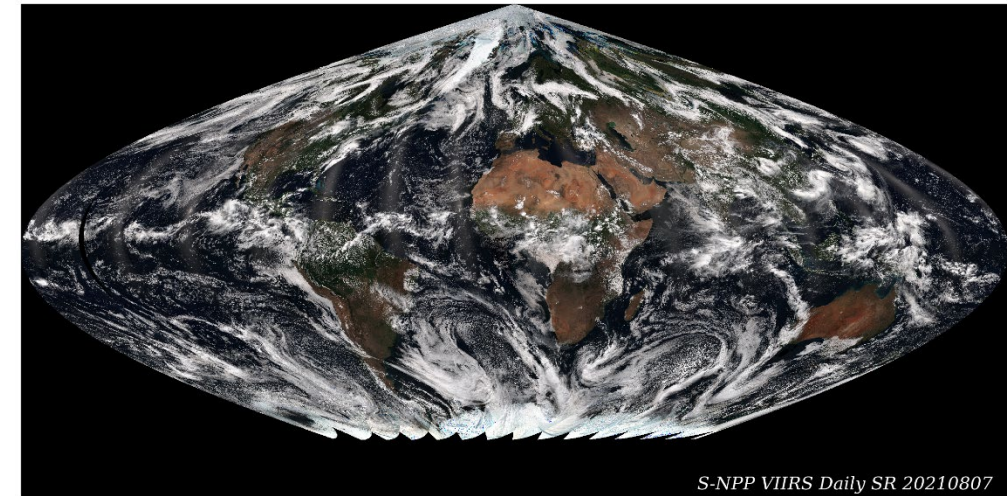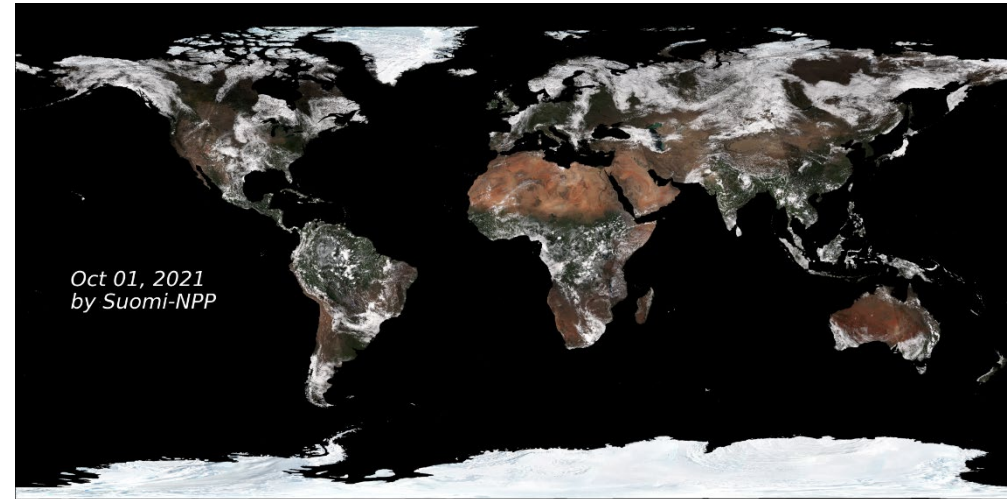
Accomplishments / Events:

- Completed the verification of the J2 VIIRS LST DAP integration. Related issues have been fixed.
- Finished and tested the script for daily global granule LST generation using framework. The newly generated LUT is used as an input.
- Performed the algorithm test based on the updated simulation database. Extended the LST LUT evaluation by including the global cross comparison with VNP21 LST at granule level. (slide 2-3)
- Improved the regression procedure with respect to the gaussian filter settings. In addition, prepared and tested new emissivity pairs based on the multi-year land surface emissivity climatology and related publications. (slide 4 & 5)
- Updated the STAR LST product webpage contents.
- Further revised the book chapter manuscript following the comments.

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	Dec-21	Dec-21		
ATBD update	Dec-21	Dec-21		
DAP update support to ASSISTT	Jan-22	Jan-22		
Manuscript ready for Remote Sensing special issue "VIIRS 2011–2021: Ten Years of Success in Earth Observations"	Apr-22	Apr-22		
All weather LST generation based on the microwave LST and VIIRS LST: methodology development and experiment	May-22	May-22		
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: NOAA LSE comparison with VNP21 LSE
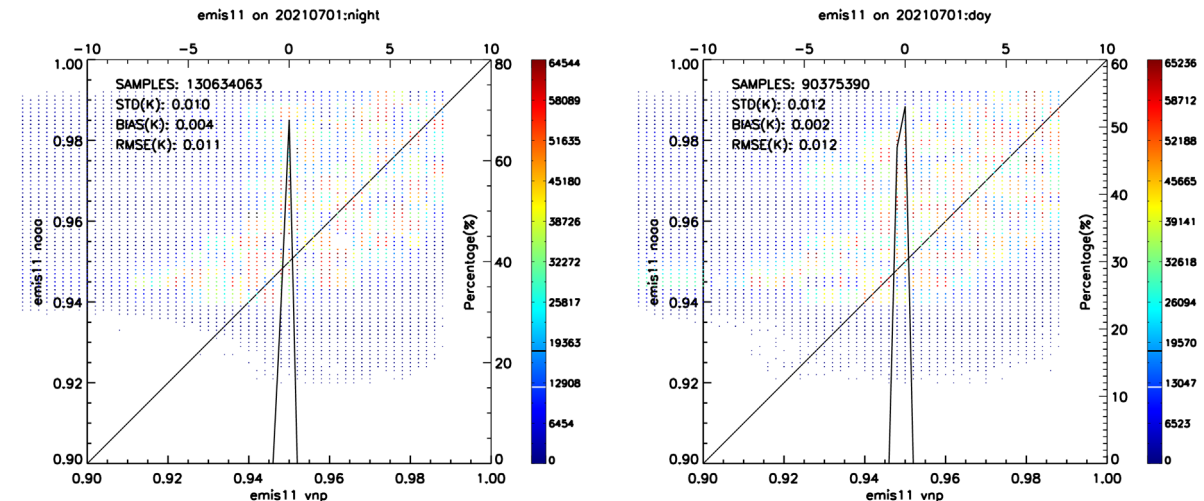
- All granules on day 07/01/2021 were used in the comparison.

Comparison with VNP21 LST-Emissivity- New LUT test
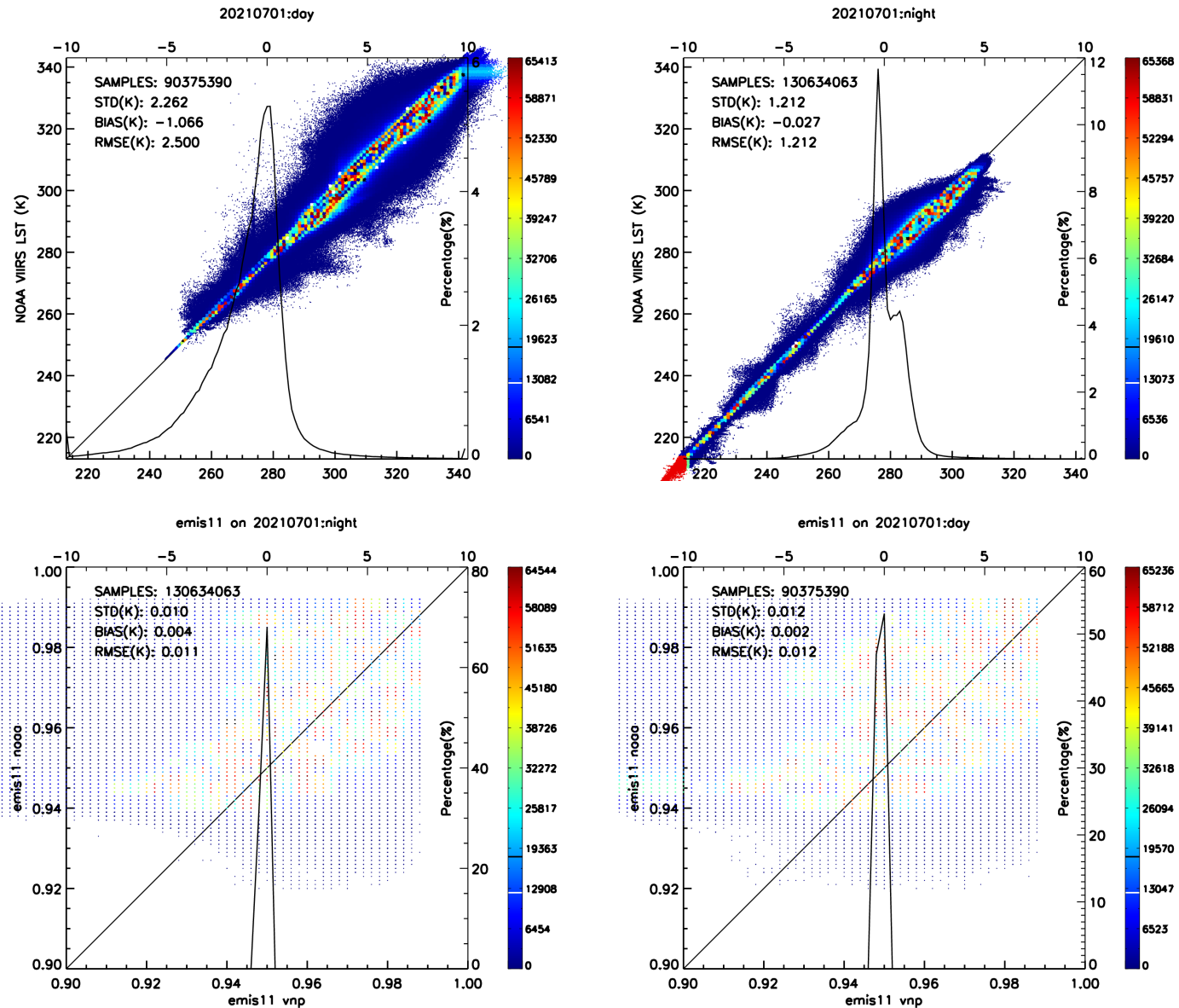
- The daily VIIRS granule LST is generated using framework, in which the new LUT is used as input.
- All granules are involved in the comparison
- Corresponding pixels are compared under following conditions:
  - Both cloud clear, VNP21 is in good quality, all output item is in valid range

- Nighttime is nearly no bias
- NOAA SNPP VIIRS LST is on average 1 K colder than VNP21 LST at daytime. The deviation is more obvious under warm temperature over 290K
- Outliers are observed for both daytime and nighttime particularly under warm temp
- VNP21 emissivity presents very low observations below 0.9, while NOAA LSE is always within the range of 0.92 to 0.99
- NOAA LSE is on average larger than VNP21 LSE for both daytime and nighttime with RMSE close to 0.01.

Comparison with VNP21 LST-Emissivity- New LUT test

date	d/n	<=-5	[-5,-4]	[-4,-3]	[-3-2]	[-2,-1]	[-1,0]	[0,1]	[1,2]	[2,3]	[3,4]	[4,5]	>=5
20210701	night	0.262	0.465	1.246	3.439	7.08	42.638	30.449	12.083	1.303	0.414	0.239	0.384
20210701	day	5.205	3.659	6.273	9.998	16.108	27.173	24.526	4.19	1.192	0.569	0.346	0.763

- Nighttime: 73% within 1 K difference; 92% within 2K difference
- Daytime: 52% within 1K difference; 72% within 2K difference

Major surface type comparison:
- Nighttime: cold bias over barren and savanna surface ; warm bias over cropland
- Daytime: cold bias over barren, open shrub land, grassland and savanna surface
- Evergreen_Broadleaf
- Positive significant Emissivity bias over Evergreen broadleaf forest.

date	d/N	stName	samples	lst_bias	lst_std	lst_rmse	emi_bias	emi_std	emi11_rmse
20210701	night	Snow-ice	25335	0.33	0.14	0.36	0.008	0.002	0.008
20210701	night	Barren	6378165	-1.87	1.15	2.19	0.008	0.009	0.012
20210701	night	InlandWater	2423	0.29	0.3	0.42	0.005	0.004	0.006
20210701	night	Openshrub	2449812	-0.26	0.5	0.56	-0.003	0.005	0.006
20210701	night	Evergreen_Broadleaf	605037	0.42	1.05	1.13	0.017	0.012	0.021
20210701	night	Grassland	503333	-0.19	0.82	0.84	0.001	0.009	0.009
20210701	night	Cropland	128238	0.88	0.38	0.96	0.002	0.005	0.005
20210701	night	Savanna	297764	-0.7	1.05	1.26	0.006	0.011	0.012
20210701	day	Snow-ice	1468851	0.05	0.41	0.41	0.007	0.003	0.008
20210701	day	Barren	9918539	-3.17	2.3	3.92	0.008	0.012	0.015
20210701	day	InlandWater	10219	0.07	0.61	0.62	0	0.005	0.005
20210701	day	Openshrub	2475381	-1.3	0.92	1.59	-0.008	0.007	0.01
20210701	day	Evergreen_Broadleaf	403200	0.32	0.88	0.93	0.008	0.008	0.011
20210701	day	Grassland	396700	-0.94	1.46	1.74	-0.002	0.01	0.01
20210701	day	Cropland	82985	-0.14	0.87	0.88	0.007	0.008	0.011
20210701	day	Savanna	238871	-0.95	1.93	2.16	0.007	0.015	0.017

Emissivity setting evaluation

SURFRAD

New emissivity settings

site	cnt	bias	rmse	cnt(d)	bias(d)	rmse(d)	cnt(n)	bias(n)	rmse(n)
BND	1361	0.57	1.93	232	0.28	2.51	1129	0.63	1.79
DRA	2191	-0.62	1.74	889	0.16	1.89	1302	-1.15	1.62
FPK	1546	0.08	1.74	596	0.08	1.67	950	0.07	1.78
PSU	694	0.81	2.04	151	0.48	1.5	543	0.9	2.17
SXF	1647	0.4	2	536	-0.26	2.33	1111	0.72	1.81
TBL	1393	0.04	1.62	367	0.64	2.17	1026	-0.18	1.38

Previous emissivity settings

site	cnt	bias	rmse	cnt(d)	bias(d)	rmse(d)	cnt(n)	bias(n)	rmse(n)
BND	1361	0.31	1.85	232	0.08	2.33	1129	0.36	1.74
DRA	2191	-1.08	1.96	889	-0.22	1.85	1302	-1.68	2.03
FPK	1546	0.04	1.7	596	0.16	1.65	950	-0.04	1.73
PSU	694	0.74	1.95	151	0.51	1.52	543	0.81	2.05
SXF	1647	0.41	1.96	536	-0.16	2.25	1111	0.68	1.8
TBL	1393	-0.14	1.61	367	0.58	2.09	1026	-0.4	1.39

- The new emissivity setting is referred to the publication by SC Freitas, IF Trigo, JM Bioucas-Dias, FM Gottsche, Quantifying the uncertainty of land surface temperature retrievals from SEVIRI/Meteosat IEEE Transactions on Geoscience and Remote Sensing 48 (1), 523-534. There are total 22 emissivity pairs
- It is evaluated through the LUT validation against the ground observations from SURFRAD and BSRN.
- The major impact is on the semi-arid site over DRA and barren surface site over GOB. The LST retrieved is warmer than the previous emissivity setting for both daytime and nighttime.

New Emissivity setting

Original Emissivity setting

GOB:20160101-20201231 (New Emissivity setting)
R= 0.995
SAMPLES: 1953
STD(K): 1.70
BIAS(K): 0.66
RMSE(K): 1.83
Night(1076): 0.05; 1.02
Day(877): 1.40; 2.05

GOB:20160101-20201231 (Original Emissivity setting)
R= 0.995
SAMPLES: 1953
STD(K): 1.69
BIAS(K): -1.35
RMSE(K): 2.16
Night(1076):-1.97; 1.04
Day(877):-0.58; 1.99

BSRN

CAB:20160101-20201231 (New)
R= 0.975
SAMPLES: 709
STD(K): 2.45
BIAS(K): 0.13
RMSE(K): 2.45
Night(451): 0.92; 1.61
Day(258):-1.26; 3.00

CAB:20160101-20201231 (Original)
R= 0.975
SAMPLES: 709
STD(K): 2.40
BIAS(K): 0.42
RMSE(K): 2.43
Night(451): 1.19; 1.55
Day(258):-0.93; 2.96

Emissivity pairs from LSE climatology with different projections

Lat/lon Projection

No	Emi11	Emi12	Samples	percentage
1	0.985	0.9725	28104079	21.888
2	0.985	0.97375	8590980	6.691
3	0.9875	0.98875	3029058	2.359
4	0.9675	0.97125	2165610	1.687
5	0.9825	0.9725	1971517	1.535
6	0.98375	0.9725	1544379	1.203
7	0.9675	0.9725	1488878	1.16
8	0.98375	0.97375	1436494	1.119
9	0.97125	0.9725	1378902	1.074
10	0.9725	0.9775	1259789	0.981
11	0.98125	0.9825	1252603	0.976
12	0.9775	0.9775	1249209	0.973
13	0.9775	0.9825	1101527	0.858
14	0.965	0.97125	1048428	0.817
15	0.97625	0.9775	1043351	0.813
16	0.9725	0.975	1032161	0.804
17	0.9725	0.9725	993803	0.774
18	0.9475	0.9675	976881	0.761
19	0.97	0.9725	976039	0.76
20	0.97125	0.975	961977	0.749

Sinusoidal Projection

No	Emi11	Emi12	Samples	percentage
1	0.985	0.9725	5463735	6.596
2	0.9875	0.98875	3417562	4.126
3	0.985	0.97375	2158229	2.605
4	0.9675	0.97125	2150516	2.596
5	0.9675	0.9725	1399350	1.689
6	0.97125	0.9725	1137418	1.373
7	0.9725	0.9775	1137372	1.373
8	0.965	0.97125	1049534	1.267
9	0.9775	0.9825	1039445	1.255
10	0.9475	0.9675	1034415	1.249
11	0.9525	0.9675	970944	1.172
12	0.98125	0.9825	958474	1.157
13	0.9825	0.9725	887179	1.071
14	0.97125	0.975	880881	1.063
15	0.9675	0.97	879638	1.062
16	0.96875	0.97125	857683	1.035
17	0.97	0.9725	856411	1.034
18	0.96875	0.9725	832428	1.005
19	0.9775	0.9775	824818	0.996
20	0.98625	0.9875	821009	0.991

- Emissivity global distribution based on the LSE climatology in lat/lon projection (left) and Sinusoidal projection(right)
- Dramatic percentage difference caused by the projection of the data source. It mainly affects the statistics over high latitude such as snow & ice over Antarctic area
- The emissivity pair obtained from Sinusoidal projection LSE is more reasonable so it will be used for the algorithm test.

Surface Albedo

Accomplishments / Events:

- Finished testing the VIIRS BRDF algorithm
  - Finalized the priority of various BRDF methods according to performance
  - Defined the Quality Flag of BRDF
  - Implemented the code to generate spectral and broadband albedos
  - Initiate the variables and fill the out-of-range values in all variables
  - Scale the output to short type
  - Evaluated the BRDF, albedo, NBAR using the NASA VIIRS product
- Finished the global snow-free VIIRS BRDF climatology generation
- Updated the PMR slides for FY21

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	Dec-21	Dec-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		

Highlights:

The shortwave albedo are consistent between local BRDF generated result and the counterpart product.

VIIRS BRDF algorithm

The VIIRS BRDF algorithm:
- The product provides spectral BRDF, albedos, NBAR, and the related Quality Flag.
- The right figure shows the flowchart of VIIRS BRDF algorithm
- The lower figure lists the quality flag definition of the current BRDF, which also determines the albedo and NBAR quality.
- The current algorithm provides consistent results with NASA BRDF product considering the difference in the Surface reflectance.
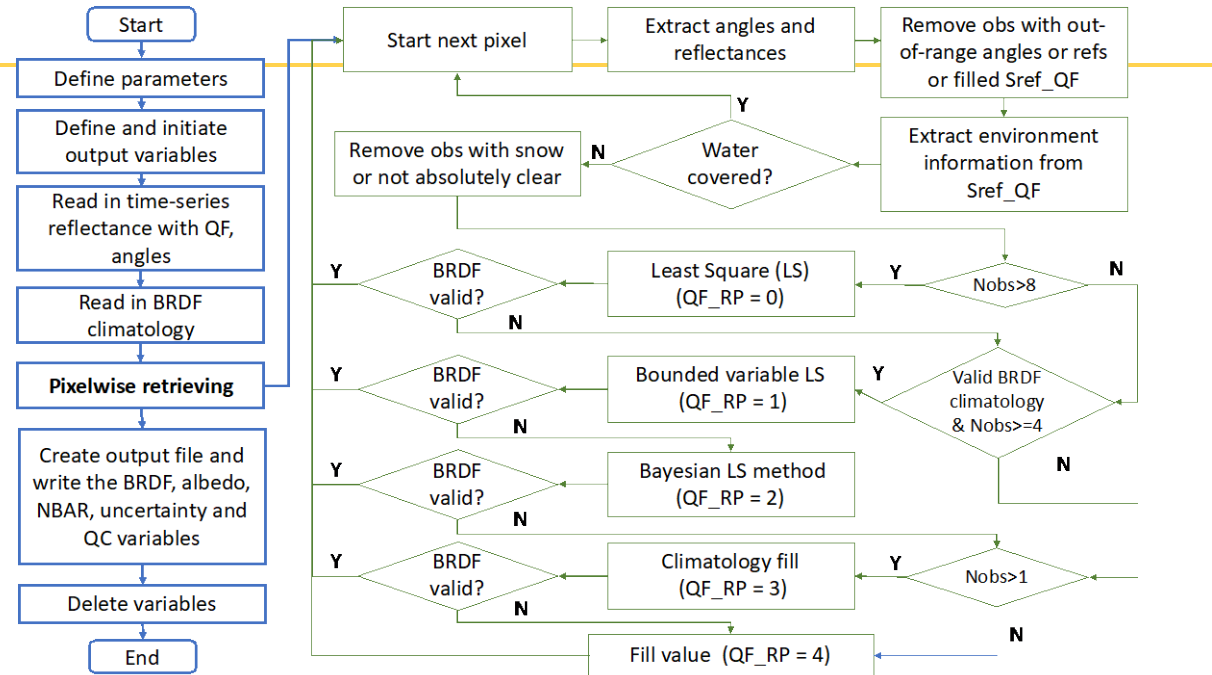
Byte	Bit	Description	How flag is set
0	0~1	Overall Quality	00: High quality retrieval (sufficient observations with small RMSE) 01: Medium quality retrieval (sufficient observations with relatively large RMSE)) 10: Low quality but valid retrieval due to insufficient observations 11: fill value
	2~4	Retrieval path	000: Full retrieval using Least-square (LS) method 001: Bounded variable least-squares (BVLS) 010: Bayesian least-square 011: Fill value using historical value 100: Invalid retrieval
	5	Valid observations	0: With clear-sky observations in the current day 1: Without clear-sky observations in the current day
	6	Snow covered	0: Snow-free 1: Snow covered
	7	Spare	

VIIRS land BRDF climatology

- Finished generating the VIIRS BRDF climatology from other historical product to provide prior knowledge for the algorithm.
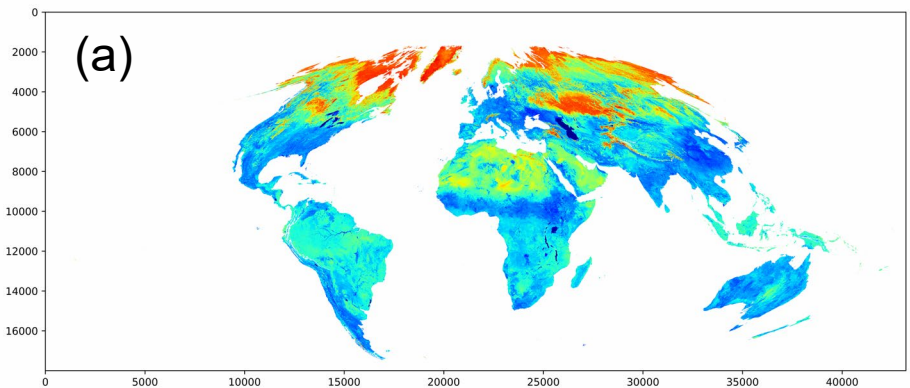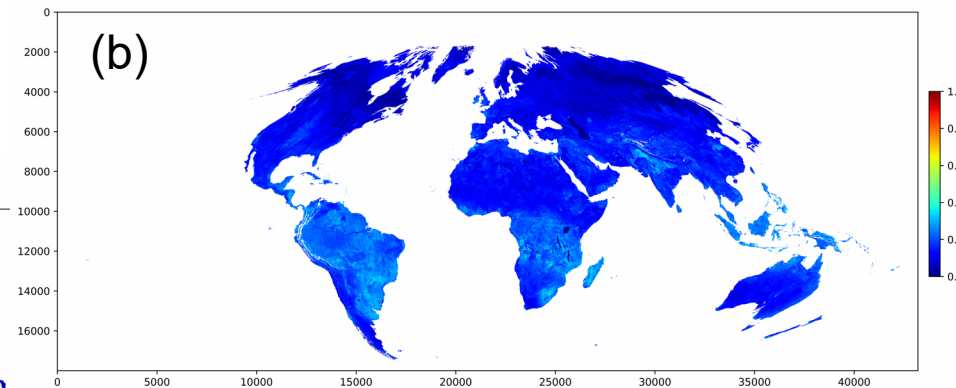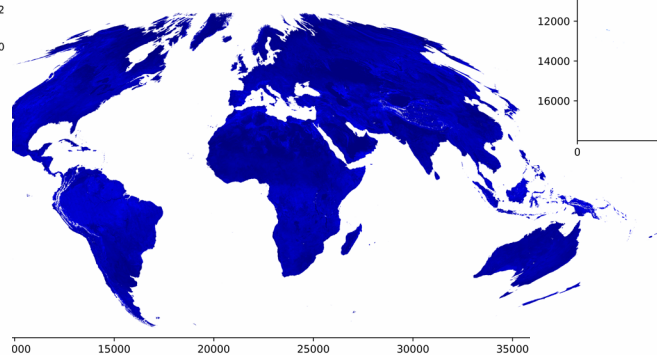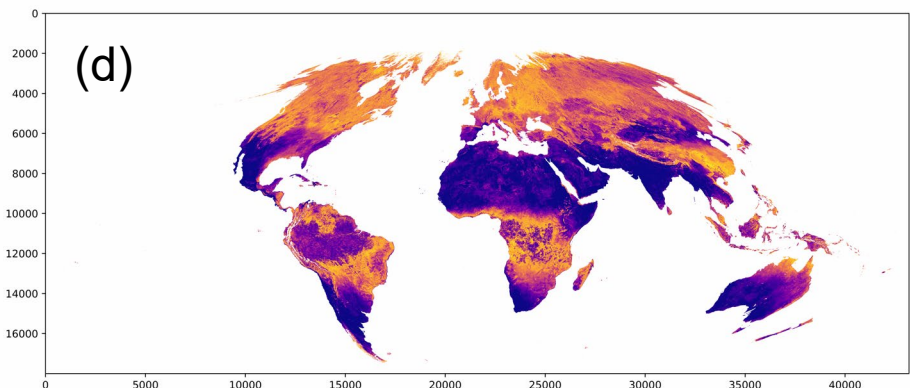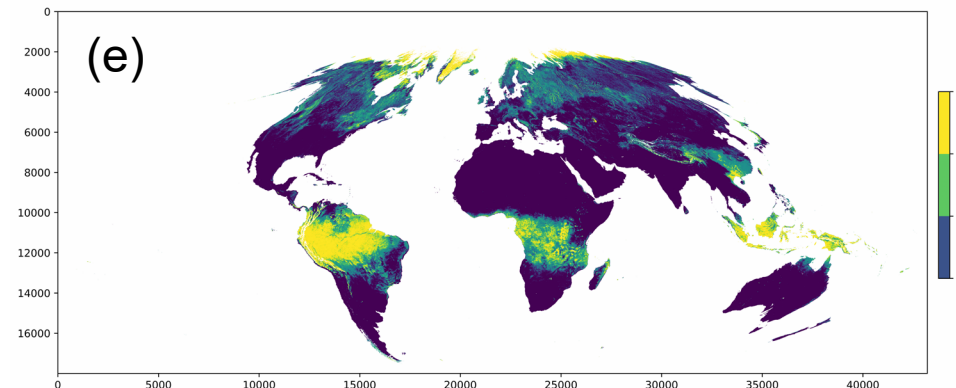
Animations to show the seasonal variation

Figure. BRDF climatology sample: band7 , DOY060. (a) f1; (b) f2; (3) f3; (4) Nobs; (5) QF

Evaluation of the local VIIRS BRDF

- The VIIRS BRDF test and evaluation was conducted on tile h16v21, which is in the western US.
- Comparison with NASA VIIRS product demonstrates the BRDF, albedo, and NBARs are all consistent, especially the infrared bands and broadband result. The visible channels has minor difference which is related to the input data difference.
- The algorithm is being tested in global tiles.
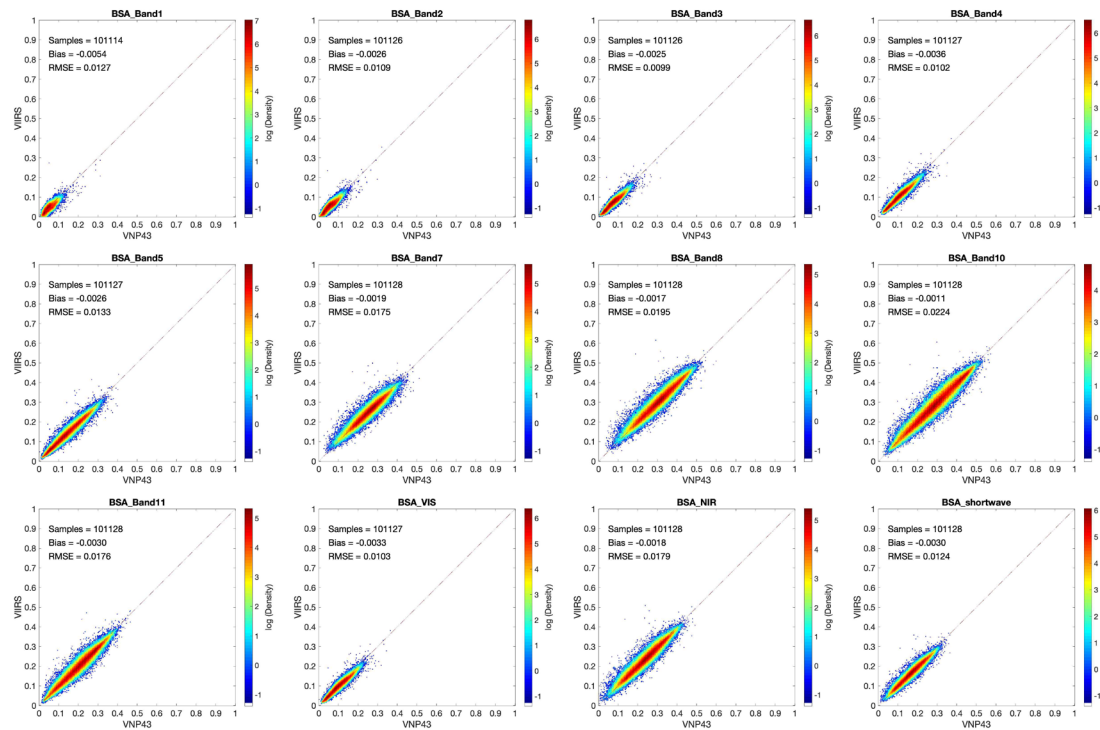
Figure. Scatter plots between our VIIRS BSA and NASA VIIRS BSA products   *Figure. Histogram comparison between our VIIRS BSA and NASA VIIRS BSA products*
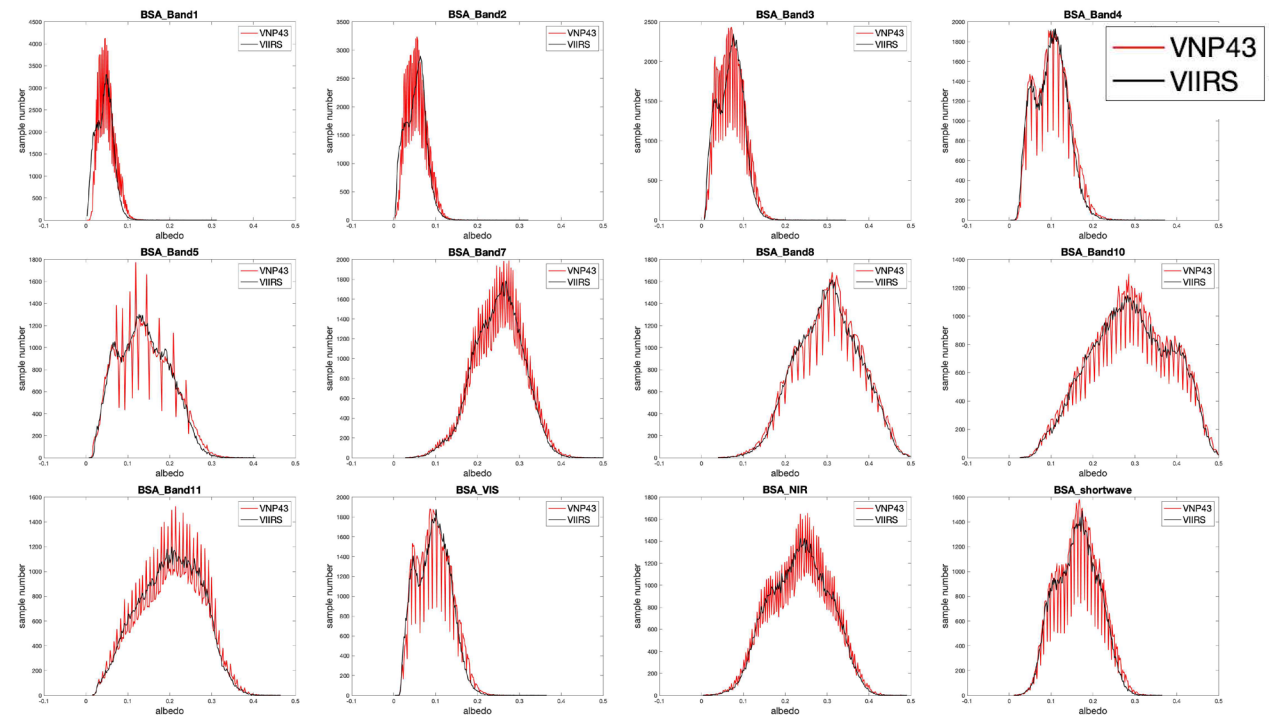
Vegetation Index and Green Vegetation Fraction

Accomplishments / Events:

- Modified the v2r2 GVF code to do gridding first and then cloud filtering and evaluate the difference between the v2r2 GVF and the modified v2r2 GVF due to the difference in the sequence of cloud filtering and gridding
- Tested response of GVF algorithm to use of cloud flag rather than reflectance test for cloud filtering
- Continued work on cal/ val of VI and GVF for year 2020 with comparisons between SNPP and NOAA-20 VIIRS VI and GVF, NOAA and NASA SNPP VIIRS VI, and VIIRS and MODIS VI
- Made composite VI from GOES-R ABI data with solar zenith angle adjusted SAVI algorithm and compared to maximum VI composite ABI and VIIRS VI data.
- Responded to user request for 1km GVF over South America

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

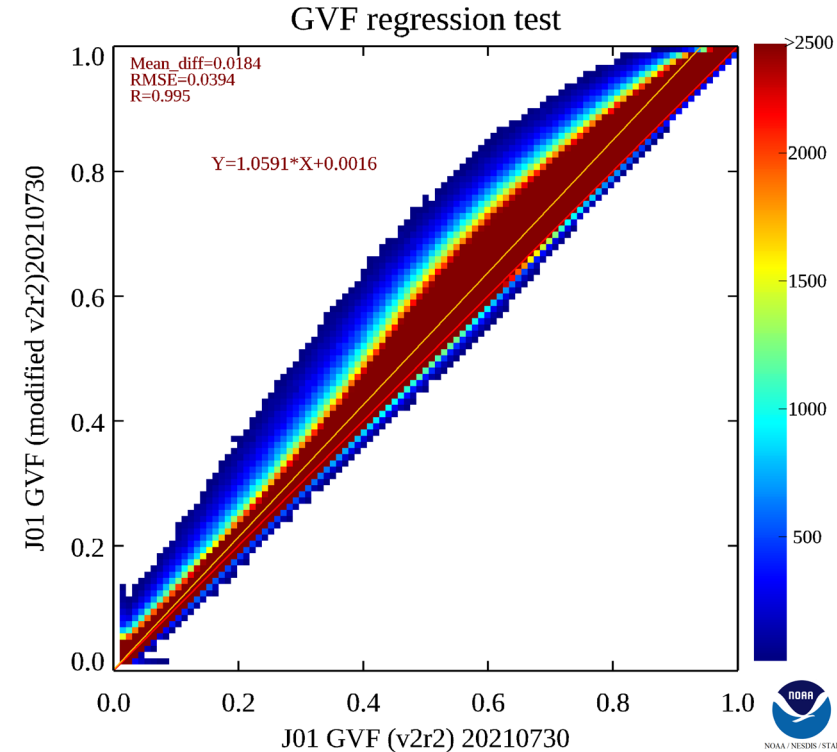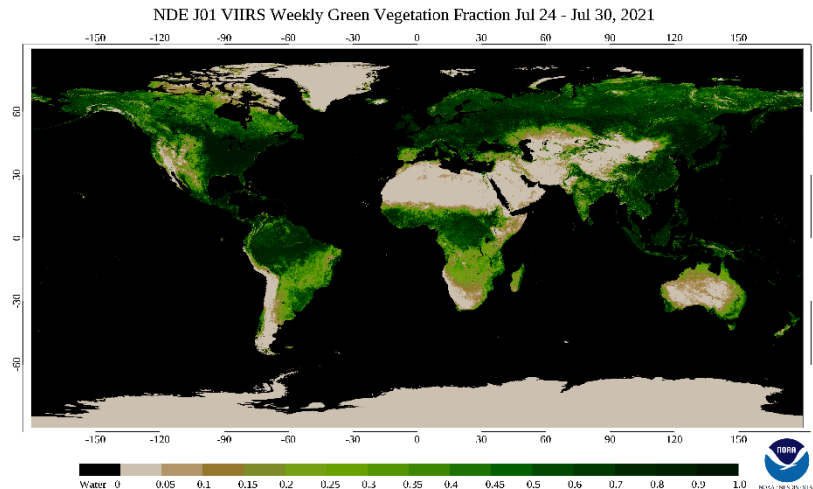| Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY21 End of Year Science Team Presentations (PMR)	Oct-21	Oct-21	10/29/21	
FY23 Program Management Review	Jun-22	Jun-22		
Final J2 ready DAP to NDE (include NPP/N20 updates)	Nov-21	Nov-21		
Prototype code of 1km global 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		
Annual algorithms/ products performance report	Aug-22	Aug-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:

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

Weekly GVF difference (Modified v2r2 - v2r2) Jul 24 - Jul 30, 2021

- The modified the 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 July 1 to July 30 2021

v2r2 GVF

Modified v2r2 GVF

NDE J01 VIIRS Weekly Green Vegetation Fraction Jul 24 - Jul 30, 2021

NDE J01 VIIRS Weekly Green Vegetation Fraction Jul 24 - Jul 30, 2021

GVF regression test

Mean_diff=0.0184
RMSE=0.0394
R=0.995

$Y=1.0591*X+0.0016$

J01 GVF (modified v2r2)20210730

J01 GVF (v2r2) 20210730
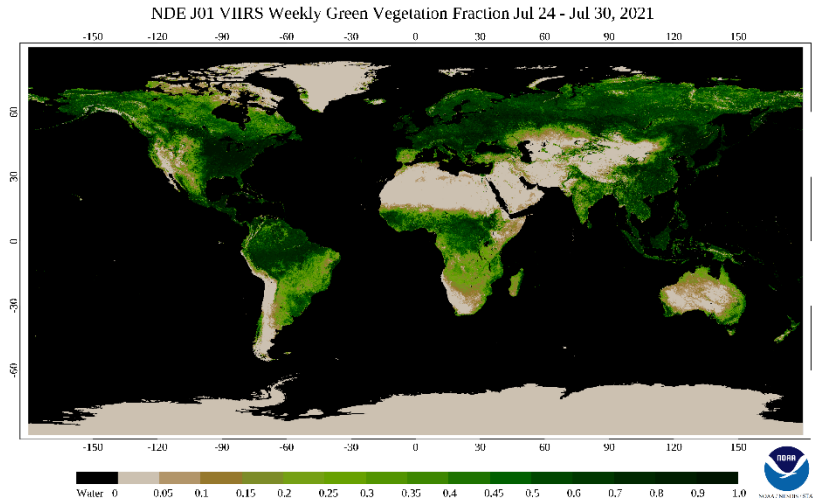
- The slope between modified v2r2 and v2r2 is 1.06, compared to 1.04 in verification 1 and 1.15 in verification 2
- The scatter plot between modified v2r2 and v2r2 is more similar to the previous verification 1

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

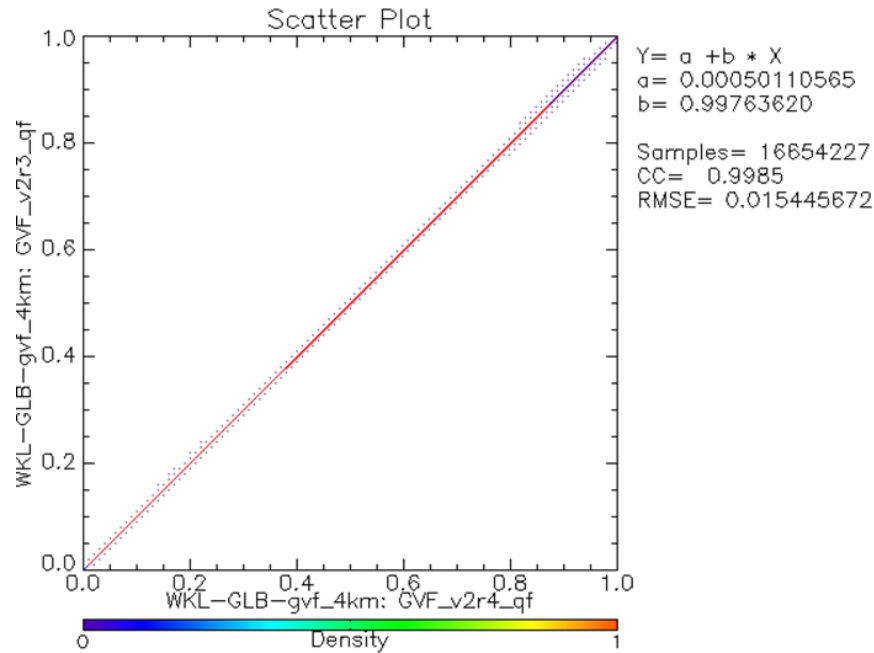Weekly GVF difference (Modified v2r2 - v2r2) Jul 24 - Jul 30, 2021
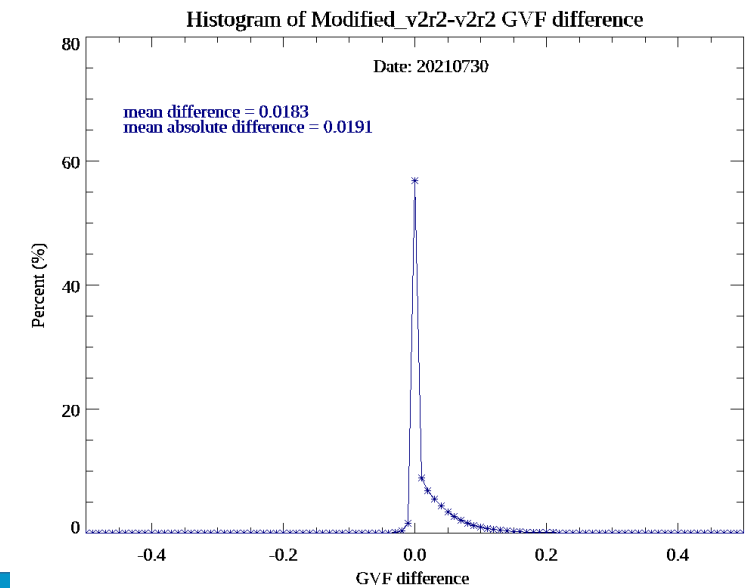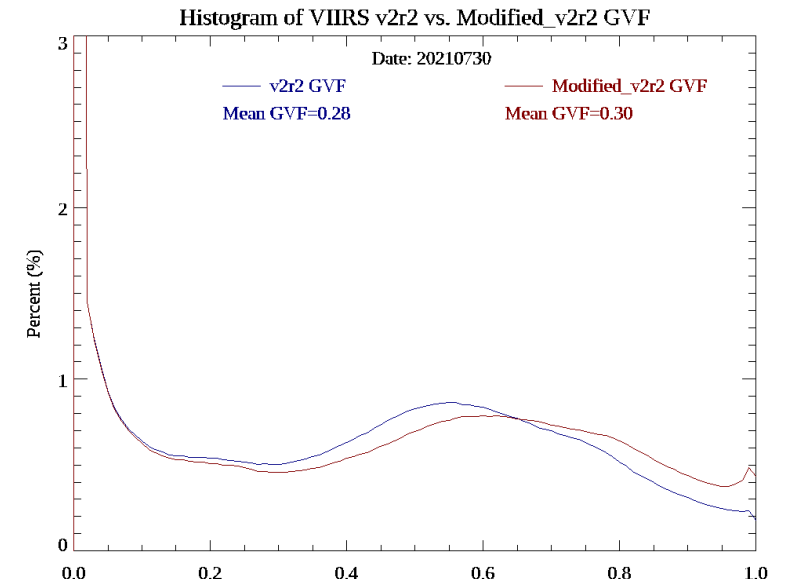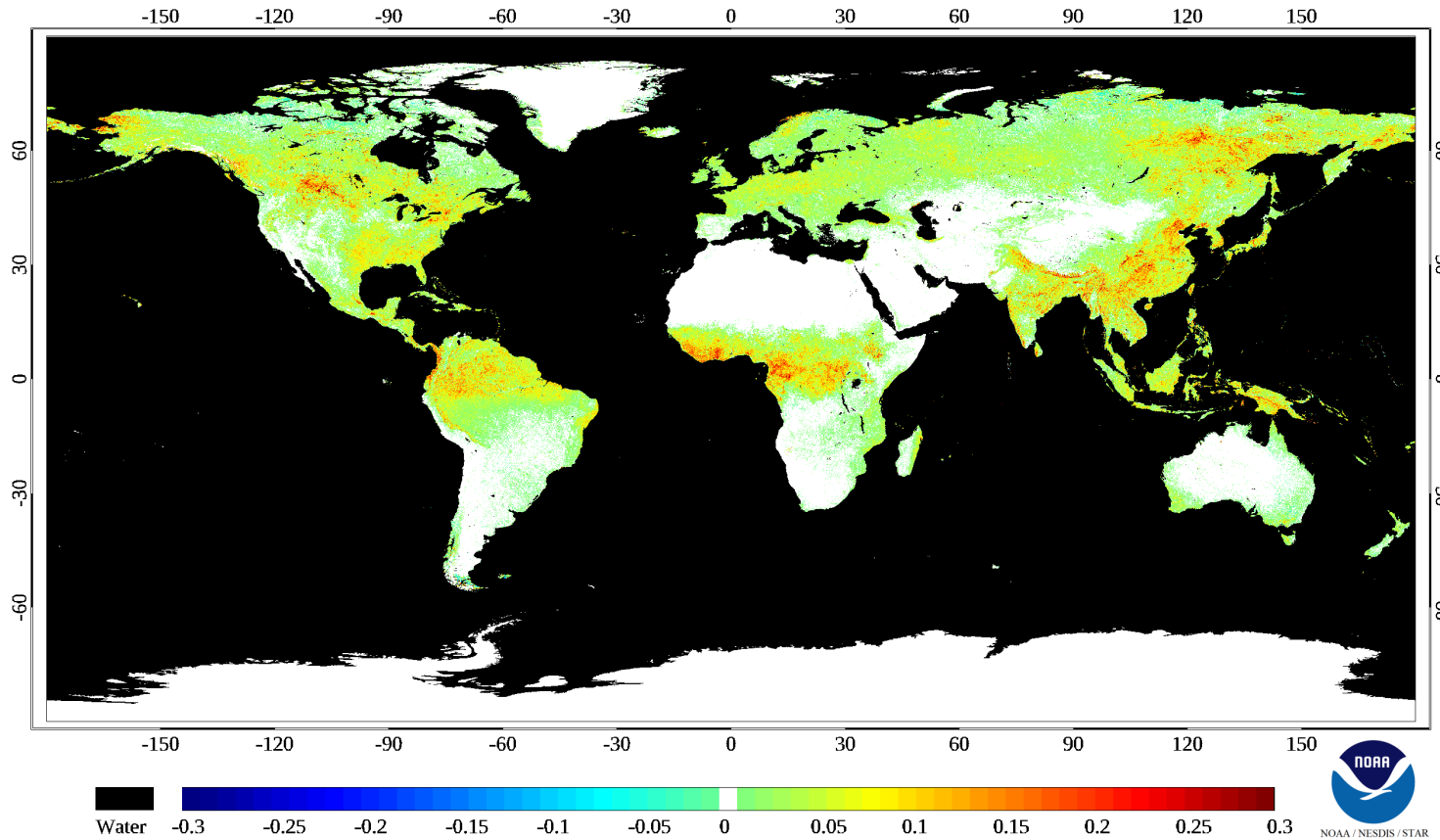
Mean GVF time series at test sites

- Time series of GVF showed the two version of GVF is consistent at some sites (Oregon, Illinois)
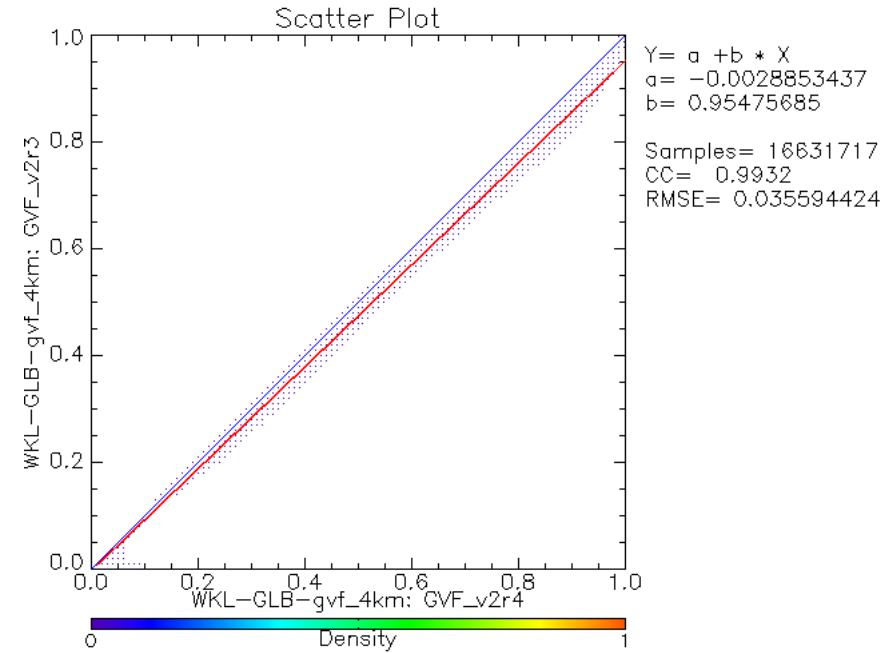- The modified GVF is higher then the original GVF
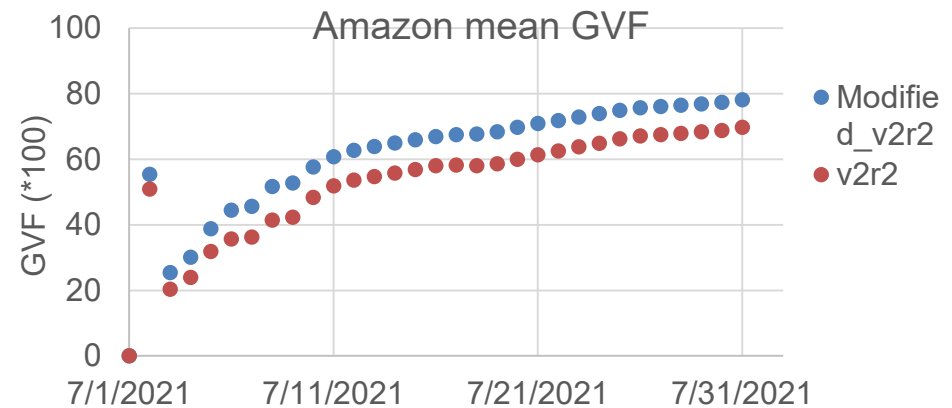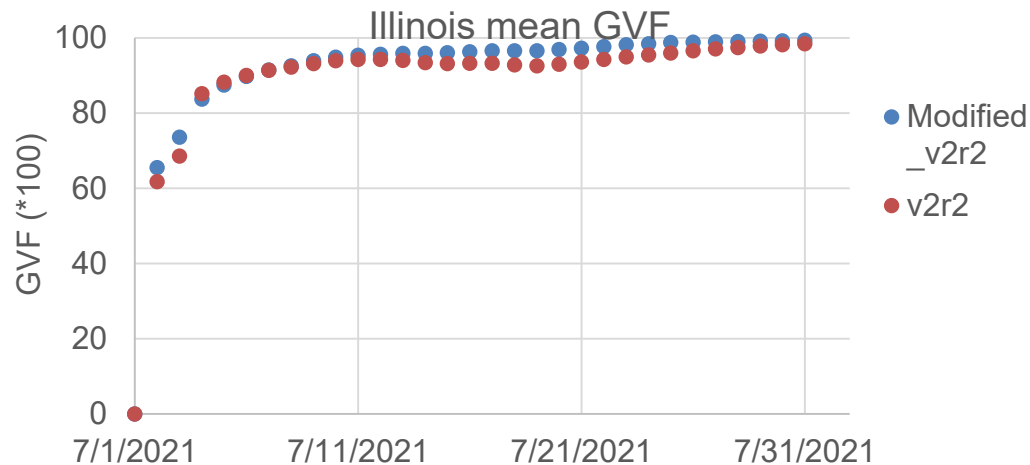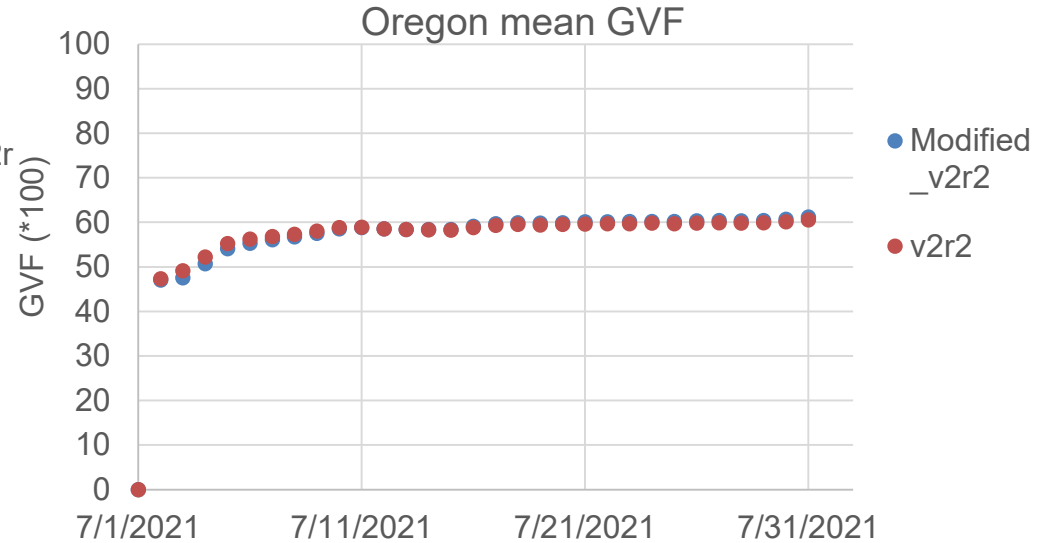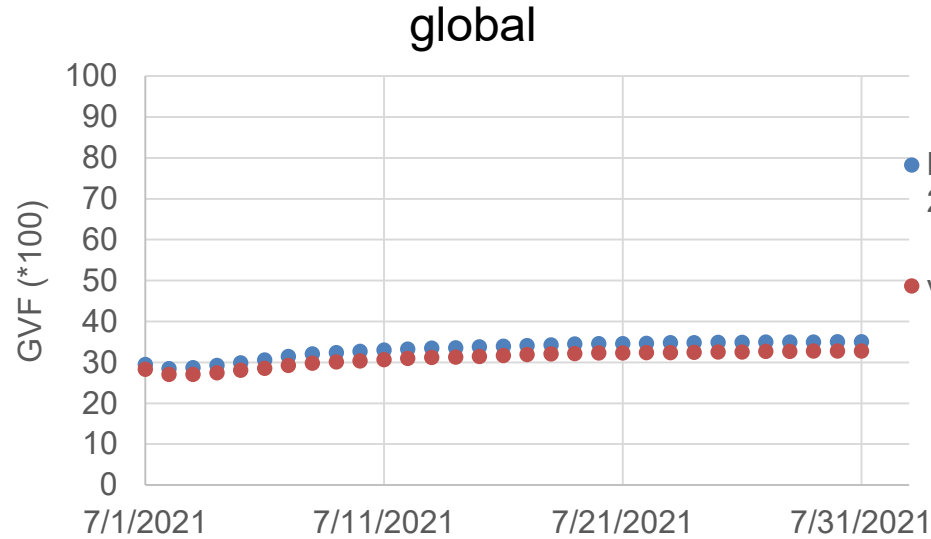
global

Oregon mean GVF

Illinois mean GVF

Amazon mean GVF
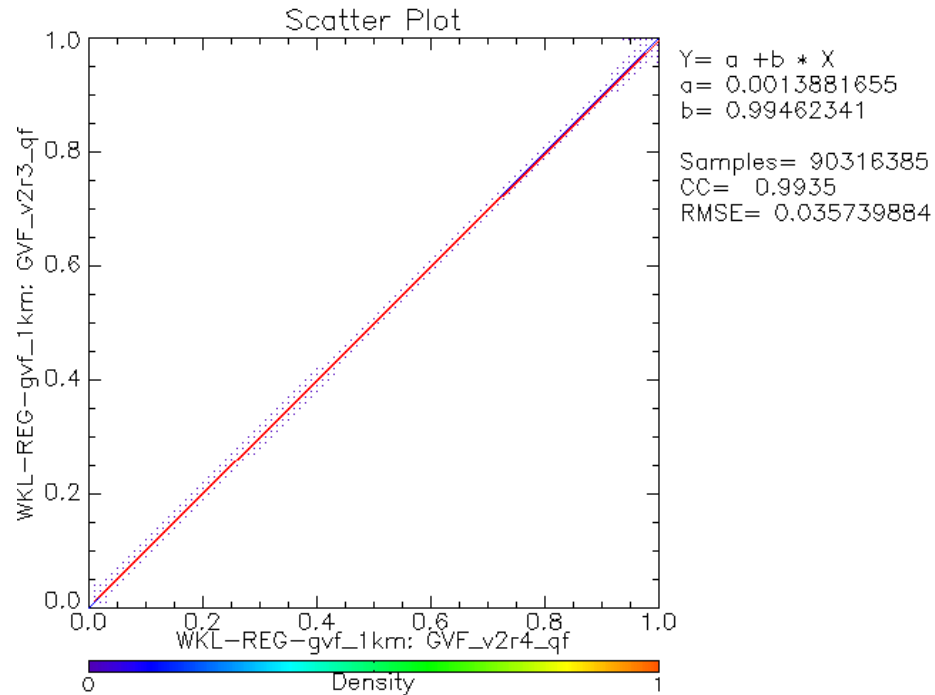
Comparison between GVFs with new QF cloudy filter

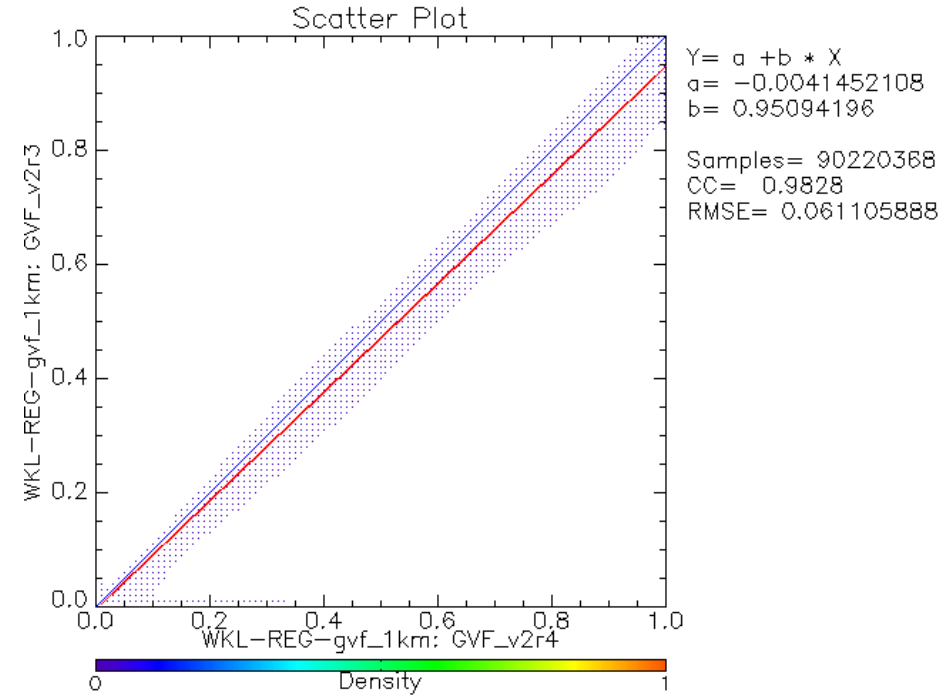Comparison between GVFs with old QF cloudy filter

- Above left scatter plot shows GVF v2r3_qf implementing cloudy quality flags (QF) filter before gridding is consistent with GVF v2r4_qf after gridding
- Above right scatter plot shows GVF v2r3 implementing the original cloudy filter before gridding is consistent with GVF v2r4 after gridding

Comparison between GVFs with
new QF cloudy filter

Comparison between GVFs with
old QF cloudy filter

- Above left scatter plot shows GVF v2r3_qf implementing cloudy quality flags (QF) filter before gridding is consistent with GVF v2r4_qf after gridding
- Above right scatter plot shows GVF v2r3 implementing the original cloudy filter before gridding is consistent with GVF v2r4 after gridding

- Stratified and time series bias, standard deviation, and RMS comparisons were made for the year 2020 for each of
  - SNPP vs. NOAA-20 VIIRS VI
  - NOAA vs. NASA SNPP VIIRS VI
  - VIIRS vs. MODIS VI
  - TOC NDVI and TOC EVI
- Results
  - Consistent with validated maturity review, but with longer time series
  - Time series were stable and mostly < 0.02 VI units
  - Stratified results show some high standard deviation and RMS values, but only at high VI where there are a small number of pixels.
  - NOAA vs. NASA VIIRS VI were more similar than VIIRS vs. MODIS VI
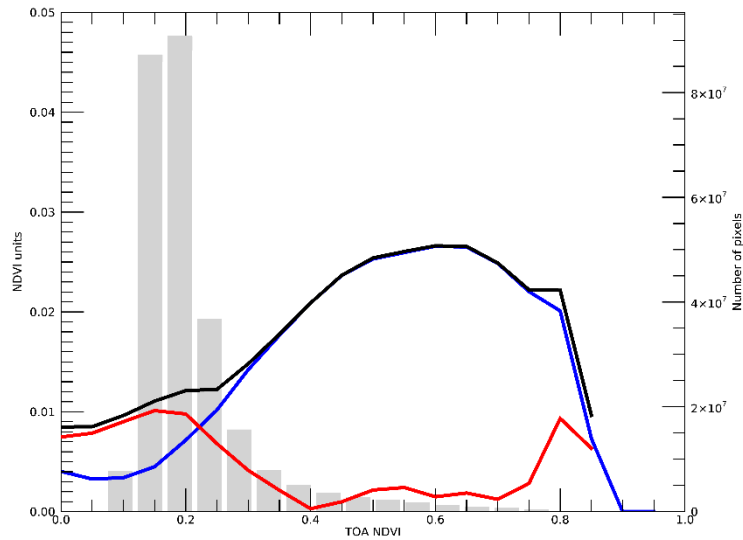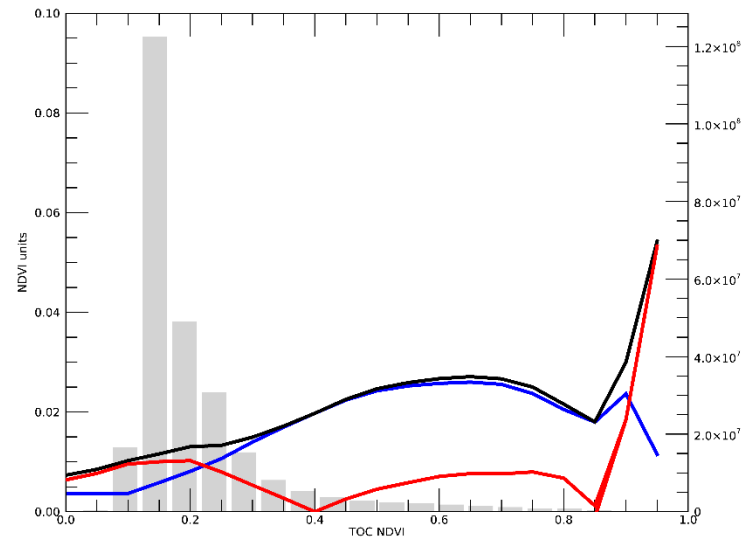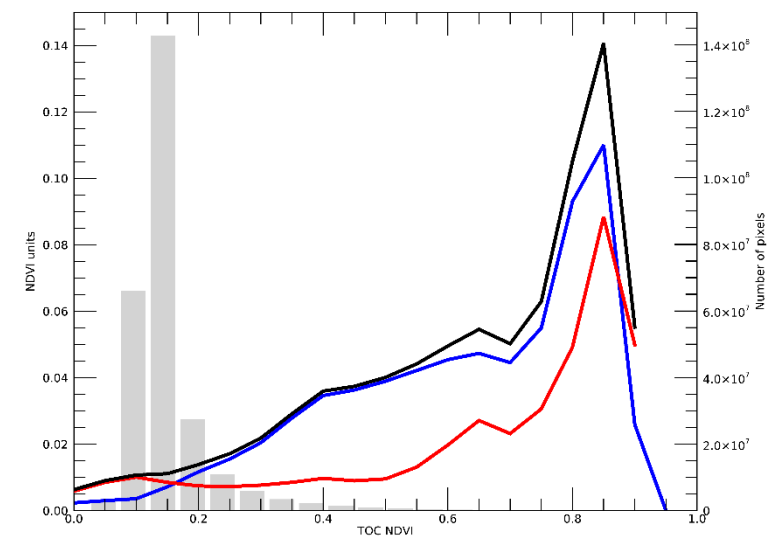
TOA NDVI

TOC NDVI

TOC EVI

Accuracy
Precision
Uncertainty

TOA NDVI
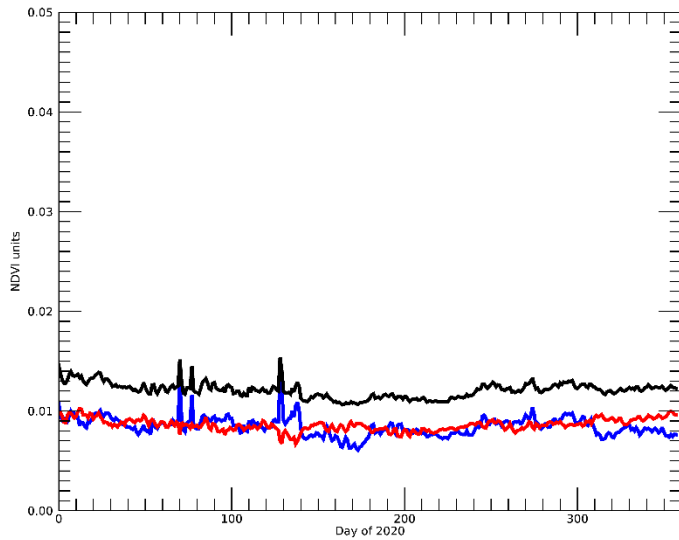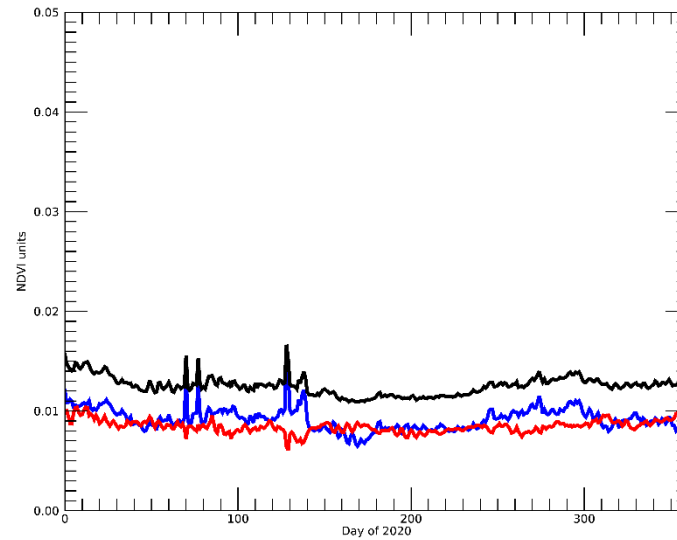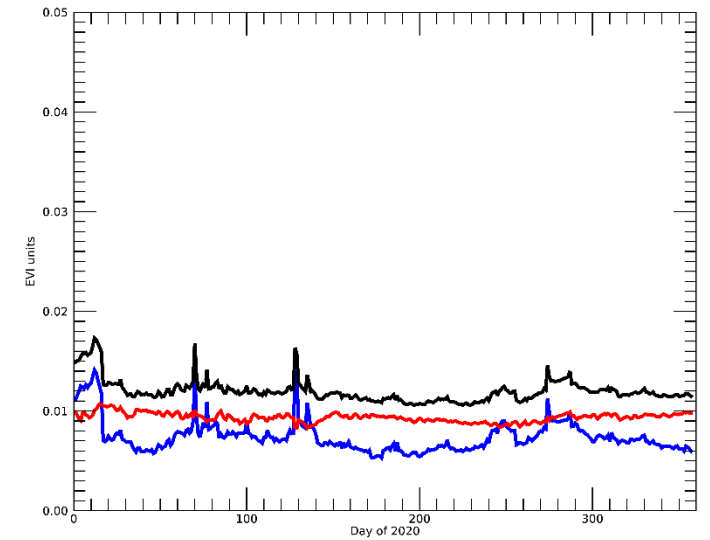
TOC NDVI

TOC EVI

Accuracy
Precision
Uncertainty
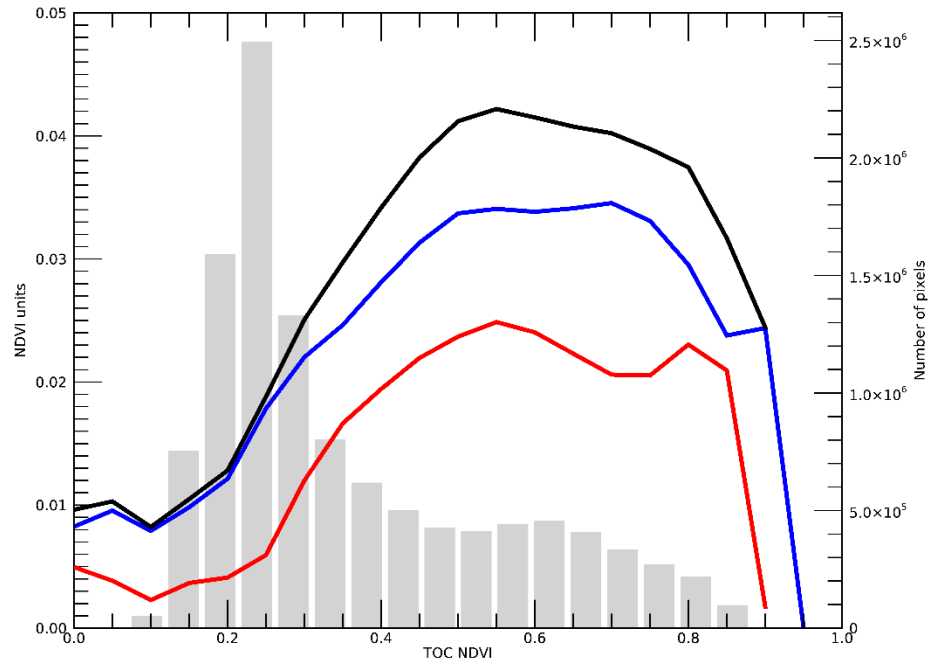
TOC NDVI

TOC EVI
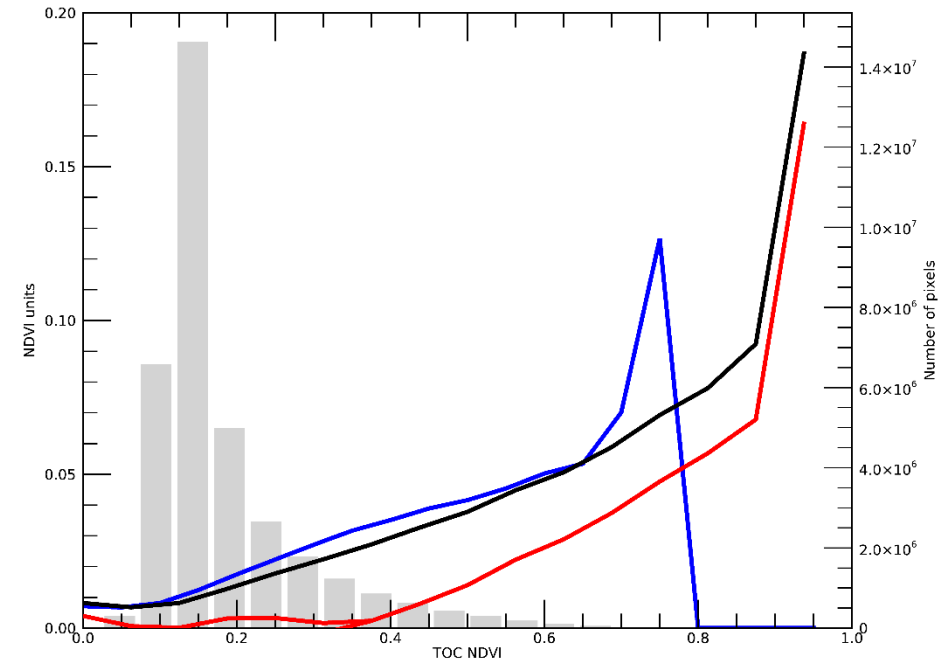
Bias
Standard deviation
RMS difference

TOC NDVI

TOC EVI

Bias

Standard deviation

RMS difference

GOES-R VI generation using SZA-adjusted SAVI compositing
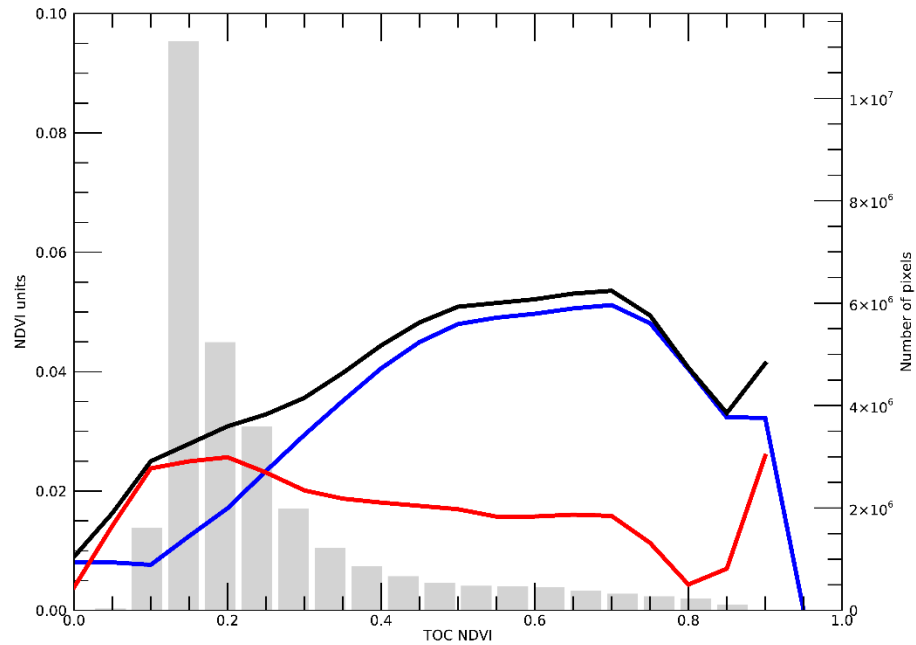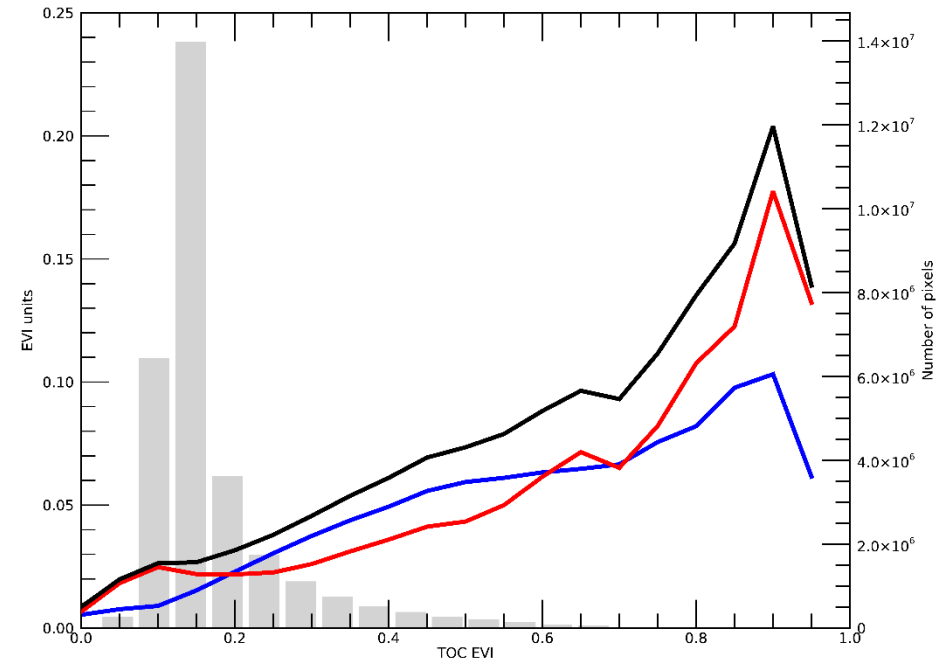
- The previous version of GOES-R ABI VIs used maximum VI compositing
- That version was shown to lack consistency with VIIRS data reprojected to the ABI geometry, with NDVI values varying and EVI values consistently higher
- A new version of GOES-R ABI VI was generated using maximum solar zenith angle adjusted SAVI compositing
  - Method is analogous to that used in VIIRS VI generation, except using solar zenith angle in place of view zenith angle for SAVI adjustment
- Results show similar consistency for NDVI and better consistency for EVI, due mainly to lower EVI values
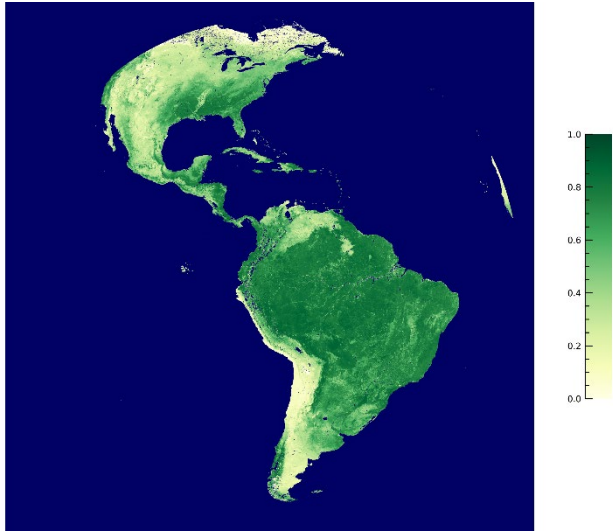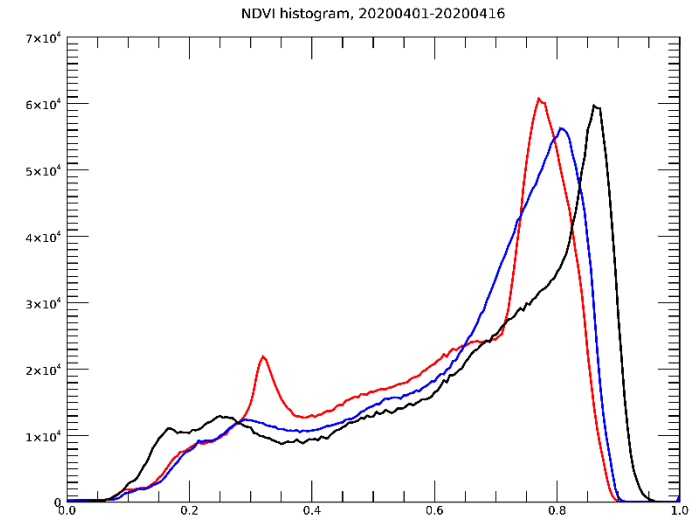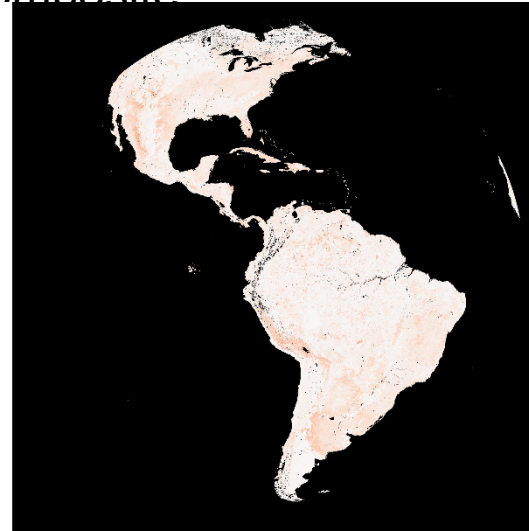
NDVI composited from April 1-16, 2020

SZA adjusted

SZA adjusted – max NDVI composite

NDVI histogram, 20200401-20200416

SZA adjusted
Max NDVI composite
Reprojected VIIRS

NDVI composited from April 1-16, 2020

SZA adjusted

SZA adjusted – max NDVI composite

NDVI histogram, 20200401-20200416

SZA adjusted
Max NDVI composite
Reprojected VIIRS

Vegetation Health
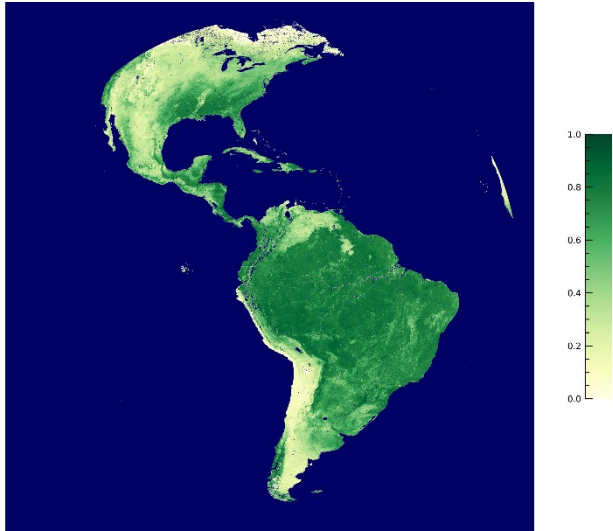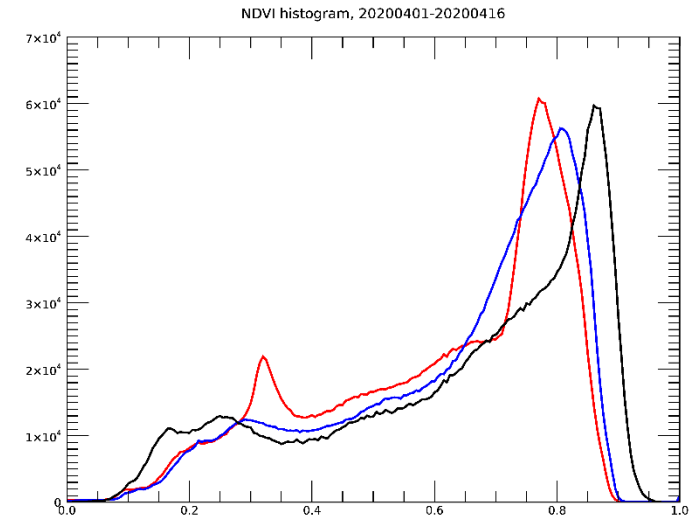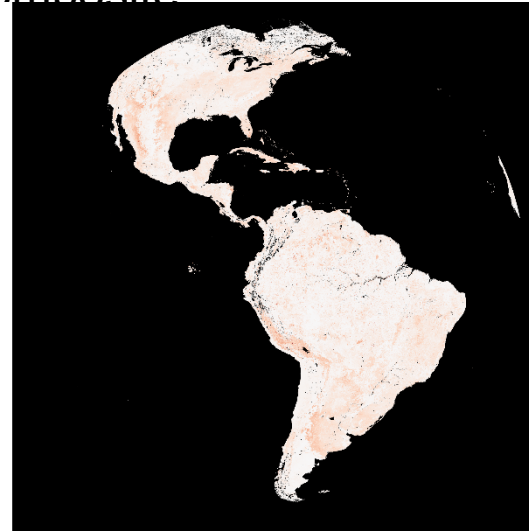
Accomplishments / Events:

- Developed C++ code to collect administrative averaged VH for 42 crops;
- Literature review of radiation impact on crop yield;
- Derived a radiation condition index (RCI) data (Highlighted); the downward shortwave surface radiation dataset was derived from CERES observation, at 1 deg resolution and monthly interval; the monthly RCI was derived using an equation similar to VCI;
- Extracted RAD and RCI time series averaging from 1) whole land and 2) cropland from selected countries;
- Generated a series of data and figures of VIIRS/VHP-1 and -4, -16 km resolution products, covering October 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: Newly Derived Global RCI of July, 2018

Accomplishments / Events:

- In-situ instruments WavCIS AOC measurements looking better after communication and other issues earlier in the year (see highlight)
- MOBY271 broke tether, recovered 15 Oct 2021
- Preliminary results on an autonomous prototype above water spectroscopic sensor made by Gybe Inc (gybe.eco) are available
- Progress made on the SAtellite VAlidation Navy Tool – SAVANT ocean color sensor monitoring GUI/Web driven database in near-real-time with NRL APS and NOAA MSL12 satellite and in situ water-leaving radiances from multiple blue (MOBY) and green (WavCIS, Venise, Chesapeake Bay AOC) water calibration and validation sites.
  - We evaluated the performance of NOAA MSL12 SNPP and NOAA-20 VIIRS at Venise between January and October 2021. Both NOAA MSL12 SNPP and NOAA-20 capture the Venise nLw trend in addition to showing very good agreement between the Venise in situ data for blue and green wavelengths

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

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY21 End of Year Science Team Presentations (PMR)	Oct-21	Oct-21	11/02/21	
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:
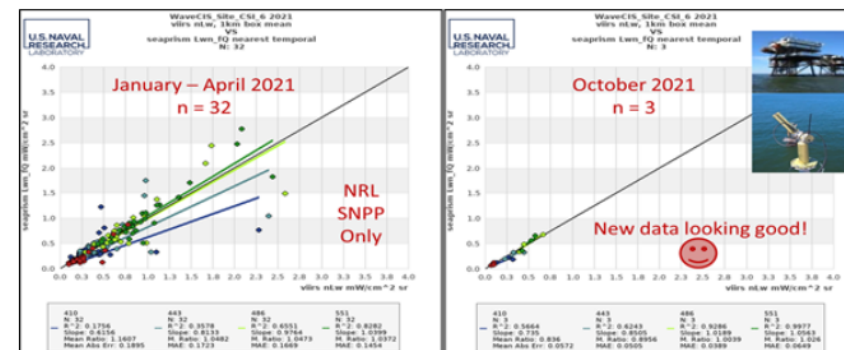
Figure 1: Scatter Plots showing nLw matchups prior to the WavCIS AOC outage between May and October (left; n=32) and newly collected nLw data starting October 01, 2021 (right; n=3) for NRL APS SNPP only. The new data collected after the post Hurricane Ida power recycle is looking good and prior issues with computers, communications, etc. seem to be resolved. Note no constraints applied due the type of evaluation to check the new data.

Accomplishments / Events:

– Testing of ACSPO 2.80 delivered to NDE in Aug 2021, continues in the NOAA monitoring systems SQUAM and ARMS. Performance is as expected, or better. Example below shows example of ACSPO Clear-Sky Mask (ACSM) performance from N20 on 21 Oct 2021. The mask leaves most interesting dynamic areas in clear-sky domain. This is a challenging task for any cloud mask, and improvement in ACSPO 2.80 is significant.

– SST Team started setting up IT environment for the 3rd reprocessing (Reanalysis; RAN3) of VIIRS SST from NPP (1 Feb 2012-on) and N20 (5 Jan 2018-on). The goal is to have the 2.80 reprocessed and back-filled in PO.DAAC and NCEI-AMS archives, by the time the 2.80 is operational in NDE. The 2.80 is J2-ready, and will be initially used to process N21 data, once J2/N21 is launched in Sep 2021.

– No significant anomalies identified in NPP or N20 SST products during the month of October 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			

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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 to update for Intel19.0.5 or for the filename
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		

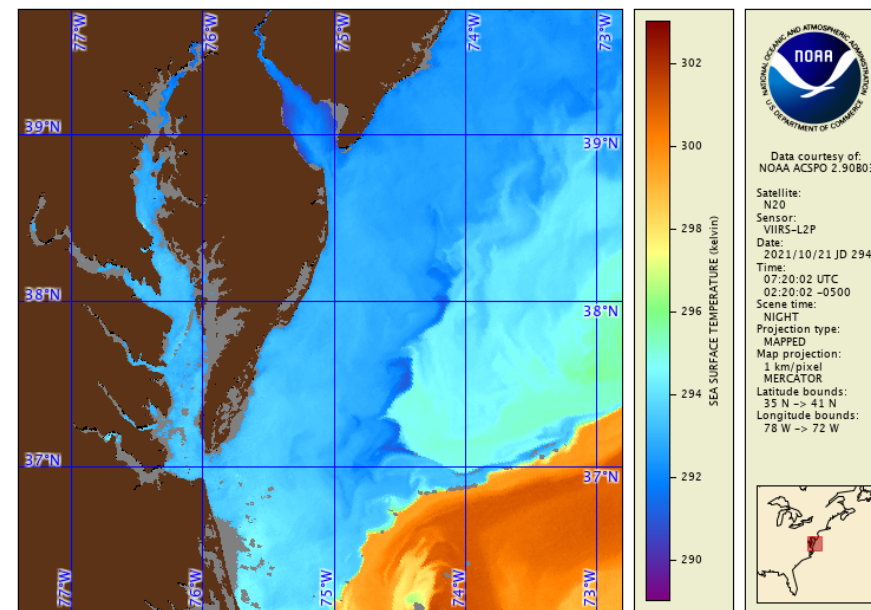## Highlights:

ACSPO Clear-sky mask (ACSM) in ACSPO 2.80 has substantially improved in dynamic areas such as the Chesapeake Bay (see example of N20 imagery for 21 Oct 2021. Areas identified by the ACSM as cloud are rendered in gray.

NPP imagery (not shown) has similar performance.

Overscreening still occurs near coastline and near strong thermal fonts. Work is underway to improve.

VIIRS Polar Winds

Accomplishments / Events:

- Support from both NASA and NOAA has enabled a preliminary demonstration of good quality polar winds from feature tracking with SNPP VIIRS/CrIS fusion. (see highlight)

  - MODIS spectral bands are replicated in VIIRS/CrIS fusion with brightness temperatures within 0.5 C (1.0 C) for CO_2 (H_2O) sensitive bands. The addition of CO_2 absorption bands (essential for cloud top height and phase, as well as temperature soundings) and water vapor absorption bands (important for tropospheric moisture determinations and polar water vapor feature tracking) enables the continuity of the data records established by HIRS and MODIS.

- Held PMR

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		
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		

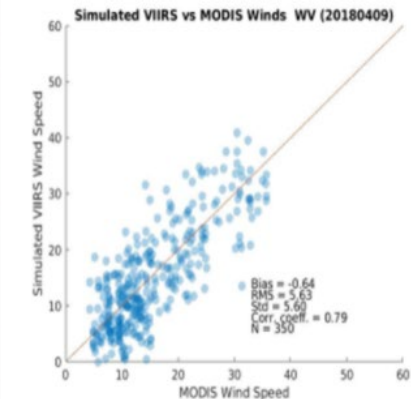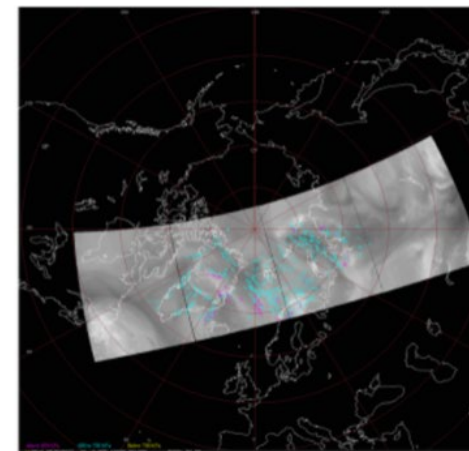*Highlights: Polar winds from SNPP VIIRS/CrIS fusion show promise for continuity with MODIS Water Vapor Winds*

Figure: Polar VIIRS/CrIS fusion water vapor winds for 9 April 2018 and the statistical comparison with those from MODIS.

Accomplishments / Events

- NUCAPS team members received AMS-2022 abstract acceptance letters. Four of the submitted abstracts received oral presentation slots, and 2 other abstracts got accepted as posters.
- NUCAPS team members convened a Technical Interchange Meeting (TIM) with the Department of Energy to explore potential common areas of interest in CO2 and CH4 monitoring.
- Continued work on three major updates to the current NUCAPS V3.0 towards NUCAPS V3.1 for mission long reprocessing of S-NPP products through NCIS Cloud infrastructure. These include, (a) Averaging Kernels and surface corrections implementation into the NUCAPS product output file, (b) updates to the ozone climatology, (c) improving PBL temperature biases optimizing the temperature damping.
- Continued work on the S-NPP (LW/SW) mini-validation package and validation exercises using the collocated matches (ECWMF, TCCON, OCO-2). The mini-validation report is going through internal check to deliver it to the JPSS program
- The BAMS manuscript (Kalluri et al.,) titled, "Validation and Utility of Satellite Retrievals of Atmospheric Profiles in Detecting and Monitoring Significant Weather Events"" has been accepted for publication in the BAMS

Overall Status:

	Green[1] (Completed)	Blue[2] (On-Schedule)	Yellow[3] (Caution)	Red[4] (Critical)	Reason for Deviation
Cost / Budget		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	11/10/21	
FY23 Program Management Review	Jun-22	Jun-22		
Final J2 ready DAP to NDE (include NPP/N20 updates)	Nov-21	Nov-21		
NUCAPS Averaging Kernels (AK) and improved stability indices. S-NPP Mission long reprocessing version (NUCAPS v3.1)	Nov-21	Nov-21		
Addition of Ammonia product to NUCAPS operational retrievals (NUCAPS v3.2)	Jan-22	Jan-22		
NUCAPS augmentation for EPS-SG (NUCAPS v3.3)	Apr-22	Apr-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		

Highlights:
Column Averaged CO2: S-NPP (all-bands) vs. S-NPP (LW/SW) Histograms of OCO-2 vs. NUCAPS CO2 over 12-focus day matches
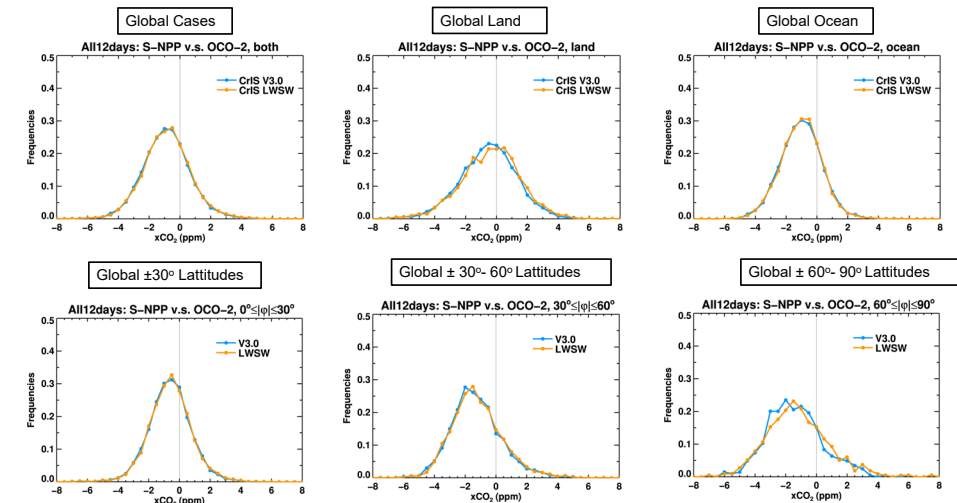

Fig. Evaluation of S-NPP (LW/SW) NUCAPS CO2 product using 12-focus days of matches of OCO-2 CO2 product. Although temperature and water vapor products are impacted due to loss of midwave band, the S-NPP (LW/SW) CO and CO2 products did not show any noticeable degradation

MiRS Products

October, 2021

Accomplishments / Events:

- Following updated guidance from ASSISTT created and delivered patches to MiRS v11.6 and v11.8. Most of the changes were related to netCDF global attributes metadata.
- Analyzed MiRS N20/ATMS water vapor retrievals for the case of the extreme atmospheric river (AR) event that impacted California on 24 October. Computed mixing ration anomalies and generated vertical cross-sections that show extremely large anomalies (> 400 % of the baseline) in layers above 800 hPa. See highlights.

Overall Status:

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

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

Issues/Risks:

None

Milestones

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		
Patch DAP delivery (to ASSISTT)			V11.6 10/19/21 V11.8 10/28/21	
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:
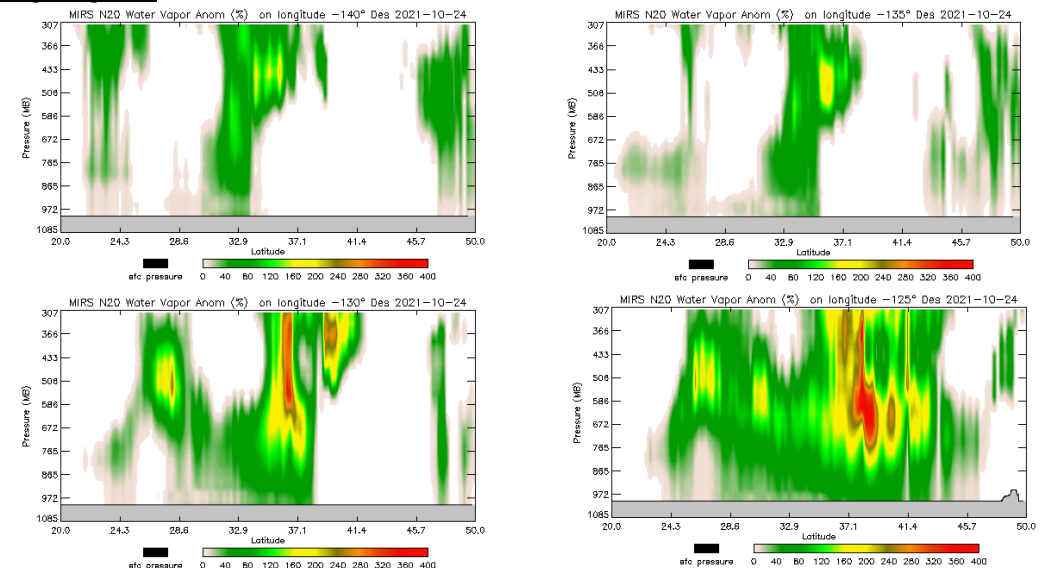
Vertical cross-sections of MiRS NOAA-20/ATMS retrieved water vapor anomalies along four longitudes (140 W, 135 W, 130 W, and 125 W) over the eastern Pacific between 20 N and 50 N latitude. Data are for descending orbits on 24 October 2021. The structure of the atmospheric river is depicted, with anomalies exceeding 400 % just off the California coast.

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Snowfall Rate

Accomplishments / Events:

- Continue to refine the XGB machine learning (ML) Snowfall Detection (SD) algorithms for ATMS and MHS (6 satellites). An issue with the SD algorithms missing intensive snowfall was traced to some questionable automated ground observations. These data points were removed from the training database and the ML models retrained. The overall Heidke skill scores for the current version of the SD algorithms are as high as 0.9 for all satellites. The Heidke skill scores are about 0.7 even if the 2 m temperature is below -15 °C. Snowfall detection under such cold condition is known to be very challenging.

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

Issues/Risks:

None

Milestones	Original Date	Forecast Date	Actual Completion Date	Variance Explanation
FY21 End of Year Science Team Presentations (PMR)	Oct-21	Oct-21		not required - no major issues
Final J2 ready DAP to NDE (include NPP/N20 updates)	Jan-22	Jan-22		
Patch DAP delivery (to ASSISTT)			V11.6 10/19/21 V11.8 10/28/21	
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: Satellite-Radar Merged Snowfall Rate Captures CA Snowfall

Radar Only
10/25/2021 17:40 UTC

Radar + Satellite
10/25/2021 17:50 UTC
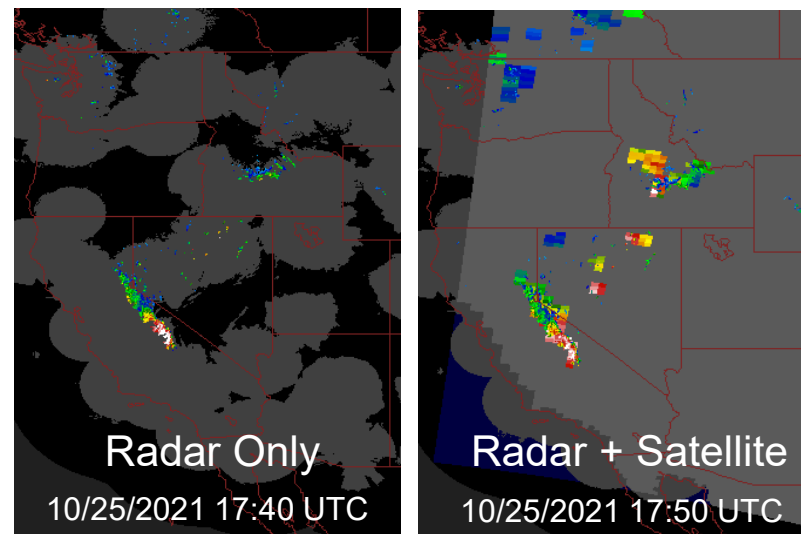
The merge CONUS satellite and radar snowfall rate (mSFR) product captures the recent California snowstorm over the Sierra Nevada Mountains on Oct 25, 2021. (Left) mSFR at 17:40UTC with radar (MRMS) snowfall rate only, and (right) mSFR at 17:50UTC with both radar and satellite (SFR). SFR fills in MRMS gaps and the matches well with MRMS in magnitude.

Accomplishments / Events:

• For the V2Limb, we are investigating a limited number of failures per day on NDE operations. Some have been traced to incomplete or repaired granules. We have reproduced the NDE cloud height fill error in our STAR processing and are working to transition new climatologies from NASA to STAR. We are also adding some monitoring plots.
• For the V8Pro we are completing the soft calibration to homogenize the S-NPP and NOAA-20 records.
• For the V8TOz, we are using the Enterprise (EV8TOz) version to make retrievals from GOME-2 with plans for TropoMI and GEMS.
• Helped to prepare NOAA/NASA Ozone Hole Press Release.

Overall Status:

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

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

Issues/Risks:

None

2021 Ozone Hole Movie

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	Nov-21	Nov-21		
Final J2 ready DAP to NDE (include NPP/N20 updates), V8Pro	Dec-21	Dec-21		
Version 2.7 Limb Profile SDR and EDR	Sep-22	Aug-22		
CloudRR Pressure Module for V8TOz	May-22	Delay		
Radiative Transfer & Bandpass Tables for V8Pro and V8TOz	Sep-22	Sep-22		
Soft calibration adjustments for V8Pro & V8TOz	Sep-22	Nov-21		Yearly
Limb Darks and Orbital Definition files: Weekly ancillary file deliveries to PDA / NDE	Sep-22	ongoing		
Overpass data sets and comparisons to GB and MERRA2	Sep-22	ongoing		
Support ASSISTT/NDE evaluation as required/needed	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)	Jun-22	ongoing		

GCOM-W1 Products

Accomplishments / Events:

- 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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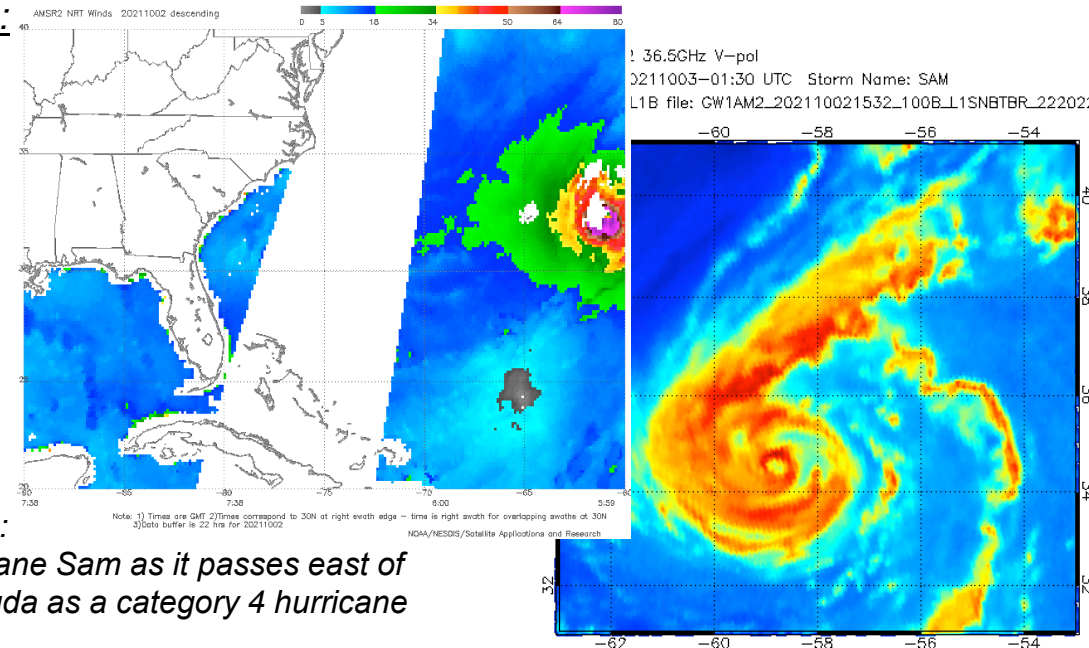
Issues/Risks:

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:
Hurricane Sam as it passes east of Bermuda as a category 4 hurricane

Accomplishments / Events:

- NPROVS monitoring of the NUCAPS v3 soundings for NOAA-20 and results presented at NUCAPS All-hands meetings
- A Case Study of NUCAPS performance during Winter snow and ice storm events was concluded and presented at the JPSS NUCAPS Users Initiative meeting
- Case studies of NUCAPS/MiRS performance in the context of "historic" Summer-21 flash flood storms in the southwest US (Easterly Monsoon) and a series of Atmospheric Rivers events impacting the US West coast (October-21) were also completed **(Highlight)**
- A new hire (IMSG) to replace Ryan Smith (departed Oct 3) was confirmed; Ms Cassandra Calderella, an Educational Partnership Program with Minority Serving Institutions (EPP/MSI) scholar mentored by A.Reale accepted the position beginning October 29.
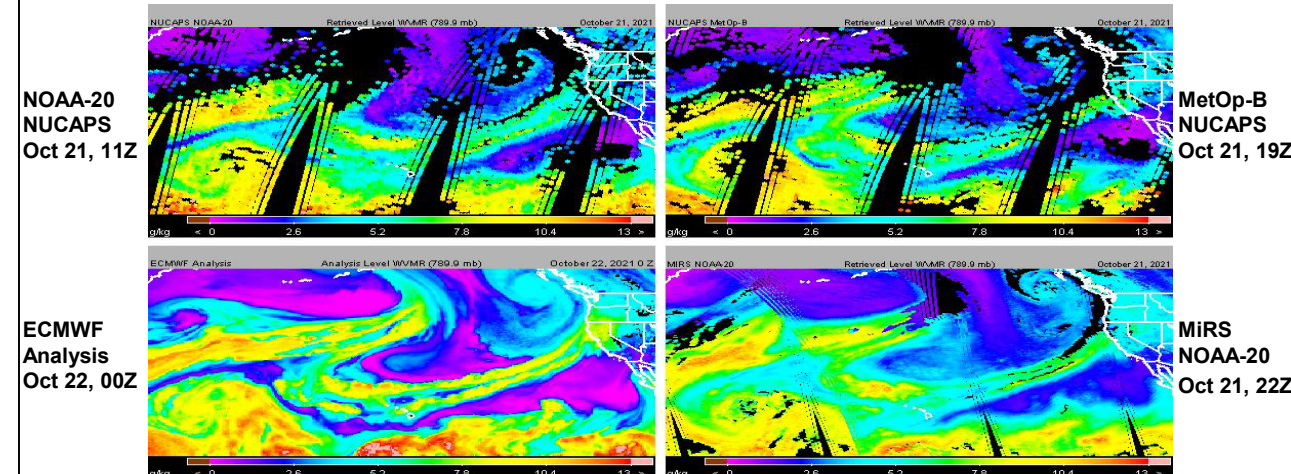
Overall Status:

	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		
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: Atmospheric Rivers

NOAA-20 NUCAPS Oct 21, 11Z   **MetOp-B NUCAPS Oct 21, 19Z**

ECMWF Analysis Oct 22, 00Z   **MiRS NOAA-20 Oct 21, 22Z**

The above panels illustrate sequential horizontal fields of NUCAPS, MiRS and ECMWF H20 vapor mixing ratio (g/kg), 800 hPa (2km), at the onset of an historic Atmospheric River event which impacted north-central California beginning October 21 (2021). The event persisted for several days, consisting of a series of waves (Rivers) approaching from the Pacific as evident in each panel. High water vapor amounts are designated by the lighter blue, green and yellow hues; black areas for NUCAPS (upper panels) indicate cloudy regions where IR based soundings are not available. Satellites are the only source of weather data in remote Pacific regions and critical for forecasting severe weather in the US. Good agreement among the independent satellite and ECMWF product suites is evident.