



## NOAA JPSS Monthly Program Office

# AMP/STAR FY18 TTA

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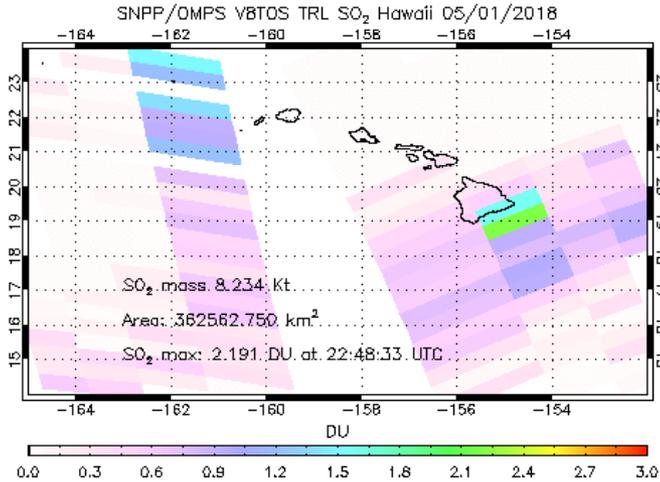
June 12, 2018

# Accomplishments

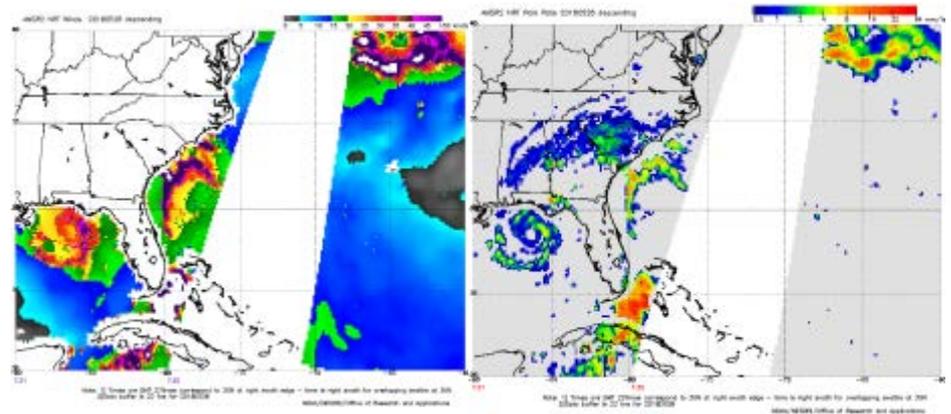
- NOAA-20 ATMS TDR in operations at ECMWF on 5/22/2018
- NOAA-20 ATMS TDR in operations at NCEP/NOAA on 5/30/2018
- ATMS DAP to DPES (ADR8458/CCR3916, PCT updates for JPSS-1 Operations Post J1 launch analysis and pitch maneuver, v007) on 5/1/2018; Updated v007 PCT on 5/9/2018
- OMPS DAP to DPES (ADR8527/CCR3906, Update S-NPP OMPS TC Straylight Table) on 5/15/2018
- VIIRS DAP to DPES (ADR8295/CCR3965, Poor quality flag set for LWIR bands in JPSS-1 VIIRS SDR products) on 5/30/2018
- N20 VIIRS SDR Geo LUTs Update #6 (ADR8686/CCR3963) DAP to DPES on 5/21/2018
- MiRS v11.3 DAP was sent to OSPO for a software code review on May 2<sup>nd</sup>, and passed OSPO code review on 5/31/2018
- OMPS Ozone EDR DAPs:
  - V8TOS v3 DAP to ASSISTT on 5/18/2018; to NDE on 6/1/2018
  - V8TOz (v3r1) to ASSISTT on 5/25/2018
  - V8Pro (v3r2) to ASSISTT on 5/25/2018; to NDE on 6/6/2018
- STAR SDRs and Imagery teams supported IDPS Block 2.1 Mx2 I&T Deploy Regression test, provided review/checkout results report to AMP (5/25/2018)
- The fourth annual JPSS dedicated VIIRS ocean color validation cruise aboard the NOAA Ship Okeanos Explorer was successfully completed on 18 May 2018.

- NOAA-20/S-NPP Operational Calibration Support:
  - S-NPP Weekly OMPS TC/NP Dark Table Updates: 05/01/18, 05/08/18, 05/15/18, 05/22/18, 05/29/18
  - NOAA-20 Weekly OMPS TC/NP Dark Table Updates: 05/01/18, 05/08/18, 05/15/18, 05/22/18, 05/29/18
  - S-NPP Bi-Weekly OMPS NP Wavelength & Solar Flux Update: 05/08/18, 05/22/18
  - NOAA-20 Monthly VIIRS StrayLight LUTs Update: 05/23/18
  - S-NPP Monthly VIIRS LUT Update of DNB Offsets and Gains: 05/22/18
  - NOAA-20 Monthly VIIRS LUT Update of DNB Offsets and Gains: 05/22/18
  - NOAA-20 VIIRS LUT update of F-Factor and NDB LGS Gain

# Highlights from the Science Teams



SO<sub>2</sub> from Kilauea eruptions during May, as captured by OMPS.



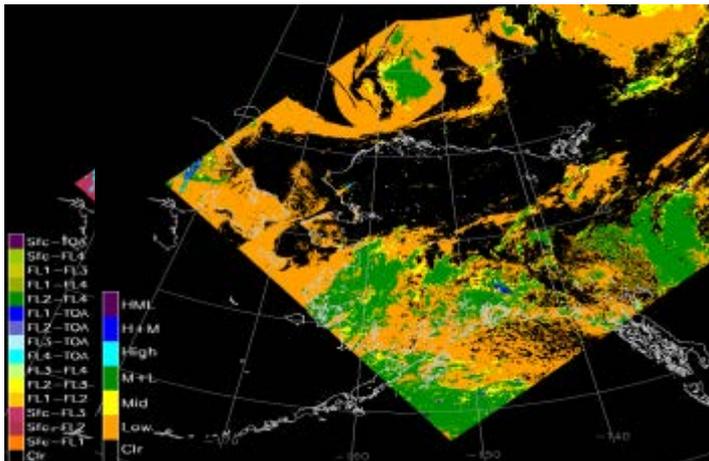
GCOM AMSR-2 retrievals of ocean surface wind speed (left) and rain rate (right) for the descending overpass (0130 local time) on 28 May 2018. Features associated with Alberto are quite evident.

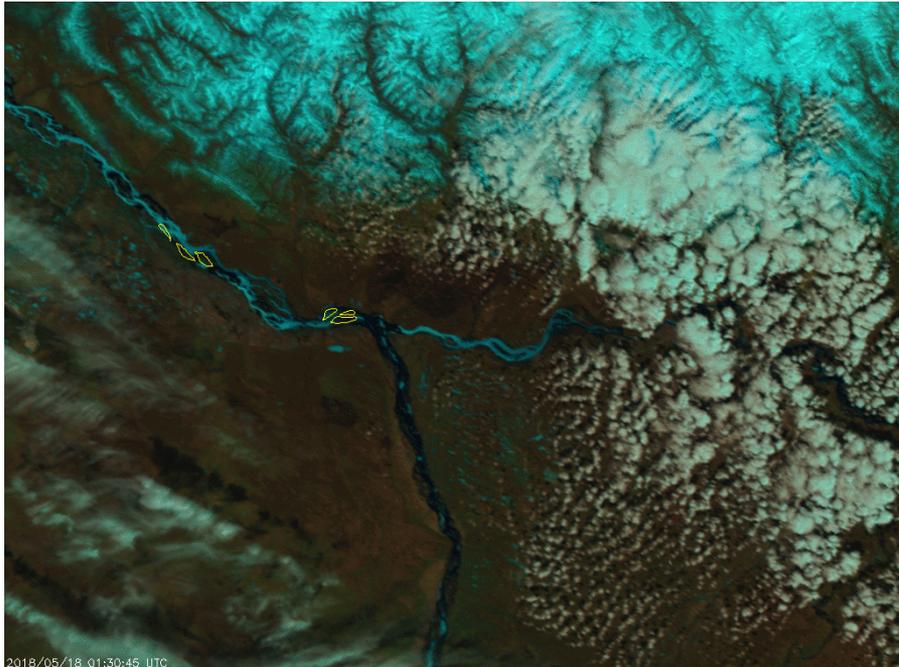
## JPSS Arctic Summit

The JPSS Arctic Summit was held in Anchorage (May 1-4) and Fairbanks (May 7-8), Alaska. Many STAR JPSS teams participated.

The Summit was a series of TIMs focused on challenges in the Arctic where the JPSS satellites provides unique capabilities critical to science, service, and stewardship including saving lives and property.

The image at left is an example of a cloud layers product which may be helpful to Alaska region forecasters.





## VIIRS sees River Ice Breakup

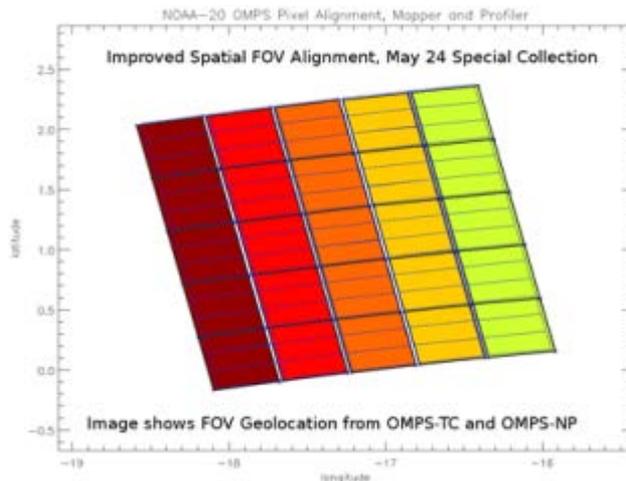
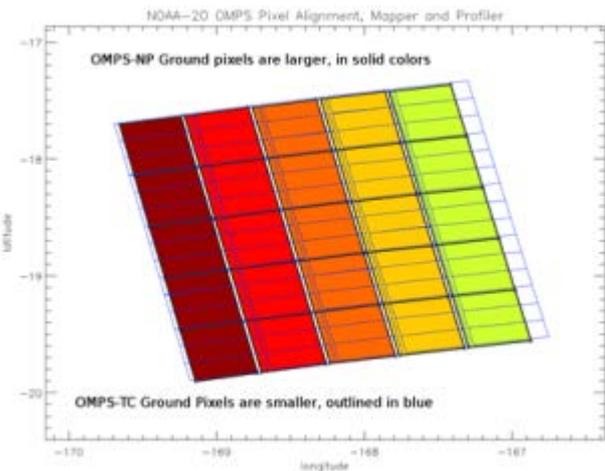
The VIIRS Imagery and Visualization Team Blog has been updated with a new post, titled, “Rivers of Ice”. This post discusses the recent breakup of ice on the Lena and Aldan rivers of central Siberia, as seen by both VIIRS instruments in the animation above. The two instruments, plus the sites northerly latitude allows extra viewing opportunities. In the animation above, the bluish river ice can be seen moving downstream in the center of the image.

## 4<sup>th</sup> dedicated VIIRS validation cruise

The fourth annual JPSS dedicated VIIRS ocean color validation cruise aboard the NOAA Ship Okeanos Explorer was successfully completed. The cruise departed 9 May 2018, from Key West, FL, sampled in the Gulf of Mexico off the Florida Northwest Coast and then moved through the Florida straits and sample in the Atlantic along the Florida East Coast, arriving on 18 May in Mayport, near Jacksonville, Florida.



# Highlights from the Science Teams



## NUCAPS participation in WE-CAN campaign

The NUCAPS team is working with Monika Kopacz at NOAA CPC and Emily Fisher at Colorado State University to participate in the 2018 WE-CAN campaign. This work is aimed at collecting additional field campaign measurements of atmospheric carbon trace gases for future validation of carbon trace gas NUCAPS products. It also provides validation opportunities for other operational JPSS products such as ozone, aerosol optical depth, and cloud products. Plans are in place to provide maps of NUCAPS CO products over the CONUS region via the JSTAR Mapper visualization tools.

## OMPS Special Collection

For NOAA-20 OMPS there was a need to take special measurements for OMPS Nadir Profiler to address the FOV mismatch between the Nadir Mapper and the Nadir Profiler. STAR processed the data for these orbits and verified that the proposed tables will greatly reduce the FOV mismatch.

The figures on the right show the initial alignment, with significant non-overlapping portions and the new alignment, with overlapping FOVs between the two instruments.

This will help to reduce error in the ozone profile product.

# Upcoming Cal/Val Maturity Reviews

June 15, 2018:

- Beta/Provisional Maturity:
  - Surface Reflectance
  - Cryosphere Products (Binary Snow Cover, Snow Fraction, Ice Surface Temperature, Ice Concentration, and Ice Thickness/Age)
  - NUCAPS (Provisional: AVMP/AVTP; Beta: Ozone/CO/Co2/CH4/OLR)
- Validated Maturity: ATMS TDR/SDR; VIIRS SDR

July, 2018:

- Beta Maturity:
  - Cloud Property Algorithms (Cloud Phase/Base/Height, DCOMP, NCOMP)
  - Land Surface Temperature, and Surface Albedo
- Provisional Maturity: OMPS NP SDR; OMPS Ozone EDRs (V8Pro & V8TOz)

August, 2018:

- Beta Maturity: Green Vegetation Fraction; Vegetation Index; Vegetation Health
- Validated Maturity: VIIRS Imagery; CrIS SDR; OMPS (TC & NP) SDR; OMPS Ozone EDRs; NUCAPS (S-NPP trace Gases)

September, 2018:

- Provisional Maturity:
  - Polar Winds; Volcanic Ash; Clouds (all products); Cryosphere (all products)
  - NUCAPS (Ozone/CO/Co2/CH4/OLR)

# Upcoming Milestones/Deliveries

- JSTAR Code/LUT Deliveries:

DAP to DPES:

- Jun-18: VIIRS SDR: M6 rollover correction (ADR8575);  
VIIRS SDR Update for J1 Radiance Limits (ADR8197)
- Jun-18: OMPS TC/NP SDR Quality Flags (ADR8684/8685)
- Jul-18: STAR delivery for CrIS Engineering package update (v115, ADR8654)
- Aug-18: VIIRS SDR: Blackbody Warm-up Cooldown (WUCD) correction
- Sep-18: OMPS NM/NP Mismatch for FOVs (LUTs update only, ADR8617)

NOAA-20 Algorithm DAP to NDE:

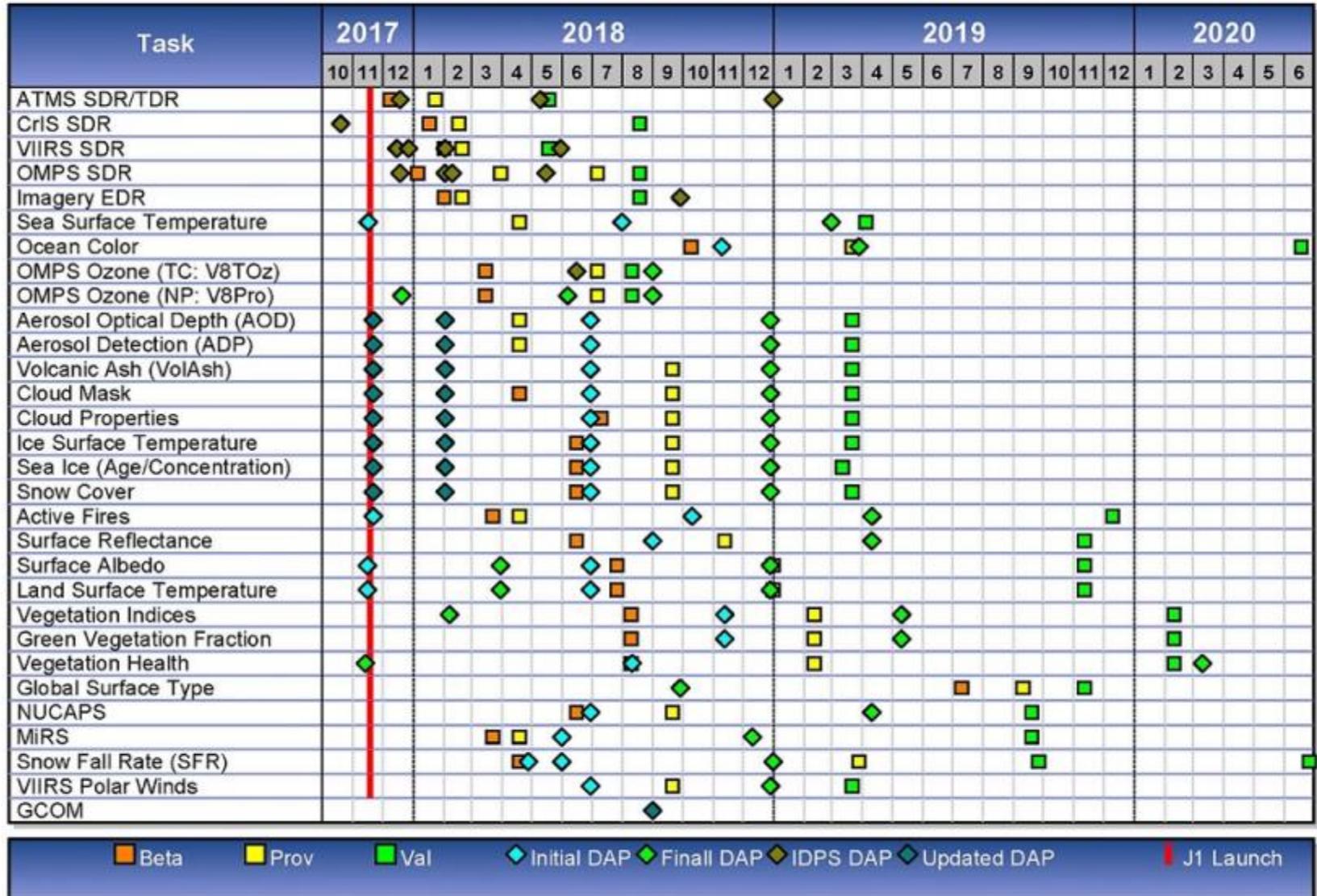
- Jun-18: MiRS DAP (includes Snow Fall Rate for S-NPP & initial DAP for N20)
- Jun-18: NUCAPS DAP (includes OLR, and GFS update)
- Jun-18: VIIRS Polar Winds
- Jul-18: EPS algorithms (Clouds, Cryosphere, Aerosol, Volcanic Ash, LST/LSA)
- Jun-18: Sea Surface Temperature (Aug-18: Patch DAP for GFS update)
- Aug-18: Surface Reflectance, Vegetation Health

- Block 2.0 Operations:
  - AMP (Guenther) coordinated a recommendation with all stakeholders to update the CrIS Bit Trim Mask and associated updated gain changes (1.5 for MWIR). The expected implementation timeline is August 2018 and requires coordination with Flight/OSPO and Ground.
  - STAR provided a recommendation to change/reduce the frequency of the S-NPP and N20 VIIRS Emmissive Band calibration events (eg Warm-up-Cool-Down events). AMP provided that recommendation to the Program and Project Scientists for concurrence and gave a heads-up to OSPO on forthcoming recommendation.
  - Over the past several months, AMP (Guenther) worked with IDPS and Raytheon to reduce the occurrence of TLE use in the geolocation processing. As of the end of May 2018, the changes completed by IDPS and Raytheon have been successful in reducing the frequency to: NPP had 6 scans using TLE in May, and N-20 has 31 scans using TLE in May. Preliminarily, this appears to be successful (pending concurrence from STAR).
  - In May 2018, AMP (Weinrich) completed an analysis of the time between code delivery from STAR and when it makes it to operations and concluded that it is twice as long as occurred during Block 1.0. AMP provided data to IDPS lead for analysis and possible improvements.
  - AMP is coordinating with STAR, IDPS, and ESPDS regarding the GFS upgrade (changes the ancillary data). Xingpin Liu is leading the effort for STAR focused on ensuring no/minimal impacts to EDRs in NDE. Rossiter/Layns met with IDPS and Raytheon on May 23. Next step for IDPS is to get sample test files (in the npoess format) from NCO. Request made to NCO on May 30.
  - In communicating with OSPO, AMP will be investigating the file naming conventions of the OMPS flight tables and whether some improvements could be made to make the CM and uploading process easier. This investigation was prompted by some table upload errors in April and May 2018.

- J2+ and Segment 3 efforts:
  - AMP members (Guenther and Rossiter) are generating monthly summary reports on J2+ instrument status. Reports can be found at [https://jpss-eroms.ndc.nasa.gov/eRoom/JPSSGround/GroundAlgorithms/0\\_f9b2c](https://jpss-eroms.ndc.nasa.gov/eRoom/JPSSGround/GroundAlgorithms/0_f9b2c)
  - AMP, in support of Ground SE, is continuing to work through the Level 2.5 -> 3 tracing. G. Fesenger finished the initial version of the redlined SRSs in March 2018. Awaiting Ground SE's review and guidance on when/how to submit the CCRs.
  - AMP (Weinrich) continues to work with the Ground Project on the DRW18 process and ensuring that accurate and timely updates related to algorithms are included in the Ground schedule. This includes planned S-NPP, N20, and J2 updates.
  - AMP members (Guenther, Rossiter) participated in the J3/4 CrIS dCDR on June 6-7. No major concerns from AMP, although it was concluded that there is likely no opportunity to implement the FOV & spatial resolution improvements recommended by Science in J3/4 era. Will follow-up with Program science.
- Other
  - NESDIS Data Management Working Group (DMWG): Layns is the JPSS representative to this group with Ann-Marie Gnall as the back-up. Two meetings occurred in May. Goal of DMWG is to get NESIDS in compliance with NOAA and NESDIS DM policies. For JPSS, we are seen as compliant; however, we do not have a DM plan that contains all the correct information based on the policies. Likely path forward is to work with OSPO to develop a JPSS DM plan and submit to JPSS CM.
  - AMP (Layns) also joined the EPS-SG Working Group organized by OPPA. Layns will provide a briefing on June 13 describing the work that has been done to document the data product requirements for NOAA from the EPS-SG constellation.
  - AMP (Layns) is leading the monthly Archive Tag-ups with NCEI, CLASS, ESPDS, and STAR. The team is closing out some remaining actions related to engineering requests for archive. Layns also submitted a draft memo to OSPO on June 7 requesting termination of IDPS-produced Cryo/Cloud/Aerosol/Ocean Color/OMPS EDRs to CLASS. This is part of the enterprise EDR migration for JPSS.
  - Integrated Work Team (IWT) Updates: Last meeting was

# JPSS Schedule

## STAR JPSS Schedule: TTA Milestones



# FY18 STAR JPSS TTA Milestones

| FY18 TTA Milestones   | Original Date | Forecast Date | Actual Completion Date                    | Variance Explanation         |
|---|---------------|---------------|---|------------------------------|
| <b>S-NPP Enterprise Algorithms Deliveries</b>   |               |               |   |                              |
| S-NPP: Enterprise Processing System (Aerosol, Volcanic Ash, Clouds, and Cryosphere) updated DAP to NDE                    | Nov-17        | Nov-17        | 11/21/17                                  |                              |
| S-NPP: Enterprise Algorithm DAP to NDE: Vegetation Indices (final DAP)  | Jan-18        | Jan-18        | Init DAP: 06/26/17<br>Final DAP: 02/06/18 |                              |
| S-NPP: Enterprise Algorithm DAP to NDE: Land Surface Temperature (final DAP)  | Feb-18        | Mar-18        | Init DAP: 11/15/17<br>Final DAP: 04/02/18 | Passed Code Review: Feb-2018 |
| S-NPP: Enterprise Algorithm DAP to NDE: Land Surface Albedo (final DAP)   | Feb-18        | Mar-18        | Init DAP: 11/15/17<br>Final Dap: 04/02/18 | Passed Code Review: Feb-2018 |
| S-NPP: Enterprise Algorithm DAP to NDE:<br>Vegetation Health (VH-1km) final DAP<br>Vegetation Health (VH-4km) updated DAP | Nov-17        | Nov-17        | 11/13/17                                  |                              |

# FY18 STAR JPSS TTA Milestones

| FY18 TTA Milestones   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| <b>JPSS-1 Algorithm Updates DAPs</b>  |               |               |                        |                      |
| JPSS-1: ACSPO 2.5 DAP (capable of processing JPSS-1 VIIRS data) to NDE  | Nov-17        | Nov-17        | 11/16/17               |                      |
| JPSS-1: Active Fires DAP (compatibility with JPSS-1 VIIRS data) to NDE  | Nov-17        | Nov-17        | 11/21/17               |                      |
| JPSS-1: MiRS DAP (JPSS-1 algorithm adjustments) to NDE  | Aug-18        | Aug-18        |                        |                      |
| JPSS-1: NUCAPS DAP (JPSS-1 algorithm adjustments) to NDE  | Aug-18        | Aug-18        |                        |                      |
| JPSS-1: VPW DAP (JPSS-1 algorithm adjustments) to NDE   | Aug-18        | Aug-18        |                        |                      |
| JPSS-1: Enterprise Processing System DAP (JPSS-1 algorithm adjustments: Aerosol, Volcanic Ash, Clouds, Cryosphere, LST, and LSA) to NDE | Aug-18        | Aug-18        |                        |                      |



# FY18 STAR JPSS TTA Milestones

| FY18 TTA Milestones  | Original Date | Forecast Date | Actual Completion Date   | Variance Explanation                               |
|--|---------------|---------------|--|--|
| <b>JPSS-1 Cal/Val</b>  |               |               |  |  |
| JPSS-1 SDRs and KPPs reach Beta Maturity (ATMS: L+20D; CrIS: L+68D; VIIRS: L+60D; OMPS: L+68D; VIIRS Imagery: L+70D) | Jan-18        | Jan-18        | 12/08/17: ATMS TDR/SDR Beta<br>01/17/18: CrIS SDR Beta<br>02/01/18: VIIRS SDR Beta<br>01/05/18: OMPS NM & NP SDR Beta<br>02/01/18: VIIRS Imagery Beta  |  |
| JPSS-1 SDRs and KPPs reach Provisional Maturity (ATMS: L+36D; VIIRS Imagery & other SDRs: L+90D)                     | Feb-18        | Feb-18        | 01/23/18: ATMS TDR/SDR Provisional<br>02/16/18: CrIS SDR Provisional<br>02/19/18: VIIRS SDR Provisional<br>02/19/18: VIIRS Imagery Provisional<br>04/18/18: OMPS TC: delta review  | 02/20/18: SDRs/Imagery Provisional Maturity Review |
| JPSS-1 SDRs and KPPs reach Validated Maturity (ATMS: L+6M; CrIS: L+9M; VIIRS: L+6M; OMPS: L+9M; VIIRS Imagery: L+9M) | Sep-18        | Sep-18        |  |  |
| JPSS-1: Day 1 EDR products Maturity Review   | Sep-18        | Sep-18        | 03/22/18: Beta Review: Active Fires, MiRS, OMPS Ozone<br>04/18/18: Enterprise Cloud Mask (Beta), Aerosol Optical Depth (P), Aerosol Detection (Provisional), Sea Surface Temperature (P), Active Fires (Provisional), MiRS (Provisional) |  |



# FY18 STAR JPSS TTA Milestones

| FY18 TTA Milestones  | Original Date | Forecast Date | Actual Completion Date   | Variance Explanation |
|--|---------------|---------------|--|----------------------|
| <b>Routine Cal/Val Maintenance</b>   |               |               |  |                      |
| SDR Reprocessing: Perform life cycle reprocessing with Block 2.0 algorithm (ATMS BUFR) | Apr-18        | Apr-18        | Feb-18   |                      |
| Update Package for ICVS-GRAVITE For JPSS-1   | Sep-18        | Sep-18        |  |                      |
| EDR LTM for JPSS-1   | Sep-18        | Sep-18        |  |                      |
| Images of the Month  | Monthly       | Monthly       | Oct-17, Nov-17, Dec-17, Jan-18, Feb-18, Mar-18, Apr-18. May-18 |                      |
| NOAA-20 ATMS First Light Image   |               |               | 11/30/17   |                      |
| NOAA-20 VIIRS First Light Image (reflected solar bands (RSB))                          |               |               | 12/14/17   |                      |
| NOAA-20 VIIRS First Light Image (day/night band (DNB))                                 |               |               | 12/14/17   |                      |
| NOAA-20 VIIRS First Light Image (thermal emissive bands (TEB))                         |               |               | 01/05/18   |                      |
| NOAA-20 CrIS First Light Image   |               |               | 01/05/18   |                      |
| NOAA-20 OMPS NM First Light Image  |               |               | 01/05/18   |                      |
| NOAA-20 OMPS NP First Light Image  |               |               | 01/05/18   |                      |



# FY18 STAR JPSS TTA Milestones

| FY18 TTA Milestones   | Original Date | Forecast Date | Actual Completion Date   | Variance Explanation  |
|---|---------------|---------------|--|---|
| <b>Operational Support</b>  |               |               |  |   |
| S-NPP: Weekly OMPS TC/NP Dark Table Updates                       | Weekly        | Weekly        | 10/03/17, 10/11/17, 10/17/17, 10/24/17, 10/31/17, 11/07/17, 11/14/17, 11/21/17, 11/28/17, 12/05/17, 12/12/17, 12/19/17, 01/02/18, 01/09/18, 01/16/18, 01/23/18, 01/30/18, 02/06/18, 02/13/18, 02/27/18, 03/06/18, 03/13/18, 03/20/18, 03/27/18, 04/03/18, 04/10/18, 04/17/18, 04/24/18, 05/01/18, 05/08/18, 05/15/18, 05/22/18, 05/29/18 |   |
| S-NPP: Bi-Weekly OMPS NP Wavelength & Solar Flux Table Update     | Bi-Weekly     | Bi-Weekly     | 10/03/17, 10/17/17, 10/31/17, 11/14/17, 11/28/17, 12/12/17, 01/03/18, 01/16/18, 01/30/18, 02/13/18, 02/27/18, 03/13/18, 03/27/18, 04/10/18, 04/24/18, 05/08/18, 05/22/18   |   |
| S-NPP: Monthly VIIRS Stray Light LUT Update                       | Monthly       | Monthly       | 10/19/19, 11/18/17, 12/17/17, 01/15/18, 02/14/18, (12-months recycling old files)  | Re-use old files  |
| S-NPP: Monthly VIIRS LUT update of DNB Offsets and Gains          | Monthly       | Monthly       | 10/03/17, 10/31/17, 11/29/17, 12/27/17, 01/24/18, 02/21/18, 03/28/18, 04/24/18, 05/22/18   |   |
| JPSS-1: Weekly OMPS TC/NP Dark Table Updates                      | Weekly        | After L+90    | 12/19/17, 01/10/18, 01/17/18, 01/23/18, 01/30/18, 02/06/18, 02/13/18, 02/27/18, 03/06/18, 03/13/18, 03/20/18, 03/27/18, 04/03/18, 04/11/18, 04/17/18, 04/24/18, 05/01/18, 05/08/18, 05/15/18, 05/22/18, 05/29/18   | 12/19/17: 1 <sup>st</sup> Dark delivery;<br>01/10/18: start of weekly J1 Dark |
| JPSS-1: Bi-Weekly OMPS NP Wavelength & Solar Flux Table Update    | Bi-Weekly     |               |  | No need now   |
| JPSS-1: Monthly VIIRS Stray Light LUT Update                      | Monthly       | After L+90    | 02/27/18, 03/29/18, 04/25/18, 05/23/18   |   |
| JPSS-1: Monthly VIIRS LUT update of DNB Offsets and Gains         | Monthly       | After L+90    | 02/13/18, 02/21/18, 03/29/18, 04/25/18, 05/22/18   |   |
| JPSS-1: Monthly VIIRS LUT update of F-PREDICTED and DNB-LGS-GAINS | Monthly       | After L+90    | 03/20/18, 04/24/18   |   |



# June 2018 AMP/STAR RMB Top Issues



Status as of: 06/08/2018

| Problem/Issue   | Programmatic Impact   | Action | Status  |
|---|---|--------|---|
|  <p>The OMPS SDR team has to make unanticipated changes to several fast-track and OOC LUTs as well as a code change in order for the OMPS NP and TC SDR products to reach provisional maturity. Provisional maturity will not be reached until Block 2.1 Mx2 goes operational in July 2018.</p> | <p>Delayed OMPS SDR products that are provisionally mature.</p> |        | <p>6/6/18: No update.</p> <p>5/2/18: The OMPS Nadir Mapper SDR passed the Provisional Maturity Review on 4/18/18.</p> <p>4/12/18: All tables necessary for Nadir Mapper Provisional Maturity have been implemented and tested. The NM product has been approved for Provisional Maturity and will go to review on 4/18/18.</p> <p>4/9/18: No update. This will remain an issue until the delta provisional review is completed.</p> <p>3/7/18: This is not a risk anymore, J-STAR OMPS Product Milestone passed L+90 days, and it has not reached provisional. This is now an issue. The changes required to reach provisional have been delivered to the program, and approved by AERB on 2/28/18. They are in process to be implemented in IDPS, and a delta provisional review will be scheduled once the changes are implemented in operations. J-STAR recommends this issue can be closed after OMPS SDR reaches provisional maturity.</p> |



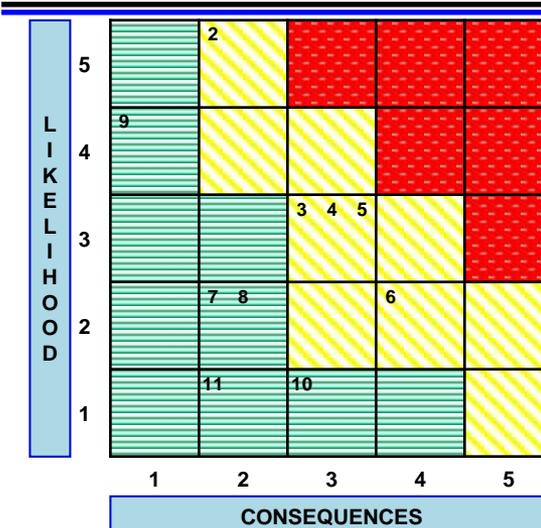
# June 2018 AMP/STAR RMB Risk Summary



## Top Risks

Status as of: 06/08/2018

| Rank Risk ID                    | Summary   | LxC Trend  | Aprch |
|---------------------------------|---|------------|-------|
| 1<br><a href="#">AMP-17-005</a> | J-01 OMPS NP degradation in short channels                        |            |       |
| 2<br><a href="#">AMP-15-002</a> | J2/3/4 VIIRS Polarization   | 5x2<br>↔   | W     |
| 3<br><a href="#">AMP-16-005</a> | Block 2.0 Algorithm Change Process & delivery of changes.         | 3x3<br>↔   | W     |
| 4<br><a href="#">AMP-17-002</a> | Lack of Proper Source/Procedure to Characterize ATMS G-Shelf SRFs | 3x3<br>↔   | W     |
| 5<br><a href="#">AMP-17-006</a> | Algorithm Testing prior to Delivery to Raytheon                   | 3x3<br>↔   | W     |
| 6<br><a href="#">AMP-18-004</a> | NWS GFS FV3 Model Upgrade Impacts                                 | 2x4<br>NEW | M     |



|                                  |  |          |   |
|----------------------------------|--|----------|---|
| 7<br><a href="#">AMP-18-002</a>  | OMPS Pre-Launch Calibration for J-02   | 2x2<br>↔ | W |
| 8<br><a href="#">AMP-18-003</a>  | J2 APID Changes to Accommodate New S/C Bus   | 2x2<br>↔ | W |
| 9<br><a href="#">AMP-17-004</a>  | Operational Data Flow to AWIPS-II  | 4x1<br>↔ | M |
| 10<br><a href="#">AMP-17-007</a> | Lack of Communication from Flight When Making On-Board Instrument Calibration Updates with Potential Ground System Processing/Science Data Quality Impacts | 1x3<br>↔ | M |
| 11<br><a href="#">AMP-15-006</a> | Continued Generation of IDPS EDRs  | 1x2<br>↔ | M |

**Criticality**

|      |
|------|
| HIGH |
| MED  |
| LOW  |

**Approach**

- A – Accept
- M – Mitigate
- W – Watch
- R – Research

**LxC Trend**

- ↓ – Decreasing (Improving)
- ↑ – Increasing (Worsening)
- ↔ – Unchanged
- NEW – Added this month



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

| Rank   | Risk ID    | Risk Statement  | Approach     | Status  |
|--|------------|---|--------------|---|
| <p><b>1</b></p> <p>J-01 OMPS NP degradation in short channels</p> <p>↔</p> <p><b>Expected Closure:</b><br/>08/2018</p> | AMP-17-005 | <p><b>Given that:</b> on-satellite testing of the OMPS Nadir Profiler on J-01 shows degradation in the shortest wavelength channels</p> <p><b>There is a possibility that:</b> there are errors in calibration or degradation of the sensor</p> <p><b>Resulting in:</b> poor data quality</p> | <b>Watch</b> | <p>6/8/18: Since we have seen no indication of degradation on orbit for 6+ months, we can close this risk.</p> <p>6/7/18: From Glen Jaross "After 6 months of solar measurements there is no indication that the anomalous degradation observed prior to launch is occurring post-launch. It bothers me that we do not know how the pre-launch degradation reversed itself or how we were fooled into thinking we saw degradation in the first place. But I'm at a loss as to how we can answer this for J1 OMPS. We only have so much data, and we've pretty much exhausted it."</p> |



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

| Rank  | Risk ID    | Risk Statement  | Approach | Status   |
|---|------------|---|----------|--|
| <div style="display: flex; align-items: center;"> <div style="background-color: yellow; border: 1px solid black; padding: 2px; margin-right: 5px;">2</div> <div style="margin-right: 10px;">J2/3/4 VIIRS Polarization</div> </div> <div style="margin-top: 10px;">↔</div> | AMP-15-002 | <p><b>Given that:</b> Raytheon El Segundo is not meeting polarization standards on J2</p> <p><b>There is a possibility that:</b> they will not meet those standards or better for J3/4</p> <p><b>Resulting in:</b> a lower quality of data.</p> | Watch    | <p>6/6/18: No firm update. With the Ocean Color products reaching Provisional maturity we can expect that handling N-20 polarization in ocean products also will be validated at provisional level. That will confirm Raytheon modeling for N-20 and by extension then may be accepted as reducing the risk of polarization problems for J2/J3/J4. Such a situation can then be taken to reduce consequence from level 2 to level 1 in severity.5/3/18: No update.</p> <p>4/9/18: No update.</p> |



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

| Rank  | Risk ID    | Risk Statement  | Approach | Status   |
|---|------------|---|----------|--|
| <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">3</div> <div> <p>Block 2.0 Algorithm Change Process &amp; delivery of changes.</p> </div> </div> | AMP-16-005 | <p><b>Given that:</b> The CFCR is not available for "outside users" to load updated, approved algorithms (code, documents, tables)</p> <p><b>There is a possibility that:</b> algorithm changes and table updates will be inefficient (slowed)</p> <p><b>Resulting in:</b> an impact to the quality of the data products.</p> | Watch    | <p>4/12/18 After Board discussion: Based on status of 4/4, Board stated that Likelihood should be increased. Looking at Consequences, we noted that the impact was more than negligible or moderate. Risk has been increased to 3x3 (LxC).</p> <p>4/4/18:</p> <ol style="list-style-type: none"> <li>1. Still have not been able to find CFCR deadline.</li> <li>2. CFCR Rack is in GT4 N250, has been powered up, and has passed NASA Security.               <ul style="list-style-type: none"> <li>- RTN personnel to arrive: TBD, but expect in April, 2018.</li> <li>- Next steps are to:                   <ul style="list-style-type: none"> <li>- - connect CFCR rack to NASA network</li> <li>- - update CFCR with current Versioned Object Bases (VOB)</li> <li>- - begin populating CFCR with users, adding roles as known.</li> </ul> </li> </ul> </li> <li>3. Current ConOps Lead now has redlines and has consulted with some of DPES and AMP; ConOps now in work.               <ul style="list-style-type: none"> <li>- ConOps is not "on contract" and is not required; of course it will help implementation go more smoothly if we have a correct one.</li> </ul> </li> </ol> <p>New development: Current network provided by Raytheon for the CommonCM is to be decommissioned. A suggestion was made at the March PMR by Raytheon to host the CommonCM on the CFCR. Raytheon is planning a meeting with DPES, AMP and IDPS to discuss RTN's requirements for Common CM / ADL / ADR / PCR / ClearCase.</p> |



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

| Rank  | Risk ID    | Risk Statement  | Approach | Status   |
|---|------------|---|----------|--|
| <br> <p>Lack of Proper Source/Procedure to Characterize ATMS G-Shelf SRFs</p> | AMP-17-002 | <p><b>Given that:</b> NGES does not currently have a proper HF source or test procedure to correctly and accurately characterize ATMS G-Shelf SRFs</p> <p><b>There is a possibility that:</b> J2 ATMS will suffer the same result as J1 and to some degree S-NPP</p> <p><b>Resulting in:</b> large uncertainty in the characterization of the G-Shelf SRFs.</p> | Watch    | <p>6/6/18: NASA ATMS Science has proposed SRF PRD language to Instrument Builder. Instrument Builder is receptive. Programmatic look like the J2 shelf testing (when SRF testing occurs) will occur prior to the J2 PRD update and the Contract Mod implementation. So for J2, the plan is for a Task Order to be written and for J3/4, the new SRF PRDs will be in effect. The J2 Task Order is not yet released. The J3/4 PRD CCR has not yet been submitted to DOORs. I'm expecting the CCR to hit MIS in the next 3-4 weeks.</p> |



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

| Rank  | Risk ID           | Risk Statement  | Approach            | Status  |
|---|-------------------|---|---------------------|---|
| <p><b>5</b></p> <p>Algorithm Testing prior to Delivery to Raytheon</p>  | <p>AMP-17-006</p> | <p><b>Given that:</b> Given that DPES is unable to test algorithm change packages in Mx 3, no algorithm change packages can be delivered to Raytheon. Specifically, DPES is unable to compile and run the Mx3-based G-ADA.</p> <p>Some examples:<br/>           CrIS DR 8444; Delivered by STAR on 8/11/17<br/>           VIIRS 8393; Delivered by STAR on 6/15/17<br/>           OMPS DR 8233; Delivered by STAR on 6/15/17</p> <p>As of 9/13/2017, none of these had been tested by DPES.<br/>           As of 9/25/2017, only the OMPS DR (8233) had been tested by DPES in Mx 2.</p> <p><b>There is a possibility that:</b> The inability to deliver algorithm change packages to Raytheon in a timely manner severely impacts the ability to maintain the data product performance in operations. And if this continues with every IDPS Mx build, it will impact the ability to operationalize the J1 products.</p> <p>DPES also has a backlog of 6 algorithm change packages that MAY need to be redelivered by STAR tested in a different version of ADL. This adds unnecessary work to STAR.</p> <p><b>Resulting in:</b> Delays in getting algorithm changes into operations, which could impact timeliness of reaching higher levels of data maturity.</p> | <p><b>Watch</b></p> | <p>6/6/18: Arron has indicated that if Block 2.1 Mx2 G-ADA is implemented without issue than this risk can be closed. RMB agreed to this with the stipulation that a low-level watch item be opened the next time DPES has to complete a large upgrade.</p> <p>5/4/18: Block 2.1 Mx1 G-ADA implemented without issue.</p> |



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

| Rank  | Risk ID    | Risk Statement   | Approach | Status   |
|---|------------|--|----------|--|
| <div data-bbox="42 282 115 332" style="background-color: yellow; border: 1px solid black; padding: 2px; display: inline-block;">6</div> <p>NWS GFS FV3 Model Upgrade Impacts</p> <p>NEW</p> | AMP-18-004 | <p><b>Given that:</b> the NWS plans to upgrade the GFS FE3 Model resolution in the second quarter of FY19</p> <p><b>There is a possibility that:</b> SDR gridding granulation of the ancillary data files could change</p> <p><b>Resulting in:</b> the failure of some EDR products.</p> | Mitigate | <p>6/6/18: Following the TIM on 5/16/18, RTN was given the action to look at example GFS files in the JPSS format. The agreed to and likely path forward on the IDPS side is to end non-VIIRS Imagery EDR processing, which will require a CCR and program agreement. The issue is being worked separately on the NDE side. STAR is working on a plan to update EDR algorithms in NDE has necessary.</p> |



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

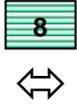
| Rank  | Risk ID    | Risk Statement   | Approach     | Status  |
|---|------------|--|--------------|---|
|  <p>OMPS Pre-Launch Calibration for J-02</p>  | AMP-18-002 | <p><b>Given that:</b> J-01 OMPS NP pre-launch on-satellite testing showed that the diffuser/sensor combination had degraded since calibration</p> <p><b>There is a possibility that:</b> similar calibration issues may occur on J-02</p> <p><b>Resulting in:</b> inaccurate J-02 OMPS pre-launch calibration and the potential for poor data quality.</p> | <b>Watch</b> | <p>6/7/18: With respect to the J1 pre-launch degradation, the sensor vendor is designing a new test that will allow us to discriminate between sensor and diffuser degradation. If this happens again they will still need time to conduct an investigation, something we didn't have on J1. Test plan will be known by PER in August 2018.</p> <p>5/3/18: No update.</p> |



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

| Rank   | Risk ID    | Risk Statement  | Approach | Status   |
|--|------------|---|----------|--|
|  <p>J2 APID Changes to Accommodate New S/C Bus</p> | AMP-18-003 | <p><b>Given that:</b> J2 has a new S/C Bus manufacturer and some new APIDs compared to J1 and S-NPP</p> <p><b>There is a possibility that:</b> the SDR algorithms will need to be updated to accommodate new RDR format/structure</p> <p><b>Resulting in:</b> additional unplanned work for Ground.</p> | Watch    | <p>6/6/18: Awaiting the next release of the J2 APID Map.</p> <p>5/2/18: Circulated J2 - J1 - SNPP APID Mapping to STAR for SDR team feedback. Feedback was provided from each team, which I shared with the J2 DFWG chair. Discrepancies have been addressed and should be corrected in the next release of the J2 APID Map.</p> |



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

| Rank  | Risk ID    | Risk Statement  | Approach | Status   |
|---|------------|---|----------|--|
| <br><br>Operational Data Flow to AWIPS-II | AMP-17-004 | <p><b>Given that:</b> AWIPS data flow issues (esp. AWIPS Data Delivery (DD) to PDA interface) are not resolved,</p> <p><b>There is a possibility that:</b> Many JPSS data products will be inaccessible to the NWS AWIPS II system for forecaster use</p> <p><b>Resulting in:</b> under-utilization of JPSS data products by the NWS forecasting community.</p> | Mitigate | <p>6/7/18: Based on a more detailed analysis of JPSS product file sizes and bandwidth needs, NWS AWIPS access to JPSS data products may not require augmented PDA capability after all: NDE production rules may be sufficient, at least for a couple of years as usage grows. We are checking that</p> <ul style="list-style-type: none"> <li>(i) NDE production rules can be applied to the AWIPS-DD interface;</li> <li>(ii) they can reduce product sizes enough to meet expected usage needs within available bandwidths; and</li> <li>(iii) the (fluctuating) bandwidth needs of polar and other products (GOES-R, radar, models, etc.) will leave enough room for polar products.</li> </ul> <p>(Effective AWIPS use of these data will also require NWS to develop a reliable AWIPS-DD capability (Raytheon has finally resumed testing w/polar products) and AWIPS plugins for JPSS products (TOWR-S has a long list of "TBD" dates for these). NESDIS is not directly involved in those efforts, but can advise and assist as needed.)</p> |



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

| Rank  | Risk ID    | Risk Statement   | Approach | Status  |
|---|------------|--|----------|---|
|  <p>Lack of Communication from Flight When Making On-Board Instrument Calibration Updates with Potential Ground System Processing/Science Data Quality Impacts</p>  | AMP-17-007 | <p><b>Given that:</b> Flight instrument vendors and NASA science teams collaborate to make on-board instrument calibration updates to firmware/software with potential ground system processing and science data quality impacts unbeknownst to IDPS, AMP, or STAR.</p> <p><b>There is a possibility that:</b> on-board instrument calibration and science data product algorithms (and their associated update tables) will be out-of-sync</p> <p><b>Resulting in:</b> failure of IDPS to produce downstream products (SDRs/TDRs/EDRs) and/or degraded science data products.</p> | Mitigate | <p>6/6/18: Have been able to access and participate in monthly Instrument PMRs. Also, actively accessing and providing concurrences on science-related Flight CCRs. Arron is working diligently to set up the first meeting with interested Flight personnel.</p> <p>5/4/18: No update.</p> |



# June 2018 AMP/STAR RMB Top Risks



Status as of: 06/08/2018

| Rank   | Risk ID    | Risk Statement   | Approach        | Status  |
|--|------------|--|-----------------|---|
|  <p>Continued Generation of IDPS EDRs</p>  <p><b>Expected Closure:</b><br/>09/2018</p> | AMP-15-006 | <p><b>Given that:</b> we are transitioning to production of EDRs on ESPC systems</p> <p><b>There is a possibility that:</b> the IDPS-generated EDRs will continue running for an extended period of time</p> <p><b>Resulting in:</b> additional maintenance and sustainment costs.</p> | <b>Mitigate</b> | <p>6/6/18: Three remaining products to be transitioned to operations are Vegetation Indices (planned for June 20, 2018 SPSRB - DELAYED) and Land Surface Temperature and Albedo (reliant on Veg Ind), ORR planned for July 2018.</p> <p>4/6/18: LSA/LST ARR successfully completed on 3/14/2018. Vegetation Indices successfully completed ORR on</p> |

**Color code:**

**Green:**

**Completed Milestones**

**Gray:**

**Non-FY18 Milestones**

## Accomplishments / Events:

- Evaluate NG provided NOAA-20 hybrid antenna pattern data
- Generate TDR to SDR conversion coefficients using hybrid antenna data and test updated correction coefficients in ADL
- Assess angular dependent bias, cross scan asymmetry, and global mean bias of SDR data generated by different versions of correction coefficients
- Update calibration algorithm code and associated PCT to include reflector emissivity correction

## Overall Status:

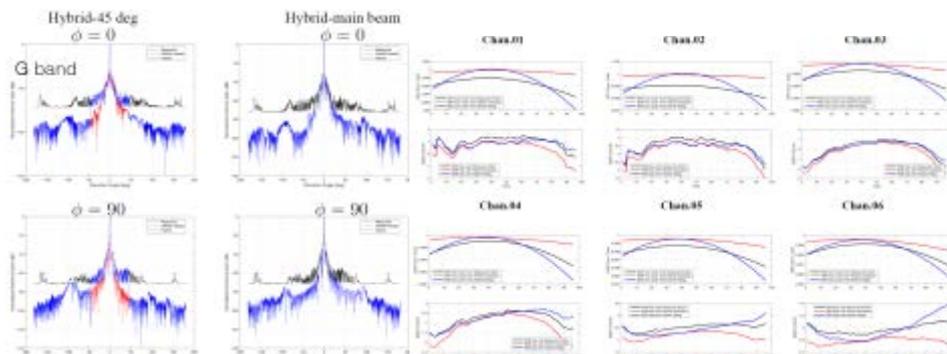
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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

## Issues/Risks:

None

## Highlights:



NOAA-20 ATMS G-band hybrid antenna pattern data provided by NG (left) and TDR to SDR conversion coefficients evaluation using different measurements on selected channels (right)

| FY18 TTA Milestones   | Original Date  | Forecast Date | Actual Completion Date  | Variance Explanation |
|---|--|---------------|---|----------------------|
| <b>J1 post-launch calibration/validation</b>  |  |               |   |                      |
| Beta Maturity   | Dec-17   | Dec-17        | 12/08/17  | L+20D                |
| Provisional Maturity  | Dec-17   | Dec-17        | 01/23/18  | V6 PCT Implemented   |
| Validated Maturity  | May-18   | May-18        | L+6M  | Scheduled 6/15       |
| J1/N20 PCT updates  | 10/30/17 (V5, ADR8506/CCR3669)<br>12/18/17 (V6, ADR8521/CCR3702)<br>05/09/18 (V7, ADR8458/CCR3916) |               |   |                      |
| J1/N20 PCT update (based on the Pitch Maneuver)   | Apr-18   | Apr-18        | 05/01/28  | To ASSISTT: 04/26/18 |
| <b>Planned Algorithm Update</b>   |  |               |   |                      |
| DAP to ASSISTT (science team to ASSISTT)  | May-18   | TBD           | The code and PCT updates will change both TDR and SDR values. Any change in TDR may impact weather forecasting. |                      |
| SNPP/J1 earth scene reflector emissivity correction in IDPS (PCT & code update) (ASSISTT to DPES AIT) | Jun-18   | TBD           | Need more time to generate sample data sets for users to test and investigate the impact.                       |                      |

## Accomplishments / Events:

- Continued the assessment and analysis of both CrIS on-orbit data and special post-launch tasks (PLT) data
- Continued to monitor, assess, and improve NOAA-20 CrIS SDR data quality
- Updated calibration algorithm with extended interferogram data points in CrIS full spectral resolution SDR data product in Block 2.1 MX1 on 04/30/2018
- Delivered the LUT fix for the missing packet issue for CrIS on NOAA-20 (ADR 8653/CCR3908). The LUT was implemented in IDPS operational system on 05/24/2018
- Proposed fix for the NOAA-20 CrIS MWIR Bit-trim Mask saturation at hot scenes (DR 8654) by increasing one-bit for MWIR BRM and increasing the PGA gain by 1.5 time in EP v115
- Working on the implementation of the polarization correction algorithm for S-NPP and NOAA-20 in ADL

## Overall Status:

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

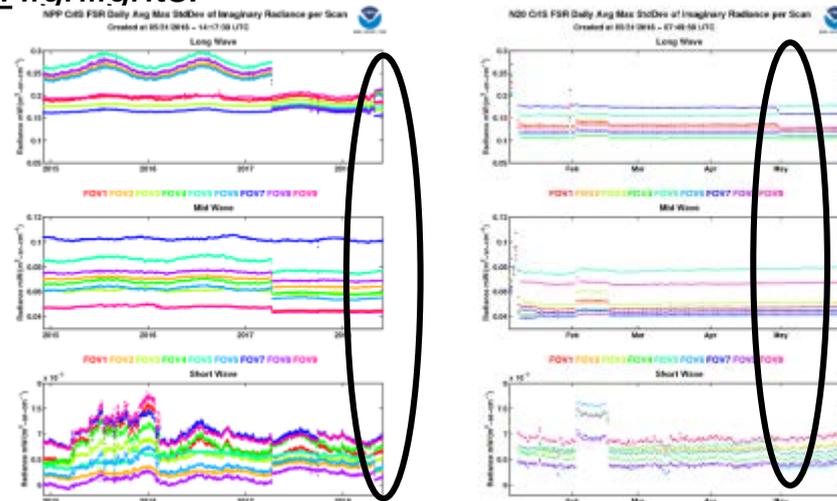
- Project has completed.
- Project is within budget, scope and on schedule.
- Project has deviated slightly from the plan but should recover.
- Project has fallen significantly behind schedule, and/or significantly over budget.

## Issues/Risks:

None

| FY18 TTA Milestones  | Original Date  | Forecast Date                    | Actual Completion Date                           | Variance Explanation                    |
|--|--|----------------------------------|--|---|
| <b>J1 post-launch calibration/validation</b>   |  |                                  |  |   |
| Beta Maturity  | Jan-18   | Jan-18                           | 01/17/18   | V113 uploaded                           |
| Provisional Maturity   | Feb-18   | Feb-18                           | 02/16/18   | V114 uploaded                           |
| Validated Maturity   | Aug-18   | Aug-18                           | L+9M   |   |
| Engineering packet update for JPSS-1 operations  | 01/05/18<br>01/18/18<br>02/16/18   | 01/05/18<br>01/18/18<br>02/16/18 | V112: 01/03/18<br>v113:01/17/18<br>V114:02/16/18 |   |
| RDR generator software package development: (1) STAR NL correction coefficient generator; (2) STAR ILS parameter generator; (3) STAR CITS unpacker to generate level 1a product; (4) STAR CITS_geolocation to generator geolocation data; (5) STAR RDR generator | Mar-18   | Jun-18                           |  | Lack of resources, especially man power |
| DAP Deliveries   | 10/19/17 (ADR8489,8490,ADR8491/CCR3656)<br>02/14/18 (ADR8519/CCR3726)<br>03/06/18 (ADR8629/CCR3851); 03/20/18 (update)<br>04/05/18 (ADR8653/CCR3908)<br>04/20/18 (ADR8631/CCR3922) |                                  |  |   |

## Highlights:



Imaginary radiance before and after implementing to use extended interferogram data points in FSR SDR on 04/30/2018. Note that imaginary radiance is a good quality indicator, and not applied CMO correction.

## Accomplishments / Events:

- Developed, reviewed, and delivered VIIRS SDR code change package for improving NOAA-20/S-NPP radiance limit verification and saturation rollover flagging
- Prepared and delivered the updated NOAA-20 VIIRS geolocation LUTs that include corrected HAM wedge/axes parameters
- Analyzed DNB new moon calibration from May 15, 2018 and updated offset and gain ratio LUTs for NOAA-20 and S-NPP
- Generated NOAA-20 DNB stray light correction LUT from May 2018 data
- Analyzed NOAA-20 VIIRS RSB radiometric consistency with S-NPP VIIRS using SNO, SNO-x and DCC trending
- Compared the F factors derived using monthly lunar collection with onboard solar diffuser and found good consistency among the two

## Overall Status:

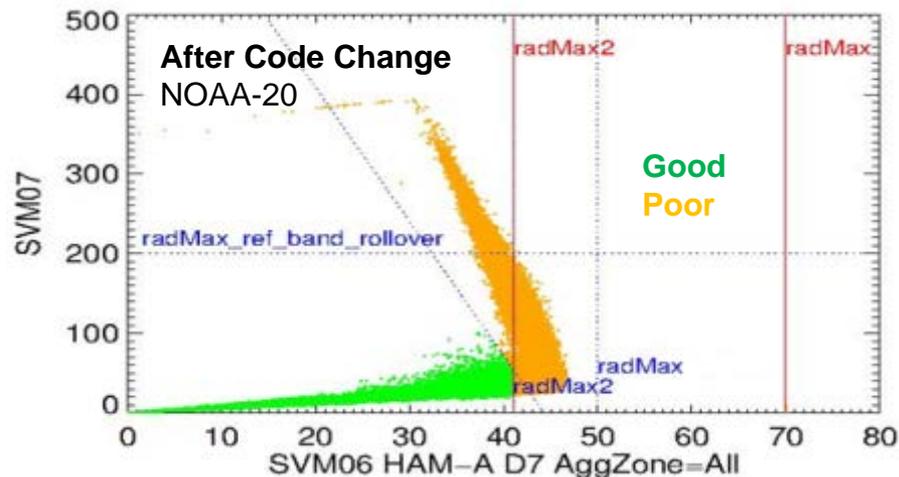
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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

## Issues/Risks:

none

## Highlights:



M6 QFs are significantly improved by applying the updated saturation rollover flagging method

| FY18 TTA Milestones  | Original Date | Forecast Date | Actual Date | Variance Explanation |
|--|---------------|---------------|-------------|----------------------|
| <b>N20 Post-Launch Cal/Val</b>   |               |               |             |                      |
| 1st set of LUT updates for operations  | Dec '17       | Dec '17       | Jan '18     | CCR 3555             |
| Beta Maturity  | Jan '18       | Jan '18       | Feb '18     | CCR 3742             |
| 2nd set of LUT updates for operations  | Feb '18       | Feb '18       | Feb '18     | CCR 3738             |
| Provisional Maturity   | Feb '18       | Feb '18       | Feb '18     | CCR 3912             |
| Validated Maturity   | May '18       | May '18       |             | Scheduled 6/15       |
| <b>Planned Algorithm Updates</b>   |               |               |             |                      |
| M6 rollover flagging correction  | Sep '18       | Jun '18       | May '18     | CCR 3966             |
| LWIR FPA temperature flagging  | Sep '18       | Jun '18       | May '18     | CCR 3965             |
| LUT update to reduce SDSM uncertainty  | Jul '18       | Jul '18       |             |                      |
| WUCD calibration correction  | Aug '18       | Aug '18       |             |                      |
| Identify algorithm updates based on JPSS-2 pre-launch test data: Pre-launch sensor characterization report | Sep '18       | Sep '18       |             |                      |

## Accomplishments / Events:

- Regular weekly dark deliveries for OMPS sensors were made.
- Regular bi-weekly OMPS-NP wavelength table deliveries were made for S-NPP.
- A successful test was performed with the NOAA-20 OMPS to improve the spatial agreement between OMPS-TC and OMPS-NP, image bottom right.
- Items that prevented OMPS-NP from reaching provisional status were verified to be fixed in MX02 through the checkout review process, nominal TTO July 2018.

## Overall Status:

|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation                                  |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|---|
| Cost / Budget            |                                   | X                                  |                                  |                                |   |
| Technical / Programmatic |                                   |                                    |                                  | X                              | Waiting for code change in IDPS, MX2 TTO July nominal |
| Schedule                 |                                   |                                    |                                  | X                              | Waiting for code change in IDPS, MX2 TTO July nominal |

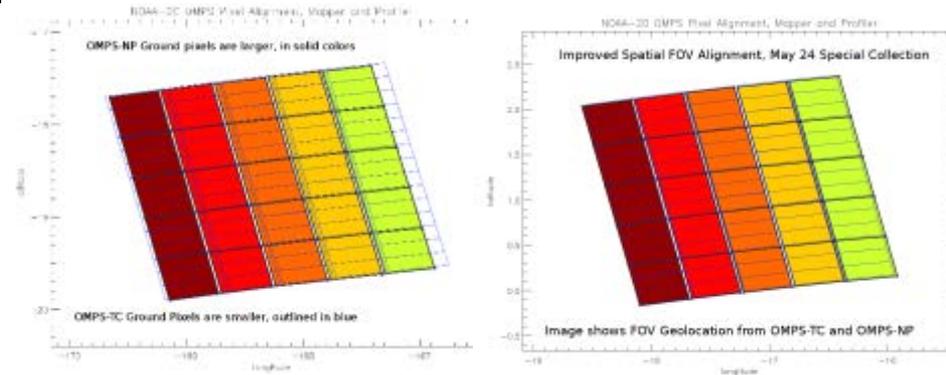
1. Project has completed.
2. Project is within budget, scope and on schedule.
3. Project has deviated slightly from the plan but should recover.
4. Project has fallen significantly behind schedule, and/or significantly over budget.

## Issues/Risks:

OMPS-NP is Red, the necessary code change will be in MX02.

| FY18 TTA Milestones   | Original Date   | Forecast Date | Actual Completion Date         | Variance Explanation                |
|---|---|---------------|--------------------------------|-------------------------------------|
| <b>J1 post-launch calibration/validation</b>  |   |               |                                |                                     |
| Beta Maturity   | Jan-18  | Jan-18        | 01/26/18                       |                                     |
| Provisional Maturity  | Feb-18  | Jul-18        | OMPS TC delta review: 04/18/18 | Review: 02/20/18<br>Pending Mx2 TTO |
| Validated Maturity  | Aug-18  | Aug-18        | L+9M                           |                                     |
| LUT update for JPSS-1 operations (1 <sup>st</sup> delivery)                           | Dec-17  | Dec-17        | 12/18/17                       | L+42D                               |
| Weekly Dark Cal for JPSS-1 operations<br>OMPS-NP-DARKS-GND-PI<br>OMPS-TC-DARKS-GND-PI | Feb-18  | Feb-18        | 01/08/18                       | Started weekly update on 1/8/2018   |
| NOAA-20 OMPS NP OSOL & Wavelength LUT update (ADR8508/CCR3770)                        | Feb-18  | Feb-18        | 02/01/18                       |                                     |
| NOAA-20 OMPS SDR LUT updates  | 01/23/18 (ADR8576/CCR3760, ADR8577/CCR3761, NM & NP FAM LUTs update)<br>02/15/18 (ADR8594/CCR3821, TC SDR LUT and GND-PI updates) |               |                                |                                     |
| OMPS NP code update (ADR8615/CCR3829)   |   | 07/02/18      | 02/16/18                       |                                     |
| Update S-NPP OMPS TC Straylight Table   | 05/15/18 (ADR8527/CCR3906)  |               |                                |                                     |

## Highlights:



Improved Spatial Match was verified with May 24 Special Collections, DR\_8617: FOV Mismatch.

## Accomplishments / Events:

- Tested and evaluated both NAGG package and ADL packer for ATMS reprocessed data aggregation
- It's been decided to use NAGG package for aggregation since it can provide aggregated dataset consistent with CLASS aggregated data
- Finished the draft of README file for reprocessed ATMS and CrIS and they will be discussed in the coming discussion with NCEI/CLASS
- Investigation of technical issues regarding applying NAGG for aggregation are underway (including adding one missing attribute in reprocessed ATMS data, and adding filled values for missing granules)

## Overall Status:

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

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

## Issues/Risks:

None

## Highlights: Comparison of NAGG Aggregation (left panels) and CLASS Aggregation (right panels)

Beam time are exactly same

Beam geolocation has very small shift ~5<sup>th</sup> digit after decimal point

| FY18 TTA Milestones  | Original Date | Forecast Date | Actual Comp Date | Variance Explanation |
|--|---------------|---------------|------------------|----------------------|
| Development of reprocessing data distribution website  | Apr-18        | Apr-18        | Feb-28-18        |                      |
| Analyze the quality of reprocessed data  | Apr-18        | Apr-18        | Mar-31-18        |                      |
| Prepare BUFRred reprocessed data for NWS reanalysis projects (NCEP/GMAO)   | Apr-18        | Apr-18        | Feb-28-18        |                      |
| Prepare ATMS user Manual for using ATMS reprocessed data as pilot dataset to archive in CLASS                      | May-18        | May-18        | May-18-18        |                      |
| Finalize the aggregation package to be used for producing the aggregated reprocessed ATMS data to archive in CLASS | May-18        | May-18        | May-18-18        |                      |
| Complete the preparation of aggregated reprocessed ATMS data to be transitioned to CLASS                           | Jun-18        | Jun-18        |                  |                      |
| Complete the reprocessing of OMPS SDR data   | Jun-18        | Jun-18        |                  |                      |
| Development of reprocessing data review website  | Jul-18        | Jul-18        |                  |                      |

Accomplishments / Events:

- Developed ATMS SDR O-B angular dependent bias modules
- Update all ATMS and SC scripts to improve execution efficiency
- Developed CrIS O-B bias time series module development
- Assisted in fixing CrIS bit trim saturation issue for NOAA-20 Mid-wave band and the scan missing issue
- Unified SNPP/NOAA-20 VIIRS imaging modules
- Added VIIRS DNB analysis module for NOAA-20
- Initialized SNPP OMPS NP daily MgII and wavelength shift module
- Initialized SNPP OMPS NM O-B module
- Developed OMPS telemetry module
- Completed ATMS-BUFR conversion to support ATMS SDR reprocessing impact evaluation
- Standardized ICVS-GRAVITE TTO delivery requirements
- Completed JPSS-ICVS Maintenance Manual draft

Overall Status:

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

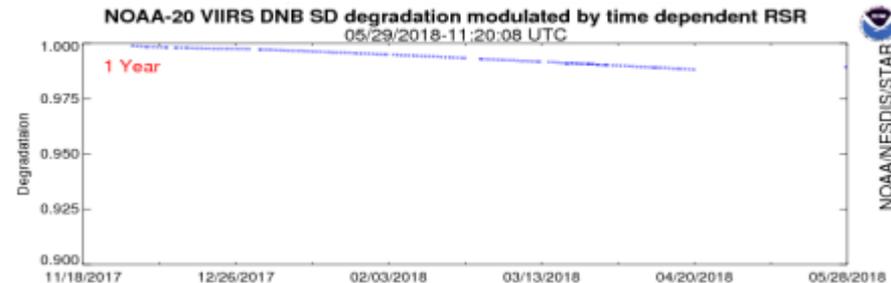
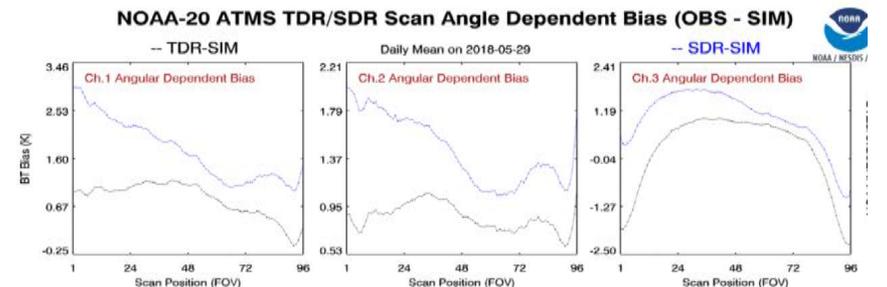
1. Project has completed.
2. Project is within budget, scope and on schedule.
3. Project has deviated slightly from the plan but should recover.
4. Project has fallen significantly behind schedule, and/or significantly over budget.

Issues/Risks:

None

| FY18 TTA Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|--|---------------|---------------|------------------------|----------------------|
| J1 Post-launch Monitoring/Trending Package                   | Dec-17        | Dec-17        | Dec-18                 |                      |
| CrIS SDR Data Quality Trending                               | Dec-17        | Dec-17        | Dec-17                 |                      |
| First version of ICVS-GRAVITE package                        | Mar-18        | Mar-18        | Mar-18                 |                      |
| OMPS SDR Quality Trending Phase I                            | Jun-18        | Jun-18        | May-18                 |                      |
| SNPP/J1 cross-comparison package initialized                 | Dec-17        | Jun-18        |                        | Change Personnel     |
| Geolocation Accuracy Trending Initialized                    | Mar-18        | Jun-18        |                        | Change Personnel     |
| ICVS-Application Website (Severe Weather Watch with JMAPPER) | Mar-18        | Jun-18        |                        | Change Personnel     |
| JPSS-ICVS Monitoring/Trending Enhancement (On-going work)    | Sep-18        | Aug-18        |                        |                      |
| Update (2 <sup>nd</sup> version) Package for ICVS-GRAVITE    | Sep-18        | Aug-18        |                        |                      |
| ICVS System Maintenance Manuals and Technical Reports        | Sep-18        | Aug-18        |                        |                      |

Highlights: ATMS O-B Angle Dependent Biases & VIIRS DNB SD Degradation



## Accomplishments / Events:

- We discovered that a **GVVSE LUT update tool** exists, but that it is not currently implemented due to changes in GRAVITE configuration. The Imagery Team will explore reinstating this tool, as we plan on updating the NCC LUTs at least once for JPSS-1/NOAA-20.
- **Block 2.1 MX 2 I&T Deploy Regression Data**, was downloaded and checked. Excessive fill values in N20 I4 products from very cold scenes have been described in ADR 8197 and should be corrected in Mx4.
- **New VIIRS Imagery blogs** at both of the following:
  - <http://rammb.cira.colostate.edu/projects/npp/blog/index.php/uncategorized/rivers-of-ice/>
  - <http://rammb.cira.colostate.edu/projects/alaska/blog/index.php/uncategorized/rivers-of-ice/>

## Overall Status:

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

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

## Issues/Risks:

None

| FY18 TTA Milestones   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>  |               |               |                        |                      |
| Beta Maturity   | Jan-18        | Jan-18        | 02/01/18               |                      |
| Provisional Maturity  | Feb-18        | Feb-18        | 02/19/18               | Review: 02/20/18     |
| Validated Maturity  | Aug-18        | Aug-18        | L+9M                   |                      |
| <b>Algorithm Update/Testing</b>   |               |               |                        |                      |
| New Error-Function DNB scaling and NCC auto-contrast (Explore potential replacements for NCC software (concept only)) | Sep-18        | Sep-18        |                        |                      |
| NCC LUT update (DAP from science team to ASSISTT)   | Aug-18        | Aug-18        |                        |                      |
| NCC LUT update (DAP from ASSISTT to DPES AIT)   | Sep-18        | Sep-18        |                        |                      |
| <b>Long Term Monitoring</b>   |               |               |                        |                      |
| Deliver additional product(s) to LTM website; Add J1 products to EDR monitoring web                                   | Sep-18        | Sep-18        |                        |                      |

## Highlights:

“Rivers of Ice”: recent breakup of ice on the Lena and Aldan rivers of central Siberia, as seen by VIIRS Natural Color RGB composite of channels I-1, I-2 and I-3 (18 May 2018).



## Accomplishments / Events:

- Cloud Team is preparing for Beta Reviews in July.
- Issue with the v1.2 NDE ECM on NOAA-20 remains unresolved.
- NOAA-20 Beta Maturity Review passed on April 18.
- NOAA/ESRL has requested JPSS VIIRS Cloud Products over the Arctic.
- Cloud team participated in the JPSS Arctic Summit.
- Cloud Team is preparing for an Cloud Product Demo in the Alaska Region.

## Overall Status:

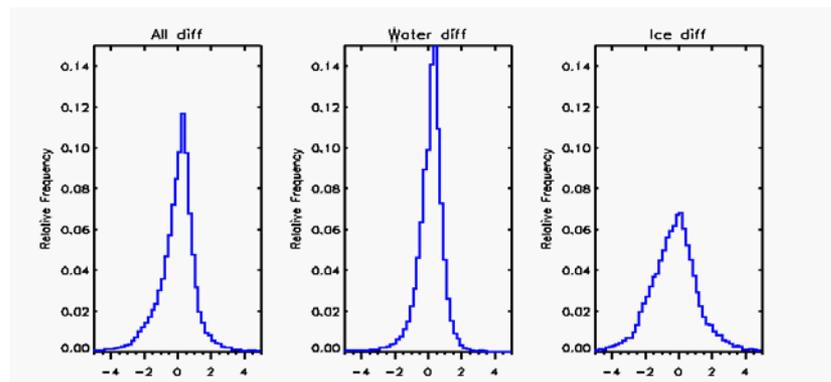
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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

## Issues/Risks:

None

## Highlights: NOAA-20 Cloud Height Analysis



Example of the first NOAA-20 / CALIPSO cloud height comparisons. Data is filtered for single layer clouds where the NDE cloud phase matched that from CALIPSO.

| FY18 TTA Milestones   | Original Date      | Forecast Date | Actual Completion Date | Variance Explanation |
|---|--------------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>  |                    |               |                        |                      |
| Beta Maturity   | Jul-18             | Jul-18        | CM: 04/18/18           | Program Request      |
| Provisional Maturity  | Sep-18             | Sep-18        |                        |                      |
| Apply CALIPSO tools to NDE Mask with Lunar Reflectance  | Sep-18             | Sep-18        |                        |                      |
| Validate products from SAPF and begin ARM data analysis to fill CALIOP/CloudSat void  | Sep-18             | Sep-18        |                        |                      |
| Continue the visualization and demonstration of CCL for the Aviation Weather Center, with focus on Alaska Region and Hawaii | Sep-18             | Sep-18        |                        |                      |
| Inter-sensor calibration studies by using visible reflectance and cloud optical thickness from GOES, JPSS and MODIS         | Sep-18             | Sep-18        |                        |                      |
| Consistency checks for day and night retrievals   | Sep-18             | Sep-18        |                        |                      |
| Continuous use of microwave-based LWP data for validation (DCOMP & NCOMP)   | Sep-18             | Sep-18        |                        |                      |
| <b>J1 algorithm adjustments:</b>  |                    |               |                        |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT)  | Apr-18             | Apr-18        | 2/23/18                |                      |
| Preliminary DAP to NDE (ASSISTT to NDE)   | Jun-18             | Jun-18        |                        |                      |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b>   |                    |               |                        |                      |
| Reprocess regional data using cloud team calibration refinements  | Sep-18             | Sep-18        |                        |                      |
| Add J1 products to EDR monitoring web   | Sep-18             | Sep-18        |                        |                      |
| JPSS EPS algorithm updated DAPs   | 11/21/17; 02/02/18 |               | (J1 capability)        |                      |

## Accomplishments / Events:

- The JPSS Arctic Summit was held this week in Anchorage, Alaska, May 1-4, 2018. The meeting continued in Fairbanks, Alaska May 7-8.
- Results of the ice product demonstration with the Alaska Sea Ice Program (ASIP) were summarized at the Arctic Summit. The assessment was overall very positive. The demonstration was continued for a few more weeks.
- A Preliminary Design Review (PDR) for a project that will define Enterprise algorithms for fire and snow products was held on May 16, 2018. The VIIRS snow fraction product will be evaluated against the GOES-R ABI snow product.

## Overall Status:

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

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

## Issues/Risks:

None

## Highlights:



The meeting room in Anchorage for the JPSS Arctic Summit, and a view of Anchorage.

| FY18 TTA Milestones                                   | Original Date                      | Forecast Date | Actual Completion Date | Variance Explanation |
|---|------------------------------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>          |                                    |               |                        |                      |
| Beta Maturity: IST                                    | May-18                             | May-18        |                        | Scheduled 6/15       |
| Beta Maturity: Snow                                   | Jun-18                             | Jun-18        |                        |                      |
| Beta Maturity: Sealce                                 | Jul-18                             | Jul-18        |                        |                      |
| Provisional Maturity (IST, Snow, and Sealce)          | Sep-18                             | Sep-18        |                        |                      |
| <b>J1 algorithm adjustments:</b>                      |                                    |               |                        |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT)  | Apr-18                             | Apr-18        | Apr-18                 |                      |
| Preliminary DAP to NDE (ASSISTT to NDE)               | Jun-18                             | Jun-18        |                        |                      |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b> |                                    |               |                        |                      |
| Improvements to snow and ice algorithms               | Sep-18                             | Sep-18        |                        |                      |
| Add J1 products to EDR monitoring web                 | Sep-18                             | Sep-18        |                        |                      |
| JPSS EPS algorithm updated DAPs                       | 11/21/17; 02/02/18 (J1 capability) |               |                        |                      |

## Accomplishments / Events:

- Continue to analyze NOAA-20 AOD and ADP products
  - ADP algorithm updates (coefficients and code changes) will be delivered to ASSIST end of June.
  - VIIRS dust detection algorithm evaluation has been carried out and a paper submitted to Journal of Aerosol Remote Sensing for a possible publication
- An oral presentation on the applications of VIIRS dust detection product for trans-Atlantic dust transport was made by team member Pubu Ciren at a dust conference in Italy

## Overall Status:

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

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## Issues/Risks:

None

## Highlights:

SNPP VIIRS ADP Validation using CALIPSO Data

| Land  | Type  | Accuracy (%) | POCD (%) | FAR (%) |
|-------|-------|--------------|----------|---------|
|       | Dust  | 84.4         | 80.0     | 1.6     |
|       | Smoke | 99.1         | 96.7     | 34.1    |
| Water | Type  | Accuracy (%) | POCD (%) | FAR (%) |
|       | Dust  | 95.4         | 96.4     | 3.3     |
|       | Smoke | 94.0         | 97.5     | 45.7    |

ADP algorithm updates in the June DAP will include code changes to minimize high False Alarm Ratios (false detections) of dust, especially when satellite is viewing the scene in nadir view.

| FY18 TTA Milestones                                   | Original Date                      | Forecast Date | Actual Completion Date | Variance Explanation |
|---|------------------------------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>          |                                    |               |                        |                      |
| Beta Maturity   | Apr-18                             | Apr-18        | 04/18/18               |                      |
| Provisional Maturity                                  | Sep-18                             | Sep-18        | 04/18/18               |                      |
| <b>J1 algorithm adjustments:</b>                      |                                    |               |                        |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT)  | Apr-18                             | Apr-18        | Apr-18                 |                      |
| Preliminary DAP to NDE (ASSISTT to NDE)               | Jun-18                             | Jun-18        |                        |                      |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b> |                                    |               |                        |                      |
| Validation of reprocessed SNPP VIIRS aerosol products | Sep-18                             | Sep-18        |                        |                      |
| Add J1 products to EDR monitoring web                 | Sep-18                             | Sep-18        |                        |                      |
| JPSS EPS algorithm updated DAPs                       | 11/21/17; 02/02/18 (J1 capability) |               |                        |                      |

## Accomplishments / Events:

- Added to a list of NOAA-20 VIIRS granules that were known to contain ash.
- Using radiosondes to associate cloud movement with height, the ash cloud height EDR was generally found to be consistent with the direction and speed of movement of ash clouds tracked in geostationary imagery (see "Highlight").
- Continued to develop and test algorithm improvements through incorporation with CrIS measurements.

## Overall Status:

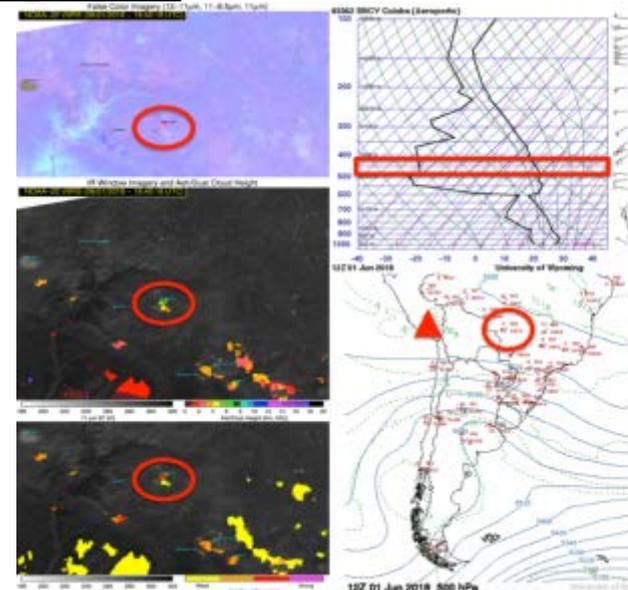
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|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|----------------------|
| Cost / Budget            |                                   | 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:

We have not yet been able to co-locate the NOAA-20 VIIRS volcanic ash EDR with CALIPSO overpasses of ash clouds. Other validation techniques (see below) are being used to mitigate this issue

## Highlights:



- NOAA-20 VIIRS observed Sabancaya (Peru) ash emission at 1840 UTC 01 June 2018
- Using GOES-16 data determined ash cloud was moving east at 21 knots
- 500 mb map shows Sabancaya and nearest sounding (SBCY) are both north of an upper level trough, at similar latitudes
- 12 UTC SBCY sounding indicates 270 degree wind at 21 knots resides between 21 and 25 kft,
- NOAA-20 ash height product agrees well with wind height assessment (max. heights around 23 kft (7 km))

| FY18 TTA Milestones  | Original Date                      | Forecast Date | Actual Completion Date | Variance Explanation   |
|--|------------------------------------|---------------|------------------------|--|
| <b>J1 post-launch calibration/validation</b>   |                                    |               |                        |  |
| JPSS-1 Cal/Val Plan  | Dec-17                             | Dec-17        | 12/18/17               |  |
| Beta Maturity  | Jul-18                             | Jul-18        |                        |  |
| Provisional Maturity   | Sep-18                             | Sep-18        |                        |  |
| <b>J1 algorithm adjustments:</b>   |                                    |               |                        |  |
| Complete development of Version 2 (V2) of the volcanic ash algorithm. Version 2 may utilize VIIRS + CrIS | Feb-18                             | Feb-18        | Feb-18                 | While not needed to meet spec, algorithm enhancements will continue to be sought |
| Update LUT and thresholds for JPSS-1   | Feb-18                             | Feb-18        | Feb-18                 |  |
| Preliminary DAP to ASSISTT (science team to ASSISTT)   | Apr-18                             | Apr-18        | Apr-18                 | Other than the LUT delivery, no other changes were required thus far             |
| Preliminary DAP to NDE (ASSISTT to NDE)  | Jun-18                             | Jun-18        |                        |  |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b>  |                                    |               |                        |  |
| Add Volcanic Ash to EDR Monitoring web (SNPP & J1)   | Sep-18                             | Sep-18        |                        |  |
| JPSS EPS algorithm updated DAPs  | 11/21/17; 02/02/18 (J1 capability) |               |                        |  |

## Accomplishments / Events:

- Performed regression test between NDE I&T and STAR runs of the NOAA-20 code
- Obtained VIIRS SDR from IDPS I&T for regression test
- 928 granules from May 25, 2018 were analyzed
- Perfect match was found for all complete granules
- Prepared slides for upcoming ORR
- Prepared slides for June SPSRB meeting to declare the NOAA-20 product operational

## Overall Status:

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

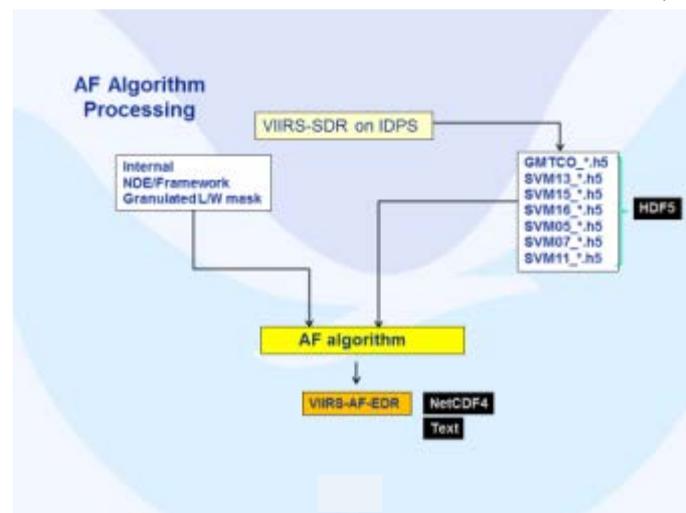
1. Project has completed.
2. Project is within budget, scope and on schedule.
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4. Project has fallen significantly behind schedule, and/or significantly over budget.

## Issues/Risks:

None

## Highlights:

Marina Tsidulko (IMSG@STAR)



Flow chart of the simplified VIIRS Active Fire processing system. The granulated land/water mask is provided by the NDE Framework

| FY18 TTA Milestones                                   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>          |               |               |                        |                      |
| Beta Maturity   | Jun-18        | Jun-18        | 03/22/18               | Virtual Review       |
| Provisional Maturity                                  | Dec-18        | Dec-18        | 04/18/18               |                      |
| <b>J1 algorithm adjustments:</b>                      |               |               |                        |                      |
| DAP to NDE (compatibility with J1 data)               |               |               | 11/21/17               |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT)  | Aug-18        | Aug-18        |                        |                      |
| Preliminary DAP to NDE (ASSISTT to NDE)               | Oct-18        | FY19          |                        |                      |
| <b>SNPP/J1 algorithm refinement (Maintenance DAP)</b> |               |               |                        |                      |
| J1 data analysis and feedback                         | Sep-18        | Sep-18        |                        |                      |
| Enterprise algorithm evaluation                       | Sep-18        | Sep-18        |                        |                      |
| Suomi NPP reprocessing analysis                       | Sep-18        | Sep-18        |                        |                      |
| Add J1 products to EDR monitoring web                 | Sep-18        | Sep-18        |                        |                      |

## Accomplishments / Events:

- Modified the NDE code to enable the processing of NOAA-20 input data
- Performed comparisons between NOAA-20 IDPS and NDE products
- Provided NOAA-20 sample data to the Vegetation Index team in support of preparations for the processing of NOAA-20 data within the Vegetation Index product suite
- Worked on analysis for the June Beta Maturity review

## Overall Status:

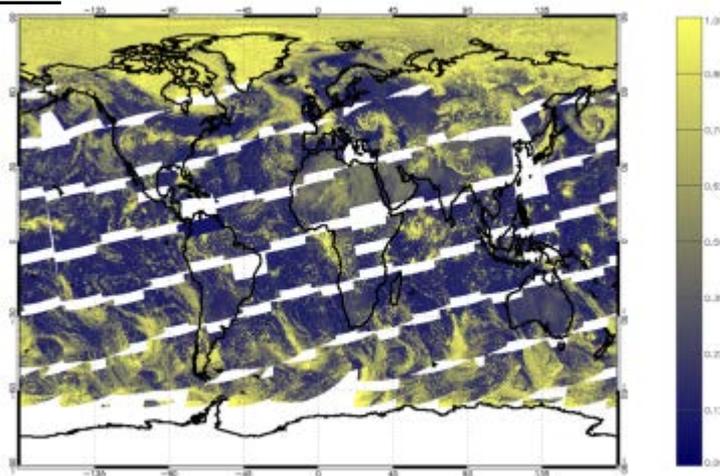
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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

## Issues/Risks:

None

## Highlights:



Mike Wilson (IMSG@STAR)

VIIRS NOAA-20 M1 NOAA-20 Surface Reflectance on May 13, 2018.  
The missing granules are due to missing upstream Risk Reduction data

| FY18 TTA Milestones                                   | Original Date  | Forecast Date | Actual Completion Date | Variance Explanation |
|---|--|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>          |  |               |                        |                      |
| Beta Maturity   | May-18   | May-18        |                        | Scheduled 6/15       |
| <b>J1 algorithm adjustments:</b>                      |  |               |                        |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT)  | Jun-18   | Jun-18        |                        |                      |
| Preliminary DAP to NDE (ASSISTT to NDE)               | Aug-18   | Aug-18        |                        |                      |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b> |  |               |                        |                      |
| Add SR to EDR monitoring web (SNPP & J1)              | Sep-18   | Sep-18        |                        |                      |
| Enterprise algorithm testing and updates              | Sep-18   | Sep-18        |                        |                      |
| Patch DAPs to NDE                                     | 10/06/17 (global attribute, endianness)<br>12/11/17 (QF2 attribute text fix)<br>01/29/18 (file name change)<br>02/21/18 (QCAI flag value change) |               |                        |                      |

## Accomplishments / Events:

- Continue to work on the regression studies, profile selection methodologies and LUT evaluations. Different parameter stratification strategies were evaluated.
- Continue to work on the evaluation of the operational NOAA-20 LST data through the comparison with the ground LST measurements and cross satellite LST estimations. (Highlights and Slide 2)
- Modified the software code for ground data evaluation by adding the associated emissivity and tpw information.
- Cross comparison between MODIS AQUA LST v6 and enterprise NOAA 20 LST was conducted. The SNO covers the areas including US, Africa, South America and Australia. The enterprise NOAA 20 LST are calculated locally.
- Cross comparison was performed for the comparison between GOES16 and NOAA 20 LST.
- T-Test analysis was performed for the profile selection procedure among the group of selected profiles, profiles over land and all profiles including over ocean. (Slide 3 and 4)
- Continue the architecture design and development of the gridded LST software package. Has generally finished the code development for digesting the operational NOAA 20 LST data in hdf5 format. Modifications e.g I/O, QC etc are needed for its adaption to the enterprise data input. (Slide 5)
- Started to prepare a manuscript for summary of the enterprise LST algorithm development and evaluation. It is undergoing.
- Continue to monitor the NOAA 20 LST data at granule and global scale.
- Provided the VIIRS LST data for soil moisture studies in STAR
- Provided support to model group for VIIRS LST assimilation studies.

## Overall Status:

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

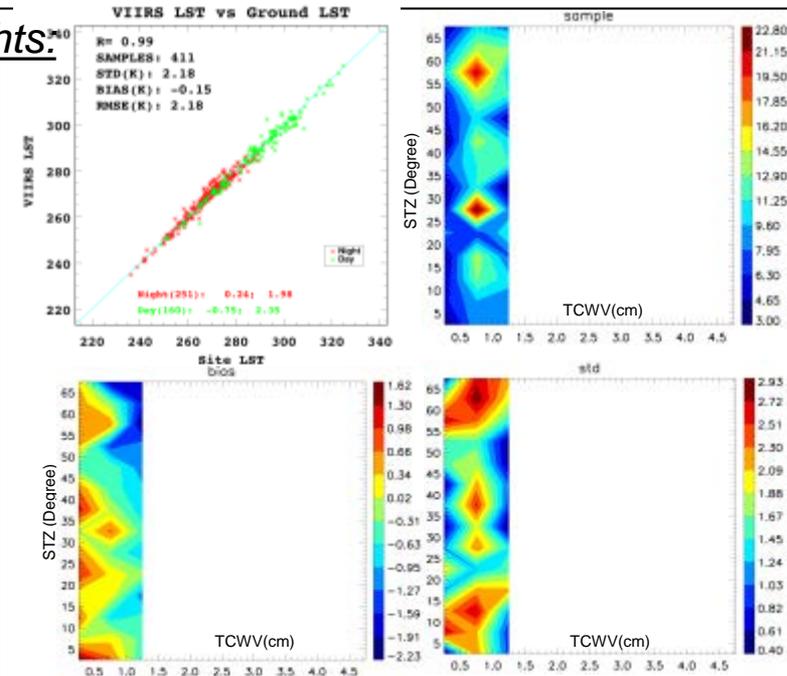
- Project has completed.
- Project is within budget, scope and on schedule.
- Project has deviated slightly from the plan but should recover.
- Project has fallen significantly behind schedule, and/or significantly over budget.

## Issues/Risks:

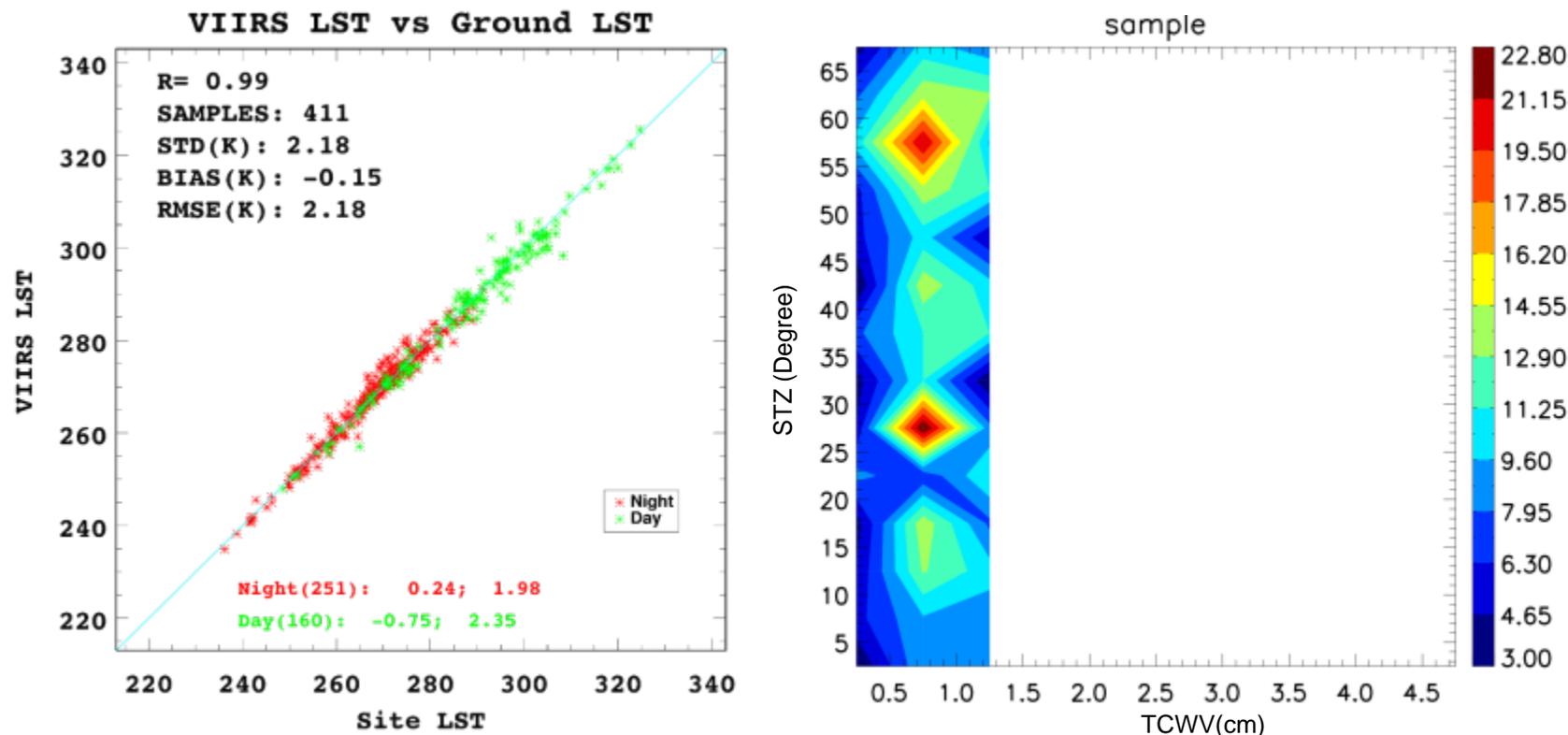
None

## Highlights:

Noaa 20 VIIRS LST against the ground LST observations over SURFEAD sites for time period from 20180106-20180430. NOAA 20 LST is calculated locally using the enterprise algorithm



| FY18 TTA Milestones                                  | Original Date | Forecast Date | Actual Completion Date                  | Variance Explanation |
|--|---------------|---------------|---|----------------------|
| <b>J1 post-launch calibration/validation</b>         |               |               |   |                      |
| Beta Maturity  | Jul-18        | Jul-18        |   |                      |
| <b>J1 algorithm adjustments:</b>                     |               |               |   |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT) | Apr-18        | Apr-18        | 03/09/18                                |                      |
| Preliminary DAP to NDE (ASSISTT to NDE)              | Jun-18        | Jun-18        |   |                      |
| <b>SNPP/J1 algorithm Refinements</b>                 |               |               |   |                      |
| Enterprise Algorithm Final DAP                       | Feb-18        | Mar-29        | Init DAP: 11/15/17<br>Final DAP: 4/2/18 | Passed SR: Feb-18    |
| CDR review ready for global gridded LST production   | Jun-18        | Jun-18        |   |                      |
| Additional cloud filtering                           | Sep-18        | Sep-18        |   |                      |
| Add J1 products to EDR monitoring web                | Sep-18        | Sep-18        |   |                      |
| Deep-dive analysis for the anomaly watch             | Sep-18        | Sep-18        |   |                      |



NOAA 20 VIIRS LST against the ground LST observations over SURFEAD sites for time period from 20180106-20180430. NOAA 20 LST is calculated locally using the enterprise algorithm. Left figure shows the comparison results in the scatter plot. The right figure shows the matchup sample size distribution over total column water vapor(x-axis) and satellite zenith angles(y-axis). It indicates that the matchups are at dry climate and relatively large view angles around 30 and 55 degree. The similar plots are shown in the highlight for the comparison bias and std.

# Profile selection method

$$\begin{cases} x_i - x_0 \leq \Delta x, y_i - y_0 \leq \Delta y \\ z_{\text{surf } i} - z_{\text{surf } 0} \leq \Delta z \\ w_i - w_0 \leq \Delta w \\ m_i - m_0 \leq \Delta m \end{cases} \quad (3)$$

where  $x$ ,  $y$ ,  $z_{\text{surf}}$  denote latitude, longitude, and elevation of the land surface, respectively;  $w$  is CWVC;  $m$  is month; the subscript 0 and  $i$  denote the current profile and the profile being compared, respectively; and the variable with the prefix  $\Delta$  is the threshold of the corresponding factor.

Latitude, longitude, elevation, tpw and seasonal distribution are considered

Threshold:

$\Delta x$  is set as 60 for high latitude and 30 for midlow latitude, respectively

$\Delta y$  is set as 15 for high latitude and 10 for midlow latitude, respectively

$\Delta z$  is set as 1000m

$\Delta w$  is set as 0.5gcm<sup>-2</sup>

$\Delta m$  is set as 2 months

Reference: Ji Zhou, Jin Ma, Shunlin Liang etc, Generating a global atmospheric profile dataset and applying for sentinel-3 SLSTR land surface temperature algorithm development

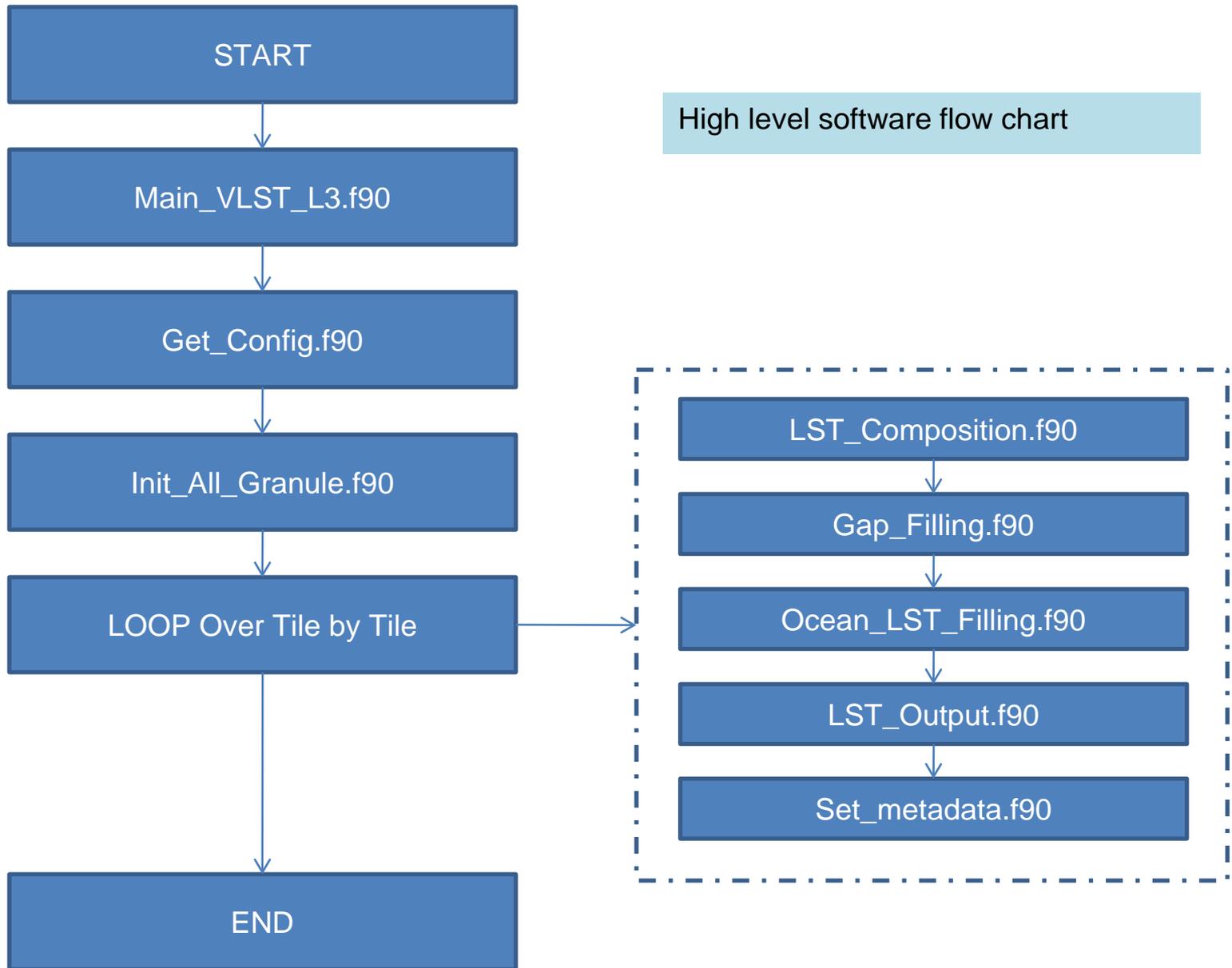
# T-Test analysis for the profile selection

$$T = \frac{\bar{x} - \bar{y}}{\sqrt{\frac{\sum_{i=0}^{N-1} (x_i - \bar{x})^2}{N-1} + \frac{\sum_{i=0}^{M-1} (y_i - \bar{y})^2}{M-1}} \left( \frac{1}{N} + \frac{1}{M} \right)}$$

The TM\_TEST function computes the Student's T-statistic and the probability that two sample populations X and Y have significantly different means. X and Y may be of different lengths. The T-statistic for sample populations x and y with means x and y is defined as: where  $x = (x_0, x_1, x_2, \dots, x_{N-1})$  and  $y = (y_0, y_1, y_2, \dots, y_{M-1})$

| Day/night | Type           |                      | T-statistic | Significance level | T-statistic* | Significance level* |
|-----------|----------------|----------------------|-------------|--------------------|--------------|---------------------|
| day       | Selected (406) | land profiles (4140) | 0.0378414   | 0.970646           | 0.0379210    | 0.969891            |
|           | Selected (406) | all profiles (6754)  | 2.98907     | 0.00280781         | 2.52088      | 0.0120595           |
|           | Land (4140)    | All profiles (6754)  | 7.10170     | 1.30955e-12        | 6.78048      | 1.28867e-11         |
| night     | Selected (389) | land profiles (4996) | 0.253909    | 0.799542           | 0.242896     | 0.808197            |
|           | Selected (389) | all profiles (8950)  | 1.86403     | 0.0623496          | 1.42431      | 0.155123            |
|           | Land (4996)    | All profiles (8950)  | 4.14694     | 3.38917e-05        | 3.87556      | 0.000107213         |

\*Results in yellow color: X and Y are assumed to be from populations with unequal variances.



## Accomplishments / Events:

- Generated J1 (NOAA-20) Sea Ice Albedo LUT for NDE granule albedo and in test
- Upgraded the albedo monitoring system, already tested on SNPP IDPS Albedo and future for SNPP/NOAA-20 NDE Albedo
- Produced daily mean albedo over CONUS in July 2017 for soil moisture team use
- Cooperated with ASSISTT to start the NRT production of J1 NDE granule albedo in framework (without LUT update yet)

## Overall Status:

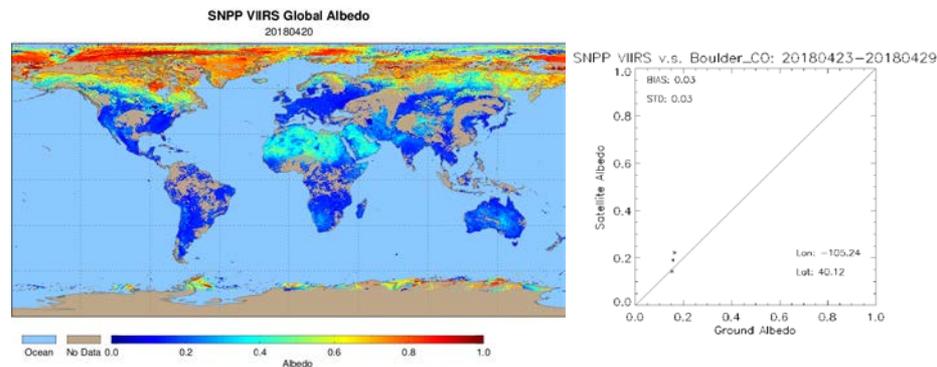
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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

## Issues/Risks:

None

## Highlights:



Animations of IDPS SNPP global albedo map (left) and validation plots (right) from the upgraded albedo monitoring system. Updates including sea ice albedo composition, and real-time validation using SURFRAD observations, etc.

| FY18 TTA Milestones                                  | Original Date | Forecast Date | Actual Completion Date           | Variance Explanation |
|--|---------------|---------------|----------------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>         |               |               |                                  |                      |
| Beta Maturity  | Jul-18        | Jul-18        |                                  |                      |
| <b>J1 algorithm adjustments:</b>                     |               |               |                                  |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT) | Apr-18        | Apr-18        | 03/09/18                         | Completed            |
| Preliminary DAP to NDE (ASSISTT to NDE)              | Jun-18        | Jun-18        |                                  |                      |
| <b>SNPP/J1 algorithm Refinements</b>                 |               |               |                                  |                      |
| Enterprise Algorithm Final DAP                       | Feb-18        | Feb-18        | Init: 11/15/17;<br>Final: 4/2/18 | Passed SR: Feb-18    |
| LUT for Sea Ice Albedo computation                   | Dec-17        | Dec-17        | 03/05/18                         | Completed            |
| Developing improved albedo climatology               | Jul-18        | Jul-18        | 02/23/18                         | Completed            |
| Refining codes of gridded VIIRS albedo               | Sep-18        | June-18       |                                  |                      |
| Deep-dive analysis for the anomaly watch             | Sep-18        | Sep-18        |                                  |                      |
| Add J1 products to EDR monitoring web                | Sep-18        | Sep-18        |                                  |                      |
| Enterprise Algorithm LSA ARR                         |               |               | 03/14/18                         |                      |

## Accomplishments / Events:

- Finished the SVM training using the 2017 training sample data. The training ROI locations are from the last year's collection, and the training parameters are tuned using cross-validation. A parallel version of SVM training software is used.
- Finished the initial SVM classification using parallel SVM classification algorithm conducted on a high performance computing cluster. The classification output is included in the highlights. The preliminary visual inspection suggests the classification is a success. Multiple post processing will be conducted on the classification output in next few months.

## Overall Status:

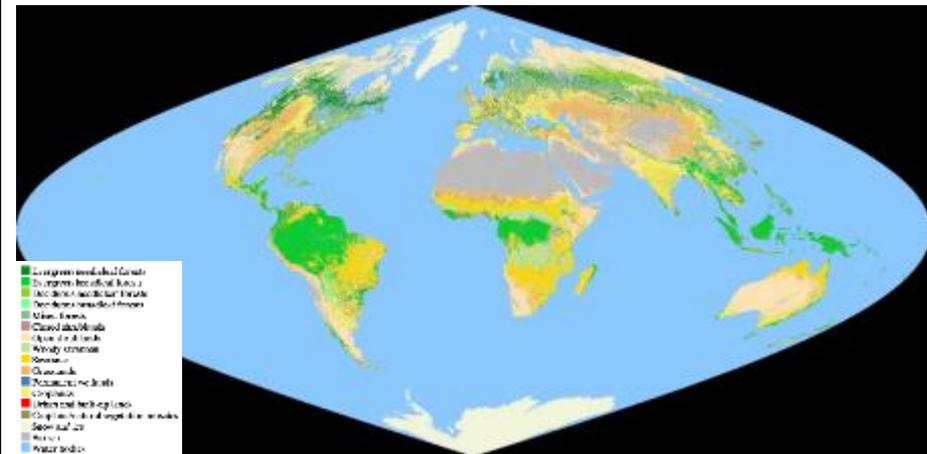
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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

## Issues/Risks:

None

## Highlights:



2017 SVM classification output for surface type product.

| FY18 TTA Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|--|---------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>   |               |               |                        |                      |
| Comparison of GST16 with surface type validation data  | Sep-18        | Sep-18        |                        |                      |
| <b>Planned Algorithm Delivery</b>  |               |               |                        |                      |
| Complete monthly composites of global gridded VIIRS data (9 land bands + thermal bands) for VIIRS GST17 based on VIIRS 2017 data | Sep-18        | Sep-18        |                        |                      |
| Generate VIIRS GST17 based on VIIRS 2017 data using SVM algorithms   | Sep-18        | Sep-18        |                        |                      |

## Accomplishments / Events:

- Conducted regression test on weekly VI products
- Explored the use of Cubesat (Planet) imagery for VI/GVF validation.
- Participated in relevant project meetings/discussions with STAR Algorithm Integration Team (AIT), and OSPO team.
- Refined the visualization website for providing better VIIRs VI product access to users  
[https://www.star.nesdis.noaa.gov/smcd/viirs\\_vi\\_web/landwatch.php](https://www.star.nesdis.noaa.gov/smcd/viirs_vi_web/landwatch.php)

## Overall Status:

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

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

## Issues/Risks:

The NOAA-20 surface reflectance data is not ready for VI operational code testing.

## Highlights:

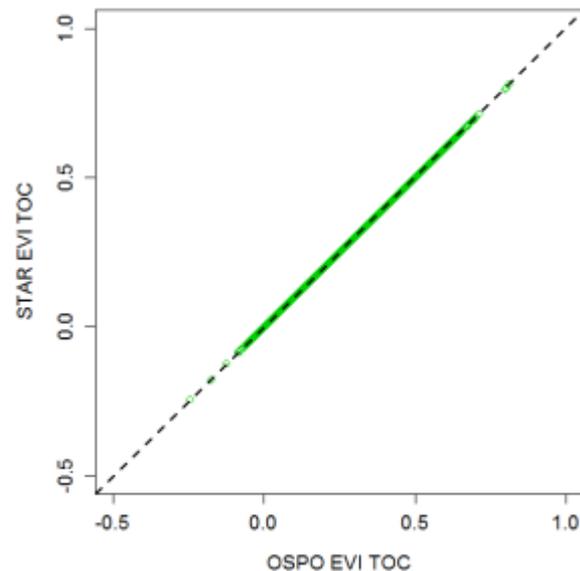
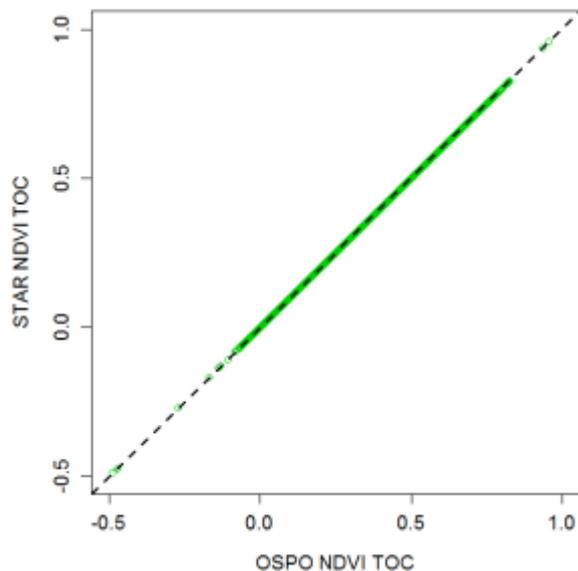
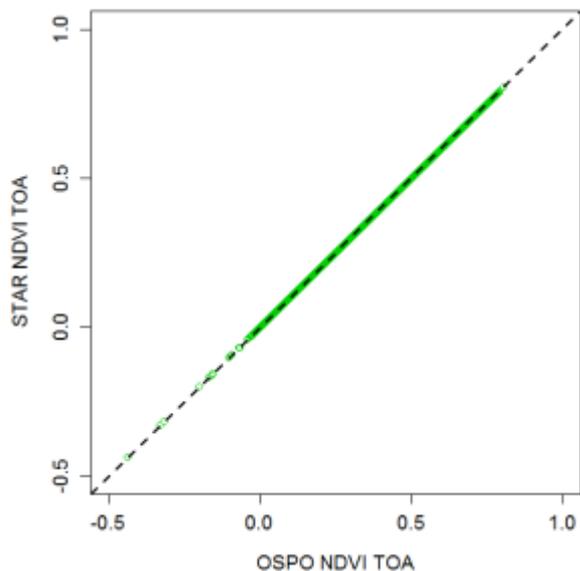


Exploration insights from Cubesat (planet imagery at 3 meter resolution) to support the validation of VI& GVF products.

| FY18 TTA Milestones                                   | Original Date | Forecast Date | Actual Completion Date  | Variance Explanation |
|---|---------------|---------------|---|----------------------|
| <b>J1 post-launch calibration/validation</b>          |               |               |   |                      |
| Beta Maturity   | Aug-18        | Aug-18        |   |                      |
| <b>J1 algorithm adjustments:</b>                      |               |               |   |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT)  | Sep-18        | Sep-18        |   |                      |
| Preliminary DAP to NDE (ASSISTT to NDE)               | Nov-18        | FY19          |   |                      |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b> |               |               |   |                      |
| Add J1 products to EDR monitoring web                 | Sep-18        | Sep-18        |   |                      |
| Enterprise Algorithm Final DAP                        | Jan-18        | Jan-18        | Initial DAP: 06/26/17<br>Final DAP: 02/06/18<br>Delta DAP: 03/15/18 |                      |
| NVPS ARR  |               |               | 12/21/17  |                      |

Comparing products from OSPO and STAR to make sure the algorithms are implemented properly. (on **DOY95-DOY101, 2018** globally)

- NDVI TOA / NDVI TOC / EVI TOC
- $R=1$ , Mean Absolute Error =0.0



## Accomplishments / Events:

- Prepared testing data for HRR model evaluation.
- Prepared a manuscript to provide a comprehensive description of VIIRS GVF products.
- Participated in relevant project meetings/discussions with STAR Algorithm Integration Team (AIT), and OSPO team.
- Updated the visualization website for providing better VIIRS GVF access to users in the following website.  
[https://www.star.nesdis.noaa.gov/smcd/viirs\\_vi\\_web/land\\_watch.php](https://www.star.nesdis.noaa.gov/smcd/viirs_vi_web/land_watch.php)

## Overall Status:

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

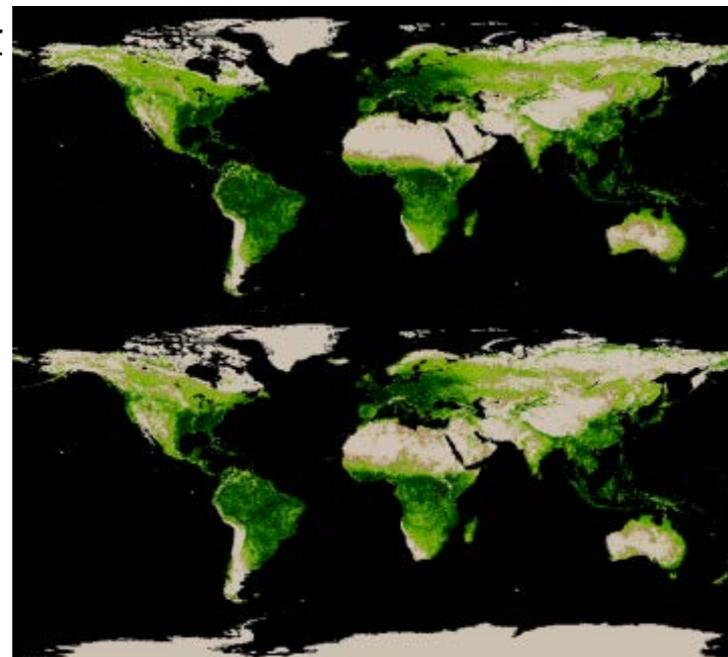
1. Project has completed.
2. Project is within budget, scope and on schedule.
3. Project has deviated slightly from the plan but should recover.
4. Project has fallen significantly behind schedule, and/or significantly over budget.

## Issues/Risks:

The NOAA-20 surface reflectance data is not ready for operational GVF code testing.

## Highlights:

Sample GVF product for HRR model test. **Upper:** IDPS GVF (20180508-20180514); **Lower:** NDE (I&T) GVF (20180508-20180514)

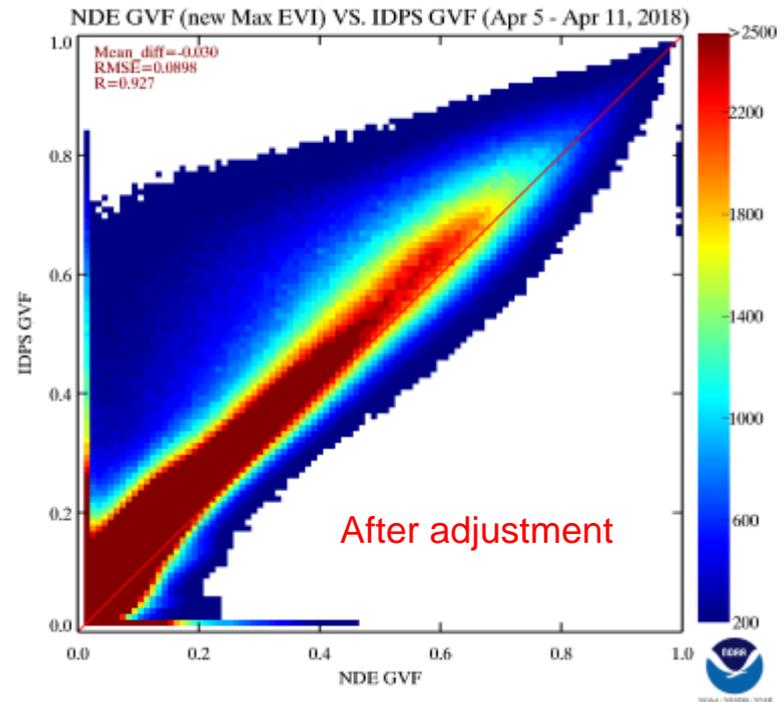
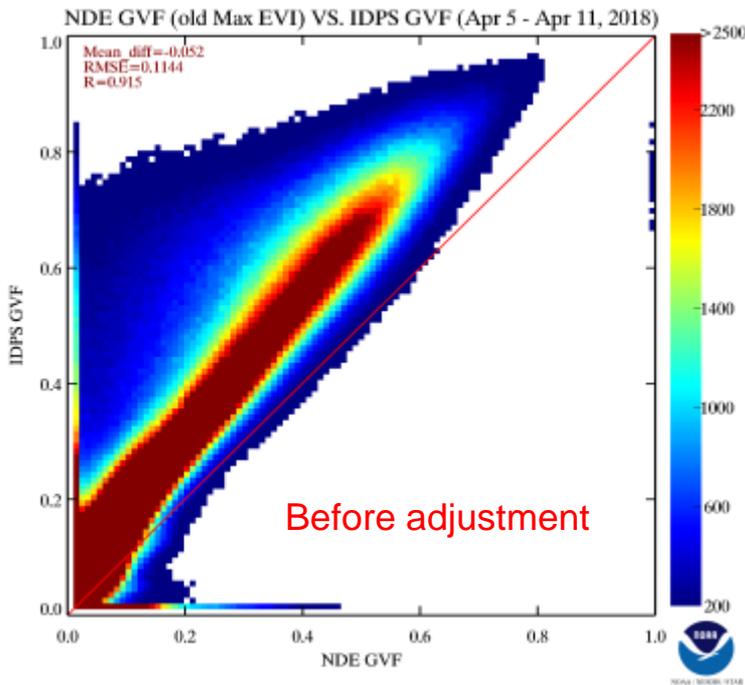


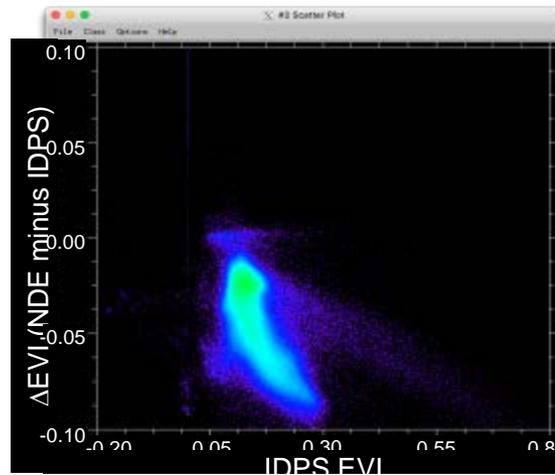
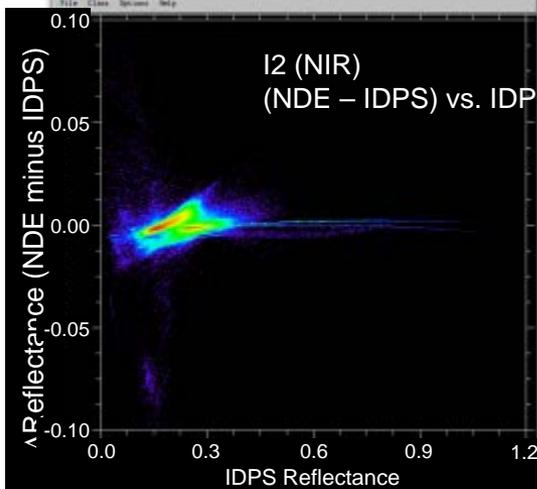
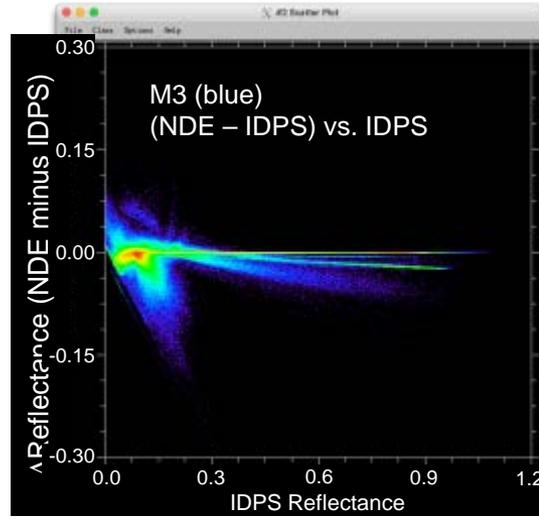
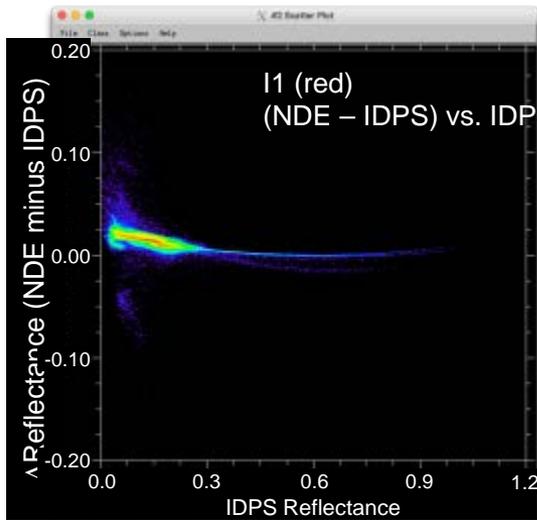
| FY18 TTA Milestones                                   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>          |               |               |                        |                      |
| Beta Maturity   | Aug-18        | Aug-18        |                        |                      |
| <b>J1 algorithm adjustments:</b>                      |               |               |                        |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT)  | Sep-18        | Sep-18        |                        |                      |
| Preliminary DAP to NDE (ASSISTT to NDE)               | Nov-18        | FY19          |                        |                      |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b> |               |               |                        |                      |
| Add J1 products to EDR monitoring web                 | Sep-18        | Sep-18        |                        |                      |

Significant differences were observed between the IDPS GVF data and the NDE GVF data. It is found that reflectance data used in NDE GVF production is different to the that used in IDPS GVF production.

A technical method is proposed to adjust the algorithm parameters of NDE GVF, in order to have the NDE GVF data being more consistent to the IDPS GVF. (figures below)

However, the adjustment shall be done later again when a sufficient NDE data sample set is ready.





A sample dataset show the VIIRS reflectance difference between NDE and IDPS system input. The sample data set is over Southwest US on May 11, 2018.

top-left: the reflectance difference (NDE minus IDPS) of I1 band; top-right: the reflectance difference of M3; bottom-left: the reflectance difference of I2; bottom-right: the EVI difference due to the reflectance difference;

5/11/18

Accomplishments / Events:

- Continued collect NOAA-20/VIIRS and S-NPP/VIIRS daily data (VIS, NIR and IR);
- Calculated NDVI (from VIS, NIR) and BT (from IR);
- Developed weekly composite NDVI and BT.
- Validation:
  - Collected in Situ Data
  - Processed in Situ Data
  - Developed global 1 km VIIRS-VH May 27 (image)
  - Overlaid USDA Soil Moisture data (Image)

Overall Status:

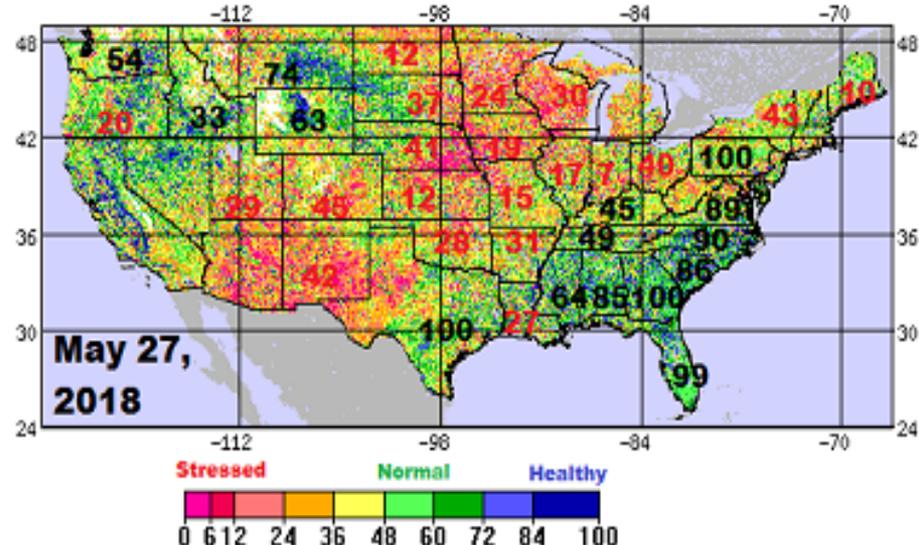
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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

Issues/Risks:

None

Highlights: VIIRS-VH validation vs USDA Soil Moisture  
**NOAA/VIIRS Vegetation Health & USDA Soil Moisture Shortage**



| FY18 TTA Milestones   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>  |               |               |                        |                      |
| Beta Maturity   | Aug-18        | Aug-18        |                        |                      |
| <b>J1 algorithm adjustments (1-km &amp; 4-km VH):</b>   |               |               |                        |                      |
| Preliminary DAP to NDE  | Aug-18        | Aug-18        |                        |                      |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b>   |               |               |                        |                      |
| Add J1 products to EDR monitoring web   | Sep-18        | Sep-18        |                        |                      |
| Vegetation Health (1-km) Algorithm Final DAP  | Nov-17        | Nov-17        | 11/13/17               |                      |
| Updated DAP to NDE (metadata statistic update; code change to process SDR files from specific satellite only → can process J01/N20 VIIRS SDR) |               |               | 12/14/17               |                      |
| Vegetation Health (1-km) Algorithm Readiness Review   |               |               | 12/13/17               |                      |

## Accomplishments / Events:

The STAR Ocean Color EDR team:

- Karlis Mikelsons and Menghua Wang had their article “Interactive Online Maps Make Satellite Ocean Data Accessible” published on Eos.org.  
<https://eos.org/project-updates/interactive-online-maps-make-satellite-ocean-data-accessible>
- The fourth annual JPSS dedicated VIIRS ocean color validation cruise aboard the NOAA Ship Okeanos Explorer was successfully completed on 18 May 2018.
- Conducted bi-weekly telecons with external VIIRS cal/val team

## Overall Status:

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

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

### Issues/Risks:

- SDR calibration error –identify how to avoid same error in future
- Concern with 9-month funding (end in March 2018) for FY17. Continuation of funding started in April 2018 is quite important, as we plan to conduct the fourth Cal/Val cruise in Spring 2018 (for VIIRS-SNPP and particularly VIIRS-J1 OC validation), as well as work on VIIRS-J1 OC data processing.

### Highlights:

The fourth annual JPSS dedicated VIIRS ocean color validation cruise aboard the NOAA Ship Okeanos Explorer was successfully completed on 18 May 2018,



| FY18 TTA Milestones   | Original Date | Forecast Date | Actual Completion Date               | Variance Explanation |
|---|---------------|---------------|--------------------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>  |               |               |                                      |                      |
| Work on J1 instrument pre-launch characterization and calibration, including addressing the out spec polarization sensitivity issue, first report   | Mar-18        | Mar-18        | Mar-18                               |                      |
| Work on J1 specific lookup tables etc. and other needed modifications for VIIRS-J1 ocean color data processing system using MSL12   | Aug-18        | Aug-18        |                                      |                      |
| Cal/Val team will finish the 2016 VIIRS dedicated cruise report (Fall 2017) and in situ data analyses (e.g., improve in situ data quality)  | Mar-18        | Mar-18        | Cruise report published October 2017 |                      |
| In situ data collections including NOAA dedicated cruise in May 2018 and continue Cal/Val for VIIRS ocean color EDR   | May-18        | May-18        | May-18                               |                      |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b>   |               |               |                                      |                      |
| With significantly improved MSL12, VIIRS mission-long ocean color data products will be reprocessed (the second data reprocessing). Both NRT and science quality data streams will be going forward using the new MSL12 | Dec-17        | Dec-17        | Dec-17                               |                      |
| Work with CoastWatch/NCEI for the second reprocessed ocean color data distributions   | Sep-18        | Sep-18        |                                      |                      |
| Add J1 products to EDR monitoring web   | Sep-18        | Sep-18        |                                      |                      |

## Accomplishments / Events:

- JPSS SST Team has supported JPSS Arctic Summit in Anchorage & Fairbanks, AK, from 1-8 May 2018. Ignatov and Gladkova presented two talks, on ACSPO SST products at NOAA and on data fusion from various VIIRS, MODIS and AVHRR sensors.
- ACSPO individual sensor products are of high quality and provide accurate SST retrievals in large domains. However, they should be notched-up, to meet stringent data fusion requirements. In particular, ice mask, residual scan and cross-sensor biases should be fixed, and residual cloud removed. This will be focus of FY19.
- Infrastructure for SNPP Reanalysis-2 (RAN2) has been set up in STAR. RAN2 will commence in Jul'2018 when ACSPO v2.60 is complete. Oral presentation at the NOAA-BoM workshop (Apr) and poster at the GHRSSST meeting (Jun) on RAN2 summarize status.

## Overall Status:

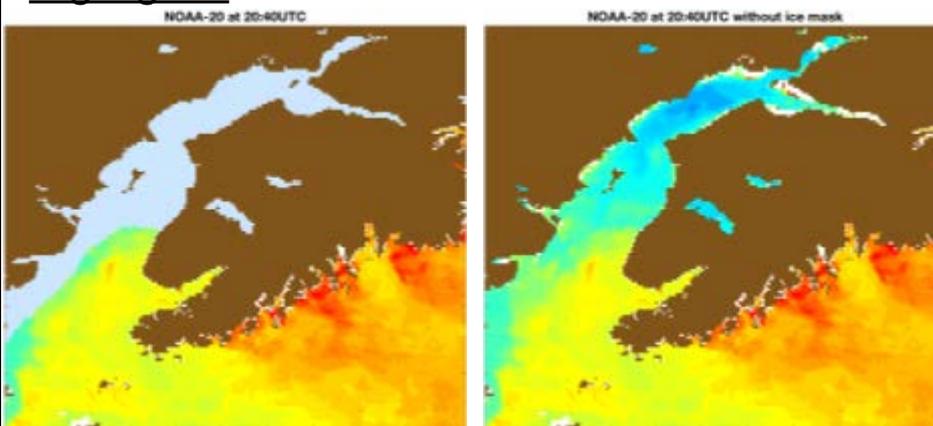
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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

## Issues/Risks:

None

## Highlights:



N20 VIIRS SST over the Kenai Peninsula, AK on 14 Apr 2018. The Cook outlet was masked out as ice (by the CMC L4 product) but in fact it was ice-free on that day. This and other issues with the retrievals are critically important for the data fusion from different VIIRS, MODIS, and AVHRR sensors currently explored by JPSS SST.

| FY18 TTA Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|--|---------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>   |               |               |                        |                      |
| Beta Maturity  | Apr-18        | Apr-18        | 04/18/18               |                      |
| Provisional Maturity   | Sep-18        | Sep-18        | 04/18/18               |                      |
| Set up RAN2 in STAR, test end-to-end   | May-18        | May-18        | 05/31/18               |                      |
| <b>J1 algorithm adjustments:</b>   |               |               |                        |                      |
| ACSPO 2.5 (improved SST Imagery, fixed bow-tie gaps/distortions)   | Nov-17        | Nov-17        | 11/16/17               |                      |
| Preliminary ACSPO 2.6 DAP to NDE (improved clear-mask in coastal/dynamic areas; ocean fronts; N20 adjustments) | Jul-18        | Jul-18        |                        |                      |
| <b>SNPP/N20 Algorithms Refinement (Maintenance DAP), LTM</b>   |               |               |                        |                      |
| Release updated SQUAM v2, iQuam v2, and ARMS v1.1  | Sep-18        | Sep-18        |                        |                      |
| Add J1 products to EDR monitoring web  | Sep-18        | Sep-18        |                        |                      |

## Accomplishments / Events:

- Performed evaluation of NUCAPS atmospheric carbon products via comparison against ATom measurements
- Completed evaluation of new QCs tailored for NUCAPS carbon monoxide retrievals
- Completed qualitative comparison of NUCAPS carbon monoxide retrievals against collocated MOPITT retrievals
- Made progress towards computation of NOAA-20 OLR regression coefficients

## Overall Status:

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

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

## Issues/Risks:

None

## Highlights:

- The NUCAPS team will participate to the WE-CAN campaign that will take place in July – September 2018. Collaborations terms were discussed during a teleconference held on May 14<sup>th</sup> 2018 with campaign’s PI, Emily Fischer (U. of Colorado).
- Antonia Gambacorta participated to the Meteosat Third Generation (MTG) Mission Advisory Group (MAG) meeting, held at EUMETSAT, Darmstadt, Germany, on May 24 and 25, 2018. This work strengthens the relationship between STAR and EUMETSAT on the next generation of hyper spectral missions.

| FY18 TTA Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|--|---------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>                                       |               |               |                        |                      |
| Beta Maturity  | Jun-18        | Jun-18        |                        |                      |
| Provisional Maturity   | Sep-18        | Sep-18        |                        |                      |
| Matchup J1 CrIS SDR with CERES data; generate regression coefficients for CrIS OLR | Jun-18        | Jun-18        |                        |                      |
| Validation against ECMWF data and radiosondes; SNPP and J1 EDRs cross comparisons  | Sep-18        | Sep-18        |                        |                      |
| Validation with NPP CERES radiation products                                       | Sep-18        | Sep-18        |                        |                      |
| Validation NUCAPS trace gas EDRs against MOPITT, AIRS, TCCON, OCO-2                | Sep-18        | Sep-18        |                        |                      |
| <b>J1 algorithm adjustments:</b>   |               |               |                        |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT)                               | Apr-18        | Apr-18        | 04/27/18               |                      |
| Preliminary DAP to NDE (ASSISTT to NDE)  | Jun-18        | Jun-18        |                        |                      |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b>                              |               |               |                        |                      |
| Add J1 products to EDR monitoring web  | Sep-18        | Sep-18        |                        |                      |

## Accomplishments / Events:

- MiRS algorithm declared by review panel to have reached Provisional Maturity in April.
- MiRS V11.3 DAP preparation completed and delivered to OSPO for code review on May 2nd. Upon completion of code review, DAP will be officially delivered to OSPO.
- Validation activities continuing, with NOAA-20 rain rate quantitative validation underway. Initial results show good consistency with reference Stage IV analysis and with SNPP rain rate (see highlights).

## Overall Status:

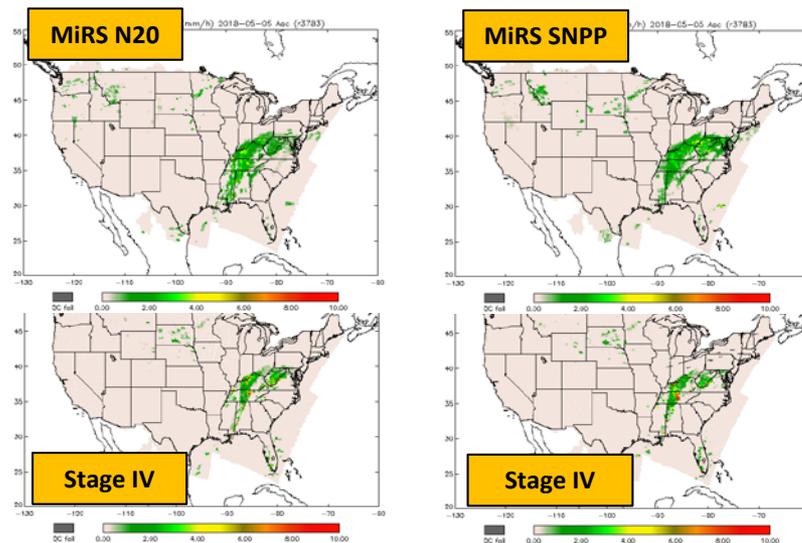
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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:



MiRS N20 and SNPP rain rate comparison to Stage IV radar-gauge.

| FY18 TTA Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation     |
|--|---------------|---------------|------------------------|--------------------------|
| <b>J1 post-launch calibration/validation</b>                                   |               |               |                        |                          |
| Beta Maturity  | Jun-18        | Jun-18        | 03/22/18               | Virtual Review           |
| Provisional Maturity   | Sep-18        | Sep-18        | 04/18/18               |                          |
| Validation against ECMWF data and radiosondes                                  | Sep-18        | Sep-18        |                        |                          |
| Validation against other reference data for MiRS EDRs (e.g. RR, SWE,SIC, etc.) | Sep-18        | Sep-18        |                        |                          |
| <b>J1 algorithm adjustments:</b>   |               |               |                        |                          |
| Preliminary DAP to NDE (Extend/Optimize MiRS for J1)                           | Apr-18        | Jun-18        |                        | Passed OSPO fcode review |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b>                          |               |               |                        |                          |
| Add J1 products to EDR monitoring web  | Sep-18        | Sep-18        |                        |                          |

Accomplishments / Events:

- S-NPP SFR has been calibrated against 2-year of MRMS radar precipitation data. The MRMS vs. S-NPP ATMS SFR scattering plot and the calibration statistics are shown in the Highlights section.
- Validation of the SFR product is being conducted using MRMS and other radar and ground observations.
- The MiRS code including the S-NPP/NOAA-20 ATMS SFR sub-system has been delivered to OSPO for code review (SCR). Once the SCR is complete, the MiRS DAP will be delivered to NDE and the S-NPP SFR will go operational in September.

Overall Status:

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

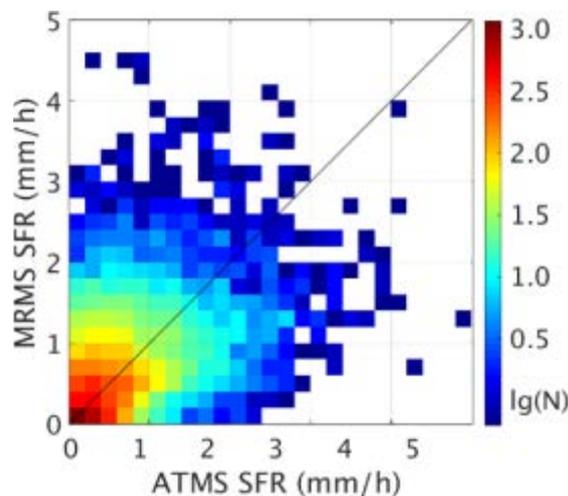
1. Project has completed.
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3. Project has deviated slightly from the plan but should recover.
4. Project has fallen significantly behind schedule, and/or significantly over budget.

Issues/Risks:

None

Highlights:

Calibration of S-NPP SFR



Correlation coeff: 0.49  
Accuracy: -0.03 mm/hr  
Precision: 0.59 mm/hr

| FY18 TTA Milestones                                   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation    |
|---|---------------|---------------|------------------------|-------------------------|
| <b>SNPP/J1 calibration/validation</b>                 |               |               |                        |                         |
| Snow Fall Rate (SFR) Cal/Val plan (draft delivery)    | Dec-17        | Dec-17        | Dec-17                 |                         |
| Snow Fall Rate (SFR) Cal/Val plan (final delivery)    | Mar-18        | Mar-18        | Mar-18                 |                         |
| S-NPP SFR Provisional Maturity                        | Jun-18        | Jun-18        |                        |                         |
| NOAA-20 SFR Beta Maturity                             | Jun-18        | Jun-18        |                        |                         |
| <b>SNPP/J1 algorithm development/adjustments:</b>     |               |               |                        |                         |
| S-NPP/NOAA-20 SFR DAP to NDE                          | Apr-18        | May-18        |                        | Passed OSPO code review |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b> |               |               |                        |                         |
| Add SFR to EDR monitoring web                         | Sep-18        | Sep-18        |                        |                         |

## Accomplishments / Events:

- Progress continues in implementing the VIIRS winds “nested tracking” algorithm (same as GOES-R) at CIMSS, so that winds can be generated locally in near real time, and algorithm improvements can be tested more efficiently.

## Overall Status:

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

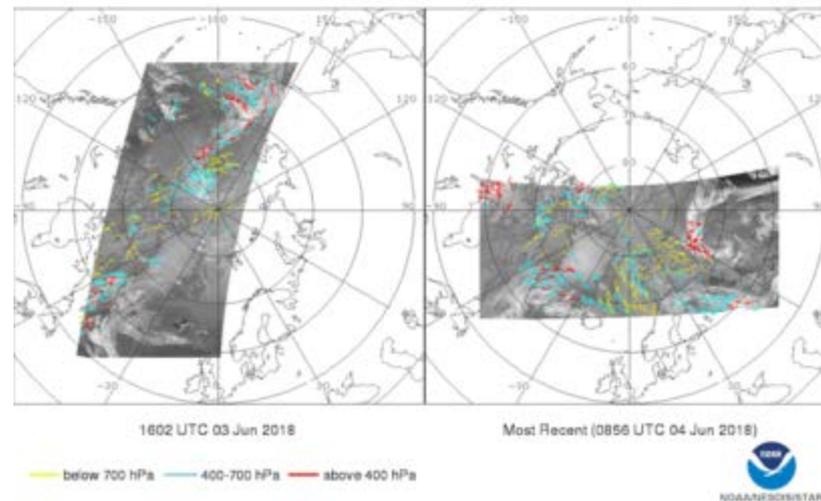
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3. Project has deviated slightly from the plan but should recover.
4. Project has fallen significantly behind schedule, and/or significantly over budget.

## Issues/Risks:

None

## Highlights:

Suomi NPP - Polar Winds - Arctic  
03 Jun 2018



| FY18 TTA Milestones                                   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---|---------------|---------------|------------------------|----------------------|
| <b>J1 post-launch calibration/validation</b>          |               |               |                        |                      |
| Beta Maturity   | Jun-18        | Jun-18        |                        |                      |
| Provisional Maturity                                  | Sep-18        | Sep-18        |                        |                      |
| <b>J1 algorithm adjustments:</b>                      |               |               |                        |                      |
| Preliminary DAP to ASSISTT (science team to ASSISTT)  | Apr-18        | Apr-18        | Apr-18                 |                      |
| Preliminary DAP to NDE (ASSISTT to NDE)               | Jun-18        | Jun-18        |                        |                      |
| <b>SNPP/J1 algorithm Refinement (Maintenance DAP)</b> |               |               |                        |                      |
| Add J1 products to EDR monitoring web                 | Sep-18        | Sep-18        |                        |                      |

## Accomplishments / Events:

- FY18 budget generally executed for contracts and grants
- Continued product cal/val; all products meeting requirements
- Comparing EDR's with counterpart JAXA EDR's
- Continue to work with IA, NJO and OSGS to respond to JAXA requests for NOAA needs for AMSR-2 follow-on and orbit preference
- Participated in relevant project meetings/discussions with NJO, OSGS and OSPO

## Overall Status:

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

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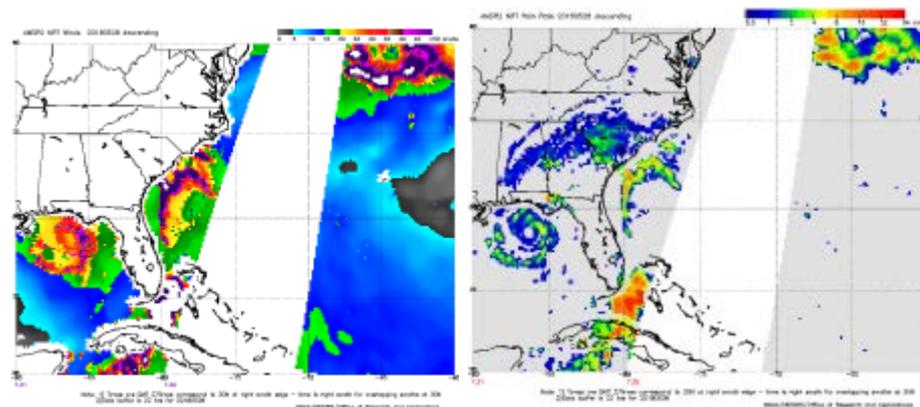
## Issues/Risks:

None

| FY18 TTA Milestones  | Original Date | Forecast Date | Actual Completion Date | Variance Explanation                         |
|--|---------------|---------------|------------------------|--|
| Updated Wind Speed Product (Coastal and accuracy improvements)                             | Nov-17        | Nov-17        | Nov-17                 |  |
| Conduct technical information meeting with JAXA GCOMW-1 scientists and engineers           | Nov-17        | Nov-17        | Nov-17                 |  |
| GAASP V2.1 DAP to NDE (switch SST ancillary file to CMC SST)                               | Jan-18        | Jan-18        | Jan-18                 |  |
| Updated AMSR2 brightness temperature calibration analysis and corrections (V2.1)           | Feb-18        | Apr-18        | Apr-18                 | Latest L1 S/W not implemented on NDE on Time |
| Soil Moisture, snow and precipitation product updates finalized for integration into GAASP | Jun-18        | Jun-18        |                        |  |
| DAP to ASSAIT (science team to ASSAIT)   | Jul-18        | Jul-18        |                        |  |
| Delivery of updated GAASP Package to OSPO (ASSAIT to NDE)                                  | Aug-18        | Aug-18        |                        |  |
| Reprocessing EDRs based upon updated GAASP package   | Sep-18        | Sep-18        |                        |  |

## Highlights:

## EDR's for T.S. Alberto



GCOM AMSR-2 retrievals of ocean surface wind speed (left) and rain rate (right) for the descending overpass (0130 local time) on 28 May 2018. Features associated with Alberto are quite evident.

## Accomplishments / Events:

- OMPS Ozone EDR delta deliveries for V8TOz, V8TOS, and V8Pro were submitted to ASSIST for testing and then delivery to NDE. The programs have updated soft calibration for S-NPP OMPS processing and full capabilities for NOAA-20 OMPS processing with its higher spatial resolution SDR products.
- Monitoring site content was expanded to include some more NOAA-20 OMPS products.

## Overall Status:

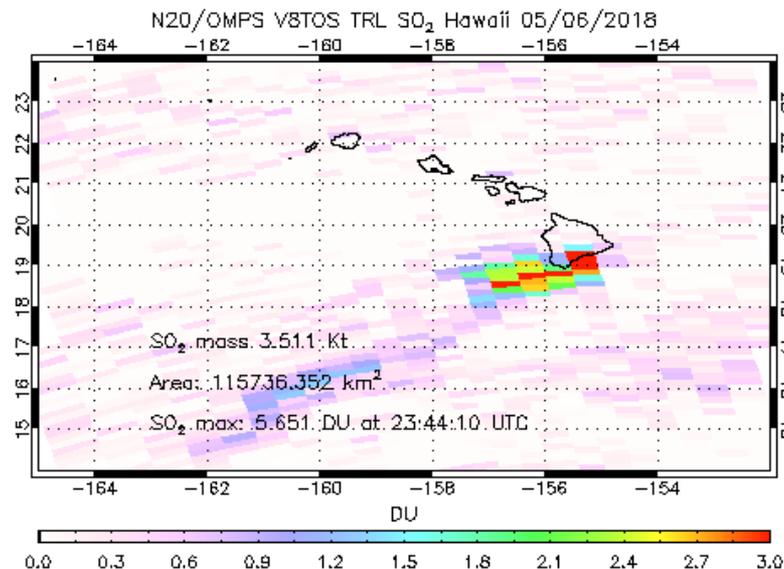
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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

## Issues/Risks:

# Code Changes for OMPS SDR on path to maturity will not be implemented at IDPS until July and September 2018.

| FY18 TTA Milestones   | Original Date | Forecast Date     | Actual Completion Date | Variance Explanation         |
|---|---------------|-------------------|------------------------|------------------------------|
| <b>NOAA-20 calibration/validation</b>                                   |               |                   |                        |                              |
| Beta Maturity   | Feb-18        | Mar-18            | 03/22/18               | Virtual Review               |
| Provisional Maturity  | Apr-18        | Jul-18            |                        | SDR Provisional              |
| Validated Maturity  | Aug-18        | Sep-18            |                        | 16-Granule Fix               |
| Prepare, demonstrate and exercise tools for J-01                        | Dec-17        | Dec-17            | Dec-17                 |                              |
| Trending of ground-based comparisons                                    | Jun-18        | Jun-18            |                        | Varying SDR calibration      |
| <b>NOAA-20 algorithm adjustments</b>                                    |               |                   |                        |                              |
| DAP to ASSISTT (science team to ASSISTT)                                | Apr-18        | May-18            | 5/28/2018              | Combined with table delivery |
| Soft Calibration for J-01 (DAP) (ASSISTT to NDE)                        | May-18        | June-18<br>Sep-18 |                        | Final will await SDR fixes.  |
| <b>SNPP/N20 algorithm refinement (Maintenance DAP)</b>                  |               |                   |                        |                              |
| Algorithm improvements (outliers, EOFs, solar, Wavelengths, bandpasses) | Sep-18        | Sep-18            |                        |                              |
| Add N20 products to EDR monitoring                                      | Sep-18        | Jul-18            |                        | Work is progressing well     |



**NOAA-20 OMPS NM Lower Tropospheric estimate of SO<sub>2</sub> over Hawaii for 6 May 2018.**

## Accomplishments / Events:

- Conducted 2-day NPROVS training sessions for NWS staff in support of radiosonde transition management
- Provided verification for NPROVS reprocessing of “special” radiosondes and ongoing Radiosonde Inter-comparison and VALidation (RIVAL) field campaign
- Assessed latest NOAA Unique Combined Atmospheric Processing System (NUCAPS) Full Spectral Resolution (FSR) Sounding for NOAA-20 and SNPP (**Highlight 1**)
- Provided final proposal for JPSS funded dedicated radiosonde program at DOE Atmospheric Radiation Measurement (ARM) sites supporting NOAA-20.
- The EDR LTM added new VIIRS cloud products to JSTAR Mapper and developed “Alaska Watch” web page (**Highlight 2**)

## Overall Status:

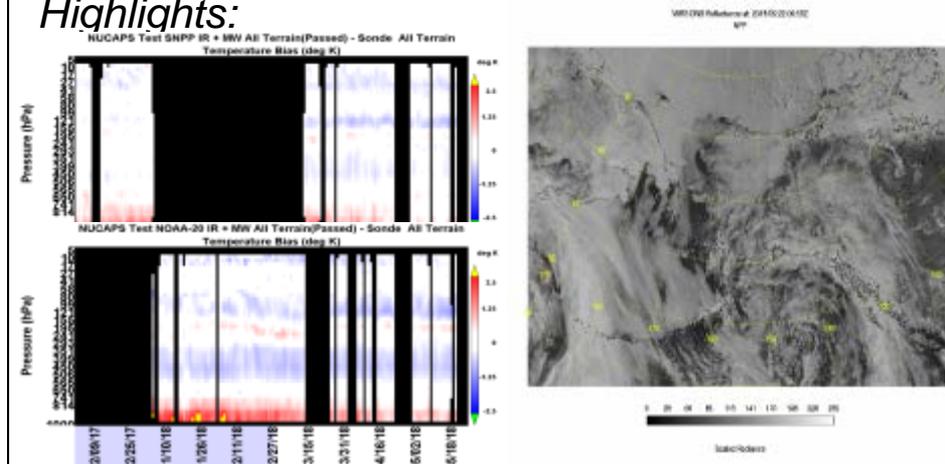
|                          | Green <sup>1</sup><br>(Completed) | Blue <sup>2</sup><br>(On-Schedule) | Yellow <sup>3</sup><br>(Caution) | Red <sup>4</sup><br>(Critical) | Reason for Deviation |
|--------------------------|-----------------------------------|------------------------------------|----------------------------------|--------------------------------|--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

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

## Issues/Risks:

None

## Highlights:



Time series of latest NUCAPS (v2.1.4) Infra-red sounding-minus-Radiosonde temperature bias from SNPP (top) and NOAA-20 (bottom) reveal similarities and differences; assessment continues.

Example of VIIRS day / night band product image under development for Alaska Watch.

| Team    | FY18 TTA Milestones   | Original Date | Forecast Date | Actual Completion Date | Variance Explanation |
|---------|---|---------------|---------------|------------------------|----------------------|
| EDR LTM | Maintain / expand existing EDR LTM web pages and integrate available NOAA-20 EDR  | Aug-18        | Aug-18        |                        |                      |
| NPROVS  | Maintain and support operational transition and algorithm upgrades for NUCAPS (and MiRS) sounding EDR from S-NPP, MetOp, and pending NOAA-20. | Aug-18        | Aug-18        |                        |                      |
|         | Maintain support of GRUAN, ongoing NOAA/GRUAN/ARM RIVAL Coordination and GRUAN / GSICS activities   | Aug-18        | Aug-18        |                        |                      |
|         | Support NWS Radiosonde Transition and AWIPS-2 (NUCAPS user) programs/initiatives  | Aug-18        | Aug-18        |                        |                      |