



NOAA NESDIS STAR

JPSS-STAR (JSTAR) PROGRAM MEETING OBJECTIVES, AGENDA, AND JSTAR OVERVIEW

PRESENTED BY LIHANG ZHOU
JPSS AMP DEPUTY FOR SCIENCE & JPSS STAR PROGRAM MANAGER

SESSION 1, AUGUST 8TH, 2016

CONTRIBUTIONS FROM MURTY DIVAKARLA, XINGPIN LIU
TOM ATKINS, TESS VALENZUELA
MEMBERS OF JPSS STAR SCIENCE TEAMS
JPSS PROGRAM SCIENCE
JPSS ALGORITHM MANAGEMENT PROJECT (AMP)
ARE THANKFULLY ACKNOWLEDGED

Meeting Objectives

1. Review the progress of the STAR JPSS program over the past year and since launch and review the plans in the coming year, particularly as they relate to J1 pre- and post-launch activities
2. Engage with users supporting the NOAA mission and other stakeholders such as NASA, DOD, OSPO, OSGS, NCEI, JPSS Risk Reduction and Proving Ground, the JPSS Ground and Flight Segments, and industry partners
3. Review the outcomes from the JPSS Enterprise Algorithm meeting and the JPSS Reprocessing Meeting
4. Enhance interaction between SDR and EDR teams and facilitate science and technical exchanges among the teams
5. Host the GSICS User Workshop, which will include an introduction to existing GSICS research and products, and discussion of new planned products

Comments: Please submit the RFA form or email to: Lihang.Zhou@noaa.gov

- **JPSS-1 Readiness:**
 - **Delivery of JPSS-1 Cal/Val Plan:** Dec-15
 - **Developed, tested, and delivered J1 algorithms for ATMS, CrIS, VIIRS, and OMPS SDRs:**
 - » Delivery of Pre-Launch Characterization Packages
 - » Delivery of algorithms and PCT/LUTs updates based on TVAC
 - » J-1 Launch Ready LUTs with mounting Coefficients
 - **Support JPSS Ground Project Block 2.0 Testing** (SDRs, Imagery, GCOM, VI, Aerosols, Active Fire, etc)

- **S-NPP Maintenance/Updates:**
 - **VIIRS Global Surface Type (GST)** Annual update: available on STAR FTP: Dec-15
 - **VIIRS LSA EDR LUT Update;** DAP delivered: Apr-16

- **Enterprise Algorithms & Reprocessing:**
 - **Enterprise Clouds, Cryosphere, and Aerosol:** DAP delivered: Dec-15; Updated DAP: Jun-16
 - **NUCAPS Phase 4 (CrIS Full Spectral Resolution)** CDR: Feb-16
 - **Delivered new VIIRS Active Fire product in NDE Operations,** TTO Mar-16
 - **Enterprise Ozone Total Column EDR DAP delivered:** Mar-16
 - **NOAA MSL12 VIIRS Ocean Color science quality mission long data** files released through the CoastWatch FTP server: Jun-16; **ACSPO SST** in ops, fully val., archived, reprocessing demonstrated
 - **SDR Reprocessing infrastructure has been established**

- **Integrated Calibration/Validation System (ICVS) Long Term Monitoring:**
 - **ICVS:** Transitioned to GRAVITE to support operation; Upgraded for J1
 - **EDR Long Term Monitoring Site Phase I Completed:** Jul-16

- **Work with Program Science and coordinate reviews of requirements; waivers; and future improvements**

Milestones	Delivery Date
CrIS SDR: Full spectral resolutions SDR	Jan-15
CrIS SDR: Fringe Count Error module update	Jun-15; Apr-16
CrIS SDR: JPSS-1 Instrument Test Data Analysis Report	Mar-15
VIIRS SDR: JPSS-1 Instrument Test Data Analysis Report	Mar-15
OMPS SDR: JPSS-1 Instrument Test Data Analysis Report	Jul-14
OMPS SDR: Extended spectral range and HCS improvement	Apr-15 (TC); May-15 (NP)
Vegetation Indices: Add top-of-canopy NDVI	Mar-15
Ocean Color: OCC for coastal and inland water	Apr-15
Active Fires: 2D fire mask; include water for global coverage	Jun-15
Risk Reduction Algorithms (Aerosol, Clouds, Cryosphere)	Jul-15; Dec-15; Jun-16
ATMS SDR: JPSS-1 Instrument Test Data Analysis Report	Feb-16
VIIRS SDR: LUT and GEO code update for JPSS-1	Aug-15; Nov-15

Milestones	Delivery Date
VIIRS Sector Rotation Quality Flag Correction	May-16
ATMS SDR: PCT update based on sensor characterization	Jun-16
ATMS SDR: S/C Sensor Mounting Coefficients	Jul-16
CrIS SDR: S/C Sensor Mounting Coefficients	Jun-16
VIIRS GEO code for RTA/HAM start encoder nominal	Apr-16
VIIRS SDR: J1 Launch Ready LUTs	Jul-16
VIIRS SDR: S/C Sensor Mounting Coefficients	Jul-16
OMPS SDR: LUTs for S-NPP Block 2.0	Mar-16
OMPS SDR: J1 Launch Ready LUTs	Mar-16 (Final Jul-16)
OMPS SDR: S/C Sensor Mounting Coefficients	Jul-16
OMPS EDR: Enterprise Total Ozone Algo (V8TOz) to NDE	Mar-16

Algorithm and Table Updates Needed for JPSS-1 Operational Readiness are Complete

Product Maturity
 • Algorithm Maturity Matrix
 • Data Maturity

Product Monitoring
 • ICVS
 • EDR LTM Site

Meetings & Reviews
 • 2016 Meetings
 • Meetings Archive

Product Applications
 • Fort McMurray Fire
 • Blizzard 2016
 • Hurricane Iselle 2014
 • Paraguay Flooding 2014

Product Teams

JPSS-1 Test Datasets

Links



Data and images displayed on STAR sites are provided for experimental use only and are not official operational NOAA products. [More information>>](#)

Calendar Year	2012	2013	2014	2015	2016 YTD	Totals
Journal Articles	19	29	36	35	19	138

2016 YTD: 19

Choi, T., Shao, X., Cao, C., & Weng, F. (2016). Radiometric Stability Monitoring of the Suomi NPP Visible Infrared Imaging Radiometer Suite (VIIRS) Reflective Solar Bands Using the Moon. *Remote Sensing*, 8(1). [\[10.3390/rs8010015\]](#)

Datla, R., Shao, X., Cao, C., & Wu, X. (2016). Comparison of the Calibration Algorithms and SI Traceability of MODIS, VIIRS, GOES, and GOES-R ABI Sensors. *Remote Sensing*, 8(2). [\[10.3390/rs8020126\]](#)

Gladkova, I., Ignatov, A., Shahriar, F., Kihai, Y., Hillger, D., & Petrenko, B. (2016). Improved VIIRS and MODIS SST Imagery. *Remote Sensing*, 8(1), 79. [\[10.3390/rs8010079\]](#)

Hillger, D., Kopp, T., Seaman, C., Miller, S., Lindsey, D., Stevens, E., Solbrig, J., Straka, W., III, Kreller, M., Kuciauskas, A., & Terborg, A. (2016). User Validation of VIIRS Satellite Imagery. *Remote Sensing*, 8(1). [\[10.3390/rs8010011\]](#)

Lee, S., & Cao, C. (2016). Suomi NPP VIIRS Day/Night Band Stray Light Characterization and Correction Using Calibration View Data. *Remote Sensing*, 8(2). [\[10.3390/rs8020138\]](#)

Liang, X. M., Ignatov, A., Kramar, M., & Yu, F. F. (2016). Preliminary Inter-Comparison between AHI, VIIRS and MODIS Clear-Sky Ocean Radiances for Accurate SST Retrievals. *Remote Sensing*, 8(3), 203. [\[10.3390/rs8030203\]](#)

Meng, F., Xin, J. Y., Cao, C. Y., Shao, X., Shan, B. Y., & Xiao, Q. F. (2016). Seasonal Variations in Aerosol Optical Thickness over Eastern China Determined from VIIRS Data and Ground Measurements. *International Journal of Remote Sensing*, 37(8), 1868-1880. [\[10.1080/01431161.2016.1163750\]](#)

Obata, K., Miura, T., Yoshioka, H., Huete, A. R., & Vargas, M. (2016). Spectral Cross-Calibration of VIIRS Enhanced Vegetation Index with MODIS: A Case Study Using Year-Long Global Data. *Remote Sensing*, 8(1). [\[10.3390/rs8010034\]](#)

Shao, X., Cao, C., & Liu, T.-C. (2016). Spectral Dependent Degradation of the Solar Diffuser on Suomi-NPP VIIRS Due to Surface Roughness-Induced Rayleigh Scattering. *Remote Sensing*, 8(3). [\[10.3390/rs8030254\]](#)

Sun, J. Q., & Wang, M. H. (2016). VIIRS Reflective Solar Bands Calibration Progress and Its Impact on Ocean Color Products. *Remote Sensing*, 8(3). [\[10.3390/rs8030194\]](#)

Wang, W., & Cao, C. (2016). Monitoring the NOAA Operational VIIRS Rsb and DNB Calibration Stability Using Monthly and Semi-Monthly Deep Convective Clouds Time Series. *Remote Sensing*, 8(1). [\[10.3390/rs8010032\]](#)

Wang, Z., & Cao, C. Y. (2016). Assessing the Effects of Suomi NPP VIIRS M15/M16 Detector Radiometric Stability and Relative Spectral Response Variation on Striping. *Remote Sensing*, 8(2). [\[10.3390/rs8020145\]](#)

Weng, F., & Yang, H. (2016). Validation of ATMS Calibration Accuracy Using Suomi NPP Pitch Maneuver Observations. *Remote Sensing*, 8(4). [\[10.3390/rs8040332\]](#)

Xiao, Q., Zhang, H., Choi, M., Li, S., Kondragunta, S., Kim, J., Holben, B., Levy, R. C., & Liu, Y. (2016). Evaluation of VIIRS, GOCI, and MODIS Collection 6aod Retrievals against Ground Sunphotometer Observations over East Asia. *Atmospheric Chemistry and Physics*, 16(3), 1255-1269. [\[10.5194/acp-16-1255-2016\]](#)

Yang, H., & Weng, F. (2016). Corrections for on-Orbit ATMS Lunar Contamination. *IEEE Transactions on Geoscience and Remote Sensing*, 54(4), 1918-1924. [\[10.1109/tgrs.2015.2490198\]](#)

Yu, F., & Wu, X. (2016). Radiometric Inter-Calibration between Himawari-8 AHI and S-NPP VIIRS for the Solar Reflective Bands. *Remote Sensing*, 8(3). [\[10.3390/rs8030165\]](#)

Zhang, R., Huang, C., Zhan, X., Dai, Q., & Song, K. (2016). Development and Validation of the Global Surface Type Data Product from S-NPP VIIRS. *Remote Sensing Letters*, 7(1), 51-60. [\[10.1080/2150704x.2015.1101649\]](#)

Zhou, L. H., Divakarla, M., & Liu, X. P. (2016). An Overview of the Joint Polar Satellite System (JPSS) Science Data Product

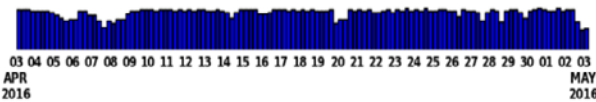
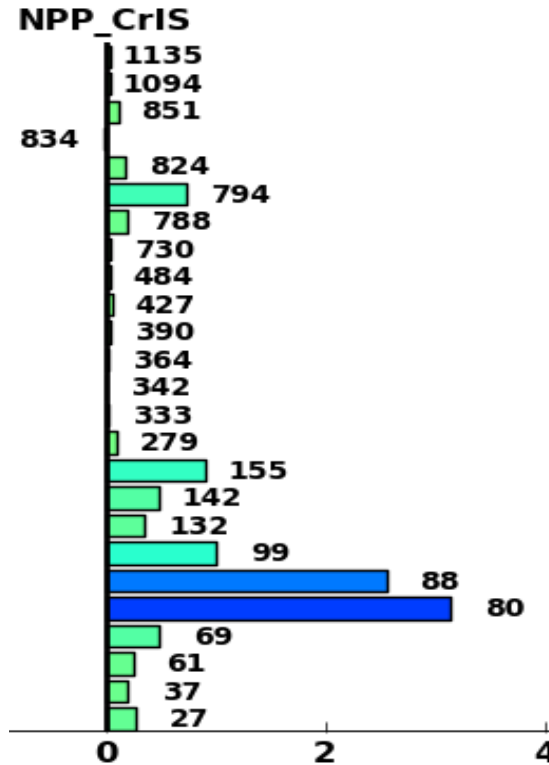
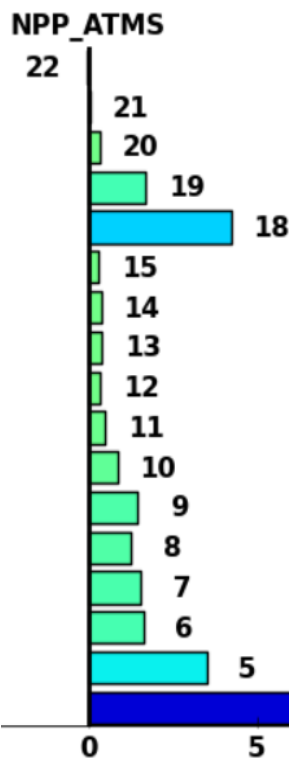
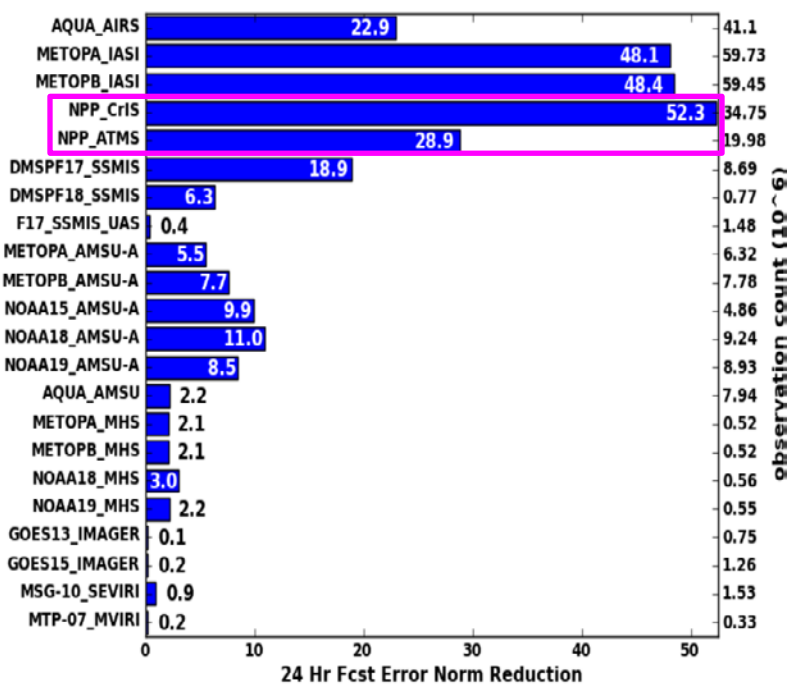


NAVGEN Observation Impact



NAVDAS-AR Observation Sensitivity

Slide Courtesy: Bill Campbell (NRL)



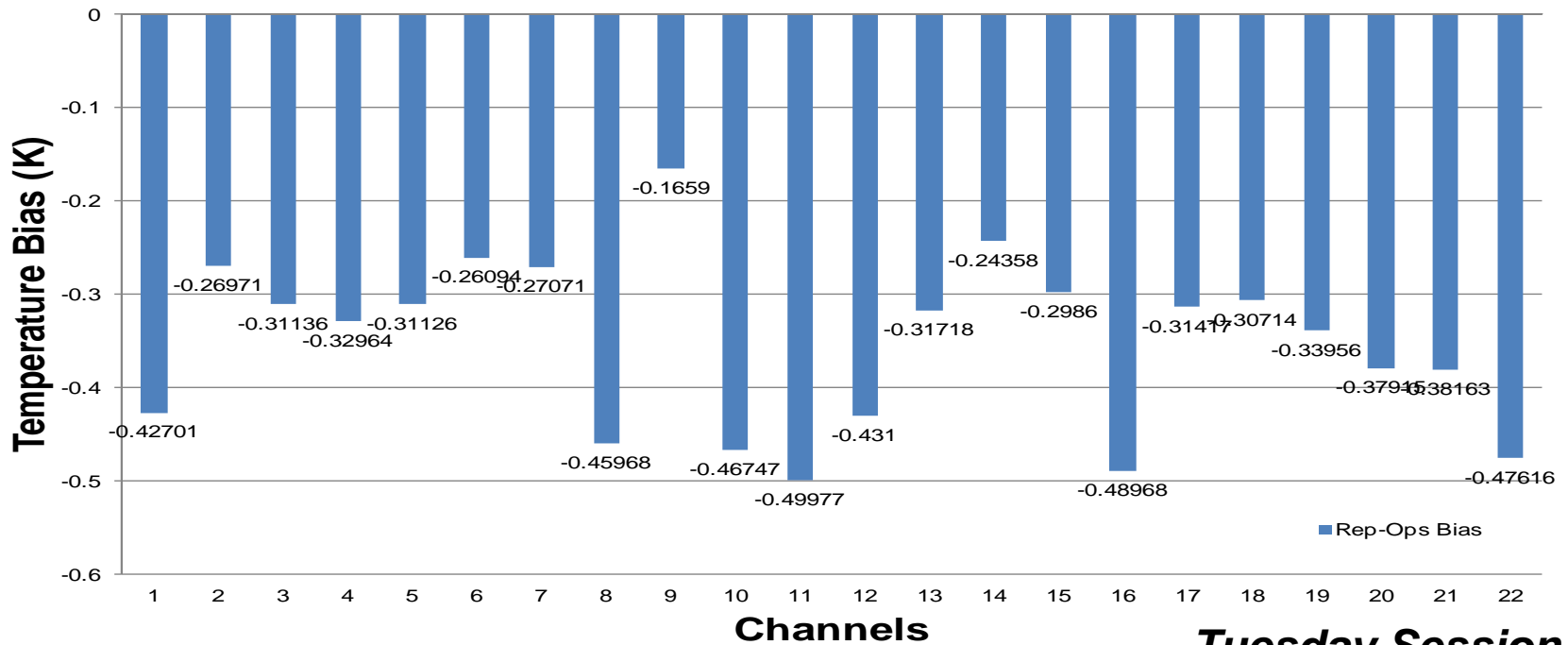
24 hr. Forecast Error Norm Reduction (J/kg)

Hyperspectral Infrared Sounders (.e.g. CrIS) and Advanced Microwave Sounders (e.g. ATMS) are the top two contributors for reducing forecast errors.

ATMS Lead: Fuzhong Weng

- ✓ Radiance based calibration algorithm
- ✓ Physical model based Lunar contamination correction algorithm
- ✓ Allan variance NEdT evaluation algorithm
- Physical model based antenna emissivity correction

S-NPP ATMS TDR Bias (Rep - OPS)



Tuesday Session 4

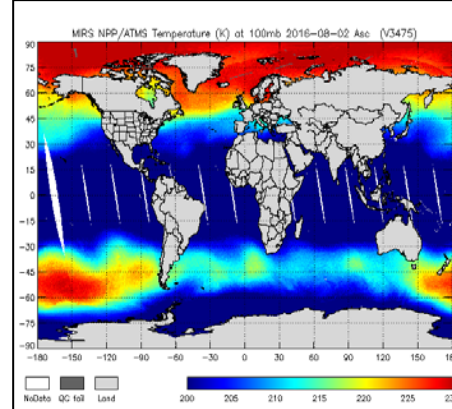
MIRS Official Products MiRS (v11.1)

1. Temperature profile
2. Moisture profile
3. TPW (global coverage)
4. Surface temperature
5. Emissivity spectrum
6. Surface Type
7. Snow Water Equivalent (SWE)
8. Effective snow grain size
9. Snow Cover Extent (SCE)
10. Sea Ice Concentration (SIC)
11. Multiyear (MY) Type SIC
12. First year (FY) Type SIC
13. Cloud Liquid Water (CLW)
14. Ice Water Path (IWP)
15. Rain Water Path (RWP)
16. Rainfall Rate
17. Snow Fall Rate

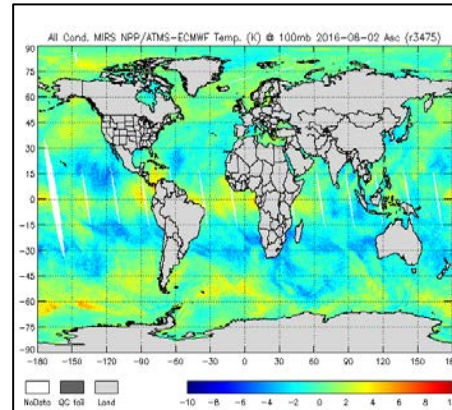
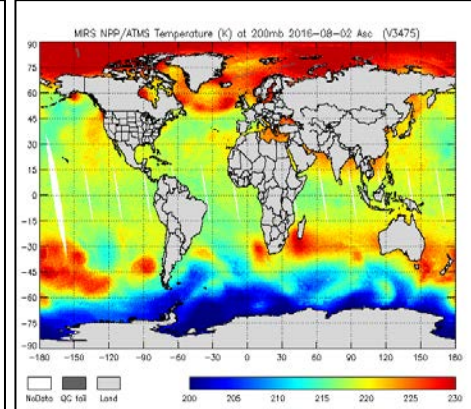
Products being investigated Experimental and getting validated

1. Cloud profile
2. Rain profile
3. Atmospheric Ice profile
4. Snow Temperature (skin)
5. Sea surface temperature
6. Wind speed

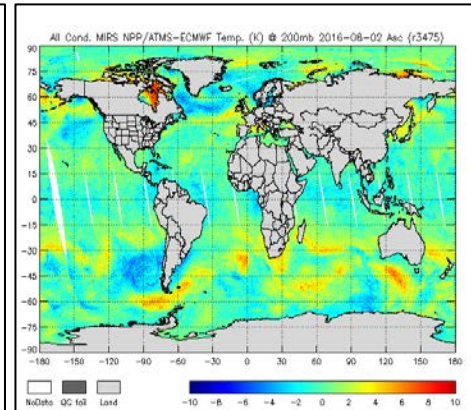
MIRS/ATMS T(p) 100mb



MIRS/ATMS T(p) 200mb



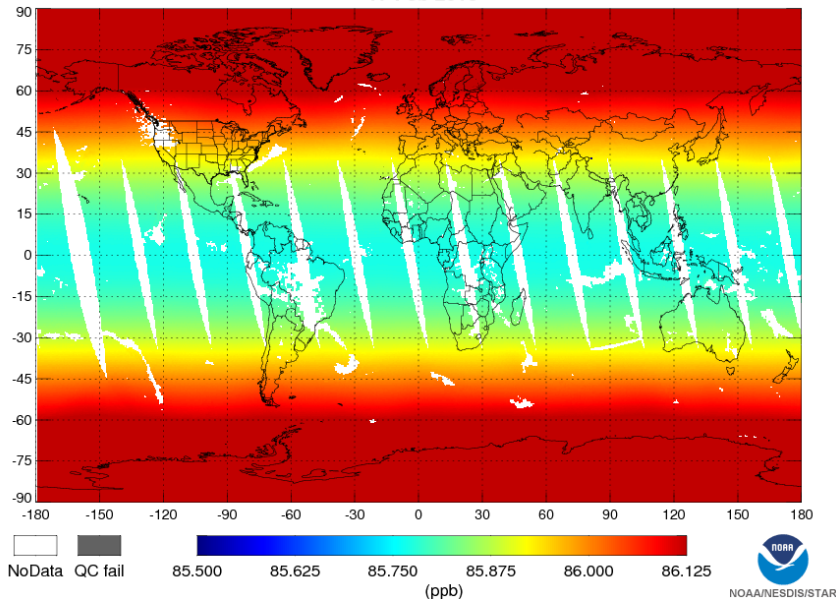
100mb T(p) Diff with ECMWF



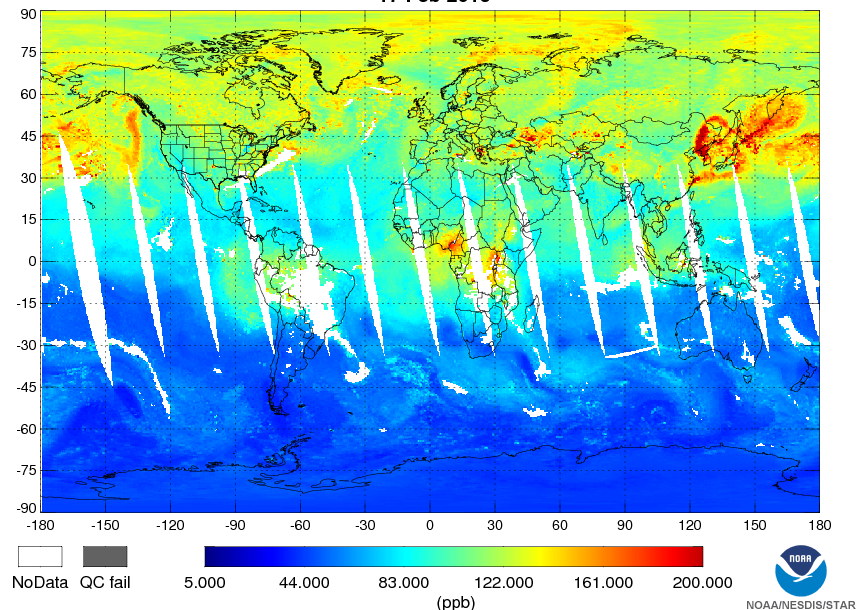
200mb T(p) Diff with ECMWF

- STAR CrIS SDR processing system routinely generating FSR SDR since 12/4/2014;
- **NWP centers worldwide routinely access FSR SDRs from STAR FTP servers**
- Operational J1 Algorithm evaluation displayed expected results

NUCAPS Carbon Monoxide Unfiltered at 500mb Asc (1.5)
17 Feb 2015



NUCAPS Carbon Monoxide Unfiltered at 500mb Asc (v1.8.1HR)
17 Feb 2015



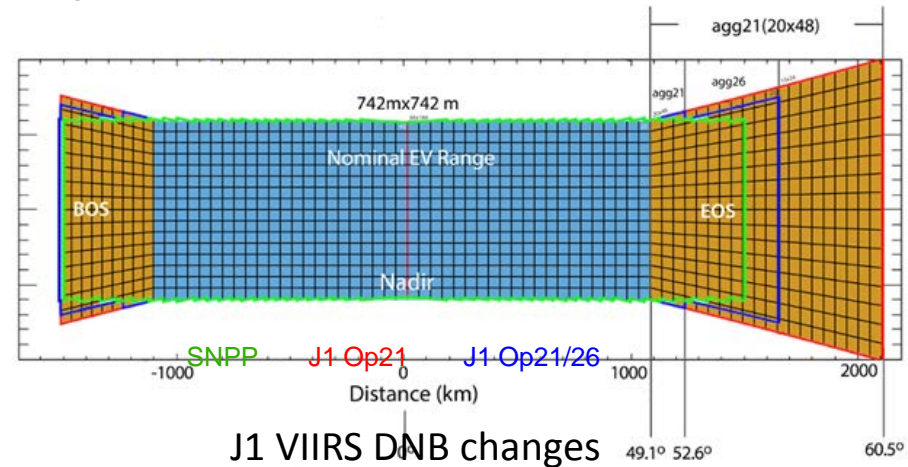
NUCAPS Trace Gas Experimental Product: CO
(Normal resolution-Left; Full Resolution Right)

Tues. Session 4
Wed. Session 6
Thur. Session 11

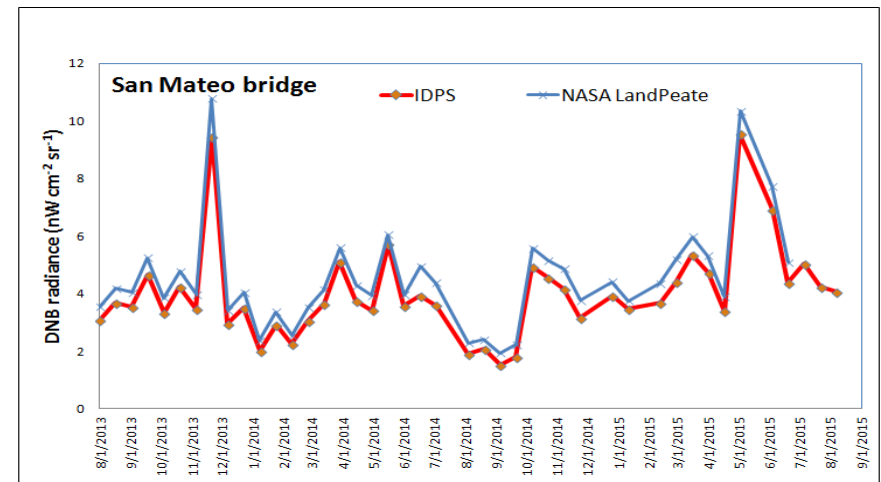
J1 VIIRS Waivers Reviewed SDR Mitigation Developed and Delivered

VIIRS Lead Changyong Cao

- Developed, tested, and delivered J1 SDR algorithms upgrades mitigating certain instrument waivers (e.g. DNB Aggregation modes 21, 21/26 GEO, LUT and code changes)
- On-going STAR research capabilities for an implementation post-launch
 - DNB other agg modes (Agg21/26; dual calibration; pixel based cal. etc.)
 - SWIR nonlinearity
 - Saturation handling



J1 VIIRS DNB changes



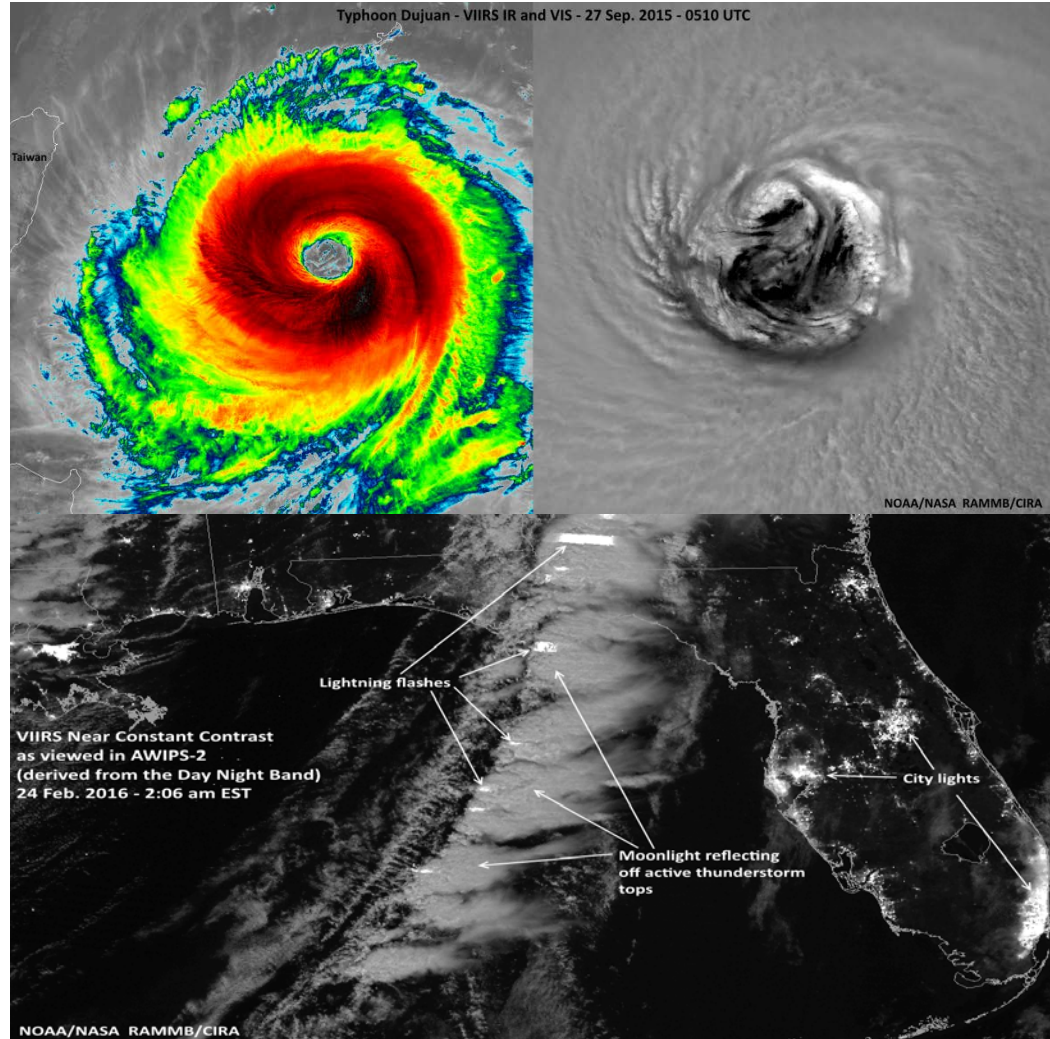
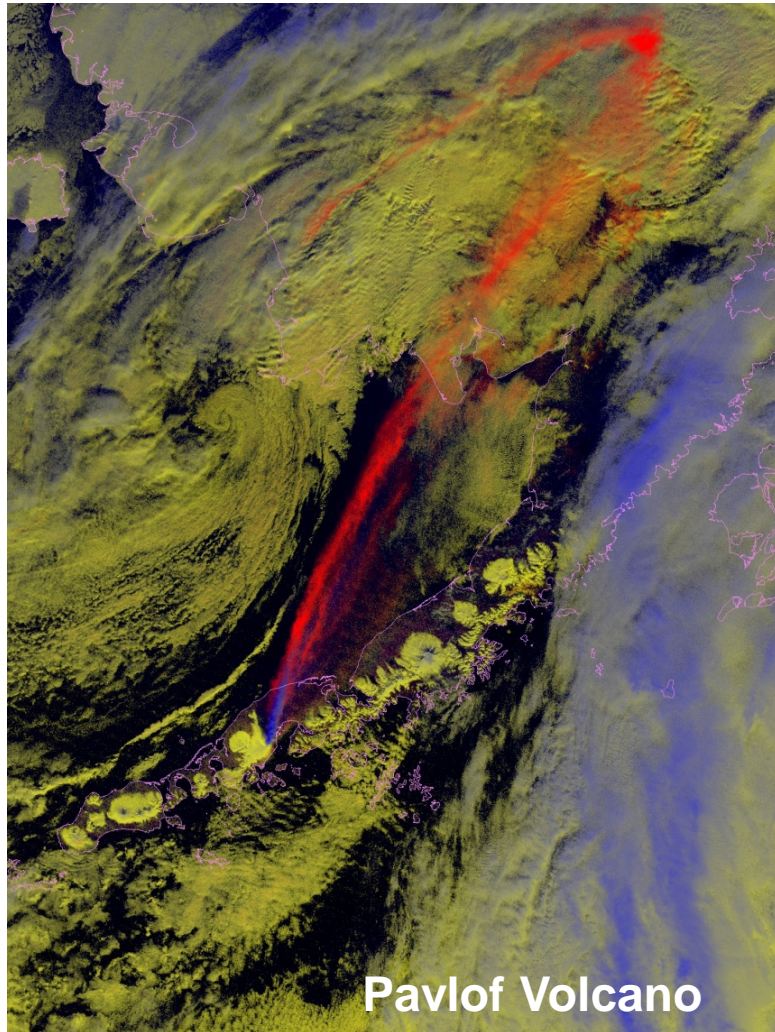
Extended DNB geolocation validation capability

Tues. Session 3

VIIRS Imagery EDR

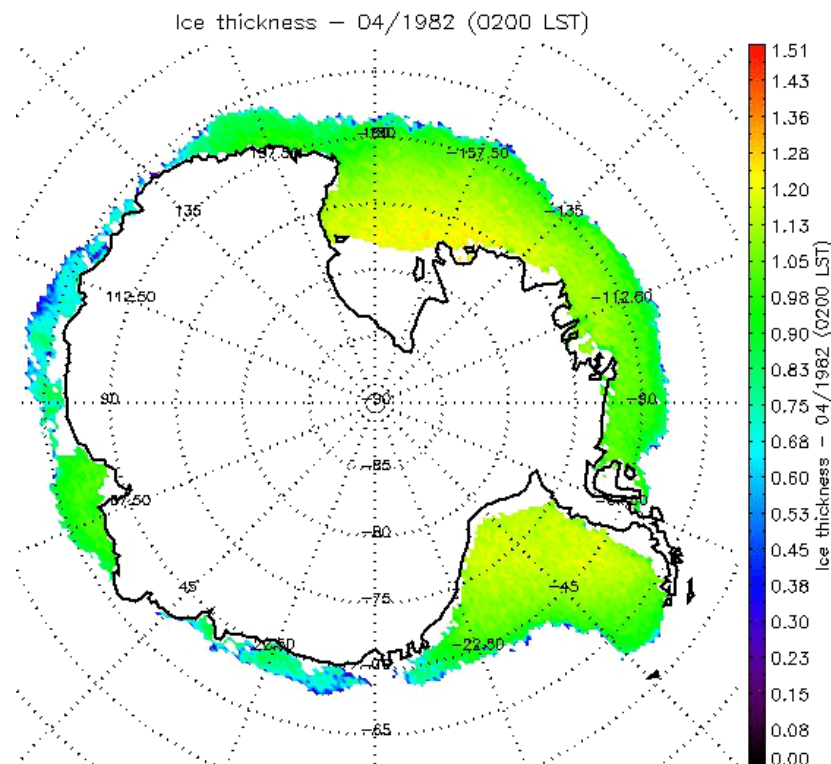
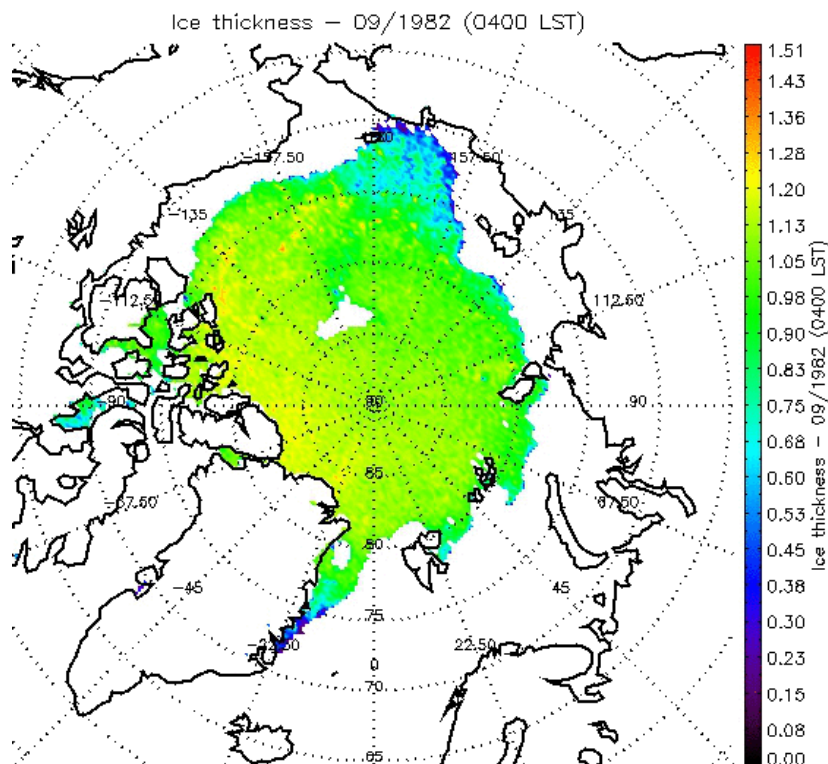
Imagery EDR Lead: Don Hillger

Various VIIRS Imagery examples, depicting details in cloud formations or on the ground which were not seen with other instrumentation.



The Enterprise VIIRS Ice Thickness Algorithm Applied to More than 30 years of AVHRR Data

Cryosphere EDR Lead: Jeff Key

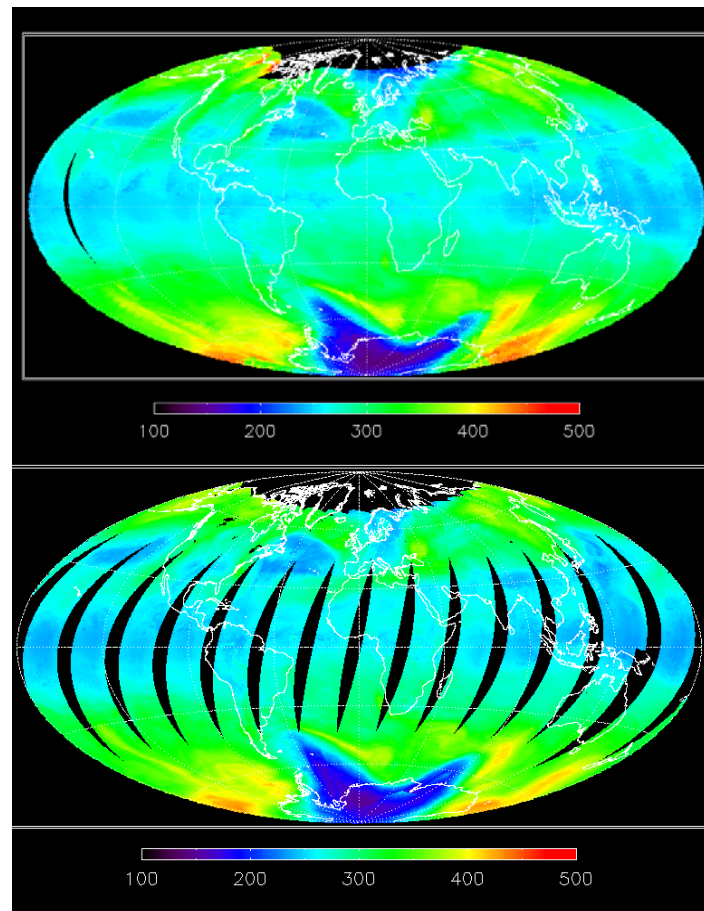
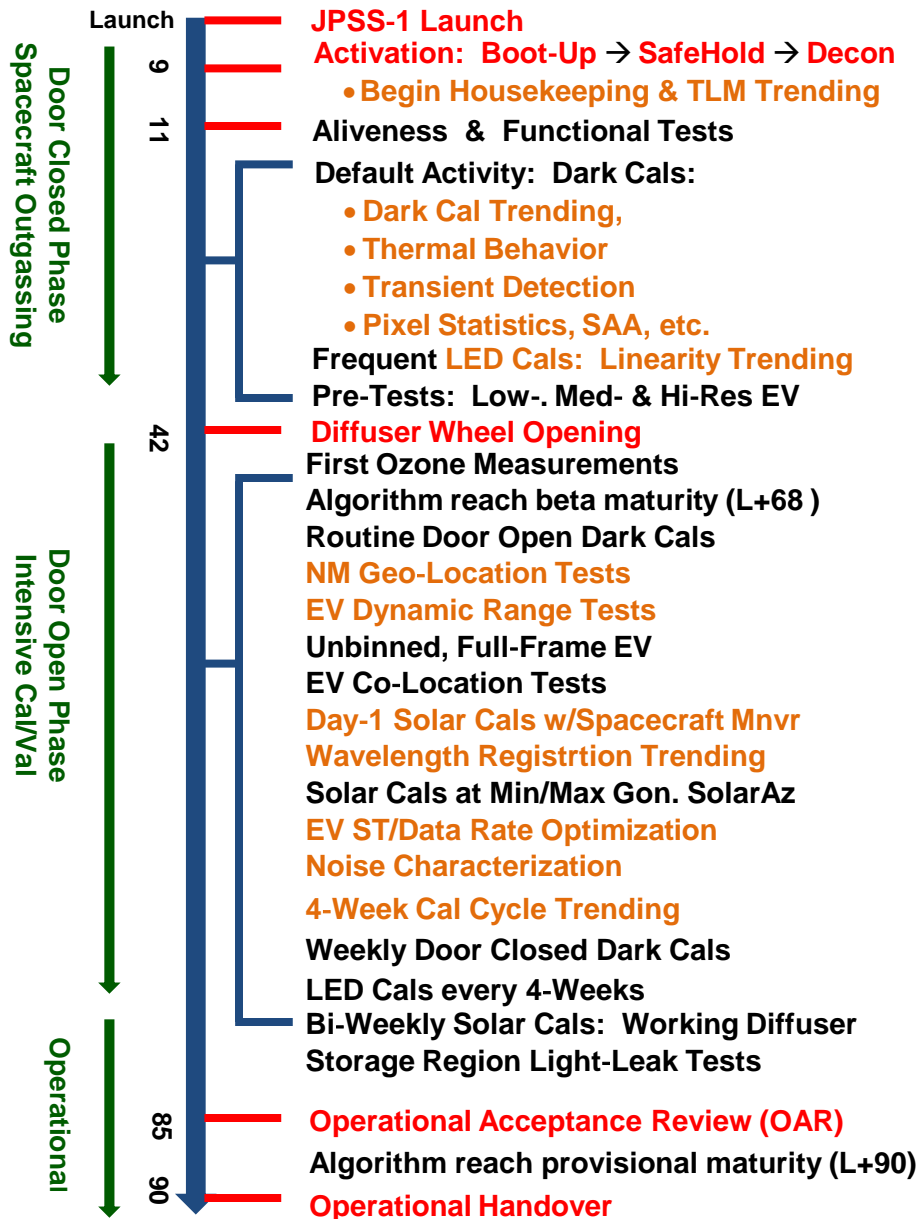


Thur. Session 9 – Land and Cryosphere; Session 10 – SST
Wed. Session 7 – Ocean Color; Session 8: Aerosols, Clouds, Imagery

J1 Cal Val Plans: Ensure SDRs/KPPs Operational Readiness L+90

OMPS Critical Cal/Val PLT Activities

OMPS SDR Leads Fuzhong Weng, Chunhui Pan



Comparisons among Total Column Ozone Products from MetOp-B GOME-2 (NOAA Version 8 algorithm), and S-NPP OMPS-NM (NOAA Version 8 algorithm) for November 2, 2014 (L Flynn).

Tue. Session 5

JPSS-1 Key Performance Parameters (KPPs) Nominal Cal/Val Timeline

Product	JPSS-1 Cal/Val Timeline (Launch + Months)												Timeline	
	1	2	3	4	5	6	7	8	9	10	11	12		
ATMS SDR	△	△					△							B:L+20D; P:L+36D; V:L+6M
CrIS SDR			△	△						△				B:L+68D; P:L+90D; V:L+9M
VIIRS SDR		△	△				△							B:L+60D; P:L+90D; V:L+6M
OMPS SDR			△	△						△				B:L+68D; P:L+90D; V:L+9M
VIIRS Imagery			△	△						△				B:L+70D; P:L+90D; V:L+9M

Beta

Provisional

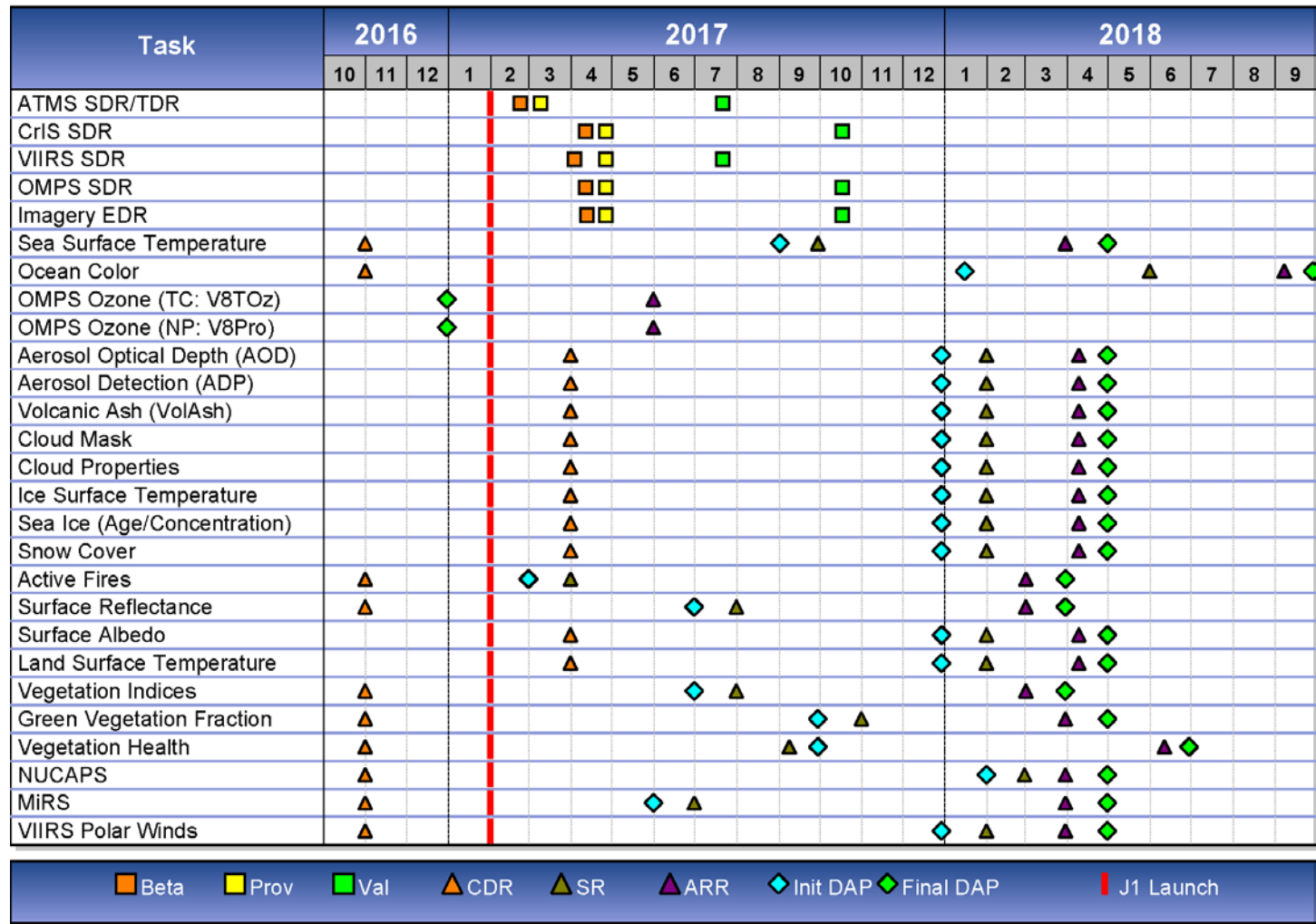
Validated

The Cal/Val activities for JPSS-1 are expected to be much more accelerated than those for S-NPP.

JPSS-1 data products will be provided to decision makers/users with a much-improved latency.

JPSS-1 Schedule

STAR JPSS Schedule: JPSS-1 Milestones



- 1. Beta/Provisional/Validated Cal/Val timeline is based on the JPSS-1 Launch Date Jan-2017
- 2. NUP Products Cal/Val Timeline will be added after receive the final Cal/Val plans

S-NPP Schedule

Enterprise Algorithm Schedule: S-NPP Milestones

Task	2015												2016												2017								
	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9					
Active Fires	◆																																
Aerosol (AOD, ADP, VolAsh)							◆						◆																				
Cloud Mask							◆						◆																				
Cloud Phase/Type							◆						◆																				
Cloud Height (ACHA)							◆						◆																				
DCOMP							◆						◆																				
NCOMP							◆						◆																				
Ice Surface Temperature							◆						◆																				
Sea Ice (Age/Concentration)							◆						◆																				
Snow Cover - Binary Map							◆						◆																				
Snow Cover - Fraction							◆						◆																				
Ozone Nadir Profile (V8Pro)													◆	▲	◆																		
Ozone Total Column (V8TOz)										◆			◆																				
Surface Reflectance										◆			▲		◆	▲					◆	▲											
Surface Albedo															▲						▲	◆				▲	◆						
Land Surface Temperature														▲							▲	◆				▲	◆						
Vegetation Indices															▲						▲	◆				▲	◆						
Green Vegetation Fraction																■																	
Vegetation Health																■																	
NUCAPS (CrIS FSR)							▲								◆	▲	◆					■											
MIRS Products																■																	
Ocean Color (MSL12)		▲											◆																				
Polar Winds																■																	
GCOM Products																																	

▲ CDR ▲ TRR ▲ ARR ■ Validated ◆ Initial DAP ◆ Final DAP

- Validated Maturity: Sep-2014, Aerosol, Clouds, Cryosphere, and Land Products; Mar-2015, Ocean Color
- NUCAPS NUP Validated Maturity: Sep-2016, OLR & Ozone; Mar-2017, Trace Gases (CO, CO₂, & CH₄)
- GCOM Validated Maturity Review: Sep-2016, Day-1 Products; Mar-2017, Day-2 Products

Summary

- ✓ Most of the operational S-NPP data products have reached the Validated maturity level and are currently in long-term monitoring and reactive maintenance phase.
- ✓ Replacement and upgrade of current S-NPP algorithms with NOAA enterprise algorithms and science reprocessing are ongoing.
- ✓ Closely engage with the JPSS-1 launch readiness testing activities, running the JPSS-1 testing data through the SDR and EDR algorithms, as well as long term monitoring system.
- ✓ With improved knowledge of the pre-launch characterization of the J1 instruments and by leveraging the S-NPP Cal/Val experience, the Cal/Val activities for JPSS-1 are well planned and expected to be much more accelerated

STAR JPSS 2016 Science Meeting List of Sessions

	Monday August 8	Tuesday August 9			Wednesday August 10			Thursday August 11				Friday August 23
		Session 3:	Session 4:	Session 5:	Session 6:	Session 7:	Session 8:	Session 9:	Session 10:	Session 11:	Session 12:	
830 - 1000		VIIRS SDR (Aud)	ATMS + CrIS (Conf)	OMPS + Ozone (ESSIC)	Soundings (Aud)	Ocean Color (Conf)	Atmosphere (Aerosols, Clouds, Imagery) (ESSIC)	Land + Cryo (Aud)	SST (Conf)	Trace Gases (Sounders + OMPS) (Rm 2552)	GSICS (ESSIC)	Session 13: Users' Impacts (Aud)
		Break			Break			Break				Break
1030 - 1200		VIIRS SDR (Aud)	ATMS + CrIS (Conf)	OMPS + Ozone (ESSIC)	Soundings (Aud)	Ocean Color (Conf)	Atmosphere (ESSIC)	Land + Cryo (Aud)	SST (Conf)	Trace Gases (Sounders + OMPS) (Rm 2552)	GSICS (ESSIC)	Session 14: Wrap Up (Aud)
1200 - 1315		Lunch			Lunch			Lunch				
1315 - 1445	Session 1: Welcome & Opening Remarks (Aud)	VIIRS SDR (Aud)	ATMS + CrIS (Conf)	OMPS + Ozone (ESSIC)	Soundings (Aud)	Ocean Color (Conf)	Atmosphere (ESSIC)	Land + Cryo (Aud)	SST (Conf)	Trace Gases (Sounders + OMPS) (Rm 2552)	GSICS (ESSIC)	
1445 - 1530	Break	Poster 1			Poster 2			Poster 3				
1530 - 1700	Session 2: J1 Readiness (Aud)	VIIRS SDR (Aud)	ATMS + CrIS (Conf)	OMPS + Ozone (ESSIC)	Soundings (Aud)	Ocean Color (Conf)	Atmosphere (ESSIC)	Land + Cryo (Aud)	SST (Conf)	Trace Gases (Sounders + OMPS) (Rm 2552)	GSICS (ESSIC)	

Aud = NCWCP Auditorium

Rm 2552 = NCWCP Conference Room 2552-2553
(inside security perimeter)

Conf = NCWCP Conference Center

ESSIC = 5825 University Research Ct.,
Rm. 4102

http://www.star.nesdis.noaa.gov/star/meeting_2016JPSSAnnual_agenda.php



Thank You and
Enjoy the Meeting!