

Updates on NOAA-21 Science Product Validation

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Introduction

The Joint Polar Satellite System (JPSS)-2 (renamed as NOAA-21 post-launch) was launched successfully in November 2022. It hosts an array of instruments similar to those currently operating on S-NPP and NOAA-20 satellites. The NOAA-21 satellite produces baseline as well as new products that are directly resulted from instrument upgrades and science improvements. This paper will present an overview of the NOAA-21 science algorithm updates and share some early results from NOAA-21 product validation and readiness for operation. The schedule of transitioning JPSS enterprise algorithms to NESDIS Common Cloud Framework (NCCF) will also be briefed.

NOAA-21 Science Products Readiness

NOAA-21 Data Products Cal/Val and Operational Plan

Mission Unique Products (from IDPS)

Enterprise Products (from NDE/NCCF)

ATMS Level 1 Products	Beta	Provisional	Declares Ready for Operations	Validated	VIIRS Level 2 Products	Beta	Provisional	Declares Ready for Operations	Validated	VIIRS Level 2 Products	Beta	Provisional	Declares Ready for Operations	Validated
Temperature Data Record (TDR)*	Nov-30-2022	Dec-15-2022	Dec-15-2022	May-10-2023	Cloud Mask	Jun -2023				Green Vegetation				
Sensor Data Record (SDR)	Nov-30-2022	Dec-15-2022	Dec-15-2022	May-10-2023	Cloud Property	Sep-2023	Oct-2023	Dec. 2023	Mar-2024	Fraction	Jul-2023	Jan-2024	Mar-2024	Jan-2025
CrIS Level 1 Product	Aerosol Optical Depth and					Vegetation Index (VI)	Jul-2023	Jan-2024	Mar-2024	Jan-2025				
SDR*	Feb-23-2023	Apr-27-2023	Mar-30-2023	Sep-28-2023	Particle Size Parameter	Jun-2023	Nov-2023	Jan-2024	Jun-2024	Vegetation Health (VH)	Sep-2023	Mar-2024	Jun-2024	Apr-2025
/IIRS Level 1 Product					Aerosol Detection	Aug-2023	Dec-2023	Feb-2024	Jun-2024	Ocean Color	Nov-2023	Mar-2024	Jun-2024	Jul-2025
VIIRS SDR	Feb-23-2022			Jul-13-2023	Volcanic Ash	Sep-2023	Oct-2023	Dec. 2023	Mar-2024	Sea Surface Temperature	May-2023	Aug-2023	Oct-2023	Aug-2024
OMPS Level 1 Product	Ice Surface Temperature	-				VIIRS Polar Winds	Nov-2023	Jan-2024	Mar-2024	Mar-2024				
Total Column and Nadir Profile	F 1 22 2022	22 A == 27 2022 A == 27 2022 D == 22 2		D 22 2022		Jul-2023	Oct-2023	Dec. 2023	Feb-2024	VIIRS Flood Mapping	Jul-2023	Jan-2024	Mar-2024	Jan-2025
SDRs	Feb-23-2023	Apr-27-2023	Apr-27-2023	Dec-22-2023	Sea Ice Concentration and	Jul-2023	0++ 2022	D		CRIS/ATMS Level 2 Product	ts			
VIIRS Level 2 Products(s)					Ice Thickness	Jui-2023	Oct-2023	Dec. 2023		NUCAPS: AVTP, AVMP,	lun-2023	Dec-2023	Feb-2024	Mar-2024
VIIRS Imagery*	Feb-23-023	Mar-30-2023	Mar-30-2023	Jul-13-2023	Snow Cover (Binary Map &	_	Oct-2023	OLR Jun-2023 D		000 2020				
Validation Maturity Levels	Not Validated	Beta	Provisional	Validated	Snow Cover Fraction)	Jul-2023	Jan-2024	Dec. 2023	Jul-2024	NUCAPS: Ozone, Trace Gas (CO, CO2, CH4)	Jun-2023	Mar-2024	May-2024	Jun-2024
					Active Fire	Jul-2023	Oct-2023	Dec. 2023	Jul-2024	ATMS Level 2 Products		· ·		
Ready for Operations		Declares Rea	ady for Operations		Land Surface Temperature	Jul-2023	Jan-2024	Mar-2024	Jan-2025	MiRS Products	May-2023	Oct-2023	Dec-2023	Oct-2024
* Key Performance Parameter (K	* Key Performance Parameter (KPP)							Mar-2024	Jul-2024	SnowFall Rate (SFR)	May-2023	Feb-2024	Apr-2024	May-2025
Ready for Operations Declares Ready for Operations * Key Performance Parameter (KPP) • The Mission Unique Products are generated from the Interface Data Processing Segment (IDPS) Closed					GST (Global Gridded	Jul-2023	Jan-2024			OMPS Level 2 Products				
System. The Enterprise Product		om S-NPP Data	Exploration (NDE) at 1	Environmental	Surface Type)	May-2024	Jul-2024		Sep-2024	Ozone EDR: NP	Mar-2023	May-2023	Jul-2023	Jan-2024
	Satellite Processing Center (ESPC).									Ozone EDR: TC	Mar-2023	May-2023	Jul-2023	Jan-2024
 All NOAA-21 EDR (except VII 	Land Surface Reflectance	Jul-2023	Jan-2024	Mar-2024	Jan-2025	Ozone LP (SDR&EDR)	Jun-2023	Jan-2024	Mar-2024	Sep-2024				



NOAA-21 launched Nov 10 2022, ATMS data started flow Nov 22, reached Beta Nov 30, Provisional Dec 15th. ATMS BUFR went into operation on the same day

1. On-orbit SDR radiometric quality on all FOVs and spectral bands has been well-characterized using different datasets 2. On-orbit radiometric noise in the form of NEdN has shown consistent performance against pre-launch analysis results, where all FOVs meet the JPSS Level-1 requirements with margin;

On-orbit SDR absolute and relative spectral calibration shifts were estimated. Preliminary results show the absolute spectral shifts for **all** three bands are within 6 ppm since the first light observation.

4. On-orbit GEO accuracy is within requirements 5. NOAA STAR NUCAPS team has performed an initial assessment of the . High quality NOAA-21 NUCAPS EDR products were generated using NOAA-21 CrIS SDR data. No additional tuning was needed for the NUCAPS algorithm.



Good global agreement between the CrIS sensor observations from NOAA-21 (Upper) and NOAA-20 (Bottom) CrIS has been found. Radiances observed at the 1569 cm⁻¹ water vapor channel on February 12, 2023 NOAA-21 NUCAPS retrievals from J2-Ready algorithm matches very well both qualitatively and quantitatively with the NOAA-20 operational NUCAPS products. (Upper: NOAA-21; Bottom: NOAA-20), February 20, 2023



Algorithm Refinements/Updates for JPSS-2 (NOAA-21)

Planned algorithm updates/enhancements before JPSS-2 launch:

Add terrain correction to the VIIRS Imagery EDRs -- Implemented in IDPS B2.2 Mx0

• Add VIIRS Imagery EDRs for all 16 M bands -- Implemented in IDPS B2.3 Mx4

• High resolution OMPS SDR implementation (10km x 12km) for J2 OMPS NM -- Implemented in IDPS B2.3 Mx4

Remove VIIRS SnowIce and QST tile dependency for OMPS SDR -- Implemented in IDPS B2.2 Mx1
J2-ready Algorithm & PCT/LUTs updates based on the pre-launch proxy/simulated/real J2 test data sets (Initial & Final DAP deliveries. The goal is to have all DAPs integrated and ready for the first J2 end-to-end JCT test event (JCT-3) testing in both IDPS & NDE)

All J2-ready initial/final DAPs have been delivered and implemented in IDPS (OPS) & NDE (I&T), which helps STAR science teams to analysis J2 (NOAA-21) algorithms on-orbit performance (J2 Cal/Val) Below is the summary table of these DAPs changes/updates details

ATMS TDR/SDR	Date 02/05/21	Version v001	Updates/Changes	Date	Version	Updates/Changes
			(J2: PCT only, ADR9393/CCR5198) initial J02 PCT:	09/14/22	v004	ADR10041/CCR6126, JPSS-2 ATMS Post TVAC Sensor Mounting Matrix PCT Update
CrIS SDR	02/08/21		ATMS-SDR-CC_j02, for both SIDE-A and SIDE-B (J2: PCT only, ADR9415/CCR5213) initial J02 LUTs/PCT: CrIS-FS-SDR-CC_j02 CrIS-FS-SDR-DQTT_j02	09/13/22		ATMS-SDR-CC_j02, for both SIDE-A and SIDE-B ADR10042/CCR6127, JPSS-2 CrIS Post TVAC Sensor Mounting Matrix PCT Update CrIS-FS-SDR-CC_j02
VIIRS SDR	02/10/21	v001	CrIS-FS-SDR-FILL-PACKET-LUT_j02 (J2: LUTs only, ADR8821/CCR5114) 44 initial J02 LUTs: CMNGEO-PARAM-LUT_j02 CmpGeo-SAA-AC_i02	09/07/22	v003	ADR8823/CCR6123, JPSS-2 VIIRS Mounting Matrix in Geo LUTs Update VIIRS-SDR-GEO-IMG-PARAM-V2-LUT_j02 VIIRS-SDR-GEO-MOD-PARAM-V2-LUT_j02
OMPS SDR	03/10/21	v001	VIIRS-RSBAUTOCAL-BRDF-SCREEN-TRANSMISSION-PRODUCT-RTA-VIEW-LUT_j02(J2: code & LUTs, ADR9095/9501, CCR 5172) Updates/Changes:1. Code update for high resolution OMPS-TC SDR (177 CT and 30 AT for J2 OMPS NM)	09/16/22	v003	VIIRS-SDR-GEO-DNB-PARAM-V2-LUT_j02 ADR10044/CCR6135, JPSS-2 OMPS Mounting Matrix Coefficients update OMPS-NP-SDR-CC_j02 OMPS-TC-SDR-CC_j02
VIIRS Cloud Mask (ECM)	04/01/21	V3r0	Scientific Changes: Quarter degree GFS is now used instead of half degree. CMC SST is now used in place of OISST.	05/17/22	v3r2	Updated to Mode 2. New LUTs and Code logic New dependancy on Day/Night Band (lunar reflectance, lunar angles) (can still run if DNB is missing by setting DNB_MISSING=true in script)
Cloud Phase/Type	04/01/21	-	The NWP_GFS unit now outputs two files. The GRID file contains outputs in the	05/17/22	v3r2	Minor updates to metadata configuration regarding sensor identifiers/wavelengths No code updates No code updates
Cloud Height (CTH, CTP, CTT)	04/01/21		satellite pixel domain. Code Changes: Preliminary J2 support	05/17/22	v3r2	Breaks up the main science code into modules and has updated science in the code. Also includes previously updated inc for winds. Adds new inputs retrieved from cloud mask (ECM ice and water probabilities). Adds a bug fix related to the DQF
Cloud Cover Layer (CCL)	04/01/21	-	This version of the DAP uses a new version of the Algorithm Services Framework as its main executable.	05/17/22	v3r2	and modifies the acha_parameters.inc include file. Added capability for Convective Cloud Probability & Supercooled Water at 5 flight
DCOMP	04/01/21	-	SDR data is now input as HDF5 files. The previous step of gapfilling and converting	05/17/22	v3r2	layers New dependency on LFC, freezing level (within NWP module) New N21 LUTs
	0 1, 01, 21		Python driver scripts have been rewritten to work with the new version of the Framework. RR algorithms are now run using a single driver script, run_jpssrr.py. Individual	00,11,11		Adds new Nighttime Lunar COMP module to calculate microphysical properties during nighttime granules and when lunar reflectances are valid (moon is shining over the surface)
NCOMP	04/01/21	-	RR algorithms are intended run as one unit, but they may be broken up to meet	05/17/22	v3r2	Changed Max Solar Zenith from 75 to 82 No code updates
Aerosol Optical Depth and Aerosol Particle Size (AOD)	04/01/21		Keys for static ancillary data have been simplified to listing the root directory instead of listing each ancillary file needed by a specific algorithm. It is assumed that the internal directory structure of the ancillary data directories are not	05/17/22	v3r2	Changed to use 17 class Surface Type rather than 14 class Surface Type Changed enumerated surface types in AER_Const.h Changed all other files to use the 17 class surface types as defined in AER_Const.h Changed valid range of QCPath from 0-31 to 0-127
Aerosol Detection (ADP)	04/01/21	-	modified. Other changes to the PCF keys have been made for all units, see the PCF-PSF document for more information. Output files for the VIIRS 750M LAND MASK NASA 1KM and NWP GFS	05/17/22	v3r2	Updated Science version to 1.3.0 from 1.2.0 Added J2 support, updated coefficients in algorithm configuration. Added fix required because of changes to the cloud mask packed flag
Volcanic Ash Ice Surface Temperature and	04/01/21 04/01/21		algorithms now use the NDE naming format. Fixed issues:	05/17/22 05/17/22	v3r2 v3r2	Handful of lines changed in eps_adp.cpp, eps_adp_input_data.cpp No code updates Script updated to handle new AMSR2 Ice Concentration input and set
ce Concentration	, , , , , , , , , , , , , , , , , , ,		ADP patch from validation Winds patch to correct metadata history attribute Winds patch to output statistics regarding phase counting Satellite metadata fix to day/night and orbit number	, -, -, -		ENV_MISSING_AMSR2_ICE variable when file is not present (Fallback option: if no inputs are available more recently than 1 week, an environment variable is set (ENV_MISSING_AMSR2_ICE) and the algorithm will run as normal without the
Sea Ice Thickness/Age	04/01/21		LSA NaN statistics fix Snow Mask IMS/SSMI previous day bug fix Adds NWP_GFS and Land Mask operational filename capability	05/17/22	v3r2	AMSR2 ice concentration input)Several parameters/constants updated. Science code version updated to v4.0Doxygen headers added for all files. Julian day adjustment code was modified inAITA_SUBROUTIN_varadj_date_latlon.f90. Parameter values updated in
Binary Snow Cover	04/01/21		Reverts Winds Last image usage Enables SAT_VIIRS operational filename capability Renames SpaStdDev to SpaStddev in AOD to support BUFR Toolkit	05/17/22	v3r2	IceThkAgeConstants.f90
Fractional Snow Cover VIIRS Polar Winds	04/01/21 04/01/21		Adds Check to Solar Zenith Angle for Ice Age/Thickness Fixes log typo for SFC_TYPE_VIIRS_1KM	05/17/22 05/17/22	v3r2 v3r2	Removes solar zenith cutoff for polar winds to address an issue where good quality winds targets were being filtered out
Land Surface Temperature	04/01/21	-	Fixed issues identified from the OSPO SCR: Fixes possible buffer overflows in C++ Lack of header/prologue Remove leading tabs	05/17/22	v3r2	Adds code to use the DQF from cloud height Added the lst uncertainty estimation module into the L2 VIIRS LST science code. lst_uncertainty_module.f90
Land Surface Albedo	04/01/21	-	Fix non-standard header files Fixes pointer usage Initialization	05/17/22	v3r2	Changes configuration file format from nc to ascii New LUTS for J1, J2 and NPP Ancillary data update.
Active Fires (L.Band)	06/24/20	v1r0	Pointer casting Ryte Size usage Scientific Changes:	02/17/22	v1r1	NAN values in the previous NPP and J01 LUTs are filled The latest J02 VIIRS SRFs were considered in the improved J02 LUTs Scientific Changes:
Active Fires (I-Band)			N/A Code Changes: Included some script level updates to account for J02 data		VIII	The primary science upgrade is that the J02 platform now uses a different fire radiative constant from NPP and J01. Other upgrades are all cosmetic or clerical in nature.
Land Surface Reflectance	04/19/21		The algorithm now accounts for missing data in the I3 band for J01, which had previously affected 1.5% of I3 band pixels. The algorithm previously misclassified NDE aerosol products as a lower level than expected. The thresholds between aerosol flag levels have been adjusted to	10/07/21 02/02/22 (patch)	v1r2	List of Code Changes: Removed the \0 characters from meta files Changed NDE GFS file pattern in config_files/preinput_template.cnf Reverted the day_night_data_flag from 0/1/2 back to "night"/"day"/"bo
Green Vegetation Fraction	04/19/21	NVPS v2r1		03/29/22	NVPS v2r2	Scientific Changes : J02 support/test
Vegetation Index (VI)	04/19/21	-	reduced operations time from 7+ to 3 hours redesigned quality flags with 13 rankings more reasonable view sun zenith and view zenith angles at some aggregated gride	03/29/22	-	VI (v2r2): 3 major improvements: reduced operations time from 7+ to 3 hours redesigned quality flags with 13 rankings more reasonable view sun zenith and view zenith angles at some aggregated
			*** NDE didn't integrate this version ***			grids GVF (v3r0): Input for GVF is now IP from the VI process (VI-SR files).
Vegetation Health (VH)			Combined Initial & Final DAP	12/20/21	v2r02	Scientific Changes: Code updates to support NOAA-21
Sea Surface Temperature	09/16/21	v2.80	Two new functionalities added: data fusion & thermal fronts		v2.80	Added ancillary data and control files for NOAA-21 Combined Initial & Final DAP 12/15/21 SPSRB documentations (EUM & SMM) delivered to NDE/OSPO 4/26/2022 patch DAP delivery to NDE: This patch resolves the issue of processing
NUCAPS Products	02/26/21 04/13/21	v3r0 v3r1	filesizes of the products 02/26/21 (v3r0):	04/08/22	DAP v4r0 Algo v3r0	ACSPO SST for VIIRS over the Great Lakes region Scientific Changes: None Code Changes:
			Makes NOAA's system compatible with running ClimCaps, but the impact to NOAA is that it now flags super saturations over 110% as failed. It also updates a few obsolete ispare/rspare values to contain new values for max relative humidity. Updated the regressions. Added a new CO2 climatology file and code to read it. Added in the MiRS ECMWE climatology for the microwave-only run.			Compiling the code now uses the ASSISTT build scripts.
MiRS Products	05/18/21	v11.6	Added in CH4 quality control it only impacts a single ispare value. Scientific Changes:	03/31/22	v11.8	Scientific Changes:
			Extension of MiRS preliminary full processing capability to JPSS-2 (NOAA-21). This is a pre-launch capability, which will be updated once real data are received after launch. Radiometric bias corrections are identical to those for NOAA-20. Updates to the SFR algorithm software including (1) updates to source code to			Updates to the snowfall rate (SFR) algorithm software including (1) final version ready for JPSS-2 processing, (2) machine learning based snowfall detection algorithms for NOAA-20 and SNPP, (3) new radiometric bias corrections for NOAA-20, S-NPP, NOAA-19, Metop-A, Metop-B, and Metop-C, (4) cloud temperature
			make package more fully modular and consistent with MiRS interfaces, and (2) updates to static coefficient files leading to improved SFR estimates.			initialization for NOAA-20, S-NPP, NOAA-19, Metop-A, Metop-B, and Metop-C, (5) machine learning ice water path initialization for NOAA-20, S-NPP, NOAA-19,
Snow Fall Rate (SFR)	05/18/21		Modification to the retrieval approach of cloud liquid water, resulting in reduction of false alarms of light rainfall over land. Code Changes:	03/31/22		Metop-A, Metop-B, and Metop-C over CONUS, and (6) machine learning SFR bias correction for NOAA-20, S-NPP, NOAA-19, Metop-A, Metop-B, and Metop-C over CONUS. Integration of an additional option for the radiometric bias correction for S-NPP
			compliance with NDE guidelines and CF conventions. This includes extracting orbit information for all satellites (except DMSP and Megha-Tropiques). Updates to the stand-alone GFS ungrib software (needed for snowfall rate			and NOAA-20. The new option is a dynamic bias correction which uses a machine learning approach to compute a unique bias correction for each individual scene based on its radiometric and geophysical characteristics.
OMPS Ozone EDR: V8TOz	05/27/21			02/03/22	V8TOz (v4r2) V8TOS (v5r0)	1) Added process of medium/high resolution OMPS J02 retrievals in the NOAA operational V8TOz package. At present, the LUTs for J02 are the same as J01 which
						 will be updated when real OMPS J02 SDR data are available. The soft-calibrations for J02 are set to zero for future updating. 2) The retrieval algorithm is switched from using narrow bandpass (original) radiance/irradiance to using broader bandpass for the six longest channel wavelengths, and the LUTs for both SNPP and N20 are updated in accordance with this bandpass switched
OMPS Ozone EDR: V8Pro	12/31/20 08/04/21 patch	v4r1	12/31/20 Main updates: Modified scripts and codes to add option for running J02 for V8Pro algorithm, added required tables and ancillary files for J02. Benlaged ald BT tables and triangular slit internal bandpass models with payr BT	07/08/22	v4r2	 this bandpass switch. 1. Modified scripts and codes for adding more source info into the metadata, so that science team can track down the reason for the differences in the retrievals between science team, ASSISTT/T4 team, NDE and OSPO. 2. Undated soft solibration adjustments for both S. NDD and N20 (Set 102 soft)
			Replaced old RT tables and triangular slit internal bandpass models with new RT tables and new higher-fidelity models. Updated soft-calibration for aerosol channel of S-NPP retrievals and make the averaged AI at Equatorial Pacific equal to zero. Set soft-calibrations for both N20 and 102 to be zero for later adjustments.			2. Updated soft-calibration adjustments for both S-NPP and N20 (Set J02 soft- calibrations to be zero for later adjustments) with new generated LUTs, which using interpolated bandpasses plus weight instead of using weight-only bandpasses. New tables for as-interpolated channels and soft calibration adjustments to force
			08/04/21: Patch DAP for OMPS NP, to address issue with scripts. Also includes			agreement for S-NPP V8Pro with NOAA-19 SBUV/2 SBUV/2 and for NOAA-20 V8Pro with S-NPP.
Reformatting Toolkit to NDE	03/31/21	v5.0	Scientific Changes: None Code Changes: Implemented data screening with Eclipse Flag for V8TOZ; Updated the Toolkit for J2 readiness;	05/25/22	v5.2	Scientific Changes: Added ASCAT L1B/L2 BUFR capabilities; Added ASCAT regional AWIPS BUFR capabilities; Added AUTOSNOW GRIB2 capability; Updated ecCodes library to version 2.22.1
	//IRS Cloud Mask (ECM) :Boud Phase/Type :Boud Base Height (CBH) :Boud Cover Layer (CCL) :Boud Cover Layer (CCL) :DCOMP ICOMP terosol Optical Depth and Nerosol Particle Size (AOD) recond Cash ce Surface Temperature and ce Concentration iea Ice Thickness/Age isinary Snow Cover rractional Snow Cover rractional Snow Cover (IIRS Polar Winds) and Surface Albedo Active Fires (I-Band) and Surface Reflectance Green Vegetation Fraction //egetation Index (VI) //ea Surface Temperature AUCAPS Products //iRS Products	DMPS SDR 03/10/21 DMPS Cloud Mask (ECM) 04/01/21 Coud Phase/Type 04/01/21 Coud Base Height (CH) 04/01/21 Coud Height (CTH, CTP, CTT) 04/01/21 Coud Cover Layer (CCL) 04/01/21 COMP 04/01/21 COMP 04/01/21 Verosol Optical Depth and terosol Optical Depth and terosol Particle Size (AOD) 04/01/21 Variation Sow Cover 04/01/21 rea loc Thickness/Age 04/01/21 eea loc Thickness/Age 04/01/21 and Surface Temperature 04/01/21 and Surface Albedo 04/01/21 and Surface Reflectance 04/01/21 and Surface Reflectance 04/19/21 and Surface Reflectance 04/19/21 and Surface Temperature 09/16/21 and Surface Reflectance 04/19/21 and Surface Reflectance 04/11/21 regetation Health (VH) 04/13/21 regetation Health (VH) 04/13/21 and Surface Temperature 09/16/21 and Surface Temperature 09/16/21 anow Fall Rate (SFR) 05/18/21	Imps SDR03/10/21v001INPS SDR03/10/21v001Inter Cloud Mask (ECM)04/01/21v3/0Ioud Phase/Type04/01/2104/01/21Ioud Gover Layer (CCL)04/01/2104/01/21Ioud Cover Layer (CCL)04/01/2104/01/21Ioud Sock Cover04/01/2104/01/21Interosol Detection (ADP)04/01/2104/01/21Interosol Particle Size (ADD)04/01/2104/01/21Interosol Sock Cover04/01/2104/01/21Interosol Fraction Fraction04/15/2104/01Interosol Fraction Fraction04/15/2104/01Interosol Fraction Fraction04/15/2104/01Interosol Fraction Fraction04/15/2104/01Interosol Fraction Fraction04/15/2104/01Interosol Fraction Fraction04/15/2104/01Interosol Fraction Fraction05/18/21v3/0Interosol Fraction Fraction05/18/21v3/0In	Instrumental base in the second sec	NPT SDM DEFAULT DEFAULT SUBJECT MARK NUMBER DEFAULT SUBJECT MARK NUMBER	Name No. No.



-		INITO	7.5	542	350	035	586		the second
ę	, 2023	M11	1	90	194	198	22*	50	S'F
4. 1	IOAA-21 VIIRS S/MWIR and	11	22	119	198	224	214	40	State -
L	WIR bands CFPA (I3 to I5	12	25	150	287	285	264	~ 30 -	and the second
	and M8 to M16) reached	13	7.3	6	171	174	149		
	perating temperature (82K)	Band	T_typ	NEDT Spec	NOAA-21 (on-orbit)	NOAA-20 (on-orbit)	S-NPP (on-orbit)		S-NPP VIIRS Band SVM15
	round 18:45 UTC on Feb.	M12	270	0.396	0.16	0.12	0.12		
		M13	300	0.107	0.04	0.04	0.04	0 5 10 15 20 25 30 Aggregation Mode	
	0, 2023	M14	270	0.091	0.05	0.05	0.06	Aggregation mode	Carles and Carles
	IOAA-21 VIIRS DNB images	M15	300	0.07	0.02	0.02	0.03		
	ave been produced since	M16	300	0.072	0.03	0.03	0.03	(11) DCD CND at $1 \pm m$ (NO1 (NO0 (NDD))	B:
	ebruary 9, 2023; DNB	14	270	2.5	0.42	0.42	0.4	• (U) RSB SNR at Ltyp (N21/N20/NPP)	1.7
C	letectors reached operating	15	210	1.5	0.41	0.42	0.4	(M) TEB NEDT at Ttyp (N21/N20/NPP)	sol
	emperature around 14:00	Band	L_min	SNR Spec	NOAA-21 (on-orbit)	NOAA-20 (on-orbit)	S-NPP (on-orbit)	• (B) DNB SNR at Lmin (NOAA-21)	and the second
ι	JTC on Feb 9, 2023	DNB**	3	6	11.8	>10	>10		



Calendar

Ozone at 49 hPa

VIIRS SDR Cal/Val: NOAA-21 VIIRS SDR has achieved beta maturity since Feb. 11, 2023 (specifically: Feb. 10, 2023, 18:45 UTC, orbit 1313) STAR VIIRS SDR team started NOAA-21 Monthly DNB (Day-Night-Band) Offsets and Gains Fast-Track LUT (Look Up Table) updates delivery in Feb, 2023. The first post-launch NOAA-21 DNB LUT updates DAP (Delivery Algorithm Package) was delivered on Mar 2, 2023 (#002, based on analysis of FEBRUARY 20, 2023 new moon data)



STAR OMPS SDR team started NOAA-21 Weekly Dark Fast-Track LUT (Look Up Table) updates delivery since 02/13/2023, for both OMPS NM and OMPS NP. The first post-launch OMPS Dark LUT updates were delivered on Jan 26, 2023 (#003

Calibration and Validation Process/Activities

Evaluate data products performance and characterize accuracy across a variety of conditions (Environmental,	JPSS-3/4	NOAA-21		NOAA-20/S-NPP	JPSS Continuity of Operations
Observing Geometry, time scales)		Beta	Provisional	Validated	2018 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
 Pre-launch Cal/Val — Simulation and Proxy data — TVAC data 					Suomi NPP
 PCT/LUTs and algorithms updates based on the pre-launch test data sets 	PRE-LAUNCH	EOC	ICV	LTM	NOAA-20
 Early on-Orbit Checkout (EOC) Antenna patterns, Spectral response functions Changes since pre-launch 	Sensor Characterization	Sensor Characterization and Calibration	Establish Sensor Stability	Monitor Sensor Stability	JPSS-2
 Parameter trending, Functional evaluation for nominal and special sensor configurations Optimal space-views, look-up-tables/process- 	Post-Launch Plan Development	Quick-Look Analysis SDRs/EDRs	• SDR Validation	• <u>Beta</u> : Early release product	JPSS Program will ensure the continuity of critical capabilities for years to come while looking for ways to make these capabilities even more useful to its operational users.
 control-table (LUTs/PCT) Intensive Cal/Val (ICV) 	Cal/Val Tool	SDR/EDR Algorithm	Key EDP Validation	familiar with formats and parameters; can have large	



STAR JPSS science teams delivered the final JPSS-2/Enterprise Cal/Val plans in April 2021. And adjusted the Cal/Val dates due to the recovery of NOAA-21 KATX. Below is the NOAA-21 Monthly Cal/Val maturity review schedule chart (Left), and the Fiscal year (FY) percent-completion chart (Right), developed based on the updated Cal/Val schedule.

																	J2 Launch	11/10/22		1	Count			Percentage (%)												
Team	Product	2022	2023 2024 2025													L+M	Date	FY	Beta	Provisional	Validated	Beta	Provisional	Validated	Summary											
		N D	J	FI	MA	М	JJ	Α	s 0	N	DJ	F	MA	M	J	JA	5	0 N	D	J F	M	A M	J	J	0	Nov-22		2	0	0	4	0	0	FY23		
	ATMS TDR/SDR	B P	>			V																			1	Dec-22		2	2	0	4	4	0	52		
	CrIS SDR			В	P				v																2	Jan-23]	2	2	0	4	4	0	10		
SDR	VIIRS SDR			в	P		v																		3	Feb-23		7	2	0	13	4	0	5		
	OMPS SDR (NP & TC)			В	Р						v														4	Mar-23		9	5	0	16	9	0			
Imagery	Imagery EDRs			в	P		v																		5	Apr-23	FY23	9	7	0	16	13	0			
	Cloud Mask						В		Р				v												6	May-23 Jun-23		21 32	9	2	38	16	4			
	Cloud Phase/Type								B P				v												8	Jul-23	ł	43	9	4	78	16	7			
	Cloud Top Property								B P				v												9	Aug-23		44	10	4	80	18	7			
Clouds	Cloud Cover Layer								B P				v												10	Sep-23		52	10	5	95	18	9			
	Cloud Base Height								B P				v												11	Oct-23		52	32	5	95	58	9	FY24		
	DCOMP and NCOMP								B P				V												12	Nov-23		54	33	5	98	60	9	3		
	Aerosol Optical Depth and Aerosol Particle Size	+	+				в			Р					v									\square	13	Dec-23		54	38	7	98	69	13	45		
Aerosol	Aerosol Detection	+						в		+	P				v										14	Jan-24		54	48	9	98	87	16	32		
Volcanic Ash	Volcanic Ash	++							B P				v		+									\square	15	Feb-24	-	54	49	11	98	89	20			
	Ice Surface Temperature and Ice Concentration	+	+		+	+	В	+	P	+		v	-	-	++		+								16	Mar-24	FY24	54	53	24	98 98	96	44			
	Sea Ice Thickness/Age	++	+		+	+	B	+	P	+		v			+									\square	17	Apr-24 May-24		54	54	24	100	98	44			
Cryosphere	Binary Snow Cover	+		-+	+	+	B	+	P	+				-		v									19	Jun-24		55	54	29	100	98	53			
	Fractional Snow Cover	+		-+	+	+	B	+		+	Р			-	+	v	+								20	Jul-24		55	55	33	100	100	60			
	Active Fires	++	+	-+	+	+	В	+	Р	+					+	v									21	Aug-24	1	55	55	34	100	100	62			
	Land Surface Temperature	++		-+	+	+	B	+		+	Р				+	· -	+			v					22	Sep-24		55	55	37	100	100	67			
	Surface Albedo	++		-+	+	+	B	+		+	P			-	+	v				·					23	Oct-24		55	55	47	100	100	85	FY25		
	Global Surface Type				+	+		+		+		+		в		P	v				+ +				24	Nov-24		55	55	47	100	100	85	0		
Land	Surface Reflectance	++			+	+	В	+		+	Р				+	· -	-			v					25	Dec-24 Jan-25		55	55	47	100	100	85 95	0 18		
	Green Vegetation Fraction	+	+				B				P	-								v					26	Feb-25	-	55	55	52	100	100	95	18		
	Vegetation Index	++	+		-		B	+		+		-			+					v				\vdash	28	Mar-25	FY25	55	55	52	100	100	95			
	Vegetation Health	+ $+$	+		-			+	B	+				,	+		+			·		v		\vdash	29	Apr-25		55	55	53	100	100	96			
OCC	Ocean Color	+ $+$							-	в			P											v	30	May-25	1	55	55	54	100	100	98			
SST	Sea Surface Temperature	+ $+$	+		+	в		P		+ +			·		+	v	+							H-	31	Jun-25]	55	55	54	100	100	98			
VPW	Polar Winds	+	+	-+	+	+ +		+		в	Р		v	-	+	+·	+								32	Jul-25	l	55	55	55	100	100	100			
VFM	VIIRS Flood Mapping	+ $+$	+		+	+	R	+		+	P		·	-	+		+			v				\vdash	33	Aug-25		55	55	55	100	100	100			
	AVTP, AVMP, Ozone, OLR	+	+	-+	+	+	B	+		+	P .		v	-	+	+	+							\vdash												
NUCAPS	CO, CO2, CH4	+	+	-+	+	+	B	+		+	· -	+	P	-	v	+	+							All NOAA-21 Products will reach the Beta Maturity by May-2024; Provisional Maturity by Jul-												
MiRS	MiRS Products	+	+	-+	+	в	-	+	P	+			·		+	-	+	v						\vdash	2024; and Validated Maturity by Jul-2025											
SFR	Snow Fall Rate (SFR)	+	+		+	B		+		+		D			+		+	•			+	v		\vdash	• Number of products reach B/P/V (Beta/Provisional/Validated) in each Fiscal Year (FY):											
311	OMPS NP Ozone EDR (V8Pro)	+ +	+		B	P		+		+	- v	- F		_	+	_						- V		\circ FY23: B (52) P (10) V (5)												
OMPS EDR	OMPS TC Ozone EDR (V8PTO)	+ $+$	+ +	_	B	P		+		+	- V	-		-	+		+																			
OWIES LON	OMPS LP (SDR & EDR)	+ $+$	+ +		-	- r	P	+		+		-			+		v							\vdash		FY24: B										
				I					<u> </u>		P						V I								0	FY25: B	s (0) P ((0) V (18)							

Potential Benefits of 3 JPSS Satellites





