The Joint Polar Satellite System (JPSS) Program's Algorithm Change Process (ACP): Past, Present and Future

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Algorithm Change Process (ACP)

The calibration/validation (cal/val) team finds an error that is in need of correcting and an Algorithm Discrepancy Report (ADR) is submitted to document the issue.

DRs are reviewed at the Discrepancy Report Action Team (DRAT) meetings and the DR is either accepted to authorize work on fixing the issue, or rejected.

A fix is proposed and the change package is submitted for DPES functional and regression code testing to ensure that the proposed fix will not disrupt any other related code or documentation.

The Algorithm Engineering Review Board (AERB) reviews the proposed fix and the board members approve or reject the suggested change.

The document change is made or the updated code fix is implemented into the next available software build cycle.

The Joint Polar Satellite System (JPSS) Program Office is the supporting organization for the Suomi National Polar Orbiting Partnership (S-NPP) satellite that was successfully put into orbit on October 28, 2011. S-NPP carries the following sensors: VIIRS, CrIS, ATMS, OMPS, and CERES. These instruments study the Earth's weather, oceans, and atmosphere. A team of scientists and engineers from all over the United States document, monitor and fix errors in software code or documentation with the algorithm change process (ACP) to ensure the success of the S-NPP mission by making sure that the best data products are being provided to users.

S-NPP is Paving the Way!

S-NPP's operational code has been taken through multiple successful software updates to provide quality data products for public use.

(Please see the table to the right)

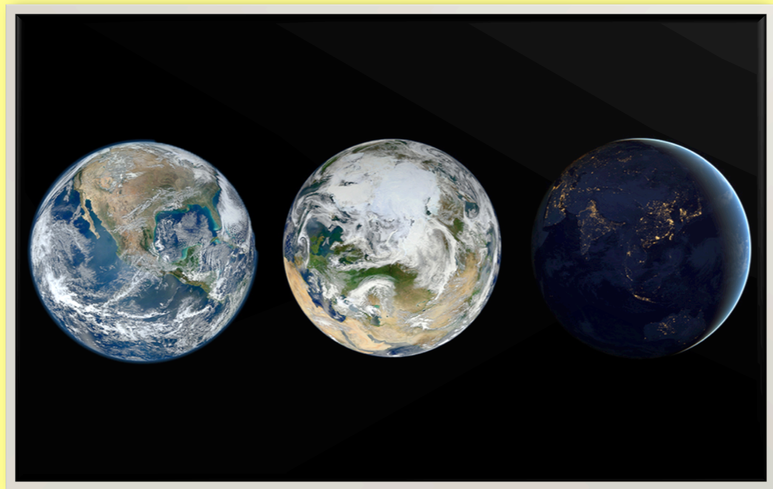
Being the first satellite to successfully launch within the program, S-NPP's lessons learned are being applied to other satellites such as GOES-R, JPSS-1 and JPSS-2 to develop their cal/val efforts and ACP.

Looking to the Future with NDE and JPSS-1

The ESPC is NOAA's primary data-processing system for the United States' environmental satellite data. Within the ESPC, the NDE subsystem processes mission data from multiple sensors into SDRs and EDRs. EDRs from the S-NPP satellite have begun transitioning to NDE and the remaining EDRs (excluding imagery) will transition over by 2018. IDPS will remain the operational processing system of Imagery and SDR products for S-NPP, JPSS-1 and JPSS-2.

This cohesion of data from multiple satellites into one system allows enterprise algorithms to improve continuity of data products between current and future satellite missions.

The new satellites under development in the JPSS program are JPSS-1, which will launch in the 2nd quarter of FY17 and JPSS-2, which is set to launch in the 1st quarter of FY22.



S-NPP Blue Marble, White Marble and Black Marble images of Earth from the VIIRS instrument.
Image from Raytheon

Sensor	Algorithm	Beta	Provisional	Validated
ATMS	ATMS SDR	Jan-2012	Oct-2012	Dec-2013
CrIS	CrIS SDR	Apr-2012	Oct-2012	Dec-2013
VIIRS	VIIRS SDR	Apr-2012	Oct-2012	Dec-2013
OMPS	OMPS SDR: NTC & NP	Feb-2012	Oct-2012	Aug-2015
VIIRS	Imagery (Not Near-Constant Contrast)	May-2012	Jan-2013	Jan-2014
VIIRS	NCC Imagery	Oct-2012	Aug-2013	Jan-2014
VIIRS	Cloud Mask	Jun-2012	Jan-2013	Jan-2014
VIIRS	Cloud Property Algorithms	Jun-2013	Jan-2014	Sep-2014*
VIIRS	Aerosol Optical Thickness and Particle Size	Sep-2012	Apr-2013	Aug-2014
VIIRS	Aerosols - Suspended Matter	Jun-2013	**	**
VIIRS	Ice Surface Temperature	May-2013	Aug-2013	Jan-2014
VIIRS	Sea Ice Concentration and Ice Thickness	May-2013	Nov-2013	**
VIIRS	Binary Snow Cover	May-2013	Nov-2013	Jan-2014
VIIRS	Fraction Snow Cover	May-2013	Nov-2013	**
VIIRS	Active Fires	Oct-2012	Aug-2013	Sep-2014
VIIRS	Land Surface Temperature	Dec-2012	Apr-2013	Dec-2014
VIIRS	Land Surface Albedo	Jun-2013	Apr-2014	Dec-2014
VIIRS	Surface Type	Feb-2013	Jan-2014	Dec-2014
VIIRS	Land Surface Reflectance	Feb-2013	Aug-2013	Sep-2014
VIIRS	Vegetation Index	Feb-2013	Aug-2013	Sep-2014
VIIRS	Ocean Color	Jan-2013	Jan-2014	Mar-2015
VIIRS	Sea Surface Temperature	Feb-2013	Jan-2014	Sep-2014
CrIS	Soundings	Aug-2012	Jan-2013	Sep-2014
OMPS	Total Column Ozone EDR	Jul-2012	Jan-2013	Aug-2015
OMPS	Nadir Profiler Ozone EDR	Aug-2012	Jan-2013	Aug-2015

Cal/Val Maturity Status of the S-NPP EDRs and SDRs.
** Represents the products that have transitioned over to enterprise algorithms.

Acronyms

ASRC: Arctic Slope Regional Corporation
ATMS: Advanced Technology Microwave Sounder
CERES: Clouds and the Earth's Radiant Energy System
CrIS: Cross-Track Infrared Sounder
DPES: Data Products Engineering and Services
EDR: Environmental Data Record
ESPC: Environmental Satellite Processing Center
GOES-R: Geostationary Operational Environmental Satellites – R Series
NJO: NOAA JPSS Program Office
NDE: NPP Data Exploitation
OMPS: Ozone Mapping Profiler Suite
SDR: Sensor Data Record
TTO: Transition to Operations
VIIRS: Visible Infrared Imaging Radiometer Suite

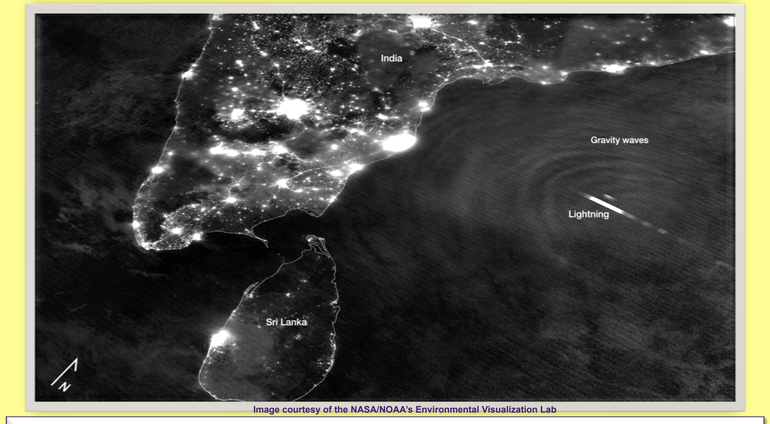
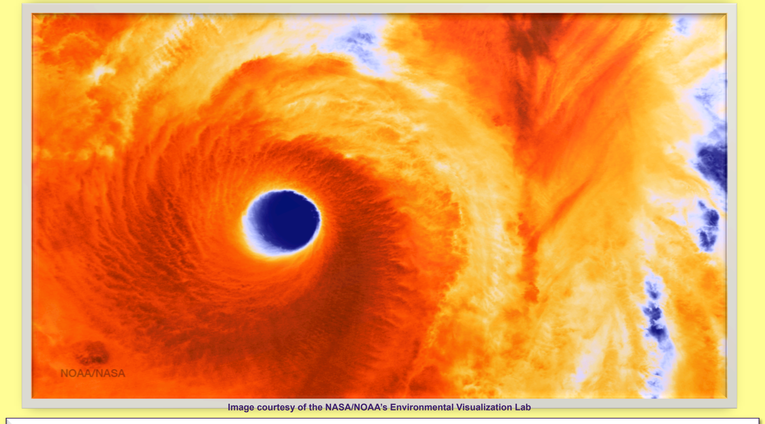


Image taken on May 13, 2013 by the VIIRS Day-Night Band was able to capture mesospheric gravity waves from a storm caused by tropical storm Mahasen. These nocturnal images are of interest to air traffic controllers because these storms can cause turbulence.



High resolution VIIRS imagery of Super Typhoon Vongfong taken on October 9, 2014 at 03:55 UTC. Vongfong was the most intense tropical cyclone in 2014, and satellite images estimated the eye of the system as 50 miles wide as it approached Japan.