



SATELLITE OPERATIONS

The Status of NOAA Satellite Operations

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Office of Satellite and Product Operations (OSPO)
NOAA/NESDIS/OSPO/SPSD

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Presentation Contributors

NESDIS / OSPO / SPSD @ NCWCP

- Matt Seybold, GOES-R Data Ops Manager
- John Paquette, Physical Scientist
- Shuang Qiu, Suomi NPP Product Area Lead (PAL)
- Awdesh Sharma, Satellite Operational Soundings PAL
- Antonio Irving, Chief - Satellite Products Branch



National Center for Weather & Climate Prediction (NCWCP)

NESDIS / OSPO / MOD @ NSOF

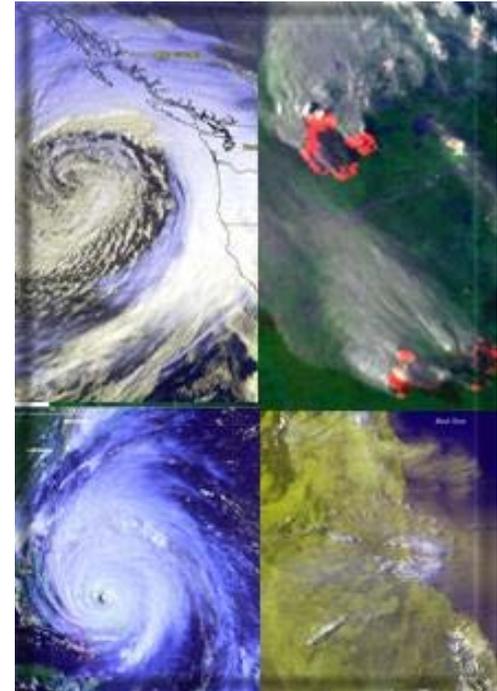
- Donna McNamara, Data Access Manager
- Chris Sisko, JPSS Data Operations Manager
- Carl Gliniak, Acting POES Lead
- Mark Danehy, Chief – Facility Engineering Branch
- John Tsui, GOES Lead



NOAA Satellite Operations Facility (NSOF)

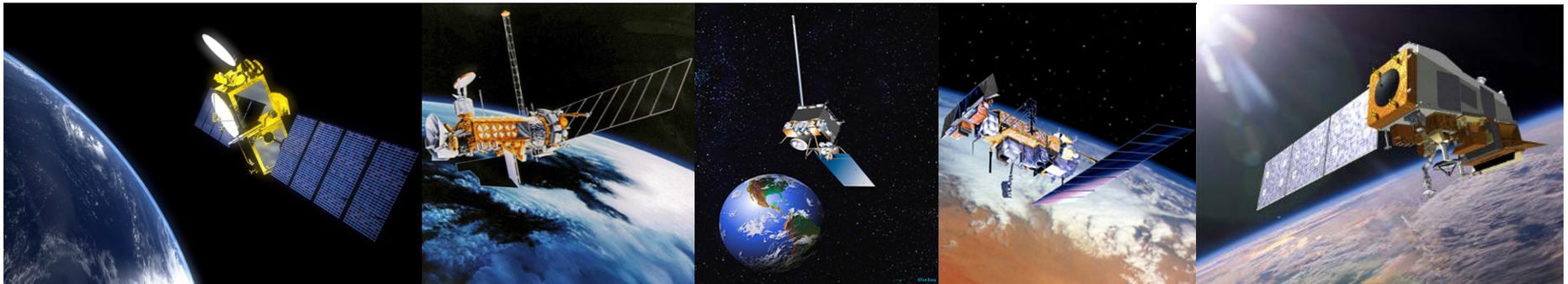
Presentation Outline

- Overview of OSPO
- Status of Satellite Operations
 - GOES & POES
- Development Initiatives, Products & Hot Topics
- Data Access and Distribution
- Q&A



NESDIS Office of Satellite and Product Operations (OSPO)

- Operates the Nation's 15 environmental satellites:
 - 3 Geostationary (GOES) by NOAA
 - 3 Polar-Orbiting (POES) by NOAA
 - 6 Defense Meteorological Satellite program (DMSP) operated by NOAA
 - 1 OSTM Jason-2 (Ocean Surface Topography Mission) - Joint NOAA, NASA, CNES, EUMETSAT effort
 - 1 Suomi National Polar-orbiting Partnership (NPP) by NOAA & NASA
 - 1 DSCOVR (Deep Space Climate Observatory) by NOAA
- Jason-3 launch scheduled for Sunday, January 17, 2016 at 10:42 AM PST from Vandenberg Air Force Base, CA

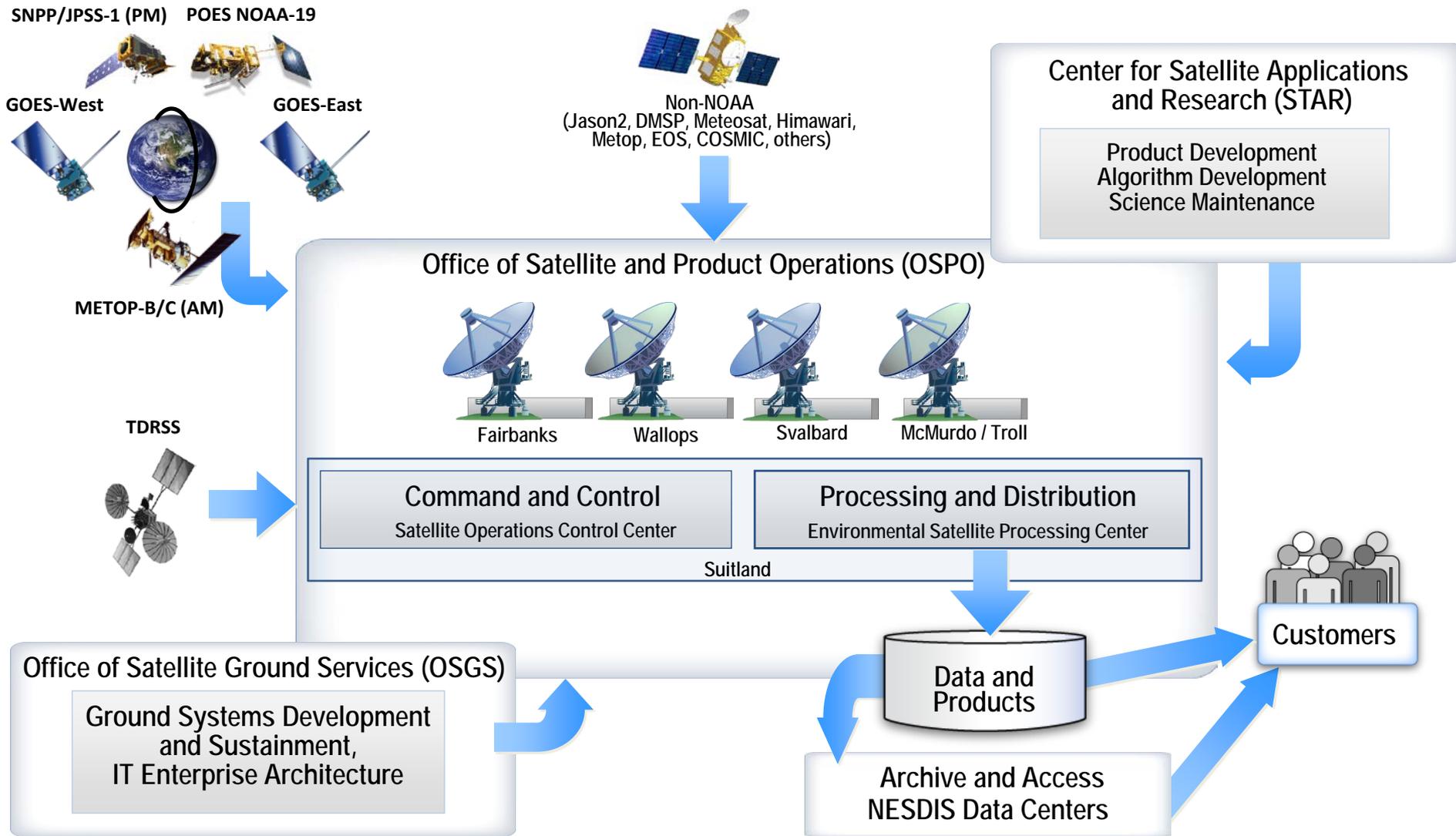


OSPO's Key Roles

- Ground System Command & Control, Ingest, Generation, and Distribution
- Pre-Launch and Post-Launch Testing
- Operational Testing, Validation, and Verification
- User Readiness for Broadcast Services and Product Delivery
- Long-Term Continuity of Products and Services



Satellite Operations, Processing and Distribution



Satellite Direct Service Operations

Emergency Managers Weather Information Network (EMWIN):

- NOAA satellites relay critical information to users across the country.

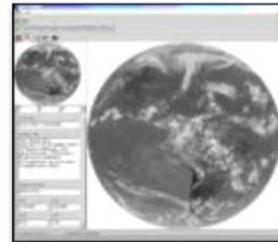
<http://www.weather.gov/emwin/index.htm>



Low Resolution Image Transmission (LRIT):

- NOAA satellites are used to relay satellite and weather products to users in remote locations, that do not have landlines or internet connections.

<http://www.noaasis.noaa.gov/LRIT/>



Data Collection:

- NOAA satellites are used to collect and relay scientific data from around the globe.

<http://www.noaasis.noaa.gov/DCS/> <http://www.noaasis.noaa.gov/ARGOS/>



Search and Rescue Satellite Aid Tracking (SARSAT):

- NOAA satellites are used to relay distress alerts from aviators, mariners and land-based users (**250 rescued through calendar year of 2015**).

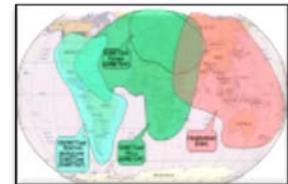
<http://www.sarsat.noaa.gov/>



Geonetcast Americas:

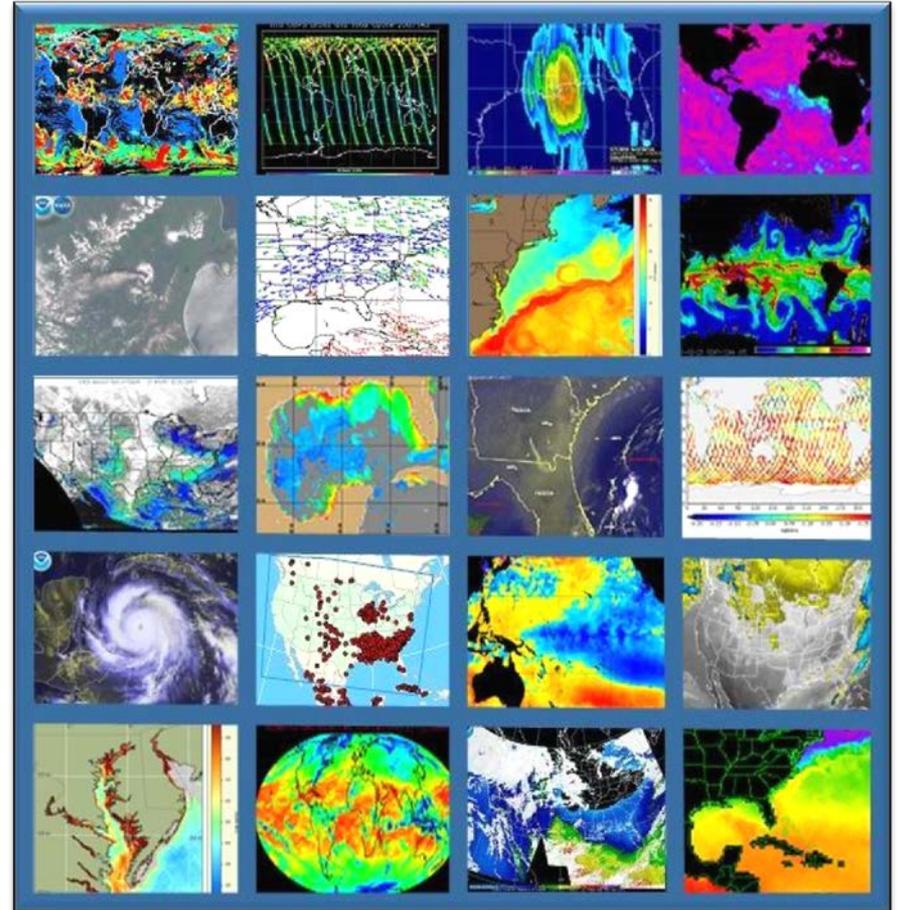
- Data from NOAA for diverse societal benefits - agriculture, energy, health, climate, weather, disaster mitigation, biodiversity, water resources, and ecosystems.

<http://www.geonetcastamericas.noaa.gov/index.html>



OSPO's Satellite Products and Services Division

- Provides 24x7 interpretive analyses of satellite data
 - Atmospheric temp/moisture
 - Hurricane intensity & position
 - Volcanic Ash
 - Fire and Smoke
 - Oil Spills
 - Significant Precipitation (20x7)
- Manages automated environmental products
- Collaborates with partners to support transition of research products into operations



Status of Satellite Operations

GOES Status (Dec 23, 2015)

<i>Payload Instrument</i>	GOES-13 (East) Launch: May 06 Activation: Apr 10	GOES-14 (Standby) Launch: Jun 09 Activation:	GOES-15 (West) Launch: Mar 10 Activation: Dec 11
Imager	G	G	G
Sounder	R (1)	G	Y (5)
Energetic Particle Sensor (EPS)	G	G	G
Magnetometers	G	G	G
High Energy Proton and Alpha Detector (HEPAD)	G	G	G
X-Ray Sensor (XRS)	Y (2)	G	G
Solar X-Ray Imager (SXI)	Y (3)	G	S/C (6)
<i>Spacecraft Subsystems</i>			
Telemetry, Command & Control	G	G	G
Attitude and Orbit Control	G	G	Y (8)
Fuel for Inclination Control	G	G	G
Propulsion	S/C (4)	G	G
Mechanisms	G	G	G
Electrical Power	G	G	G
Thermal Control	G	G	G
Communications Payloads	G	G	S/C (7)

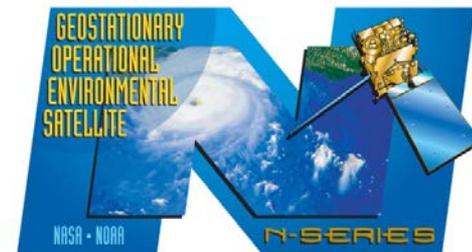
Key

Operational	G
Spacecraft issues but no user impacts	S/C
Operational with limitations	Y
Non-operational	R

<http://www.oso.noaa.gov/goesstatus>

GOES-13 (East)

Launch: May 2006 | Operational: April
2010



Issue #1:

Sounder filter wheel anomaly.
Sounder frame sync losses.

Impact:

Sounder IR data are not usable.

Issue #2:

XRS capacitor short.

Impact:

XRS X-ray measurements can potentially invert unexpectedly.



Issue #3:

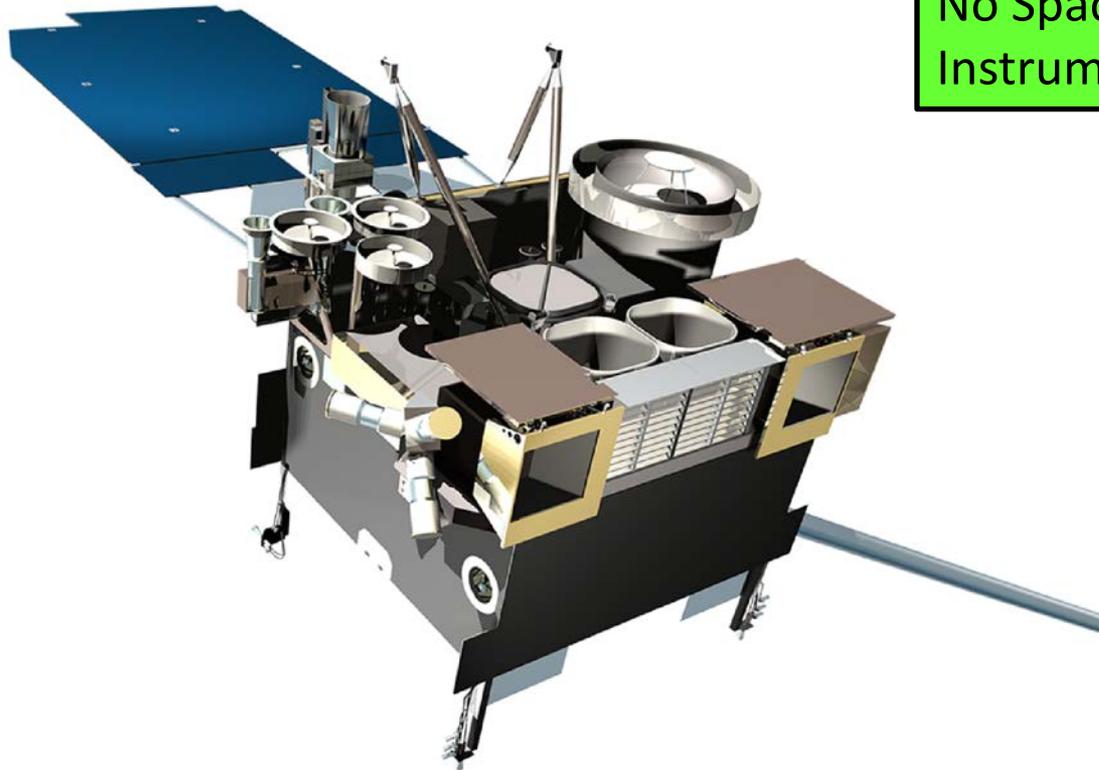
SXI detector damage due to flare.

Impact:

SWPC forecasting operations slightly degraded.

GOES-14 (Standby)

Launch: June 2009 | Operational: N/A



No Spacecraft or Instrument Issues

GOES-15 (West)

Launch: March 2010 | Operational: Dec 2011



Issue #1:

Star Tracker1 (ST1) and Star Tracker2 (ST2) failure.
Operations with ST3 only.

Impact:

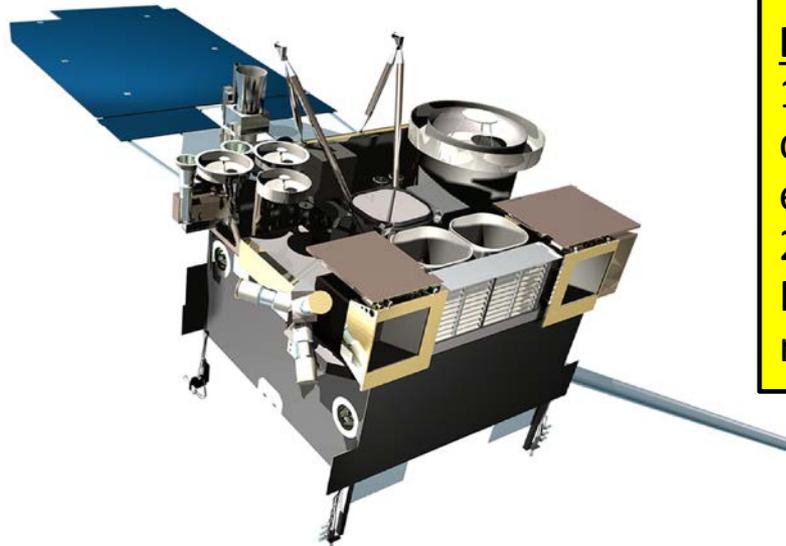
Degraded INR performance in both E/W and N/S directions.

Issue #2:

Sounder temperature control blanket is raised. To maintain patch temperature control, a yaw flip at Equinox to keep Sun angle below cooler plane.

Impact:

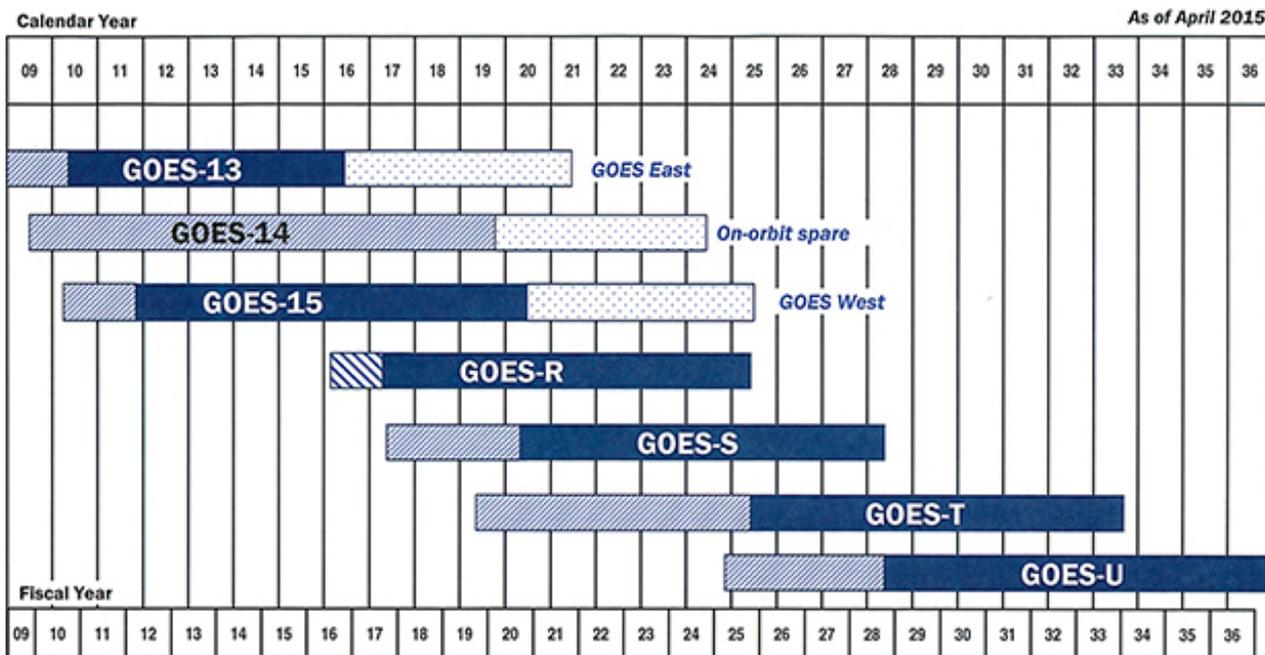
1 hour data outage and degraded products during each yaw flip maneuver and 28 hours of INR (Image Navigation & Registration) recovery period.



GOES Flyout Schedule



Continuity of GOES Mission



Approved: *Stephen V. ...* 4/21/2015
 Assistant Administrator for Satellite and Information Services

GOES: Geostationary Operational Environmental Satellite

- On-orbit Storage
- Test & Checkout
- Operational
- Fuel-Limited Lifetime



POES Status (Dec 18, 2015)

<http://www.ospo.noaa.gov/Operations/POES/status.html>

Operational	G
Spacecraft Issue but no User Impact	S/C
Operational with Limitation	Y
Non-Operational	R
Not Applicable	N/A

	METOP-A	METOP-B	NOAA-19	NOAA-18	NOAA-15
Launch Date	Oct 2006	Sept 2012	Feb 2009	May 2005	May 1998
Operational Date	May 2007	April 2013	Jun 2009	Aug 2005	Dec 1998
Mission Data Category	Secondary (AM)	Primary (AM)	Prime Services Mission (PM)	Secondary (PM)	Secondary (AM)
Payload Instruments					
AVHRR	G	G	G	G	Y(20)
HIRS	G	Y (33)	Y (32)	Y (3)	R (6)
AMSU-A1	G	G	G	G	Y(21)
AMSU-A2	G	G	G	G	
AMSU-B	N/A		N/A	N/A	R (12)
MHS	G	G	Y (8)	G	N/A
SEM	G	G	G	G	G
SBUV	N/A		S/C (9)	R(29)	N/A
Spacecraft Subsystems					
Telemetry, Command & Control	G	G	G	G	G
ADACS	G	G	G	Y (7)	Y(10)
EPS	G	G	G	G	G
Thermal Control	G	G	G	G	Y(22)
Communications	Y (1)	G	G	G	Y(23)
APT/LRPT	R (2)	G	G	G	G
DCS	N/A	N/A	N/A	G	G
ADCS	G	Y(31)	G	N/A	N/A
SAR	G	Y(31)	G	G	Y(24)





S-NPP Status as of Dec 2015



Spacecraft	S-NPP
Launch Date	Oct 28, 2011
Mission Category	LTAN 1330 (PM) +/- 10 mins



Payload Instruments	Status
ATMS	G
CERES	G
CrIS	G
OMPS – Nadir	G
OMPS – Limb	G
VIIRS	G

Spacecraft Subsystem	Status
TLM, Command & Control	G
ADCS	G
EPS	G
Thermal Control	G
Communications	G
CDP	G
SCC	G
GPS	G
1553	G
1394	G

- Operational (or capable of)
- Operational with limitations (or in standby)
- Operational with degraded performance
- Not functional

- Functional but turned off
- No status reported

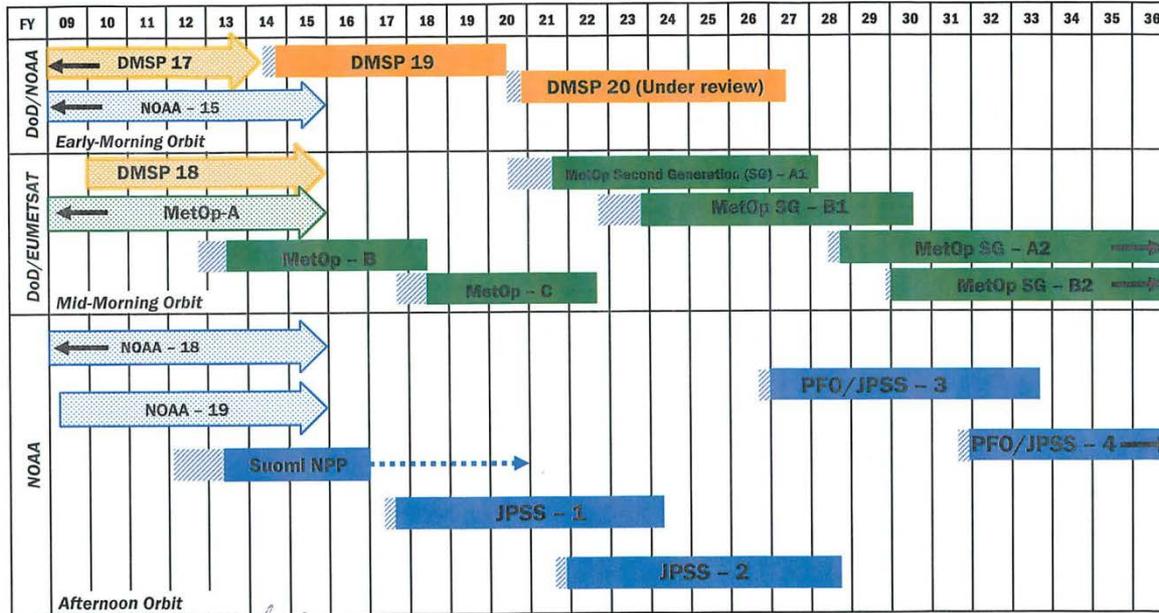
LEO Flyout Schedule



NOAA & Partner Polar Weather Satellite Programs Continuity of Weather Observations



As of April 2015



Approved: *Mark S. Parise*
Assistant Administrator for Satellite and Information Services

Note: Extended operations are reflected through the current FY, based on current operating health.

DMSP: Defense Meteorological Satellite Program	Post Launch Test
JPSS: Joint Polar Satellite System Program	Operational based on design life
Suomi NPP: Suomi National Polar-orbiting Partnership	Secondary
	Operational beyond FY 2036
	Extended mission life
Note: DoD and EUMETSAT data provided for reference only	Launched before Oct 2008

<http://www.nesdis.noaa.gov/FlyoutSchedules.html>

<http://www.jpss.noaa.gov>



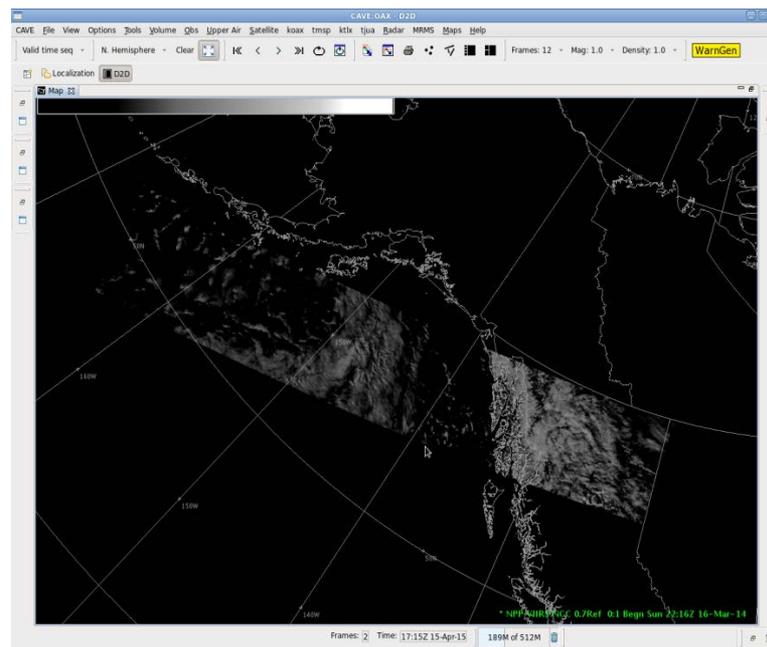
Development Initiatives, Products & Other Hot Topics

S-NPP Near-Constant Contrast

NWS Technical Implementation Notice 15-48 issued on Oct 20, 2015

http://www.nws.noaa.gov/os/notification/tin15-48nde_npp_sbn.htm

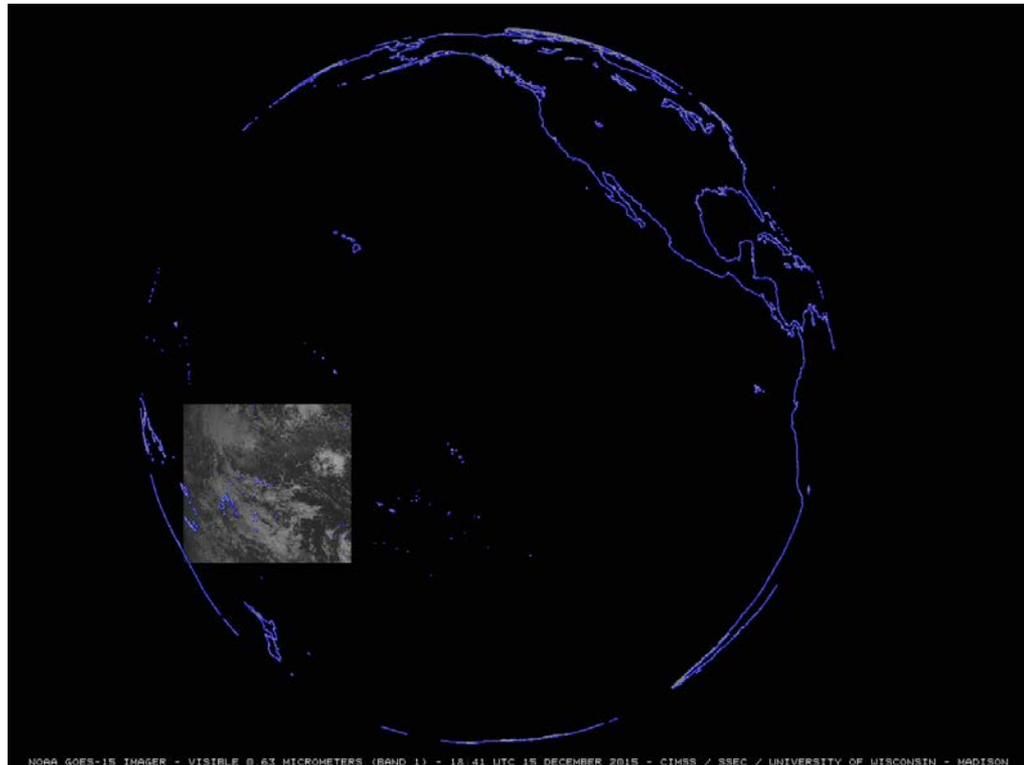
- On December 14, 2015 at 1500 UTC, NESDIS began sending S-NPP Near-Constant Contrast (NCC) imagery to the NWS NCF for further broadcast via the Satellite Broadcast Network (SBN) to support NWS AWIPS.
- NCC products provide improved environmental sensing and user analyses in extreme low light conditions.
- The new imagery is provided to four geographical regions:
 - Alaska Region Sector (WMO Header: **TIPB10 KNES**)
 - Pacific Region Sector (WMO Header: **TIPI10 KNES**)
 - CONUS Sector (WMO Header: **TIPC10 KNES**)
 - Puerto Rico Sector (WMO Header: **TIPQ10 KNES**)



Example of NCC in
AWIPS2/CAVE -
Alaska Region Sector.

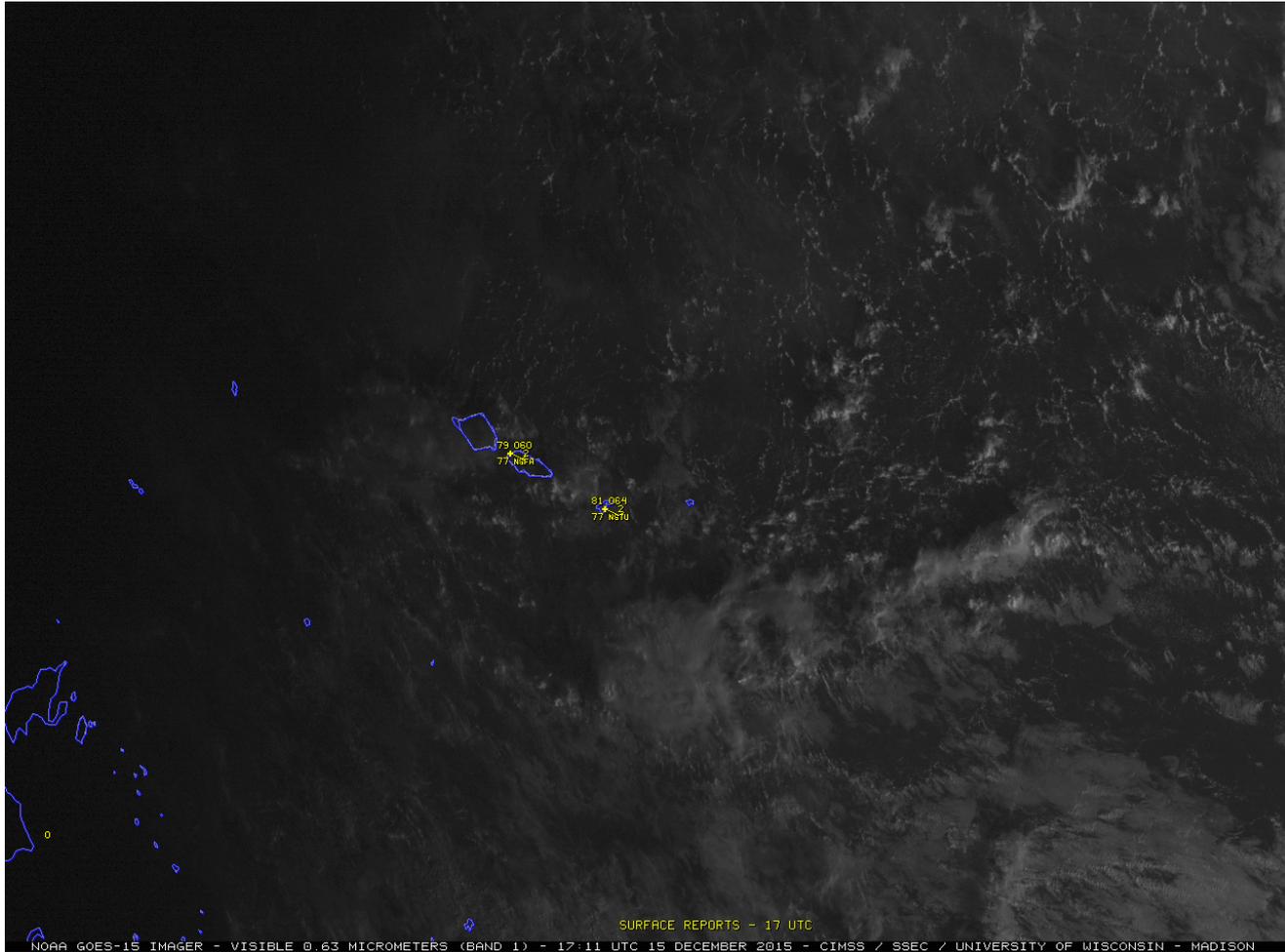
New American Samoa RSO Sector

- Sector added to improve tropical cyclone monitoring and tracking in the Pacific region. Below is the American Samoa RSO sector in relation to the GOES-West Full Disk scan coverage.



<http://cimss.ssec.wisc.edu/goes/blog/archives/category/goes-15>

New American Samoa RSO Sector



<http://cimss.ssec.wisc.edu/goes/blog/archives/category/goes-15>

MTSAT-2 Transition to Himawari-8

- Background
 - The Japan Meteorological Agency (JMA) replaced MTSAT-2 with Himawari-8 at 140E as the primary operational satellite on July 7, 2015.
 - To assist users in the transition to the new satellite, JMA operated MTSAT-2 in parallel with H-8 until December 4, 2015.
 - OSPO provided current MTSAT-2 products to users until December 4, 2015.
 - On November 5, 2015, a general email notification was sent to users identifying the new/replacement McIDAS filenames that will be used for H-8 from December 4.
(<http://www.ssd.noaa.gov/PS/SATS/MESS/MSG3091948.01.txt>)
- OSPO's Mitigation Plan using H-8 Data
 - To mitigate the coverage gap for current users of MTSAT-2 data, OSPO replaced MTSAT-2 imagery with sub-sampled H-8 data in McIDAS format.
 - Sub-sampled H-8 data reflect the MTSAT-2 specifications of the five channels having a spatial resolution of 4 km in the IR, and 1 km in the Visible.
 - OSPO will make H-8 imagery McIDAS Area Files available from its GEODIST system.

GOES-East Imager ASOS SCP for CONUS

- On December 29, 2015, the GOES-East Imager ASOS SCP products for CONUS were operationally implemented as a replacement for the GOES-East Sounder ASOS SCP products.
- This action was in response to the loss of IR sounder data from the GOES-East (GOES-13) Sounder instrument failure on November 20, 2015.
- The GOES-East Imager ASOS SCP products may not be able to produce for all the stations that were produced by the GOES-East Sounder ASOS SCP due to a different coverage of Imager and Sounder for CONUS regions.

New GOES Ingest NOAAPORT Interface GINI-II – Benefits for AWIPS

- Improved Reliability
 - Quicker fault detection (missing scan lines, frame breaks, etc.)
 - More efficient fault diagnosis and resolution
- Improved Processing Efficiency
 - Faster production and distribution
 - Overall timeliness improvement
- Increase in Visible Imagery
 - Production of visible imagery periods now dependent on location of AWIPS sector, not a universal time period for all sectors

POES AVHRR Channel Switching

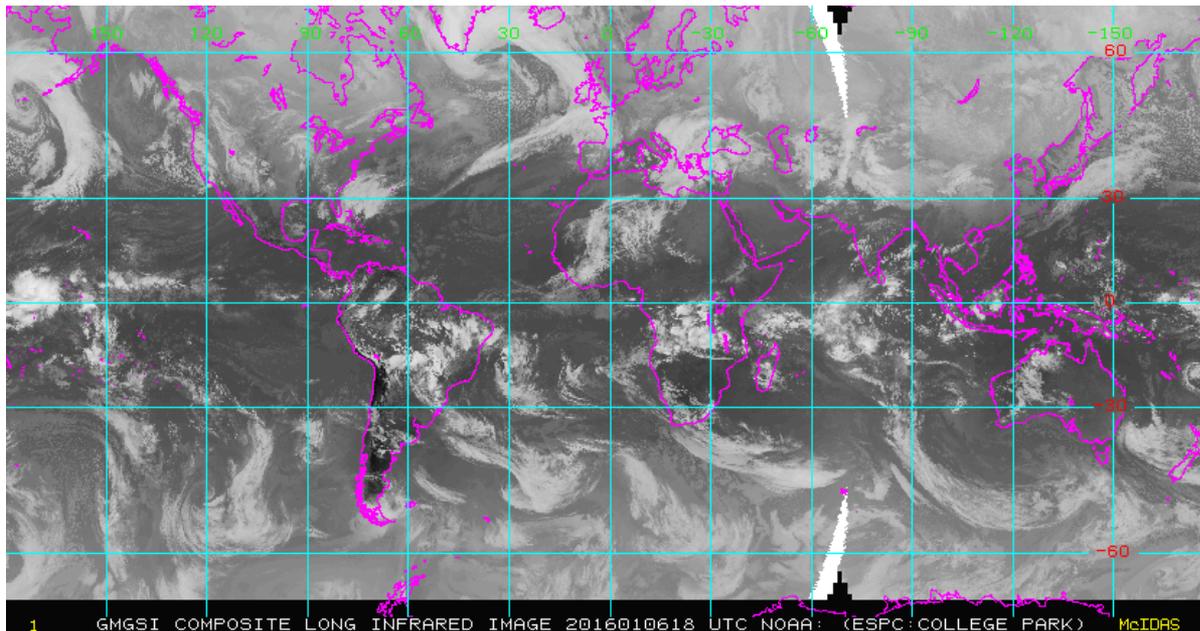
- Background: AVHRR Channel 3A/3B
 - Hydrology Community needs snow/ice data mapping (channel 3A).
 - Hazard Community needs data for fire detection and monitoring (channel 3B).
- Current configuration:
 - POES AVHRR using 3B, NOAA-15, NOAA-18 and NOAA-19
 - Metop AVHRR 3A/3B configuration: both A and B swapping at day/night terminator crossing
- Origin of initial request for switching and justification came from Geographic Information Network of Alaska (GINA).
- NWS has submitted a formal request to NESDIS for the activation of 3A/3B switching of NOAA-15 and NOAA-19 satellites to Channel 3A over the Alaska region for the period excluding June, July, and August.

Satellite Products – Transitioned to Operations

Product Name	Date Approved	Objective	Status
Ocean Heat Content for South Pacific	6/15/2015	Operational Implementation Decision Brief to SPSD Division Chief	Operational
Product Monitoring Phase I Products	8/19/2015	SPSRB Operational Implementation Decision Brief	Operational
VIIRS Vegetation Health Product	8/19/2015	SPSRB Operational Implementation Decision Brief	Operational
Global Mosaic of Geostationary Satellite Imagery (GMGSI)	10/21/2015	SPSRB Operational Implementation Decision Brief	Operational
Megha-Tropiques Data and Products (MTROPS)	10/21/2015	SPSRB Operational Implementation Decision Brief	Operational
NUCAPS OLR and Ozone Products	10/21/2015	SPSRB Operational Implementation Decision Brief	Operational
GCOM-W1 and AMSR-2 Day-1 Products	10/21/2015	SPSRB Operational Implementation Decision Brief	Operational

GMGSI – Operational

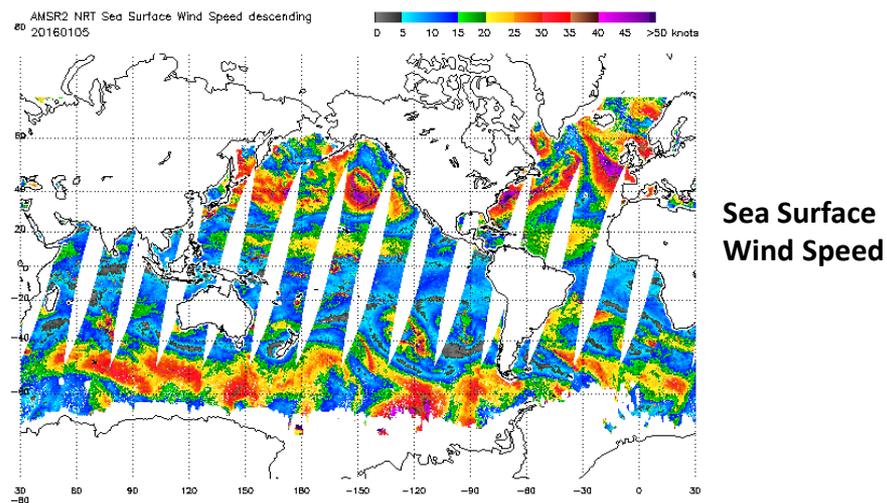
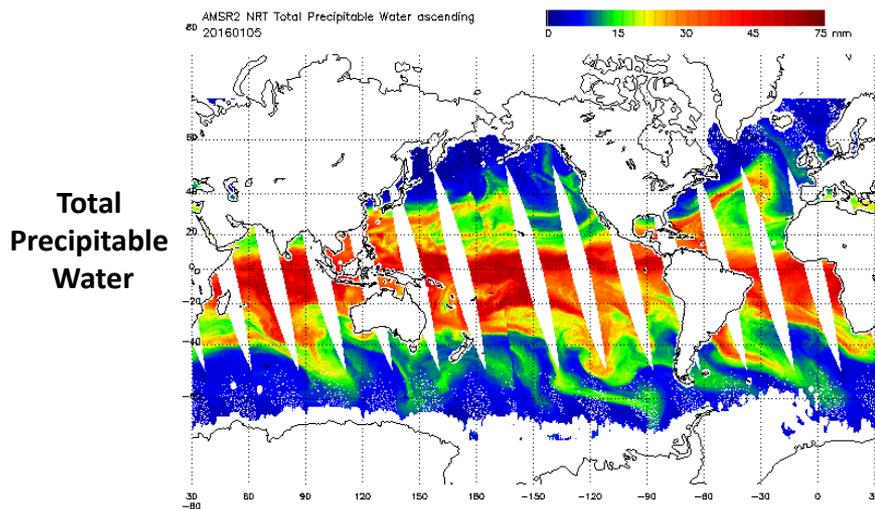
- Global Mosaic of Geostationary Satellite Imagery (GMGSI) was activated by OSPO in November 2015.
 - Generates 8-km global composite dataset (longwave IR, shortwave IR, and visible) with coverage extended to 60°S latitude.
 - Provides global satellite data to help Environmental Modeling Center (EMC) derive new global icing analysis products for the improvement of international flight safety.



<http://www.ospo.noaa.gov/data/imagery/gmgsi/gmgsi-lw.gif>

GCOM-W1 AMSR-2 Day 1 Products – Operational

- The Global Change Observation Mission - GCOM-W1 Advanced Microwave Scanning Radiometer 2 (AMSR2) Day 1 Products were activated by OSPO in November 2015.
 - Implementation includes AMSR-2 Imagery, Total Precipitable Water (TPW), Cloud Liquid Water, Rain Rate, Sea Surface Temperature, and Sea Surface Wind Speed.
 - Improves numerical weather prediction, precipitation and tropical cyclone location, intensity analysis, and monitoring.

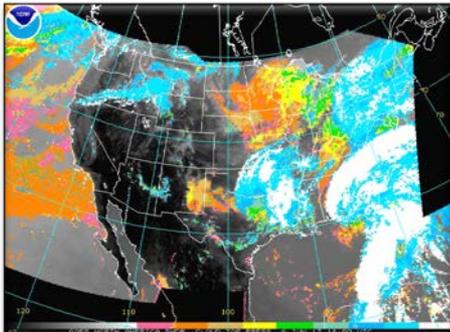


<http://www.ospo.noaa.gov/Products/atmosphere/gpds/>

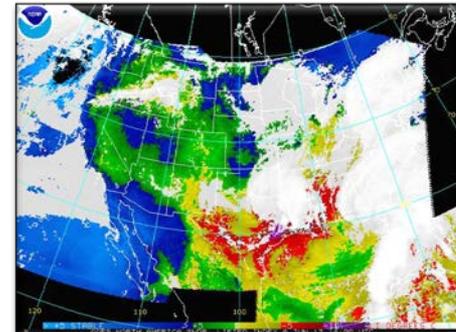
Data Access and Distribution

Data Access & Distribution Policy

- Full policy and forms at <http://www.ospo.noaa.gov/Organization/About/access.html>
- Security requirement to know and document all users accessing operational data servers and what products they are receiving
 - Users request data using a Data Access Request (DAR) form.
- Ever increasing data volume requires prioritization of users to effectively manage distribution resources and ensure effective system performance
- Higher priority access will be given to organizations with:
 - Mission and statutory authority
 - Signed NESDIS cooperative agreements or legislative authorities
 - A demonstrated timeliness requirement for near-real time data to support operational user applications
- If available and sufficient, users will be directed to sources of data external to NESDIS (e.g. CIMSS). Also recommend alternatives for denied users



**Cloud
Top
Pressure**



**Lifted
Index**

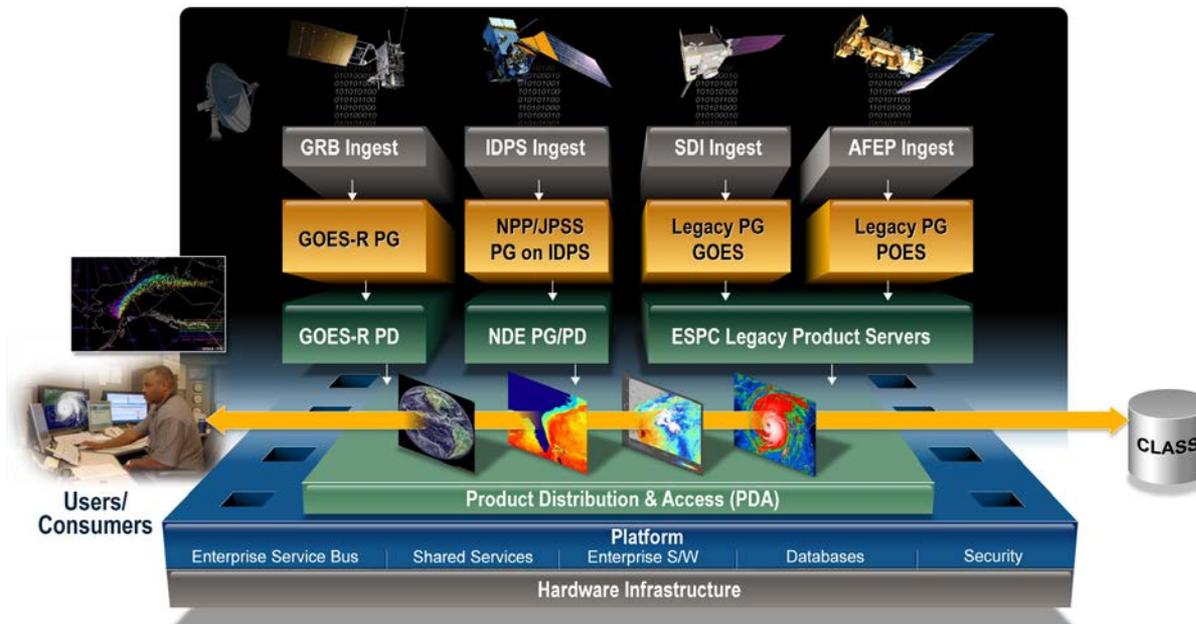
Future Processing and Distribution with PDA

The purpose of the Product Distribution and Access (PDA) is to serve as the NESDIS enterprise distribution system for near real-time users.

- All near real time distribution except for McIDAS will be migrated to PDA – phased approach (new missions and then current missions).
- McIDAS ADDE access will remain on GEODIST systems for the foreseeable future.
- GOES-R products will be provided to the primary PDA system (at NSOF).
- S-NPP/JPSS products will be provided via IDPS and PDA
- All distribution will use FTPS or SFTP protocols

PDA Distribution Service Improvements

- PDA will enable NESDIS to more easily scale framework to meet future distribution demands.
- Provide for enhanced security controls / transfer protocols.
- Allow for far greater management control and system insight over data distribution.
- Grant the ability to deliver the large mission data (such as GOES-R, JPSS, etc) to authorized users
- In deference to NOAA security policies, PDA will set subscriptions for international and non-US government partners, as is done now on the DDS. (PDA User Interface requires a government CAC or PIV card.)



ESPC Notifications, Status, and Contacts

24/7 Help Desk	ESPCOperations@noaa.gov
ESPC Messages	http://www.ssd.noaa.gov/PS/SATS/messages.html
WMO GTS Bulletins	Urgent: http://www.weather.gov/view/validProds.php?prod=ADM&node=KNES Routine: http://www.weather.gov/view/validProds.php?prod=ADA&node=KNES
User Services	SPSD.UserServices@noaa.gov
Data Access	NESDIS.Data.Access@noaa.gov
Webmaster	SSDWebmaster@noaa.gov
Facebook	www.facebook.com/NOAANESDIS
Twitter	www.twitter.com/noaasatellites
Satellite Ops Status	http://www.oso.noaa.gov/daily-news/index.asp
Press releases	http://www.nesdis.noaa.gov/news_archives/
Web	www.ospo.noaa.gov

Thank you!

Questions?