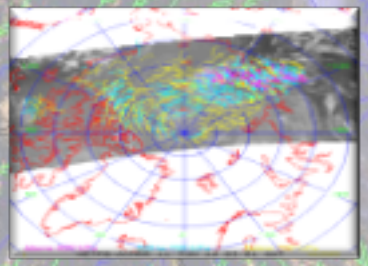
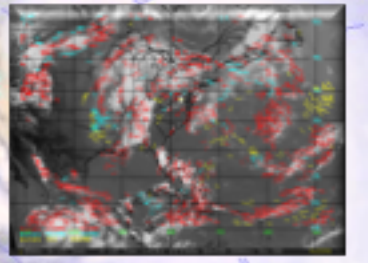
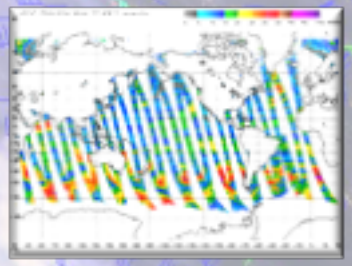
Operational Wind Products at NOAA/NESDIS

Current Status & Updates

Hongming Qi[1], Jaime Daniels[2], Jeff Key[2], Paul Chang[2]
Nicholas Esposito[1], Andrew Bailey[2], Jeffrey Augenbaum[1], Yufeng Zhu[1]
1: NOAA/NESDIS/OSPO/Satellite Products & Services Division (SPSD)
2: NOAA/NESDIS/STAR

13th International Winds Workshop, Monterey, USA
June 27, 2016

TOPIC

- Status of GOES and POES Satellites
- Operational AMV System and Products
  - AMV System Architectures
  - AMV Products, Monitoring, and Distribution
- Operational ASCAT processes and products
- Update on Satellites, Products, and Systems

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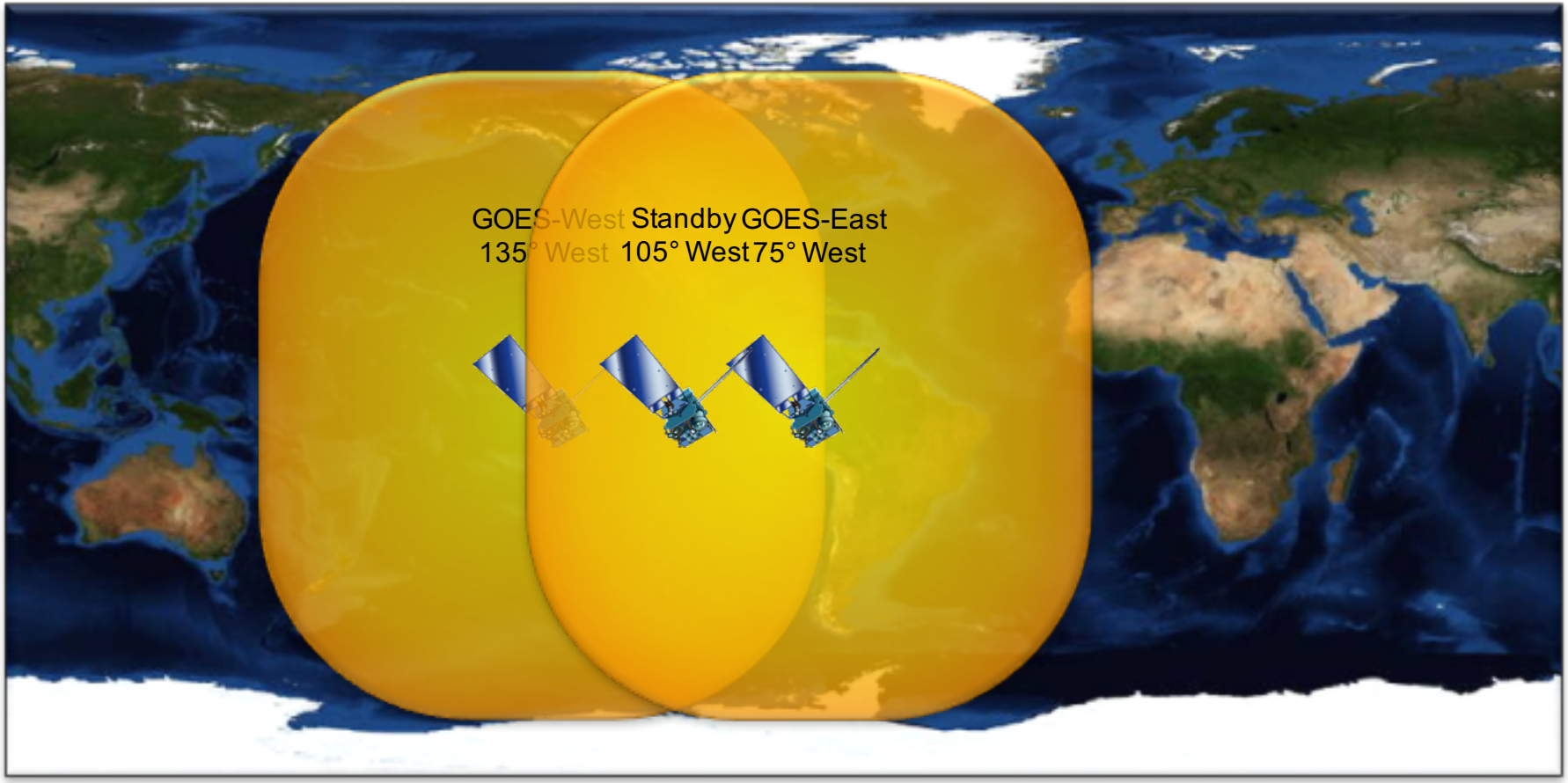
Nominal GOES Constellation

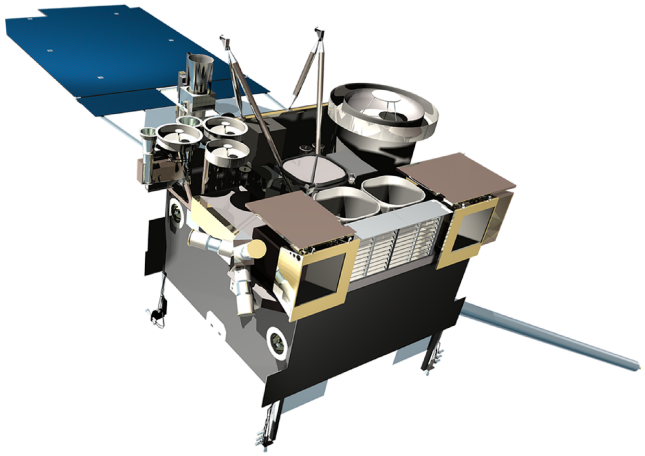


- Continuity of Operations since 1974
- GOES 13/14/15 improvements over GOES 10/11/12
  - Spring and fall eclipse outages are avoided by larger onboard batteries
  - Improved navigation and radiometrics

GOES-13 (East)

Launch: May 2006 | Operational: April 2010

No Issue on Imager Instrument

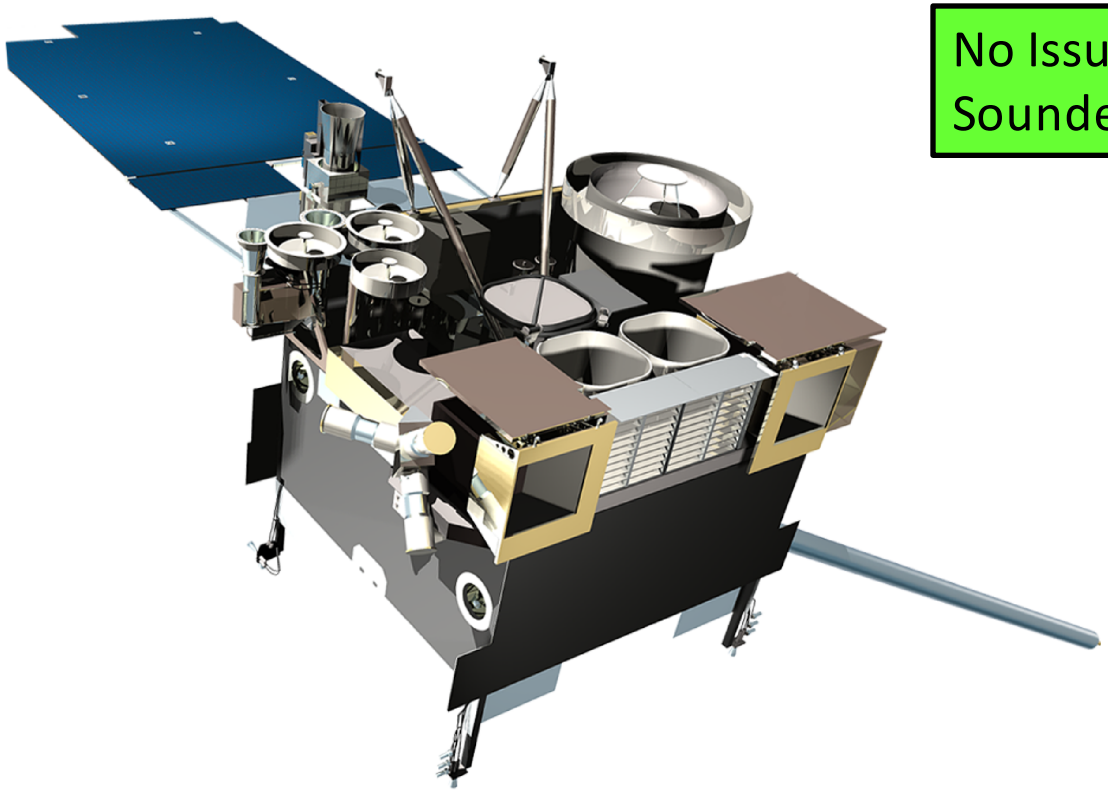


Issue:
Sounder filter wheel anomaly.
Sounder frame sync losses.

Impact:
Sounder IR data are not usable.

GOES-14 (Standby)

Launch: June 2009 | Operational: N/A

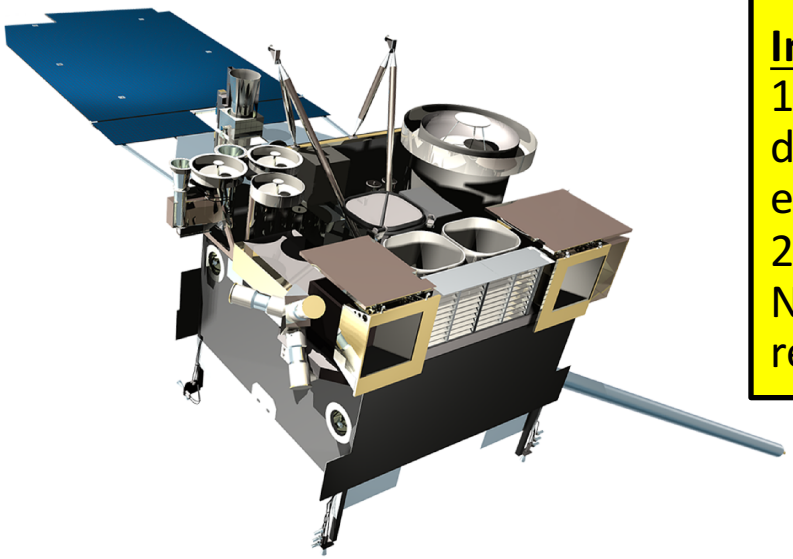


No Issue on Imager and Sounder Instrument

GOES-15 (West)

Launch: March 2010 | Operational: Dec 2011

No Issue on Imager Instrument

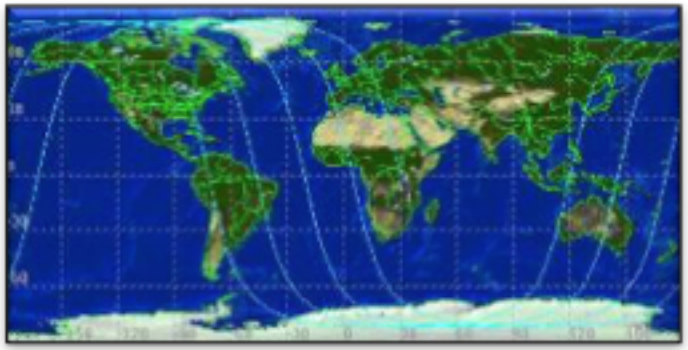


Issue:
Sounder temperature control blanket is raised. To maintain patch temperature control, a yaw flip at Equinox to keep Sun angle below cooler plane.

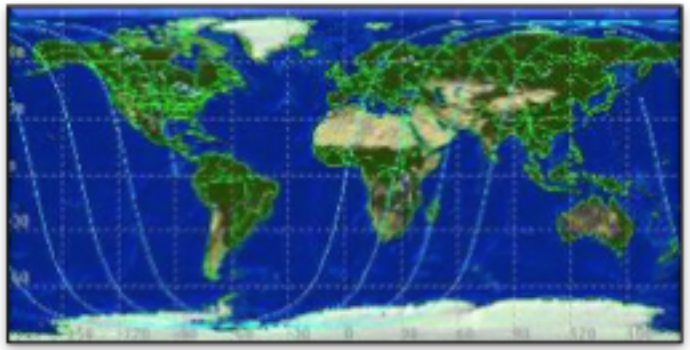
Impact:
1 hour data outage and degraded products during each yaw flip maneuver and 28 hours of INR (Image Navigation & Registration) recovery period.

POES Constellation

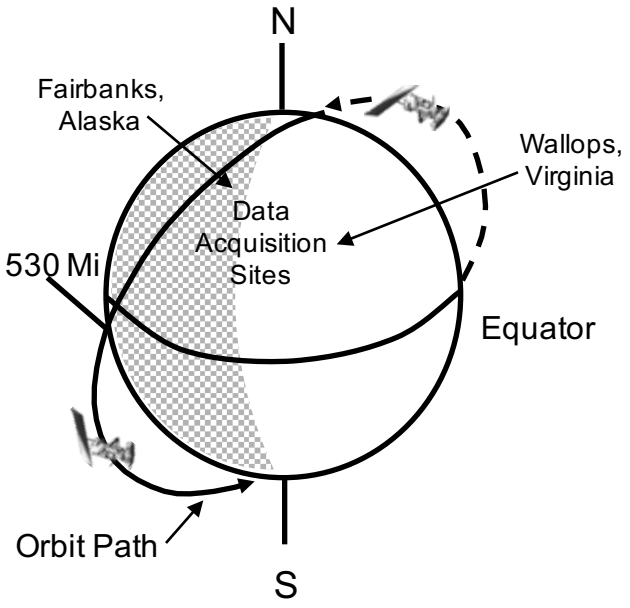
AM Orbit (Metop-B)



PM Orbit (S-NPP)



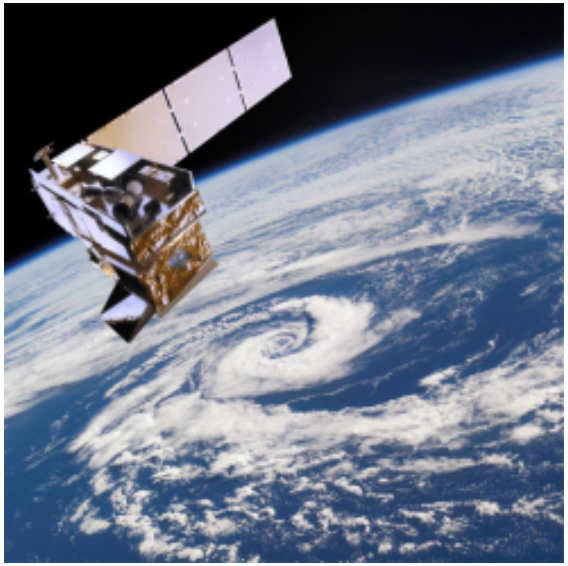
- Two polar operational satellites; one in morning and one in afternoon orbit. Each orbit is 102 minutes
- Since May 2007, NOAA using EUMETSAT satellite operationally for mid-morning orbit through NOAA/EUMETSAT partnership
- Each satellite provides world-wide coverage every 12 hours (6-hour global sampling for the pair)
- Directly broadcasts data to global users



- Continuity of operations since early 1960s

S-NPP Status as of June 2016

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



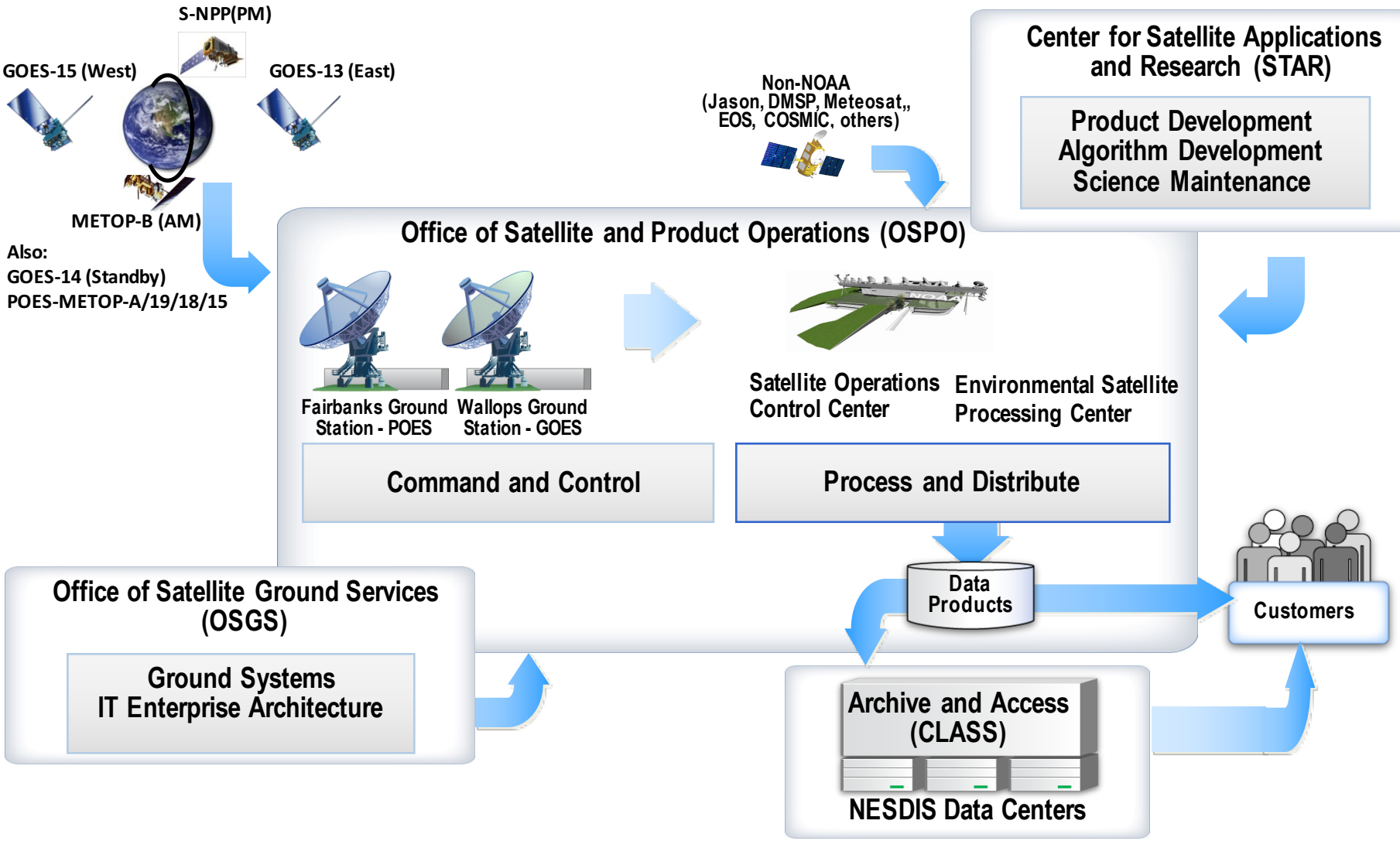
Payload Instruments	Status
ATMS	G
CERES	G
CrIS	G
OMPS – Nadir	G
OMPS – Limb	G
VIIRS	G

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

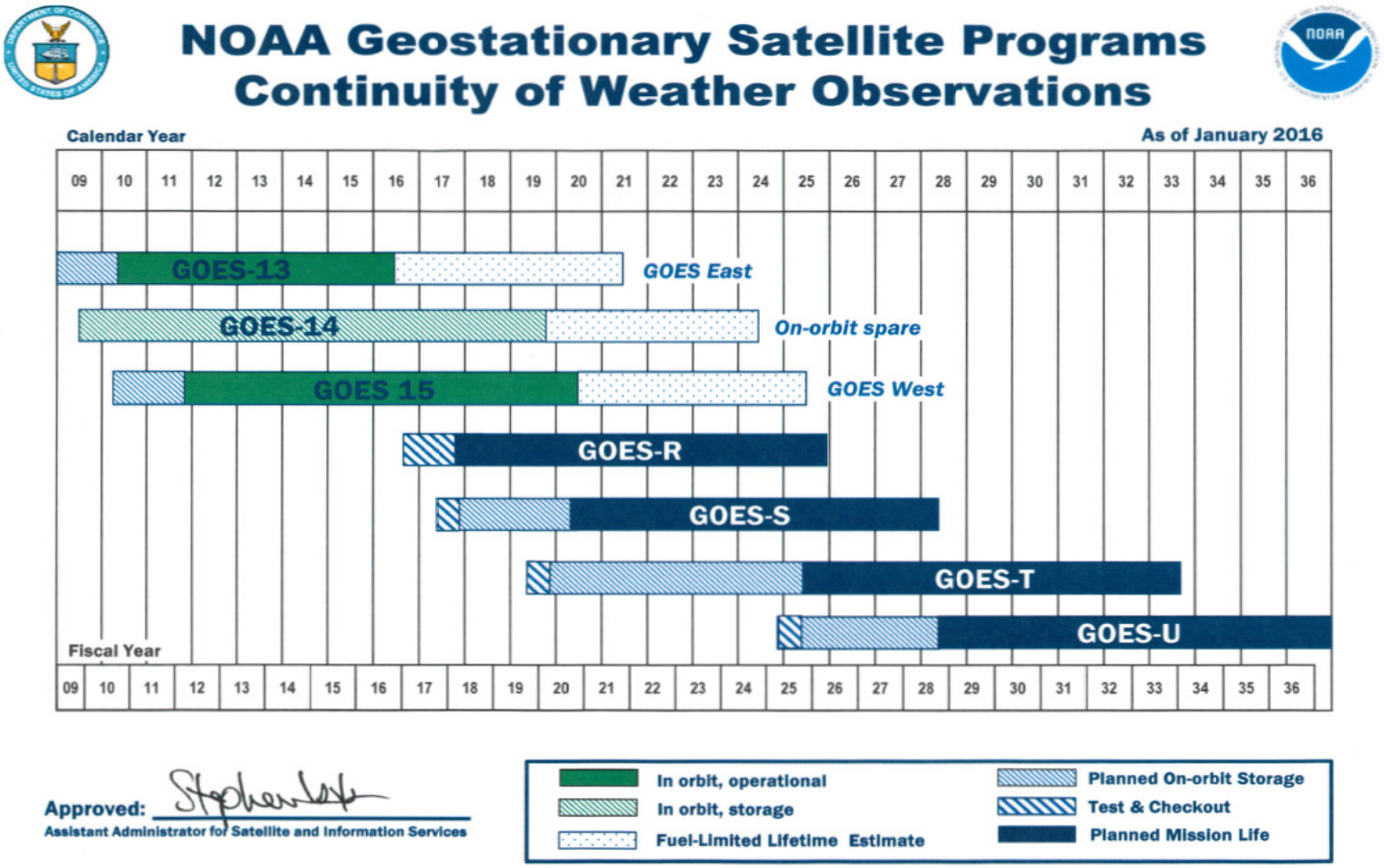
Spacecraft Subsystem	Status
TLM, Command & Control	G
ADCS	G
EPS	G
Thermal Control	G
Communications	G
CDP	G
SCC	G
GPS	G
1553	G
1394	G

- Functional but turned off
- No status reported

Satellite Information Flow

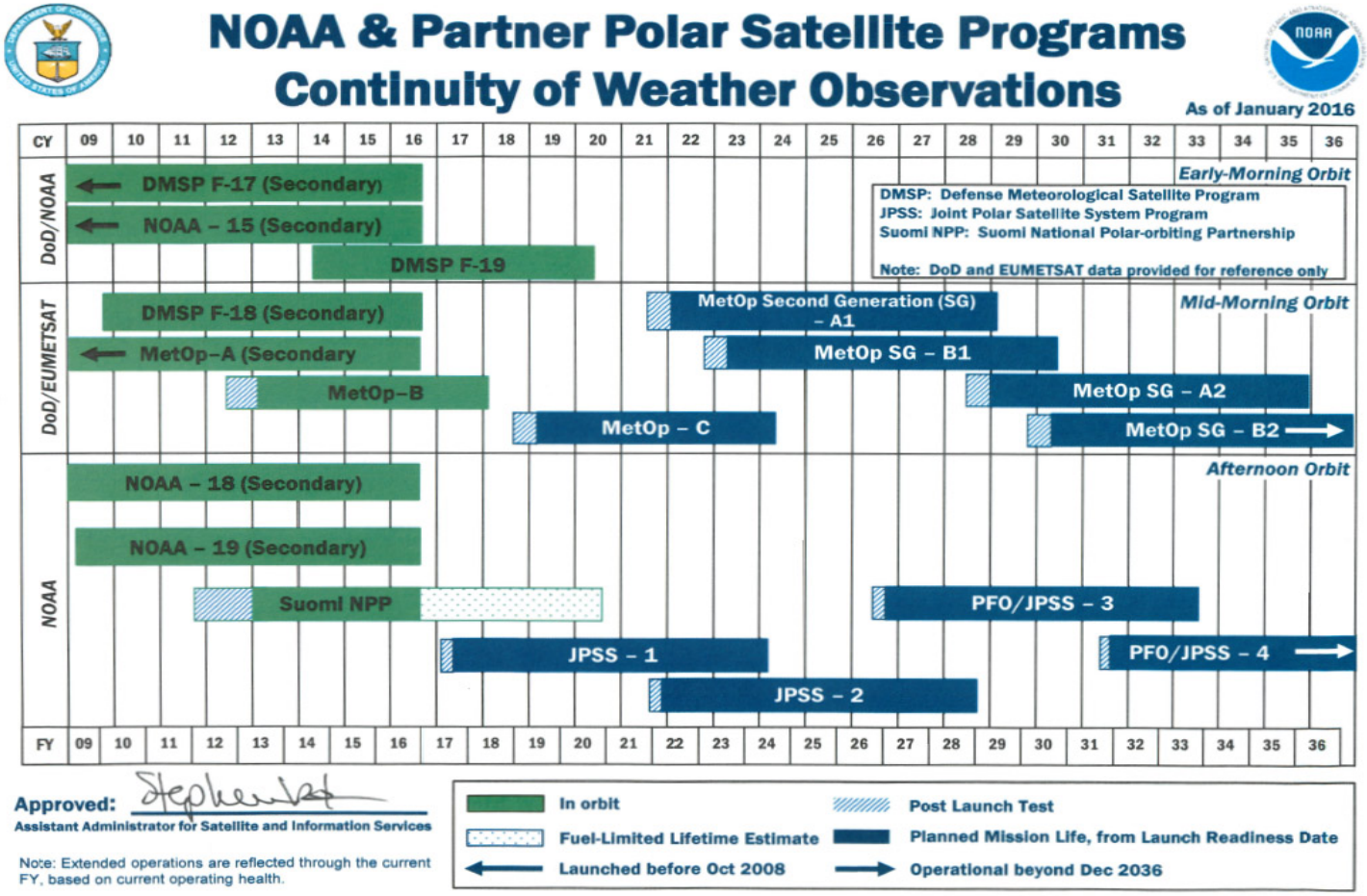


GOES Flyout Schedule



http://www.nesdis.noaa.gov/flyout_schedules.html

LEO Flyout Schedule



http://www.nesdis.noaa.gov/flyout_schedules.html

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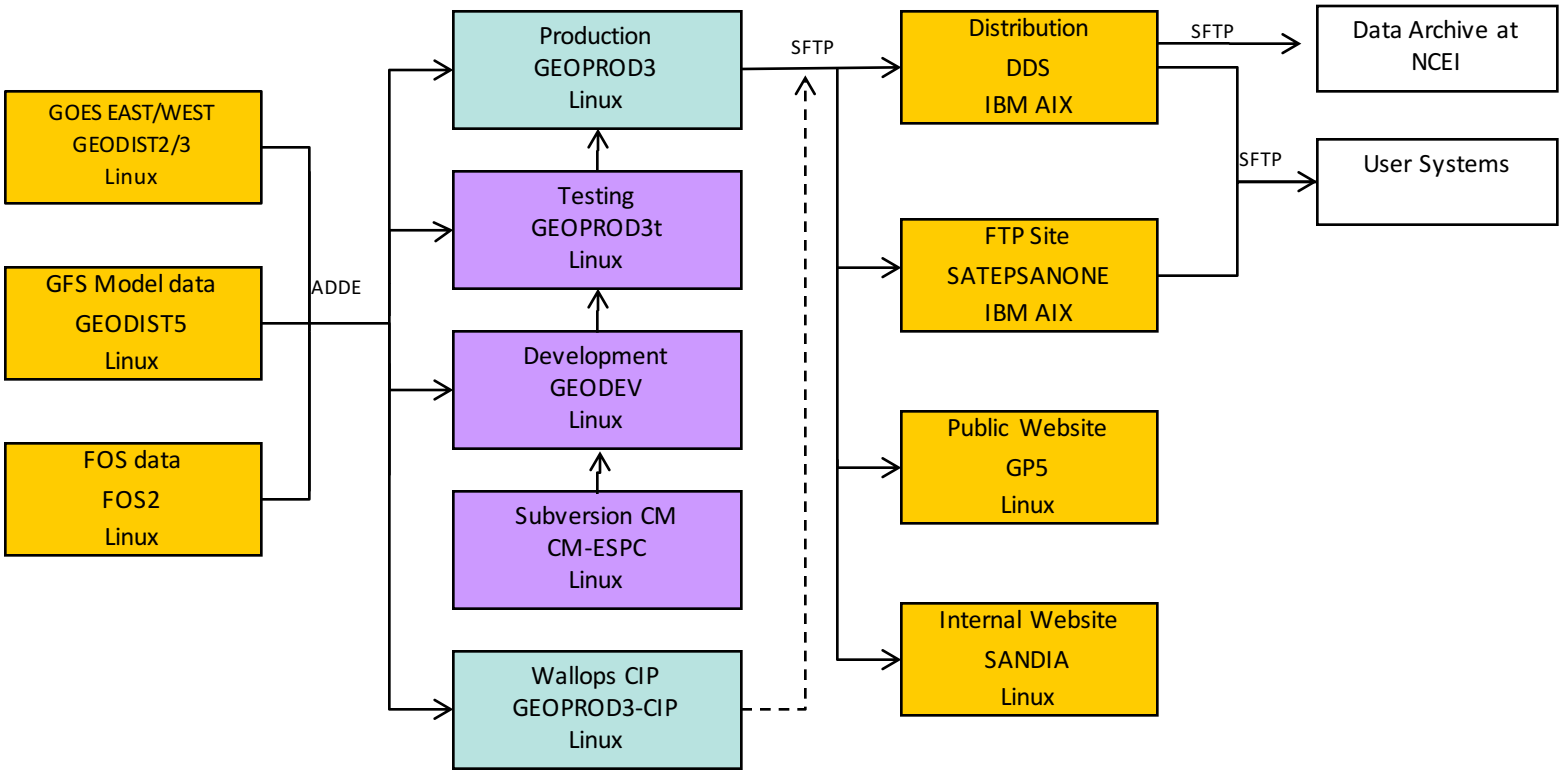
Operational AMV Systems

- GOES and POES AMV System
  - Generate GOES, MODIS, and AVHRR AMV products
  - Run on Linux VM server
- OSPO NDE system
  - An Enterprise System for S-NPP
  - Generate S-NPP VIIRS Polar Winds

GOES/POES Winds System and Data Flow



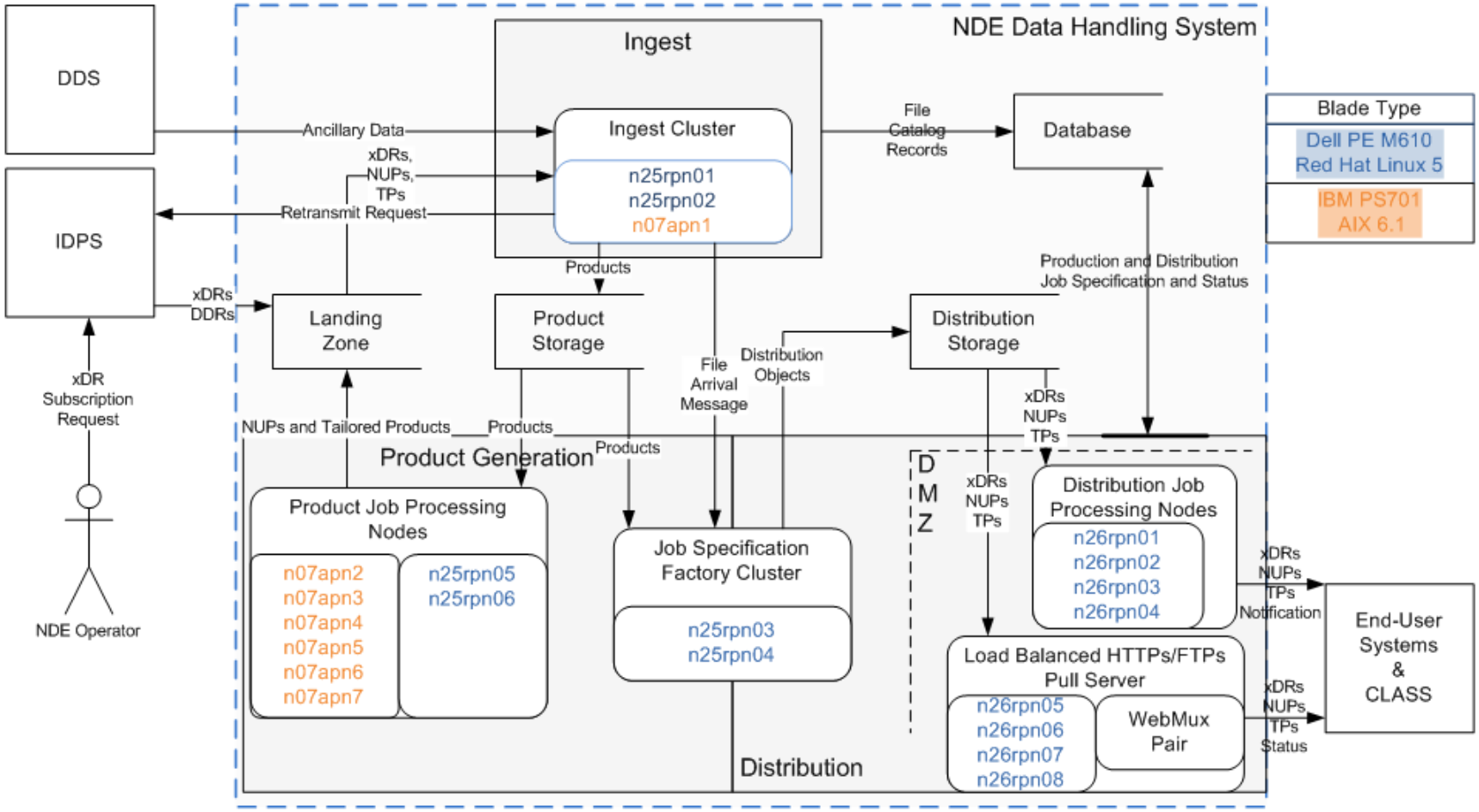
SATEPS Security at ESPC/NSOF

Production Zone
Development Zone
Distribution Zone (DMZ)
External User Zone

OSPO NDE System

- S-NPP Data Exploitation (NDE) is an enterprise system to generate and distribute S-NPP products
- NDE Data Handling System (DHS) consists of Ingest, Product Generation, Product Distribution and Monitoring subsystems
- Numerous Linux servers and SAN
- VIIRS Polar Winds is one product from NDE

OSPO NDE System Diagram



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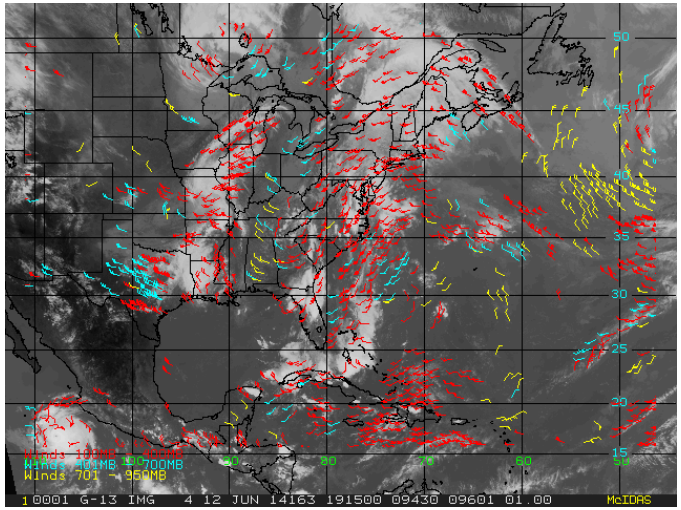
Update on Operational AMV Products

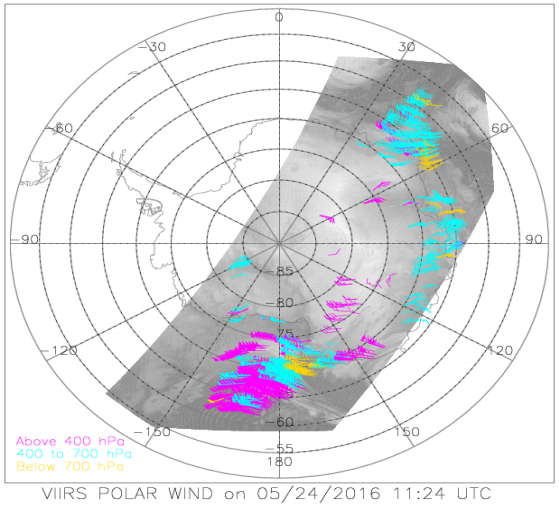
- Discontinued AMV products in recent years
  - GOES-E Sounder Water Vapor Channel Winds in November 2015

    (Failed Sounder Instrument on GOES-13)
  - MTSAT-2 Winds in December 2015 (Decommissioned MTSAT-2 Satellite)

Update on Operational AMV Products

- AMV products in operation
  - GOES, MODIS, AVHRR, and S-NPP VIIRS Winds





VIIRS POLAR WIND on 05/24/2016 11:24 UTC

Operational AMV Products (1/4)

AMV Products	Frequency (hours)	Image Sectors	Image Interval (min)	WMO Header
GOES				
LWIR (10.68um) Cloud-drift	1	CONUS/PACUS	15	JACX11 (GOES-E) JCCX11 (GOES-W)
	1	NHEM/SHEM	30	
SWIR (3.9um) Cloud-drift	1(Nighttime)	CONUS/PACUS	15	JQCX11 (GOES-E) JRCX11 (GOES-W)
	1 (Nighttime)	NHEM/SHEM	30	
Water Vapor (6.55um)	1	NHEM/SHEM	30	JECX11 (GOES-E) JGCX11 (GOES-W)
Visible (0.625um) Cloud-drift	1 (Daytime)	CONUS/PACUS	15	JHCX11 (GOES-E) JJCX11 (GOES-W)
	1 (Daytime)	NHEM/SHEM	30	

Operational AMV Products (2/4)

AMV Products	Frequency (hours)	Image Sectors	Image Interval (min)	WMO Header
GOES SOUNDER				
Sounder WV (7.4um)	1	Tropical	60	JMCX11 (GOES-W)
Sounder WV (7.0um)	1	Tropical	60	JPCX11 (GOES-W)
AQUA/TERRA MODIS				
LWIR (11um) Cloud-drift	2	NHEM/SHEM (poleward 65°)	100	JBCX11 (TERRA) JICX11 (AQUA)
Water Vapor (6.7um)	2	NHEM/SHEM (poleward 65°)	100	JLCX11 (AQUA)

Operational AMV Products (4/4)

AMV Products	Frequency (hours)	Image Sectors	Image Interval (min)	WMO Header
AVHRR				
LWIR Cloud-drift	2	NHEM/SHEM (poleward 65°)	100	JCVX98 (Metop-B) JCVX95(N19) JCVX97(Metop-A) JCVX94(N18) JCVX91(N15)
VIIRS				
LWIR (10.76um) Cloud-drift	2	NHEM/SHEM (poleward 65°)	100	INVX01 INVX02 INVX03

Operational GOES AMV Monitoring

Monitor of GOES-E HD Winds Operations

Friday, 06/24/2016 16:09:49 UTC		Prev Day <<						Saturday, 06/18/2016					>> Next Day										
		00Z	01Z	02Z	03Z	04Z	05Z	06Z	07Z	08Z	09Z	10Z	11Z	12Z	13Z	14Z	15Z	16Z	17Z	18Z	19Z	20Z	21Z	22Z	23Z
Northern Hemisphere (NH)	CD	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr
	SW	N/A	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	VZ	Wnd Bufr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr
	WV	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr
Southern Hemisphere (SH)	CD	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	N/A	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr
	SW	N/A	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	VZ	Wnd Bufr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Wnd Bufr	Wnd Bufr	Wnd Bufr	N/A	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr
	WV	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	N/A	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr
CONUS	CD	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	N/A	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr
	SW	N/A	N/A	Wnd	Wnd	Wnd	Wnd	Wnd	Wnd	Wnd	Wnd	Wnd	Wnd	Wnd	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	VZ	Wnd Bufr	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Wnd Bufr	Wnd Bufr	Wnd Bufr	N/A	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr	Wnd Bufr

Operational POES AMV Monitoring

Friday, 06/24/2016 16:11:48 UTC

METOP-A High Density Winds

N.	06/24/16 12:22 Wind BUFR	06/24/16 10:40 Wind BUFR	06/24/16 08:59 Wind BUFR	06/24/16 07:18 Wind BUFR
	06/24/16 05:36 Wind BUFR	06/24/16 03:55 Wind BUFR	06/24/16 02:14 Wind BUFR	06/24/16 00:32 Wind BUFR
H.	06/23/16 22:51 Wind BUFR	06/23/16 21:09 Wind BUFR	06/23/16 19:28 Wind BUFR	06/23/16 17:47 Wind BUFR
	06/23/16 16:05 Wind BUFR	06/23/16 14:24 Wind BUFR	06/23/16 12:43 Wind BUFR	
S.	06/24/16 11:31 Wind BUFR	06/24/16 09:50 Wind BUFR	06/24/16 08:08 Wind BUFR	06/24/16 06:27 Wind BUFR
	06/24/16 04:46 Wind BUFR	06/24/16 03:04 Wind BUFR	06/24/16 01:23 Wind BUFR	06/23/16 23:41 Wind BUFR
H.	06/23/16 22:00 Wind BUFR	06/23/16 20:19 Wind BUFR	06/23/16 18:37 Wind BUFR	06/23/16 16:56 Wind BUFR
	06/23/16 15:15 Wind BUFR	06/23/16 13:33 Wind BUFR	06/23/16 11:52 Wind BUFR	

METOP-B High Density Winds

N.	06/24/16 13:15 Wind BUFR	06/24/16 11:33 Wind BUFR	06/24/16 09:52 Wind BUFR	06/24/16 08:10 Wind BUFR
	06/24/16 06:29 Wind BUFR	06/24/16 04:48 Wind BUFR	06/24/16 03:06 Wind BUFR	06/24/16 01:25 Wind BUFR
H.	06/23/16 23:44 Wind BUFR	06/23/16 22:02 Wind BUFR	06/23/16 20:21 Wind BUFR	06/23/16 18:40 Wind BUFR
	06/23/16 16:58 Wind BUFR	06/23/16 15:17 Wind BUFR	06/23/16 13:35 Wind BUFR	
S.	06/24/16 12:24 Wind BUFR	06/24/16 10:42 Wind BUFR	06/24/16 09:01 Wind BUFR	06/24/16 07:20 Wind BUFR
	06/24/16 05:38 Wind BUFR	06/24/16 03:57 Wind BUFR	06/24/16 02:16 Wind BUFR	06/24/16 00:34 Wind BUFR
H.	06/23/16 22:53 Wind BUFR	06/23/16 21:12 Wind BUFR	06/23/16 19:30 Wind BUFR	06/23/16 17:49 Wind BUFR
	06/23/16 16:08 Wind BUFR	06/23/16 14:26 Wind BUFR	06/23/16 12:45 Wind BUFR	

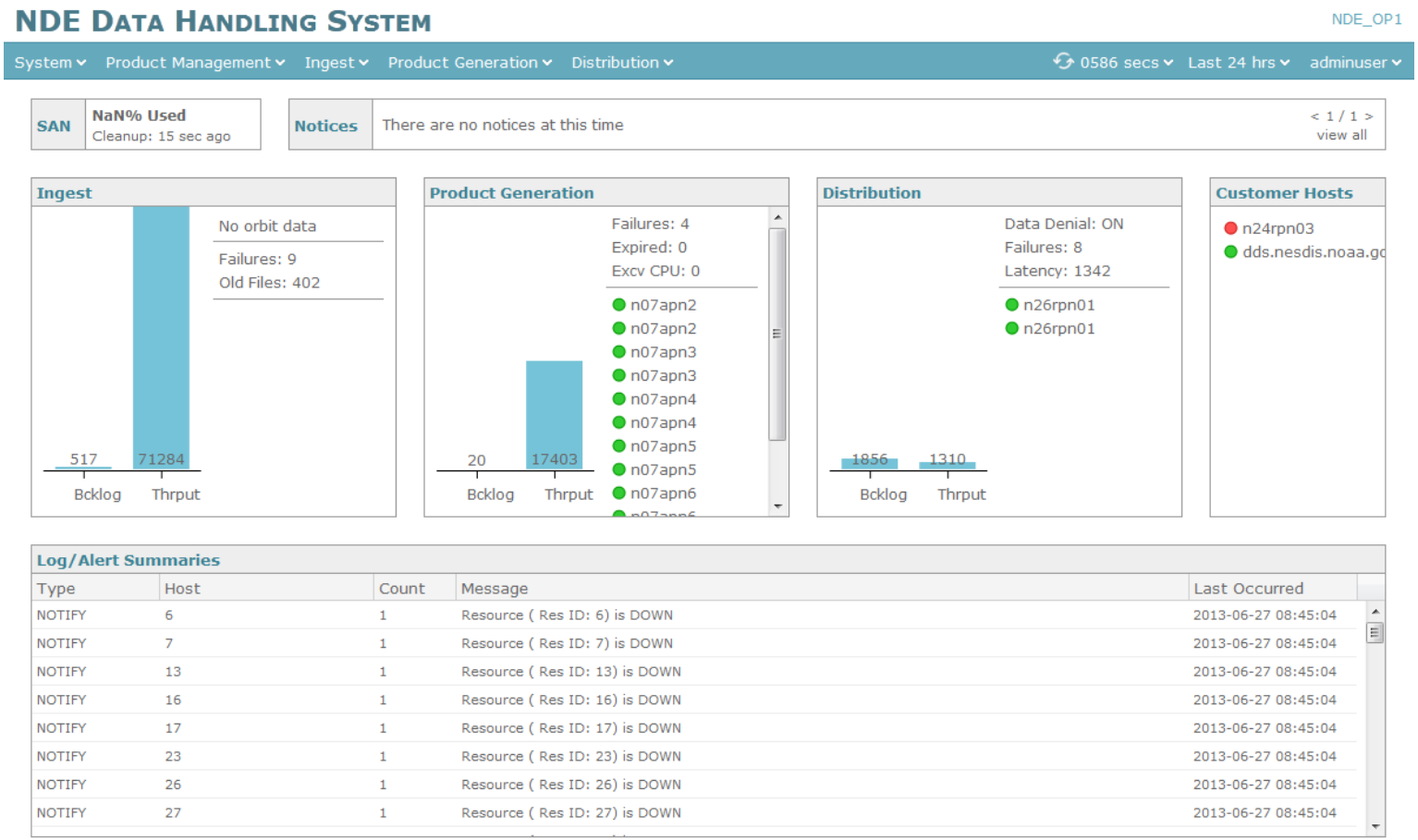
NOAA-18 High Density Winds

N.	06/24/16 10:45 Wind BUFR	06/24/16 09:03 Wind BUFR	06/24/16 07:21 Wind BUFR	06/24/16 05:39 Wind BUFR
	06/24/16 03:57 Wind BUFR	06/24/16 02:15 Wind BUFR	06/24/16 00:33 Wind BUFR	06/23/16 22:51 Wind BUFR
H.	06/23/16 21:09 Wind BUFR	06/23/16 19:27 Wind BUFR	06/23/16 17:45 Wind BUFR	06/23/16 16:03 Wind BUFR
	06/23/16 16:03 Wind BUFR	06/23/16 14:21 Wind BUFR	06/23/16 14:21 Wind BUFR	06/23/16 12:39 Wind BUFR
	06/24/16 09:54 Wind BUFR	06/24/16 08:12 Wind BUFR	06/24/16 06:30 Wind BUFR	06/24/16 04:48 Wind BUFR

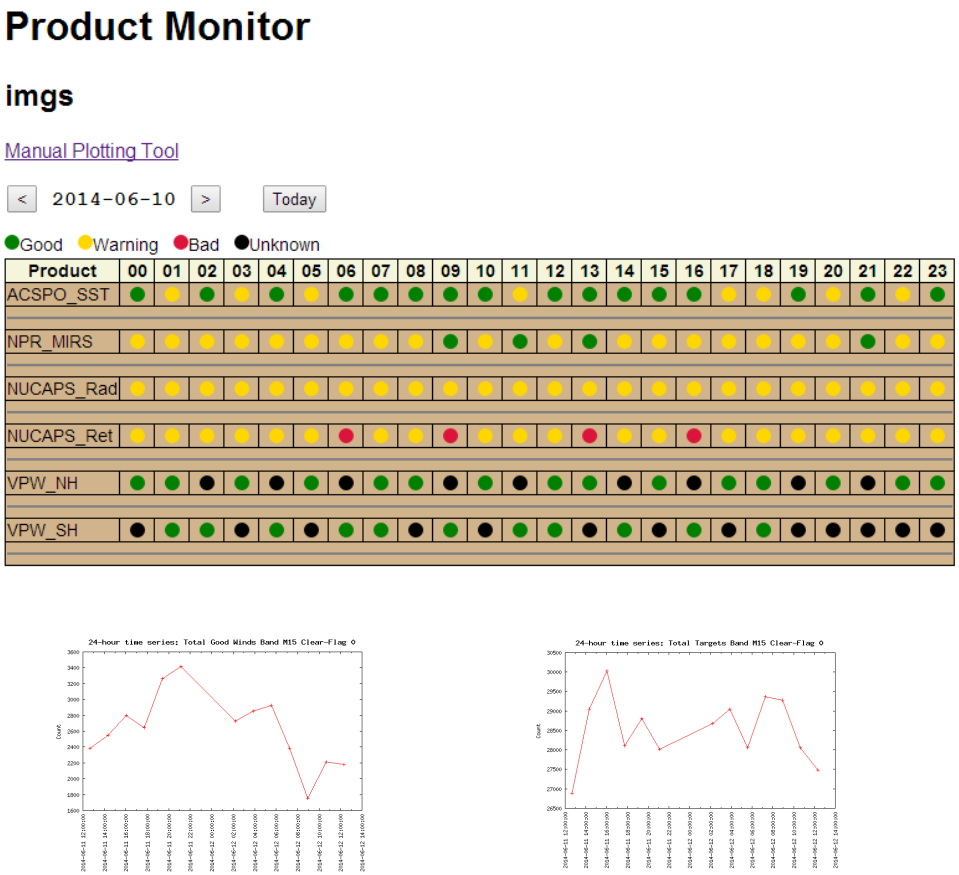
NOAA-19 High Density Winds

N.	06/24/16 13:05 Wind BUFR	06/24/16 11:23 Wind BUFR	06/24/16 09:41 Wind BUFR	06/24/16 07:59 Wind BUFR
	06/24/16 06:17 Wind BUFR	06/24/16 04:35 Wind BUFR	06/24/16 02:52 Wind BUFR	06/24/16 01:10 Wind BUFR
H.	06/24/16 01:10 Wind BUFR	06/23/16 23:28 Wind BUFR	06/23/16 21:46 Wind BUFR	06/23/16 20:04 Wind BUFR
	06/23/16 18:22 Wind BUFR	06/23/16 16:40 Wind BUFR	06/23/16 14:58 Wind BUFR	06/23/16 13:16 Wind BUFR
	06/24/16 12:14 Wind BUFR	06/24/16 10:32 Wind BUFR	06/24/16 08:50 Wind BUFR	06/24/16 07:07 Wind BUFR

OSPO NDE Process Monitoring

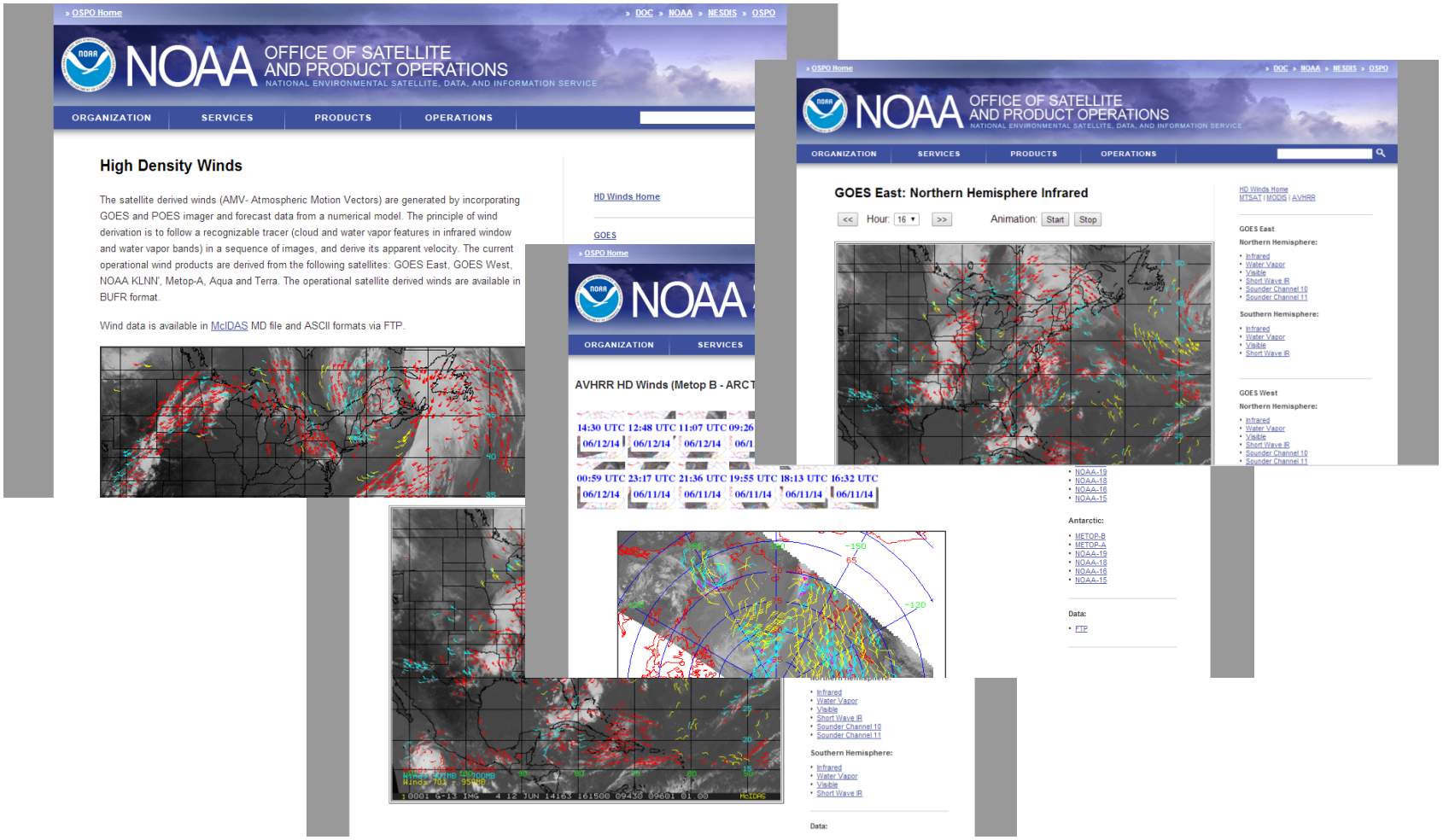


VPW Quality Monitoring



- New quality monitoring tool which has one database as the backend
- More information of the process and products on metadata and database
- Benefit the monitoring of AMV product quality in the longer term
- Automatic email warning notification

OSPO AMV Products Web Pages

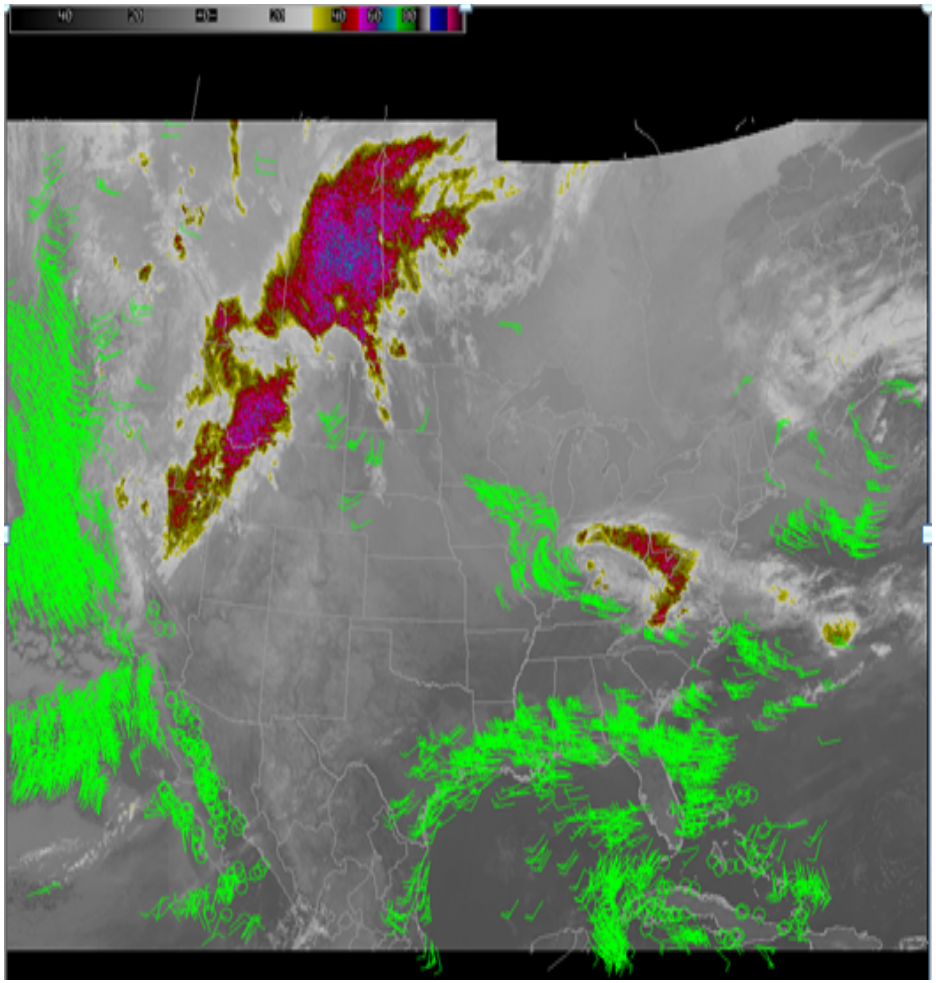


http://www.ospo.noaa.gov/Products/atmosphere/hdwinds/index.html

Operational AMV Products Distribution

- GOES, POES and MODIS AMV products are distributed via DDS server for NOAA users and via GTS for international users
- S-NPP VIIRS Polar Winds is being distributed via OSPO NDE distribution subsystem (FTPS transfer protocol is needed) and GTS with EUMETSAT help

Day to Day Uses of AMV at AWIPS

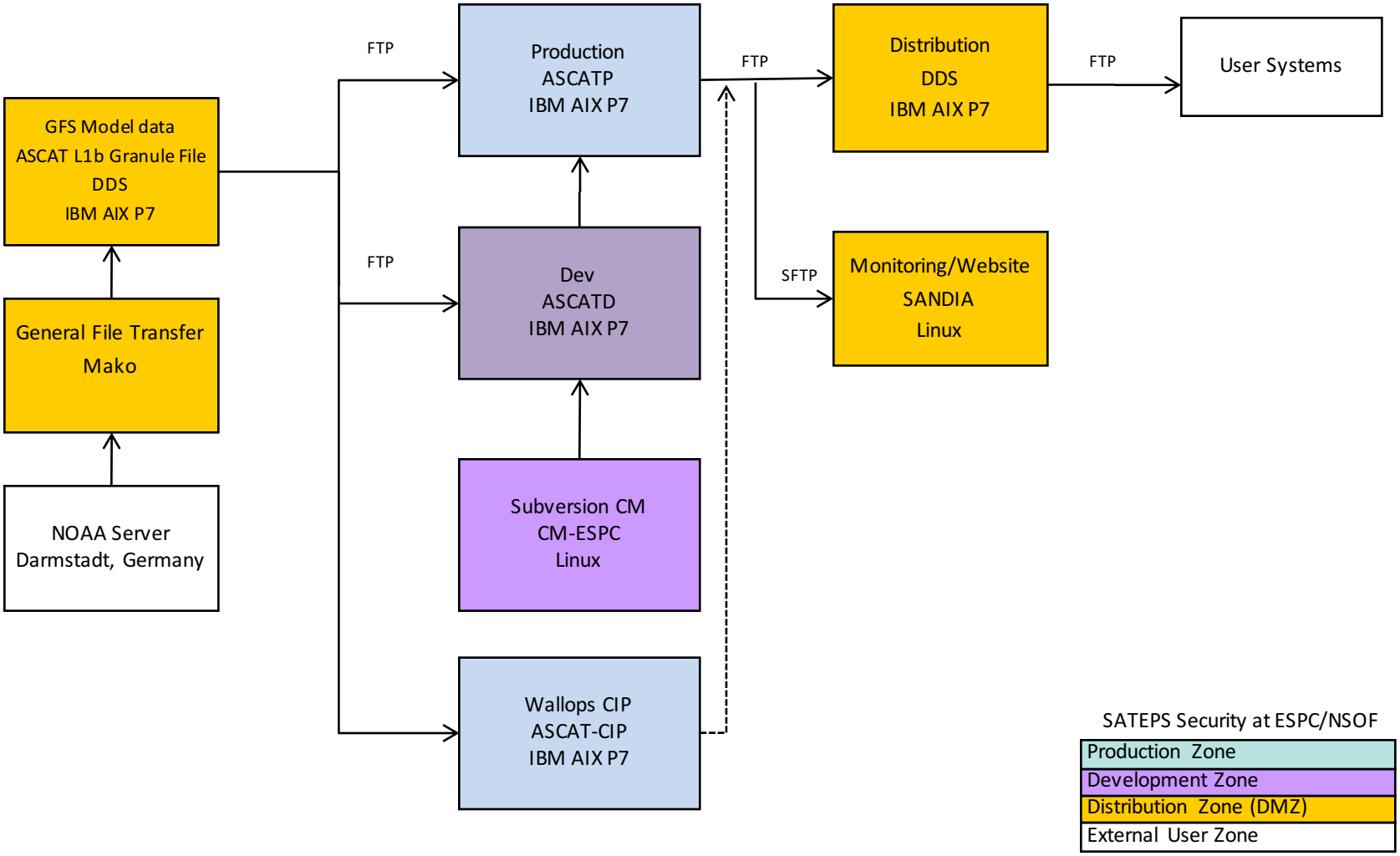


- NWS AWIPS gives the field forecasters access to a multitude of digital data to help them in daily forecast preparation
- AWIPS display software allows for easy integration of AMVs with a multitude of other data sources like model analyses/forecasts, observations from other observation systems)

TOPIC

- Status of NESDIS' GOES and POES Satellites
- Operational AMV System and Products
  - AMV System Architectures
  - AMV Products, Monitoring, and Distribution
- Operational ASCAT processes and products
- Update on Satellites, Products, and Systems

ASCAT Ocean Surface Wind System and Data Flow



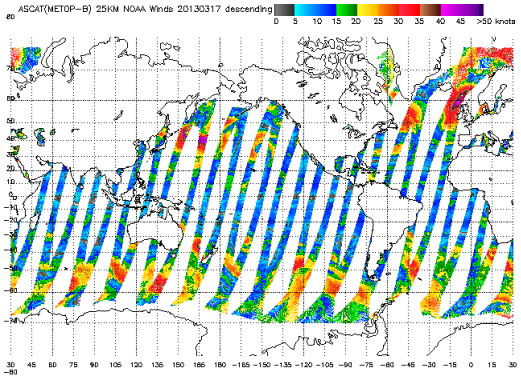
Operational ASCAT Winds (1/2)

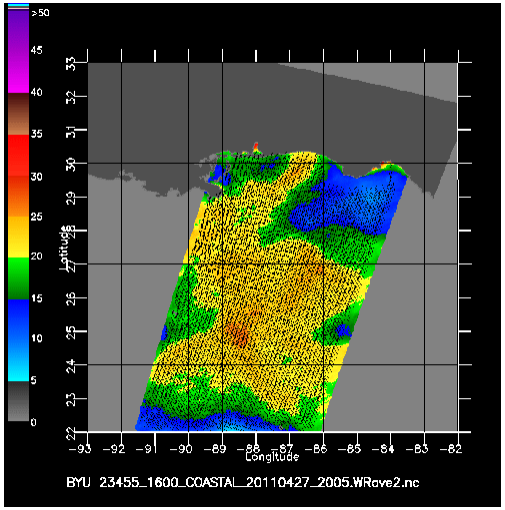
- Metop-B and Metop-A ASCAT
  - 50 km and 25 km OSVW products
    - 50 km
      - 3-min granule files in BUFR and binary
      - 3-min ASCAT-lite files for NAWIPS (binary)
    - 25 km
      - 3-min granule files in BUFR and binary
      - 3-min ASCAT-lite files for NAWIPS (binary)
      - 3-min ASCAT-lite files for AWIPS (BUFR)

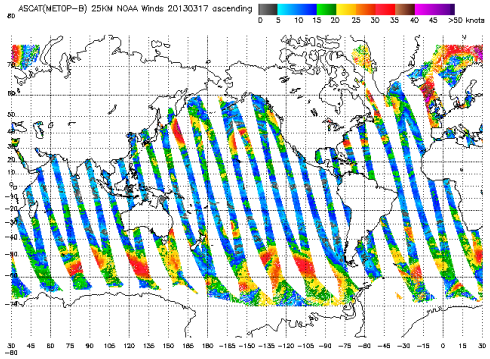
Operational ASCAT Winds (2/2)

– Enhanced resolution wind products

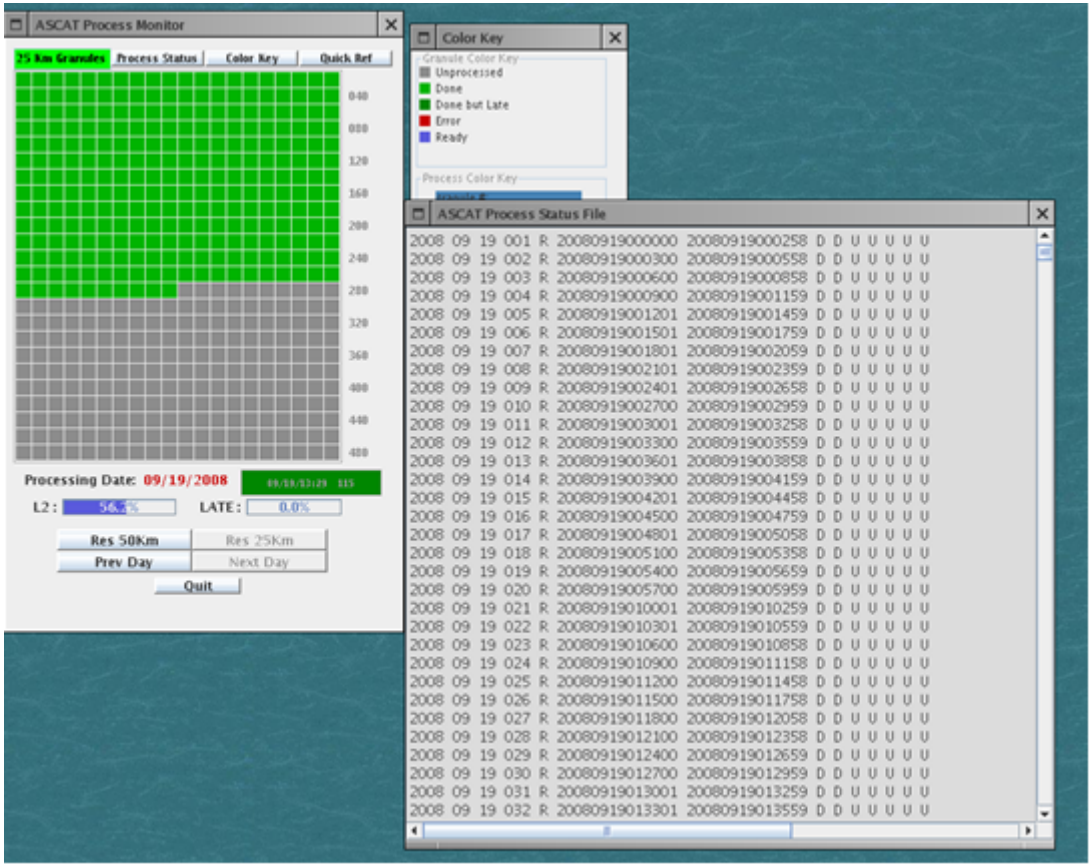
- Tropical cyclone storm sector wind speed imagery







ASCAT Winds Monitoring



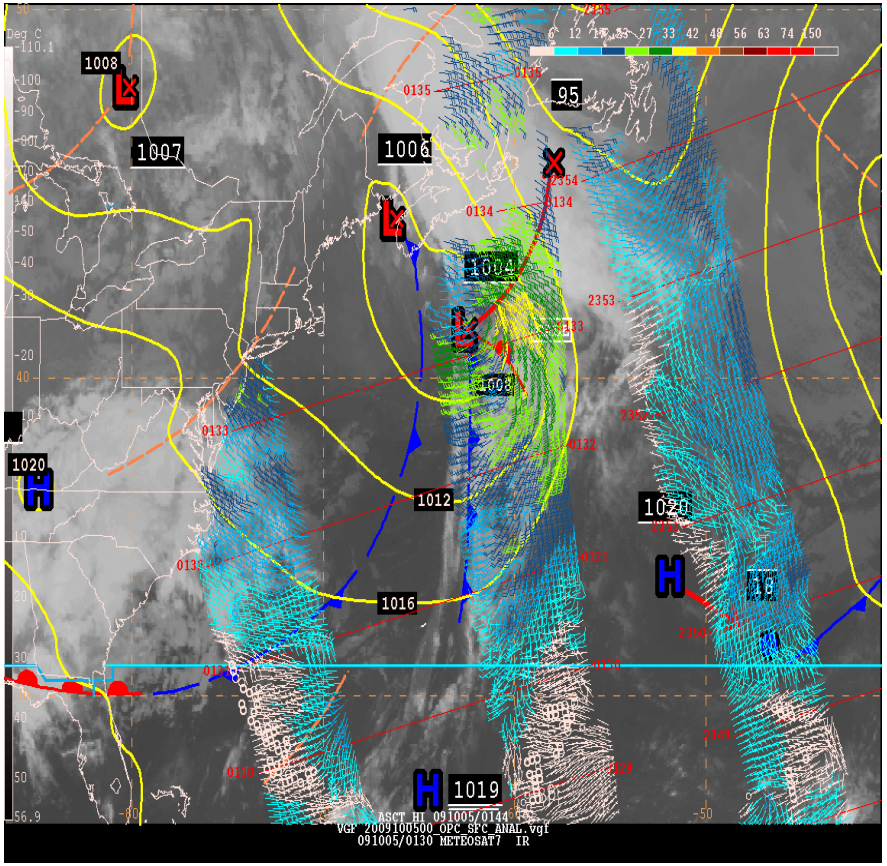
- A Java based automatic monitoring tool for ASCAT winds
- Monitoring the process on 3-minute granule level
- Ability to display the status from data ingest, process and distribution

Operational ASCAT Winds Distribution

- ASCAT winds are distributed via DDS server
- Main NOAA users
  - National Hurricane Center (NHC)/Tropical Prediction Center (TPC)
  - Ocean Prediction Center
  - Alaska and Pacific Regions
  - Coastal Weather Forecast Offices
  - Great Lakes Weather Forecast Offices
  - Environmental Modeling Center (EMC)

Day to Day Uses of ASCAT at OPC

- Identify weather features
- Marine wind warnings
- Short term marine forecasts
- Real-time Verification



TOPIC

- Status of GOES and POES Satellites
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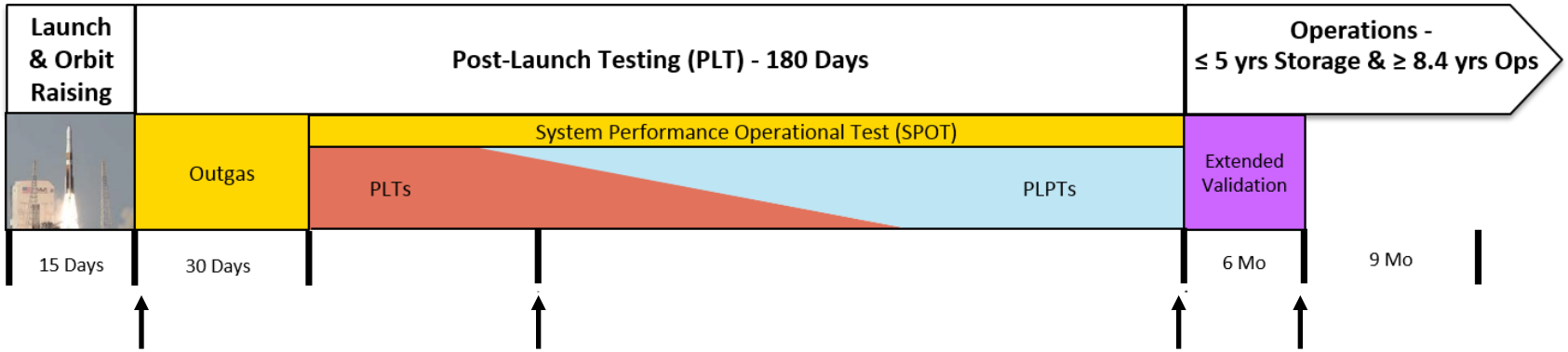
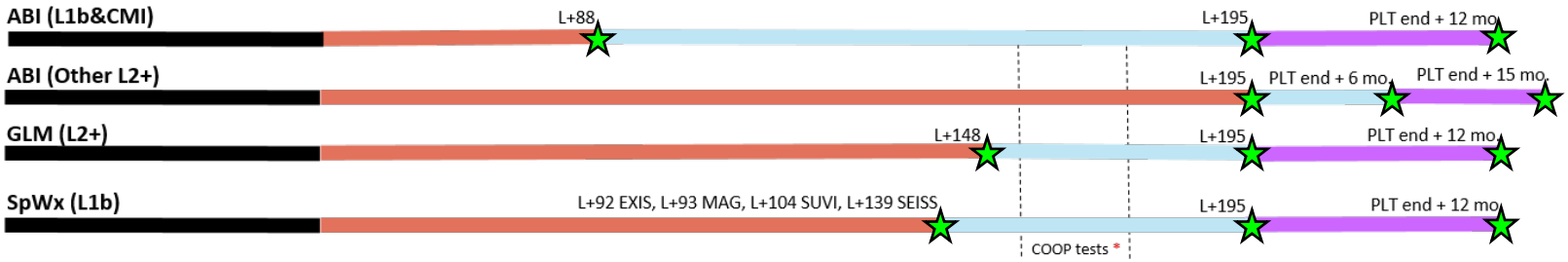
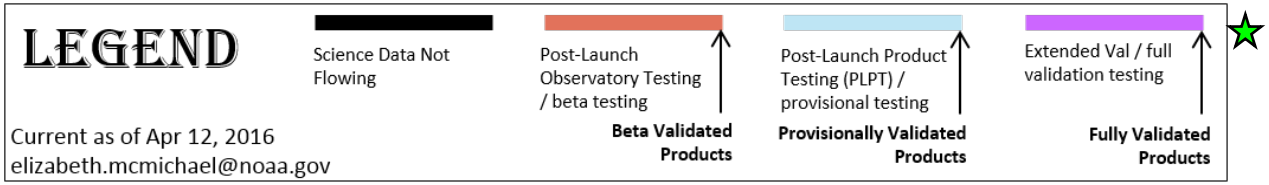
Update on GOES-R Satellite

- GOES-R Launch: Nov. 4, 2016 to 89.5 deg West
- Post-Launch Testing: Nov. 2016 – Apr. 2017 at 89.5 deg West
- Extended Validation: Apr. 2017 – Nov. 2017 at 89.5 deg West
- Positioned at GOES-East or West: Nov. 2017

Data Release & Product Validation Schedule







* Two one-day data blackout during this period due to COOP tests.

GOES-R Winds

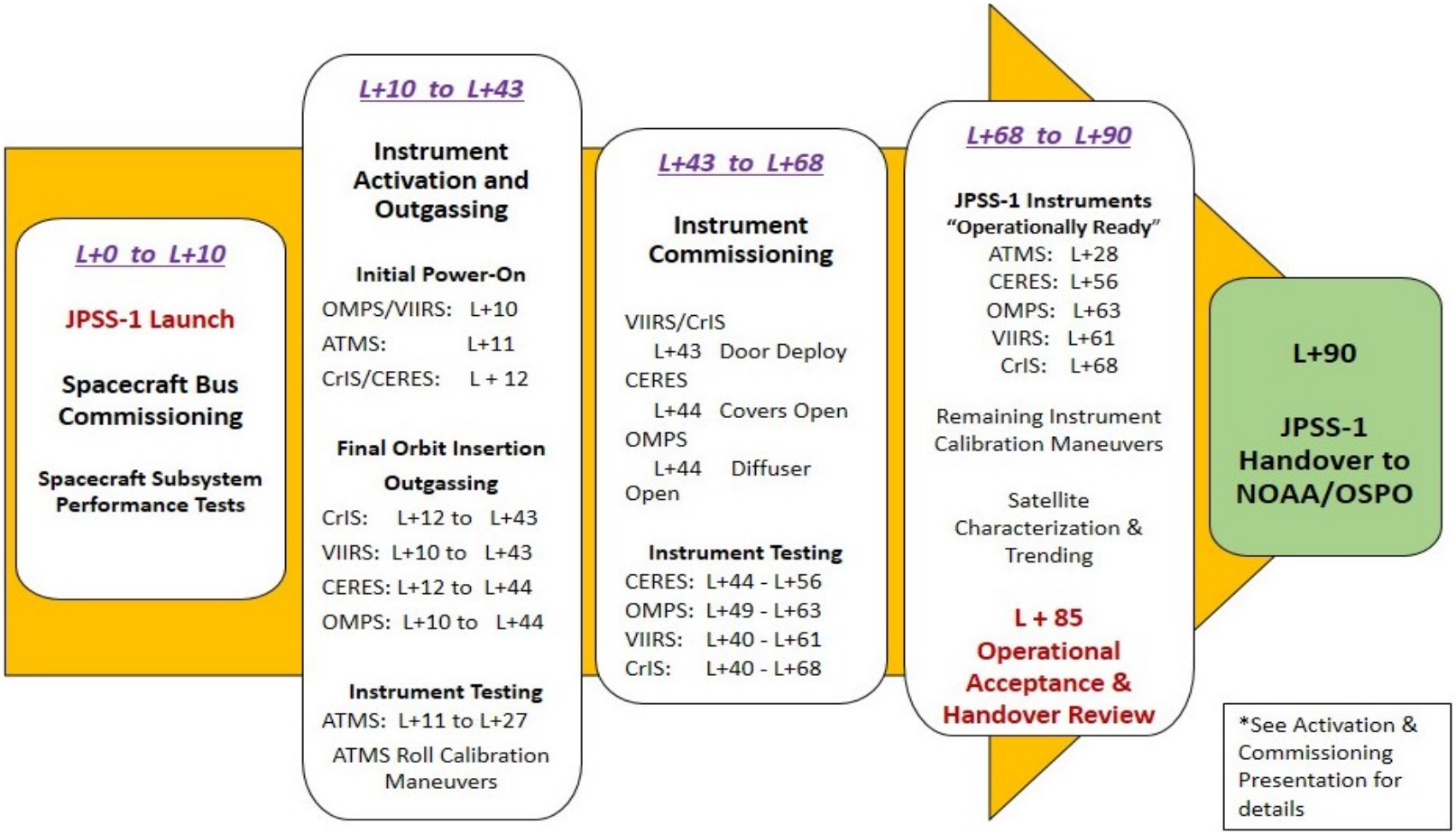
- Available in NETCDF format and BUFR formats with new BUFR table
- Begin to be distributed to users via PDA at Launch+6 months
- A provisional validation maturity status at Launch+1 year
- A full validation maturity status at Launch+21 months
- Plan to be disseminated via GTS

Update on JPSS-1 Satellites

- Proposed JPSS-1 Launch date is around Jan., 2017
- JPSS-1 Handover to OSPO at Launch+90 days

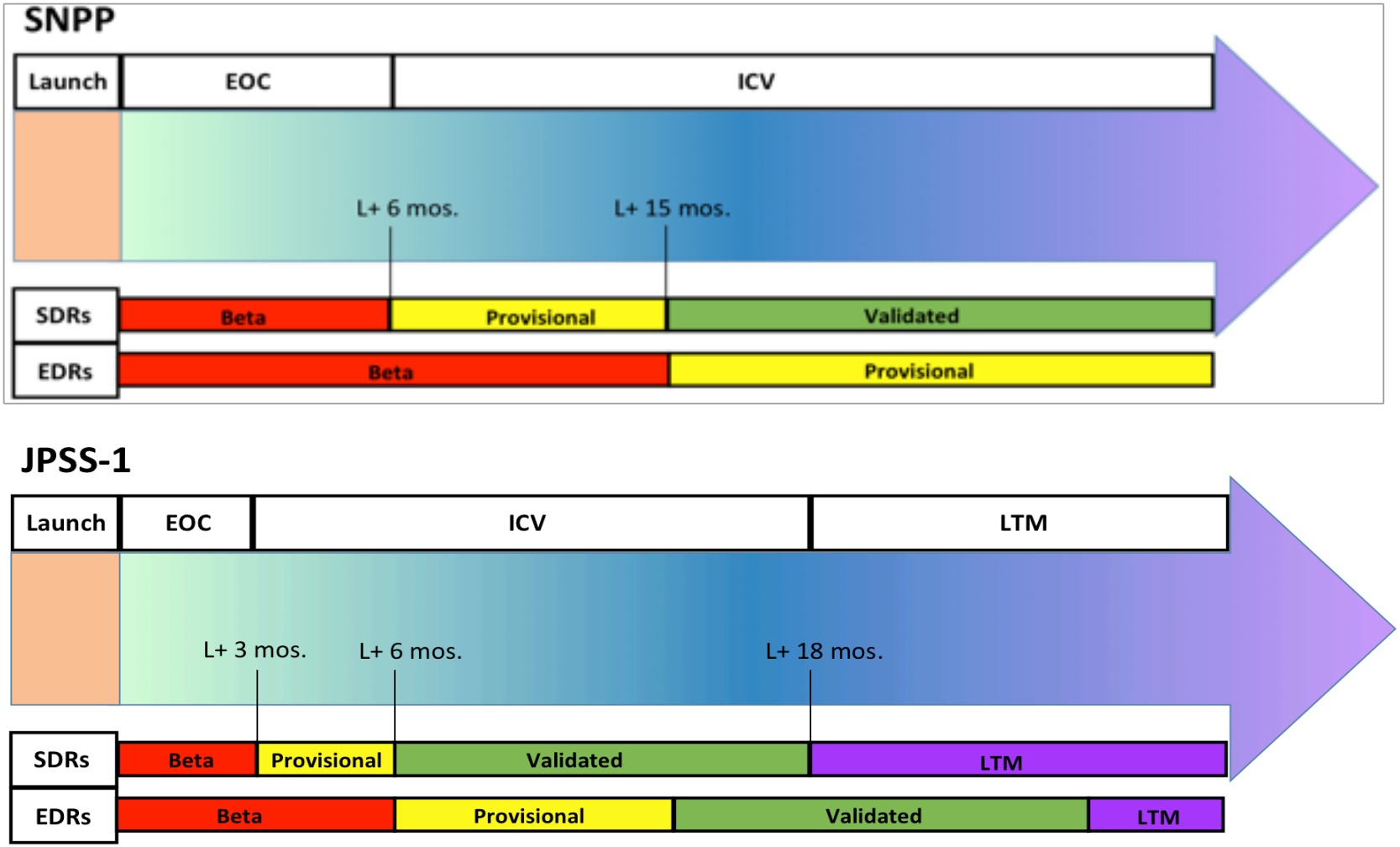
On-orbit Commissioning Timeline Overview (JPSS-1)

Launch Readiness Date (LRD) - Jan 2017



Tentative schedule – informational only

JPSS-1 Cal/Val Timeline (Draft Version)



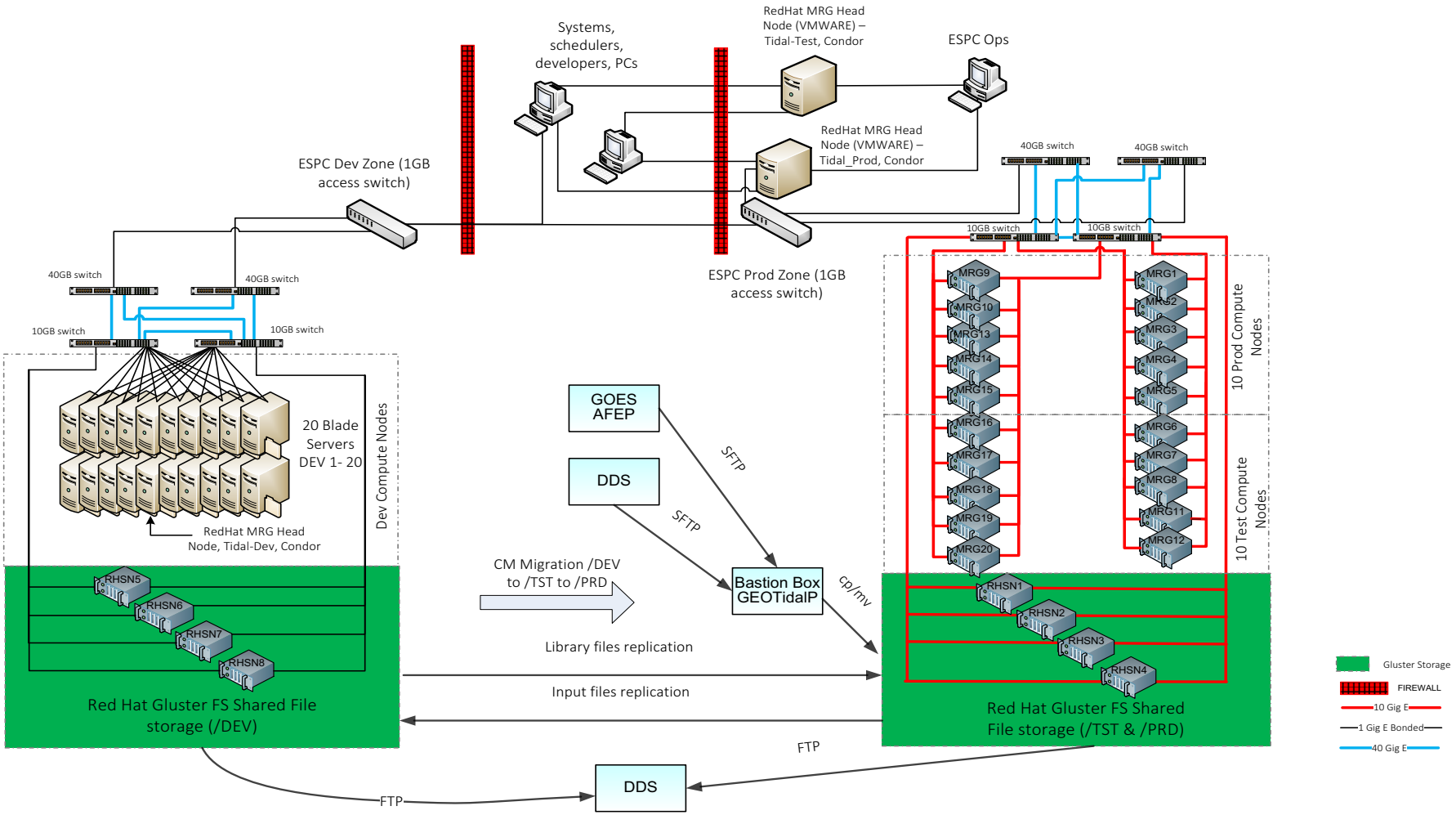
Early Orbit Checkout (EOC); Intensive Cal/Val (ICV); Long Term Maintenance (LTM)

Note – this is an early draft timeline; a detailed schedule is to be available In summer 2016.

JPSS-1 VIIRS Polar Winds

- Products will be in operation in June 2018
- Will be run on OSPO NDE system as S-NPP VPW
- Available in NETCDF format and BUFR formats with new BUFR table
- Will be distributed via PDA

CHOPS 2.0 Architecture Diagram



CHOPS 2.0 Architecture 03152016.vsd

Update on AMV Products

- New Improved GOES Winds (Expected to be available in Spring 2017)
  - Using GOES-R algorithm with current GOES data
  - Available in NetCDF4 format and BUFR format with new BUFR table
  - Will run on CHOPS 2.0
  - Plan to provide users the testing period in parallel with current GOES AMV products

Update on AMV Products

- MODIS/AVHRR Winds with GOES-R Algorithm (June, 2017)
  - Will be generated by the same GOES-R algorithm as S-NPP VIIRS Polar Winds
  - Avoid the different error characteristics from different algorithm
  - Will run on CHOPS 2.0

New Processing & Distribution

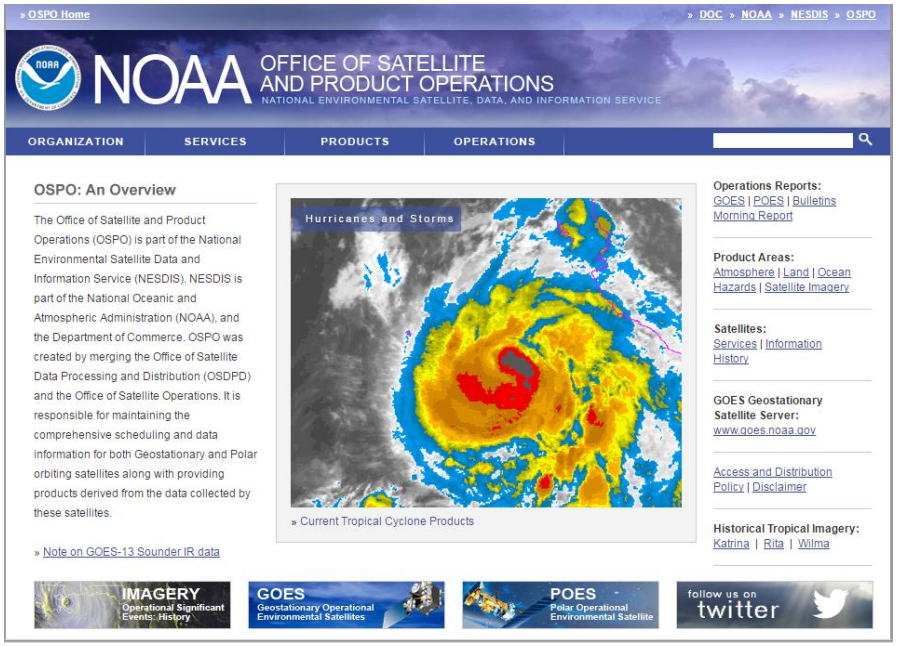
- PDA – Product Distribution and Access System
- All near real time distribution will be done from PDA
  - GOES-R products
  - S-NPP and JPSS products
  - Other products from currently supported missions

New Processing & Distribution

- Highly automated, user driven process
- User managed search and tailoring
- OSPO to manage and update international user subscriptions, same as current DDS
- Currently GOES-R data is expected to be the first products available on PDA

Data Access & Distribution Policy

Contact: NESDIS.data.access@noaa.gov



www.ospo.noaa.gov

- To consistently vet user requests for near real-time satellite data and products based on organizational affiliation or type of application
- To effectively manage data distribution resources to ensure effective system performance
- To be in compliance with policy, procedures and required interconnection agreements with NIST/DOC IT security regulations
- To factor ESPC IT system planning and future distribution resource availability and capacity needs into data access decisions

Contact Information for Operational Wind Products

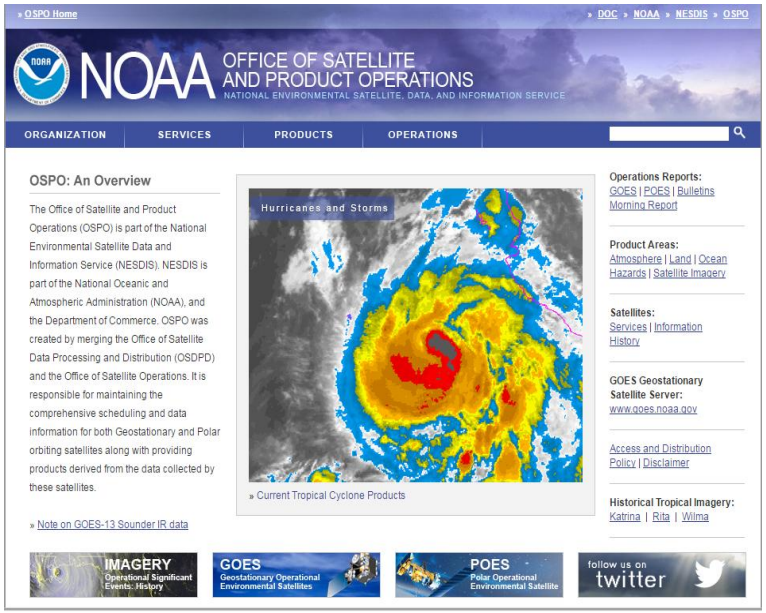
Hongming Qi

Winds PAL (Product Area Leader)

At NESDIS/OSPO

Email: *Hongming.Qi@noaa.gov*

Contact Information



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Data Access	NESDIS.Data.Access@noaa.gov
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Comments and Questions

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Takk
Danke!
Teşekkürler
Salamat
Mahalo
Cảm ơn bạn
谢谢您
dhanayawad
Grazie
multumesc!
Хвала
Kiitos
Bedankt
¡gracias!
Спасибо
Σε ευχαριστώ
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obrigado!
Hvala
Go raibh maith agat
THANK YOU!
ありがとうございました
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merci!
Благодаря
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