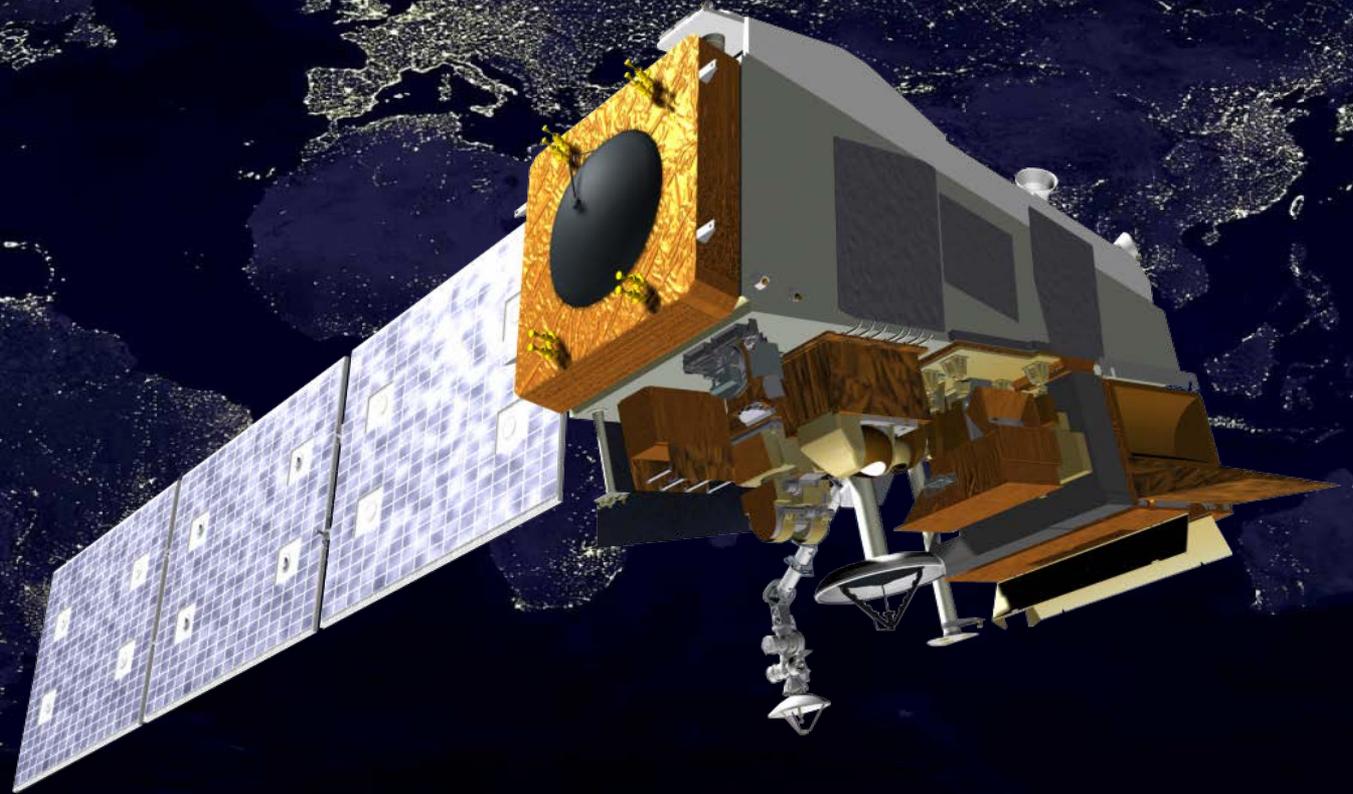


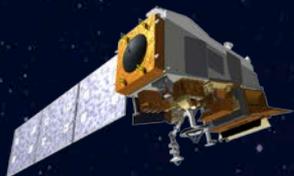
NOAA Polar Orbiting Satellites



*From POES to JPSS:
New capabilities in satellite observations*



Harry Cikanek, Director, Joint Polar Satellite System
NOAA Satellite Conference 2015, Greenbelt, MD



Why JPSS? JPSS provides...



...the most critical data for numerical weather prediction to enable accurate 3-7 day ahead forecasts, giving high confidence to emergency managers in advance of severe weather events



October 2014 - Vongfong IR

...operational weather and environment satellite observations for Alaska and Polar Regions operational forecasting



March 2015 - ice congests Chesapeake Bay

...global coverage and unique day and night imaging capabilities in support of civilian and military needs



May 2013 - Tropical Cyclone Mahasen

Without JPSS, the Nation will experience an immediate degradation in weather forecasting capability

JPSS Supports All Four Key NOAA Mission Areas

Improved understanding of a changing climate system that informs science, service and stewardship



Climate Adaptation and Mitigation

Improved coastal water quality support that enables coastal communities to effectively manage resources and improve resiliency



Resilient Coastal Communities and Economies



Weather Ready Nation

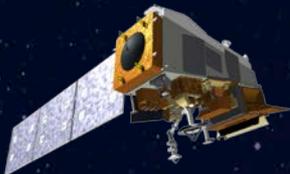
Reduced loss of life from high-impact weather events while improving efficient economies through environmental information



Healthy Oceans

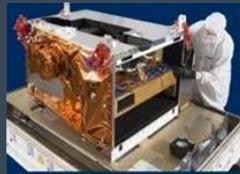
Improved understanding of ecosystems to inform resource management decisions

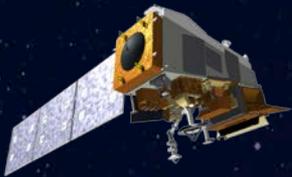




JPSS Instruments



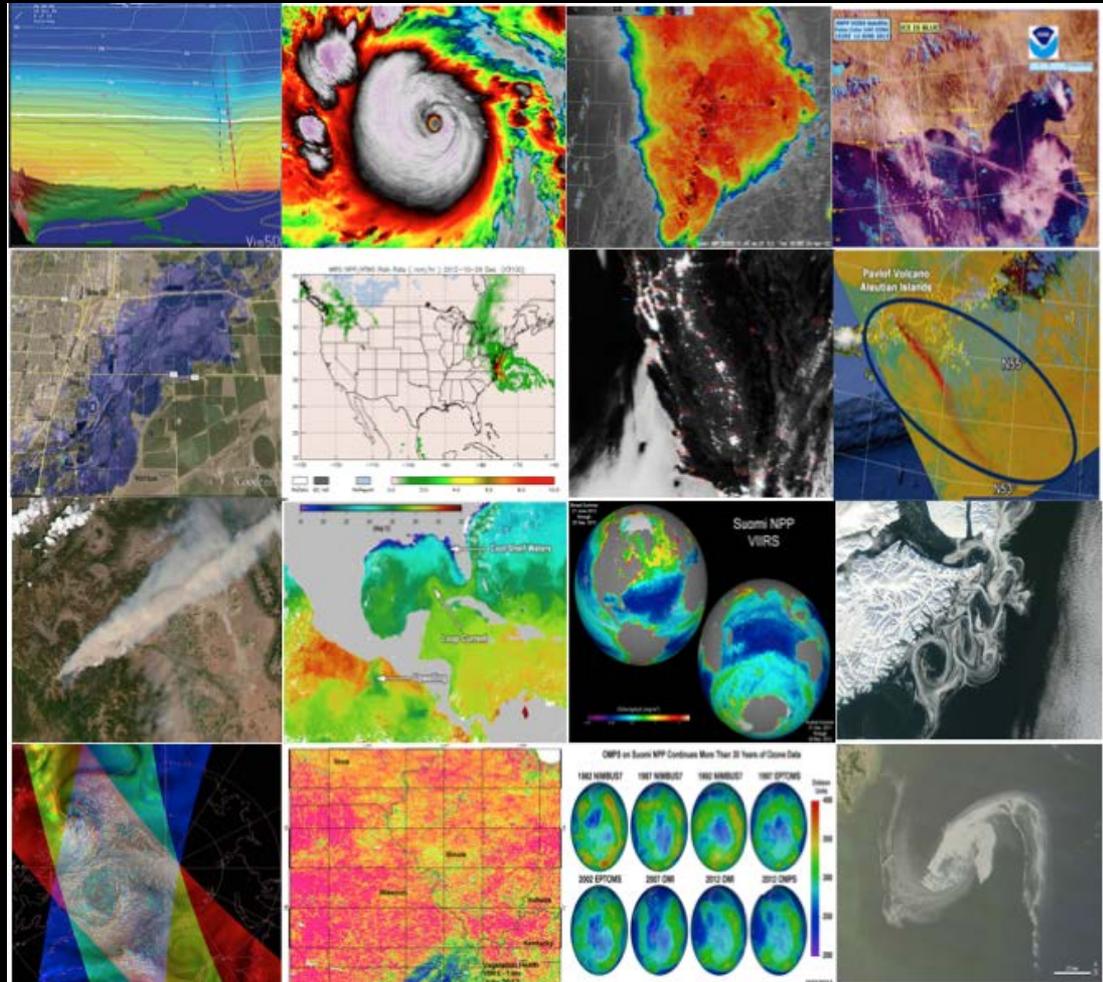
<i>JPSS Instruments</i>		<i>Measurements & Products</i>	<i>Contractor</i>
	ATMS - Advanced Technology Microwave Sounder	High vertical resolution temperature and water vapor information critical for forecasting extreme weather events, 5 to 7 days in advance	Northrup Grumman Electronic Systems
	CrIS - Cross-track Infrared Sounder		Exelis
	VIIRS – Visible Infrared Imaging Radiometer Suite	Critical imagery products, including snow/ice cover, clouds, fog, aerosols, fire, smoke plumes, vegetation health, phytoplankton abundance/chlorophyll	Raytheon Space and Airborne Systems
	OMPS - Ozone Mapping and Profiler Suite	Ozone spectrometers for monitoring ozone hole and recovery of stratospheric ozone and for UV index forecasts	Ball Aerospace and Technologies Corp.
	CERES – Clouds and the Earth’s Radiant Energy System (S-NPP and JPSS-1)	Scanning radiometer which supports studies of Earth Radiation Budget (ERB)	CERES - Northrup Grumman Aerospace Systems
	RBI – Radiation Budget Instrument (JPSS-2, 3, 4; provided by NASA)		RBI - Exelis

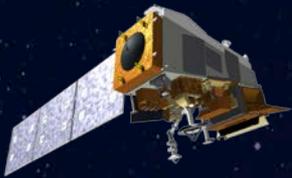


JPSS Enhanced Data Products



- Atmospheric temperature/moisture profiles
- Hurricane intensity and position
- Thunderstorms, tornado potential
- Alaska “nowcasting” (e.g. imaging for operational weather forecasting)
- Significant precipitation and floods
- Dense fog
- Volcanic ash
- Fire and smoke
- Sea surface temperature, ocean color
- Sea ice extent and snow cover/depth
- Polar satellite derived winds (speed/direction/height)
- Vegetation greenness indices and health
- Ozone
- Oil spills

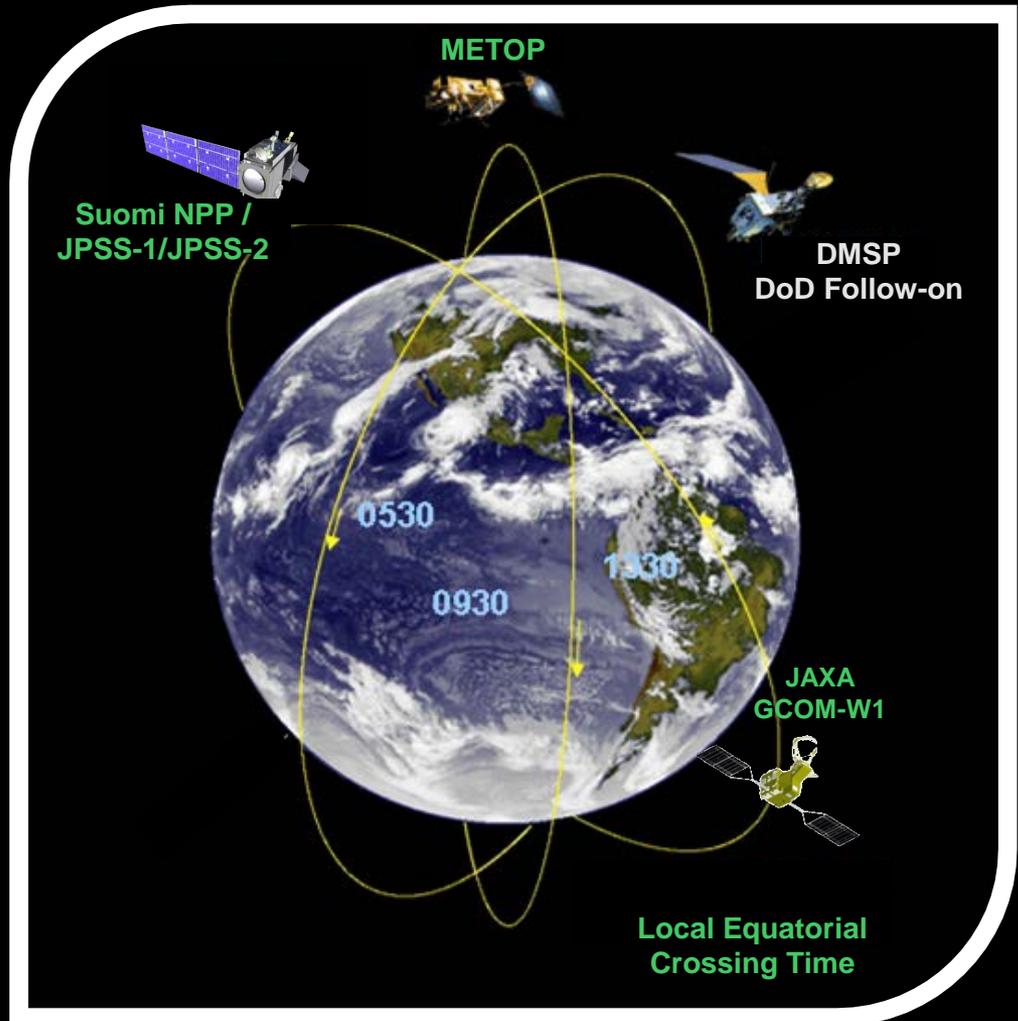




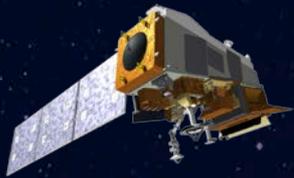
JPSS: Integral to 3-Orbit Global Polar Coverage



- JPSS implements U.S. Space Policy and international agreements to ensure:
 - Global coverage
 - Observational continuity for the afternoon orbit
- Orbits:
 - Early Morning - DoD
 - Mid Morning - EUMETSAT
 - Afternoon - NOAA
- 3-orbit coverage provides vast majority of data critical to 3-7 day ahead forecast and environmental monitoring
- JAXA provides microwave imagery



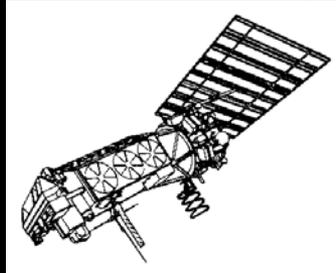
History of NOAA POES Weather Satellites



**TIROS-1-10/
ESSA 1-9/ITOS 1-8**
two cameras and (some)
radiometers



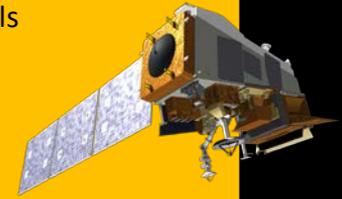
TIROS-N /NOAA 6-14
(TIROS-N LD - Oct 1978)
first to fly AVHRR and the three sounders
and a data collection system



JPSS

(S-NPP LD – Oct 2011)

- 5 new instruments
- 100x more channels
- Higher resolution
- Lower latency
- Wider swath
- 200X data



1960

1978

1998

2011

2017

NOAA-15

(LD – May 1998)

first to fly advanced microwave
sounding units, AVHRR flew
additional 1.6micron channel



NOAA-18

(LD – May 2005)

improved resolution for the HIRS
sounder

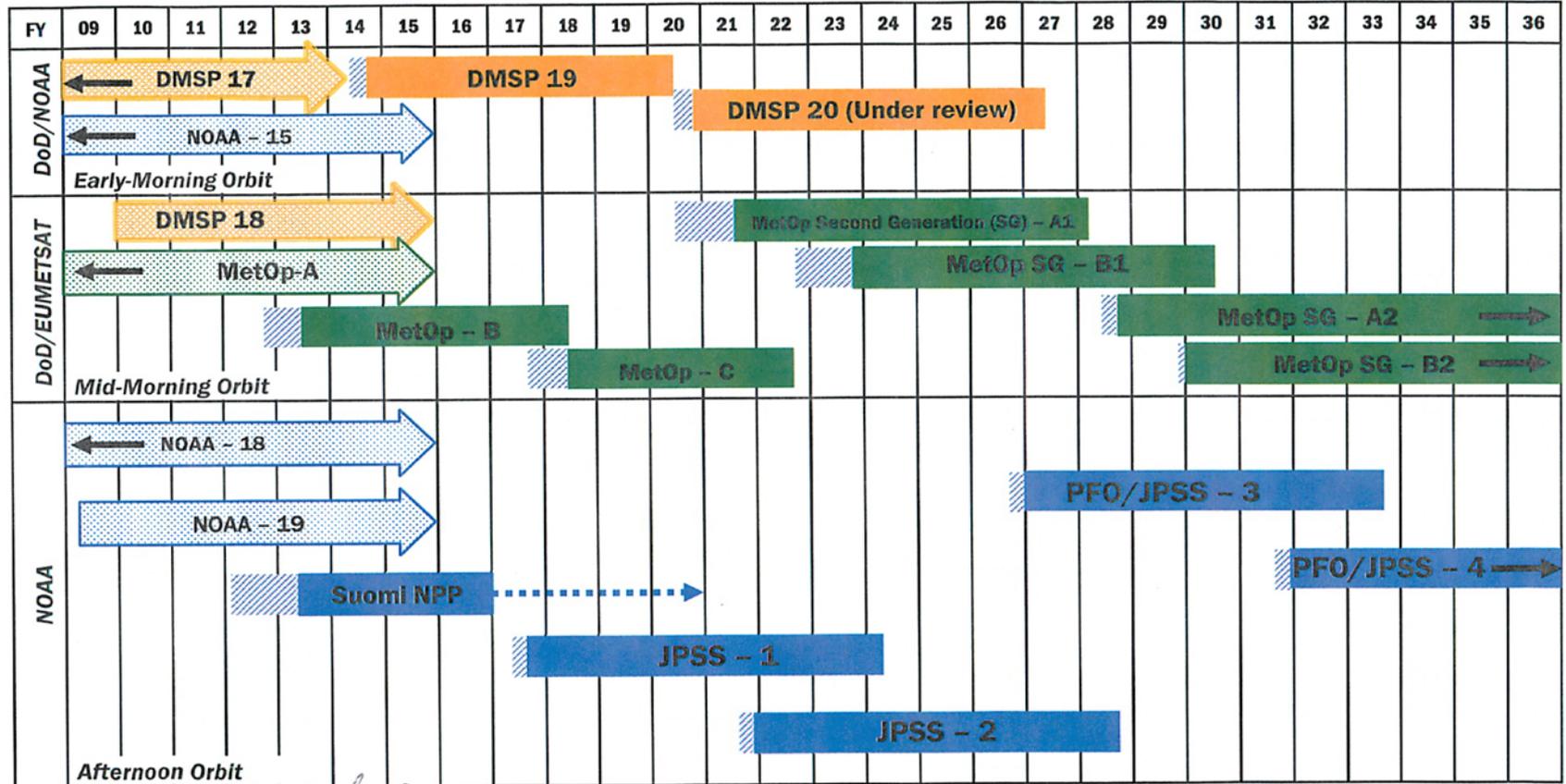


NOAA & Partner Polar Weather Satellite Programs

Continuity of Weather Observations



As of April 2015



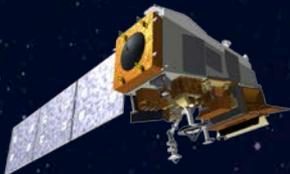
Approved: *Mark S. Pese*
 Assistant Administrator for Satellite and Information Services

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

DMSP: Defense Meteorological Satellite Program
 JPSS: Joint Polar Satellite System Program
 Suomi NPP: Suomi National Polar-orbiting Partnership

Note: DoD and EUMETSAT data provided for reference only

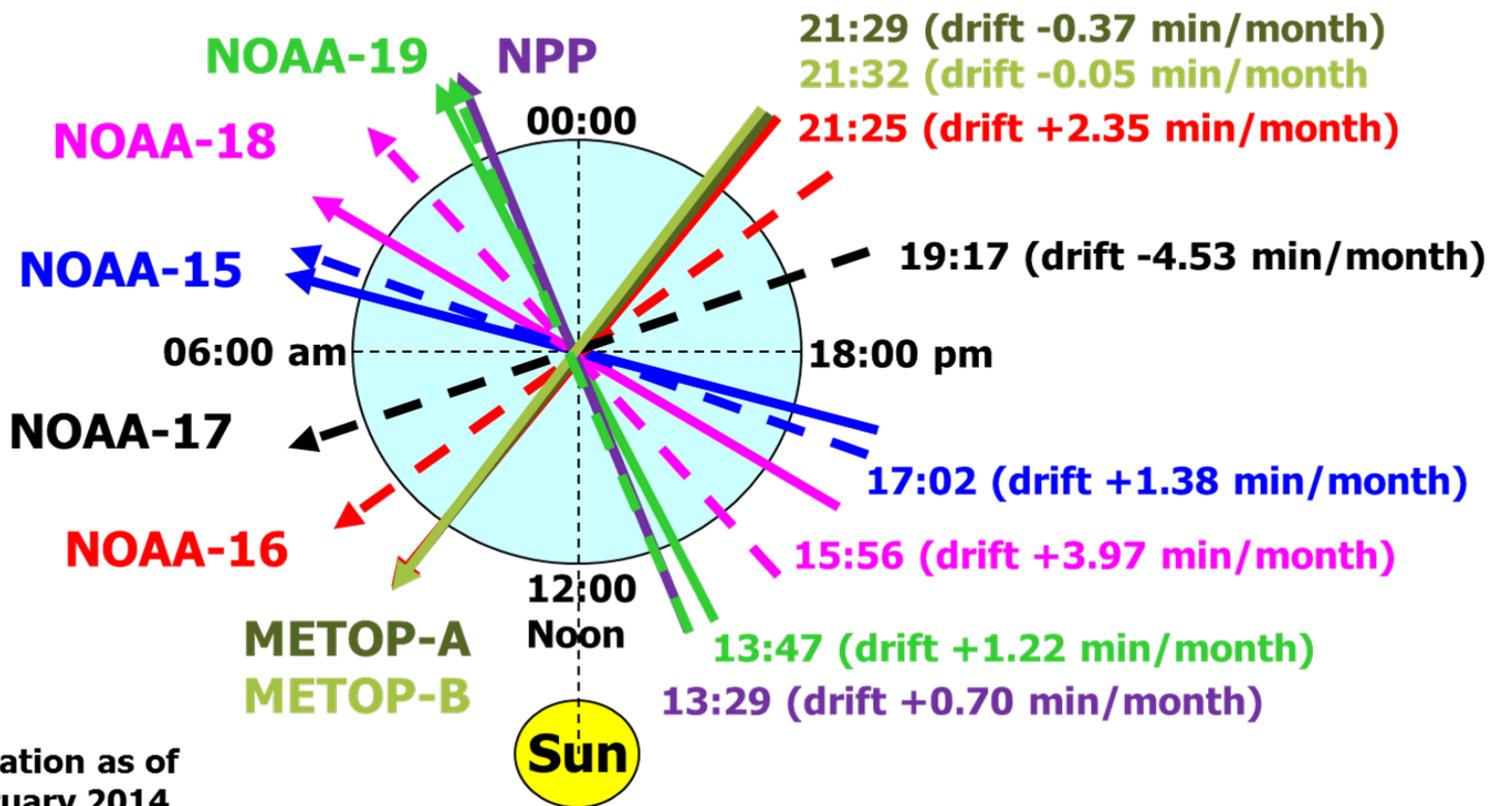
- Post Launch Test
- Operational based on design life
- Secondary
- Operational beyond FY 2036
- Extended mission life
- Launched before Oct 2008



NOAA Polar Satellites Status



Constellation Orbital Configuration



Constellation as of
20 February 2014

Dashed Lines are from July 2012

Constellation Health Status PM Orbit March 31, 2015

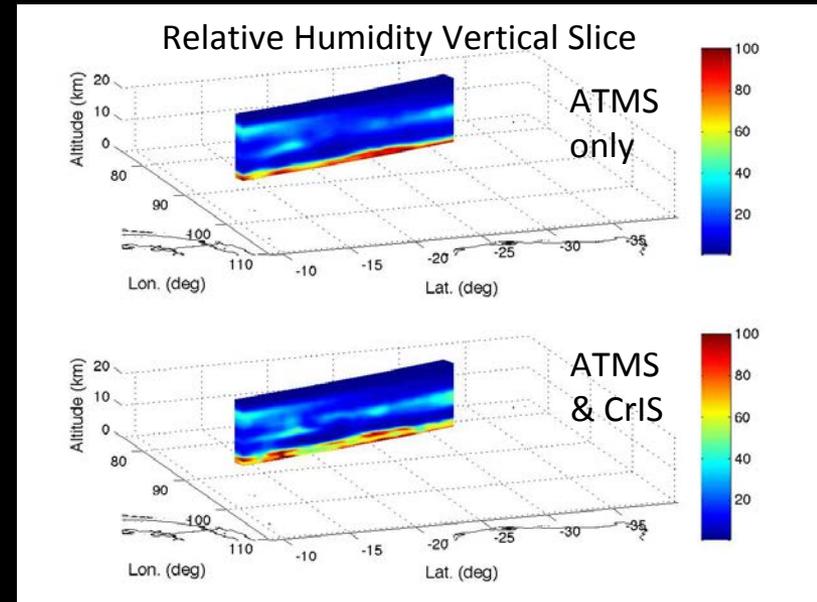
	PM Secondary NOAA-16 Decommissioned June 9, 2014	PM Secondary NOAA-18	PM Prime Services Mission NOAA-19	Aqua 1330	PM Primary S-NPP 1330	GCOM-W
Launch Date	9/21/2000	5/20/2005	2/06/2009	5/4/2002	10//28/2011	5/17/2002
Spacecraft Design Life (years)	> 2	> 2	> 2	6	5	5
Instruments:						
Infrared	HIRS (Y13)	HIRS (R3)	HIRS (Y31)	AIRS	CrIS	
Microwave Sounding	AMSU-A1(Y14)	AMSU-A1	AMSU-A1	AMSU-A(1)	ATMS	
	AMSU-A2	AMSU-A2	AMSU-A2	AMSU-A(2)		
	AMSU-B	MHS	MHS (Y6)			
Microwave Imagery						AMSR-2
Imagery	AVHRR/3	AVHRR/3	AVHRR/3	MODIS	VIIRS	
Spacecraft:						
Command and Control						
Communications	(Y28)					
Attitude Control	(O16)					
Data Handling	DTR 4B,5A, 5B R					
Power						
Thermal						
Fuel	n/a	n/a	n/a			
Ground						



Suomi-NPP Mission Status



- Launched on October 28, 2011, bridge from legacy POES/EOS to JPSS
- 3rd Anniversary on October 28, 2014
- In three years - 15,550 orbits, more than 31.719 petabytes of data = to 266,076,160 (16GB) smartphones.
- Observations are exceeding expectation with high data availability.
- Named NOAA's primary polar-orbiting weather satellite on May 1, 2014



This animation depicts vertical resolution enhancement by using CrIS with ATMS



JPSS Program Baseline



NOAA responsibilities:

- End-to-end responsibility, requirements, funding, delivering to National Weather Service
- Operations, data product science, enterprise ground elements

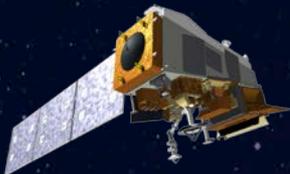
NASA Goddard Space Flight Center responsibilities:

- Systems engineering lead
- Flight Segment, majority of Ground Segment
- Safety and mission assurance

JPSS Summary	
Launch Dates*	No later than 2 nd Quarter FY 2017 (JPSS-1); 1 st Quarter FY 2022 (JPSS-2)
Program Architecture	<ul style="list-style-type: none">▪ 3 Satellites (Suomi NPP*, JPSS-1, JPSS-2)▪ 4 Primary Instruments (ATMS, CrIS, VIIRS, OMPS)▪ Global Ground System (Alaska, Colorado, Maryland, West Virginia, Norway, Antarctica)▪ Operational design life: Suomi NPP: 5-year; JPSS-1 & JPSS-2: 7-year
Program Operational Life	FY 2012 - FY 2025

*Launch Date based on President's FY 2014 Budget Request

*Suomi NPP is a joint NASA / NOAA mission



Polar Follow On (PFO)



FY2016 President's Budget Request includes new missions

- Adds JPSS-3 and JPSS-4 Missions to ensure a stable NOAA Polar Operational Weather Satellite System expected to operate into the late 2030's
- Proposes a small microwave sounding mitigation mission (EON) for the late 2010's when continuity risk is highest
- Complemented by activities underway as documented in the NOAA gap mitigation plan, and COSMIC 2 Radio Occultation

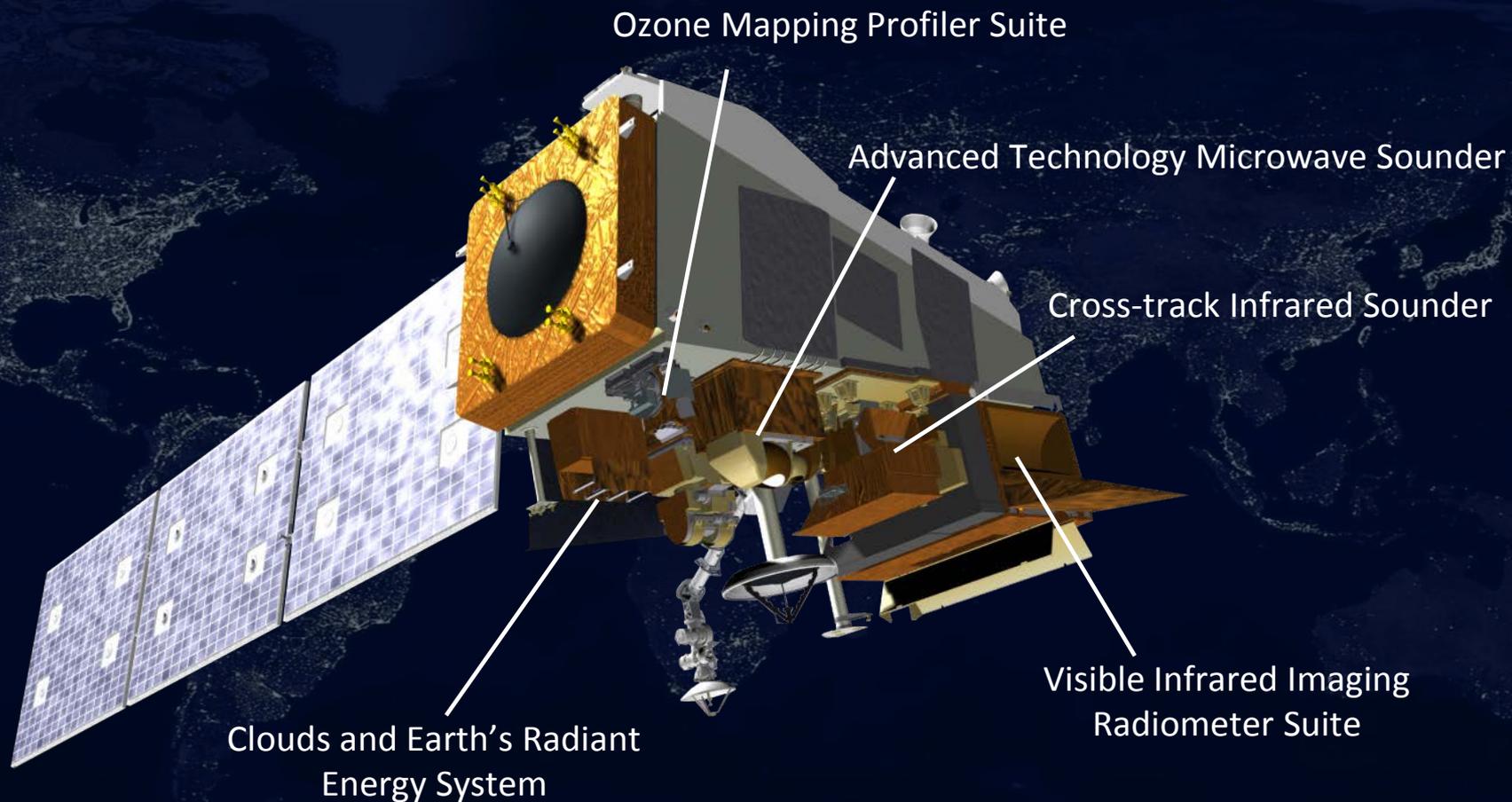
Approach:

- JPSS 3 and JPSS 4 to be copies of JPSS-2, procurement activities underway
- Managed as an integrated program with S-NPP, JPSS-1 and JPSS-2
- EON managed outside JPSS
- JPSS-3 and JPSS-4 to be ready ahead of planned need to enable recovery from loss of sounders in orbit

Mission	Launch Readiness Date	Launch Date
PFO/JPSS-3 Contingency	Q3 FY 2023	-
PFO/JPSS-3 Full	Q2 FY 2024	Q4 FY 2026
PFO/JPSS-4	Q3 FY 2026	Q4 FY 2031

Bottom Line: Establish a stable, fault tolerant polar observing system as quickly as possible to ensure delivery of critical weather observations

JPSS-1 Satellite & Instruments



Ozone Mapping Profiler Suite

Advanced Technology Microwave Sounder

Cross-track Infrared Sounder

Visible Infrared Imaging Radiometer Suite

Clouds and Earth's Radiant Energy System

JPSS System Architecture





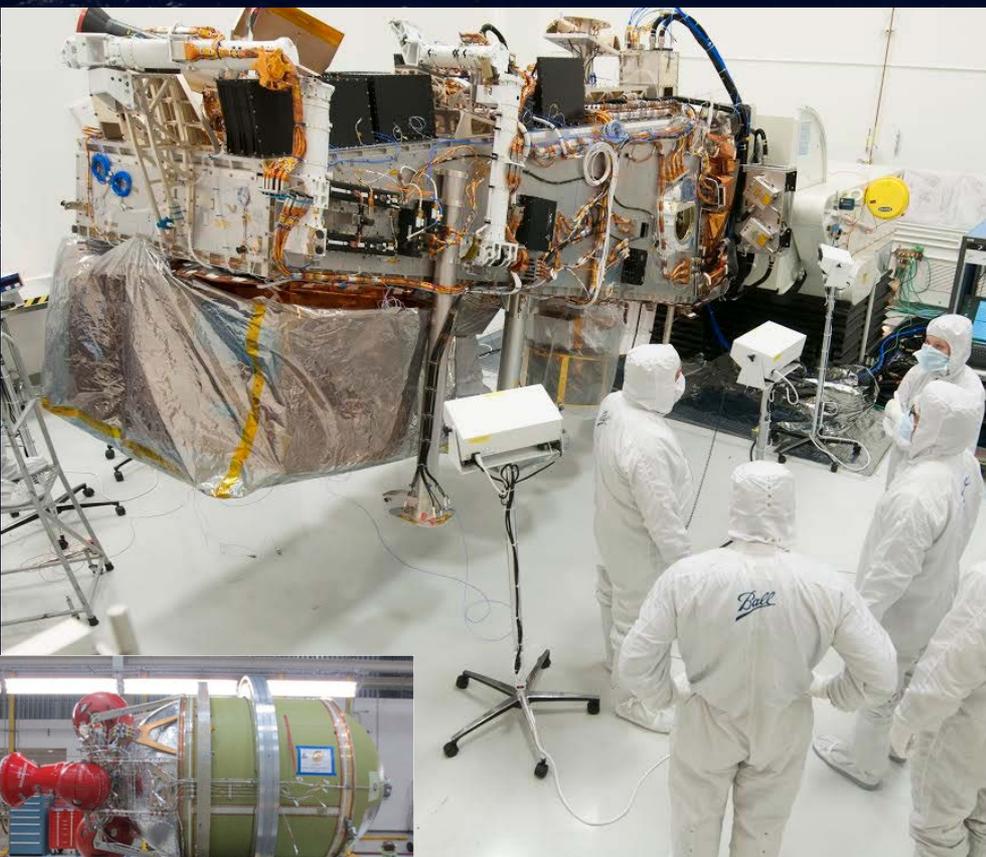
Program Status

JPSS-1



CERES being attached to JPSS-1 spacecraft
Courtesy of Ball Aerospace

Spacecraft with CrIS, VIIRS, OMPS, CERES integrated
(Ball Aerospace)



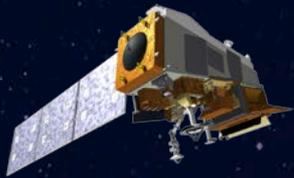
ATMS EDU integration
(Ball Aerospace)



Delta II Fairing and Booster Assembly
(United Launch Alliance)



Delta II Second Stage
(United Launch Alliance)



Program Status

JPSS-2, Ground, Science



4M Ka-Band Antenna at Fairbanks Feb 2013



- JPSS-2 instruments under contract, spacecraft in procurement
- Block 2.0 Ground deployed, in Integration, Test, Verification – TTO early 2016
 - Multi-Mission
 - Technology Refresh
 - Security
 - Efficient flexible operations

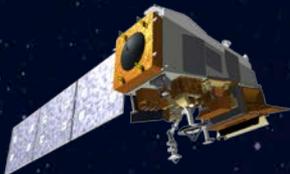
4M Ka-Band Antenna at Svalbard Sept 2013



- Significant Block 1 updates operating well
- User readiness / risk reduction progress
- Plan beyond JPSS-2 submitted
- Joint Polar System Agreement with EUMETSAT approved



Block 2 Racks at CBU Jan 2014



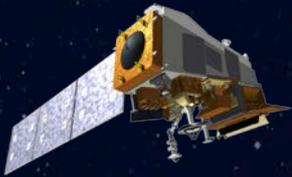
We Want Your Input!



- JPSS tracks usage of JPSS data products.
- Conference presenters have been asked to respond to the following:
 - Do S-NPP/JPSS products provide continuity from legacy POES, METOP, DMSP, EOS satellites? Are the legacy products well-utilized in user operations? When will users switch to S-NPP/JPSS products?
 - What S-NPP/JPSS products are in use now in operations and for what purpose (e.g., data assimilation, validation, decision support, etc.)?
 - If a JPSS product is not in use, is there an actionable/funded plan to use the S-NPP/JPSS product?
 - Are there issues with the current product performance or data access that inhibit the use?
 - For products where JPSS provides advanced capabilities, what are the benefits?
 - What additional work needs to be done to ensure that the S-NPP/JPSS product is/will be well-utilized? Are additional enhancements needed?
- We invite those not presenting to provide input via the JPSS Program Science Office

JPSS - Program Science Office

Dr. Mitch Goldberg, Bill Sjoberg, Arron Layns, Julie Price, & Kathryn Shontz,



Program Status Summary



Suomi NPP is producing outstanding data

- The satellite is healthy and producing a high availability of data (~99.99%)
- Operations of the satellite transferred from NASA to NOAA in 2013
- Suomi NPP is the primary operational polar-orbiting satellite for NOAA

JPSS-1 is executing as planned

- Instruments and spacecraft are proceeding well
- The spacecraft bus is built and undergoing testing
- Development and implementation of the new ground data processing system are underway

JPSS-2 procurement activities are progressing well

- The VIIRS, OMPS, CrIS, and ATMS and Radiation Budget Instrument are underway

PFO: JPSS-3 and JPSS-4 in the President's FY2016 Budget Request

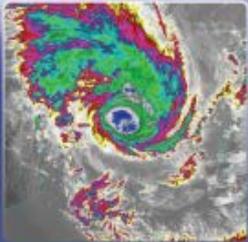


JPSS

JOINT POLAR SATELLITE SYSTEM



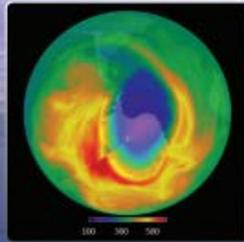
The next generation of polar-orbiting environmental satellites



Advanced weather prediction instruments



High-resolution weather monitoring



A new era of environmental observations

Thank you!

For more
information visit

www.jpss.noaa.gov



/NOAANESDIS



/NOAASatellites



@NOAASatellites