National Research Council
Space Studies Board

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March 9, 2010

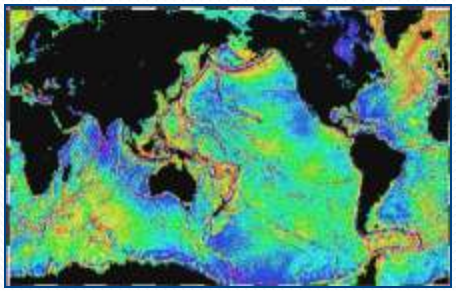
National Oceanic and Atmospheric Administration

Agenda

1. FY 2009 Accomplishments
2. FY 2010 Activities
3. Obama Administration Policy Announcements
4. FY 2011 Budget Overview
5. NOAA Satellite Planning Priorities
6. Summary of FY 2011 Program Changes

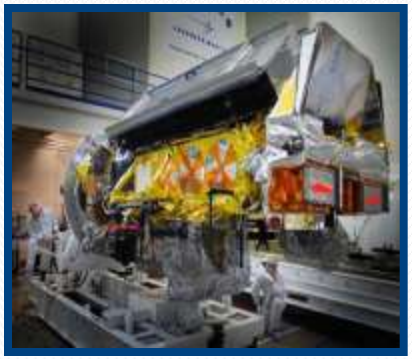
NESDIS FY 2009/10 Accomplishments

- **Transitioned the Jason-2 Satellite to Full Operation**
- **Awarded Geostationary Operational Environmental Satellite-R (GOES-R) Spacecraft and Ground System Contracts**
- **Launched Polar-orbiting Satellite-N Prime/NOAA-19**
- **Published the 2009 Report, *Global Climate Change Impacts in the United States***
- **Launched NOAA GOES-O& P (GOES-14 & 15)**
- **Integrated American and European Ocean Color Observations**



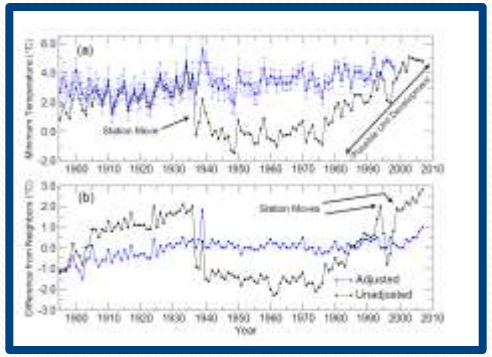
NESDIS FY 2009 ARRA Activities

$74 million to accelerate development of space-based climate sensors and other satellite acquisitions
(NESDIS allocation)



$9 million to construct the replacement Operations building at the Fairbanks Command and Data Acquisition Station
(NOAA Facilities allocation)

$0.670 million to develop bathymetry applications in support of NOAA coastal management programs
(NOAA Ocean Service allocation)



$5 million to initiate the Climate Data Records program
(NOAA High Performance Computing allocation)

NESDIS FY 2010 Activities

- **Check out GOES-P**
- **Continue acquisition of the GOES-R Series**
- **Prepare for the 2011 launch of the NPOESS Preparatory Project (NPP) in partnership with NASA**
- **Begin implementation of the Joint Polar Satellite System (JPSS), the White House decision to restructure the NOAA portion of the NPOESS program**
- **Continue acquisition of the climate sensors in partnership with NASA, academia, and industry**
- **Continue collaboration with EUMETSAT to meet mid-morning observational requirements which the MetOp satellites will provide**
- **Begin acquisition of Jason-3 in partnership with EUMETSAT, CNES, and NASA**
- **Prepare for the GEO Ministerial Summit in Beijing**

Obama Administration Policy Announcements

Joint Polar Satellite System (JPSS)

On February 1, 2010, the White House announced its decision to restructure the NPOESS Program to better enable NOAA, NASA, Air Force to meet the Nation's needs for weather and climate observations.

- **Separates civilian and military satellite procurements but retains sharing of common assets such as ground system**
- **NOAA will be responsible for the afternoon orbit called Joint Polar Satellite System (JPSS)**
- **NOAA leads JPSS, with NASA as its program management and acquisition agent**
- **Department of Defense will continue early morning orbit**
- **EUMETSAT will continue to cover the mid-morning orbit**
- **Observations planned in the afternoon orbit for NPOESS are maintained**
  - **VIIRS, CrIS, ATMS, OMPS, and CERES/ERBS remain**
  - **Efforts underway to utilize AMSR sensor data from Japanese GCOM satellite to replace MIS for microwave imaging/sounding**
- **Continue plan for operational use of NPOESS Preparatory Project data (afternoon orbit) with a Fall 2011 launch readiness date**

NOAA Climate Service

On February 8, 2010, the Secretary of Commerce and the NOAA Administrator announced the proposed establishment of a NOAA Climate Service.

The following parts of NESDIS are proposed for transfer to the NOAA Climate Service:

- **The NOAA National Data Centers:**
  - **National Climatic Data Center**
  - **National Geophysical Data Center**
  - **National Oceanographic Data Center**

- **The Comprehensive Large Array-data Stewardship System (CLASS)**

www.climate.gov

NESDIS Budget Overview

($M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	ATB*	Program Change	FY 2011 President's Budget
Environmental Satellite Observing Systems (ORF)	107.9	0.0	110.5	0.0	1.7	**3.1**	**115.3**
NOAA's Data Centers and Information Services (ORF)	79.5	5.0**	88.7	(27.5)	0.7	**13.0**	**74.9**
Subtotal ORF	187.4	5.0	199.2	(27.5)	2.4	**16.1**	**190.2**
Satellite Acquisition (PAC)	965.7	74.0	1,170.4	0.0	0.0	**831.4**	**2,001.9**
Data and Other System Investments (PAC)	24.9	0.0	28.9	(12.0)	0.0	**0.0**	**16.9**
Subtotal PAC	990.6	74.0	1,199.3	(12.0)	0.0	**831.4**	**2,018.8**
NESDIS Total***	1,178.0	79.0	1,398.5	(39.5)	2.4	847.6	2,209.0

* Adjustment to Base (ATB)
** $5M transferred from NOAA High Performance Computing for Climate Data Records
*** Numbers may not add due to rounding

NESDIS ORF: $190.2 million

ORF Account ($M)	FY 2011 President's Budget
Environmental Satellite Observing Systems	115.3
Data Centers and Information Services	74.9
Total *	190.2

* Numbers may not add due to rounding

Environmental Satellite Observing Systems: $115.3 million

ORF Account ($M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	ATB	Program Change	FY 2011 President's Budget
Satellite Command and Control	46.4	0.0	47.4	0.0	0.8	0.0	**48.2**
Product Processing and Distribution	31.5	0.0	32.7	0.0	0.4	**3.1**	**36.2**
- IT Security							
Product Development, Readiness & Application	27.6	0.0	28.0	0.0	0.4	0.0	**28.4**
Office of Space Commercialization	0.6	0.0	0.6	0.0	0.0	0.0	**0.7**
Commercial Remote Sensing Licensing & Enforcement	1.3	0.0	1.3	0.0	0.1	0.0	**1.3**
Group on Earth Observations (GEO)	0.5	0.0	0.5	0.0	0.0	0.0	**0.5**
Total *	107.9	0.0	110.5	0.0	1.7	3.1	115.3

*** Numbers may not add due to rounding.**

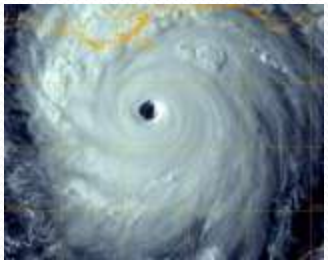
Climate Data Records

Transformation of raw satellite data into unified/long-term observations records

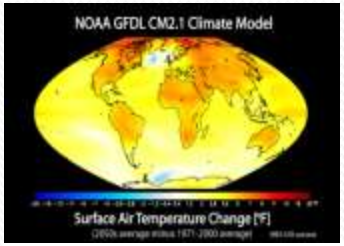
($ M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	Total ATB	Program Change	FY 2011 President's Request
PPA: Archive, Access and Assessment							
Climate Data Records	0.0	5.0	10.0	(3.0)	0.0	11.0	18.0

U.S. Temperature Outlook: NOAA

- Climate Data Records (CDR) are time series of measurements of sufficient length, consistency, and continuity that can be used to determine climate variability and change
- CDRs are critical to climate modelers and decisions makers concerned with advancing climate change understanding, prediction, mitigation and adaptation strategies, policies, and science
- The climate community has expressed a need for 84 CDRs that address the Global Climate Observing System (GCOS)
- Funding will be used to develop algorithms and processes to transform raw satellite data into unified and coherent long-term environmental observations and products that are critical to the climate community.
  - 10 CDRs will be produced operationally and 8 CDRs will be developed



Satellite Image of Hurricane Katrina



NOAA GFDL CM2.1: Climate Model

NESDIS PAC: $2,018.8 million

PAC Account ($M)	FY 2011 President's Budget
Satellite Acquisitions	2,001.9
Data and Other Systems Investment	16.9
Total *	2,018.8

* Numbers may not add due to rounding

Satellite Acquisition: $2,001.9 million

PAC Account ($M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	Program Change	FY 2011 President's Budget
Geostationary Operational Environmental Satellite (GOES)-N Series	73.3	0.0	57.6	0.0	**0.0**	**57.6**
GOES-R Series	465.0	0.0	667.5	0.0	**62.5**	**730.0**
Joint Polar Satellite System (JPSS)	288.0	26.0	382.2	0.0	**678.6**	**1,060.8**
Jason-3	0.0	0.0	20.0	0.0	**30.0**	**50.0**
Climate Sensors	74.0	48.0	0.0	0.0	**49.4**	**49.4**
COSMIC- 2	0.0	0.0	0.0	0.0	**3.7**	**3.7**
DSCOVR	0.0	0.0	0.0	0.0	**9.5**	**9.5**
Polar-orbiting Operational Environmental Satellite (POES)	65.4	0.0	43.1	0.0	**(2.3)**	**40.9**
Total Satellite Acquisition *	965.7	74.0	1,170.4	0.0	831.4	2,001.9

*** Numbers may not add due to rounding.**

NOAA Satellite Planning Priorities

- **Continue the current programs to ensure continuity of data**
  - GOES-N program to GOES-R
  - POES to NPP and JPSS
    - International partnership with EUMETSAT for future MetOp satellites
  - Jason-2 Ocean Altimetry to Jason-3
- **Ensure climate data continuity**
  - Deliver climate sensors to NPP and JPSS
  - Long term strategy defined in 2010
- **Pursue "Research to Operations" transitions**
  - Pursue high priority measurement candidates for research to operations (R2O) transition and incorporate into budget submissions as they are ready
    - Solar wind
    - Radio Occultation Measurements
      - for atmospheric temperature and humidity profiles
    - Ocean Surface Vector Winds
  - Identify future measurement candidates and partnerships for R2O transitions
  - Continue work with commercial sector for possible purchase of satellite products and services

Continuity of GOES Operational Satellite Program

Calendar Year

As of January 1, 2010

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028

GOES 10 *Decommissioning December 2009*

GOES 11 *GOES West*

GOES 12* *GOES East*

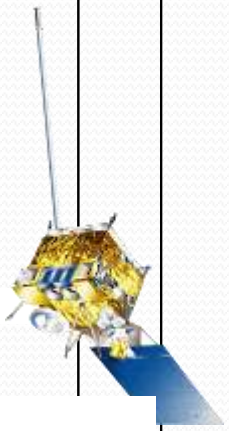
GOES 13 *Transitioning to GOES East*

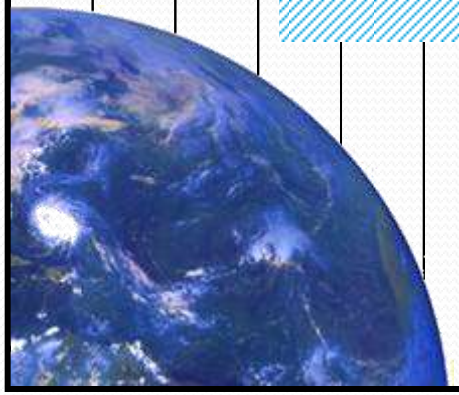
GOES 14 *On-orbit spare*

GOES P

GOES R

GOES S





Approved: _____

Deputy Assistant Administrator for Systems

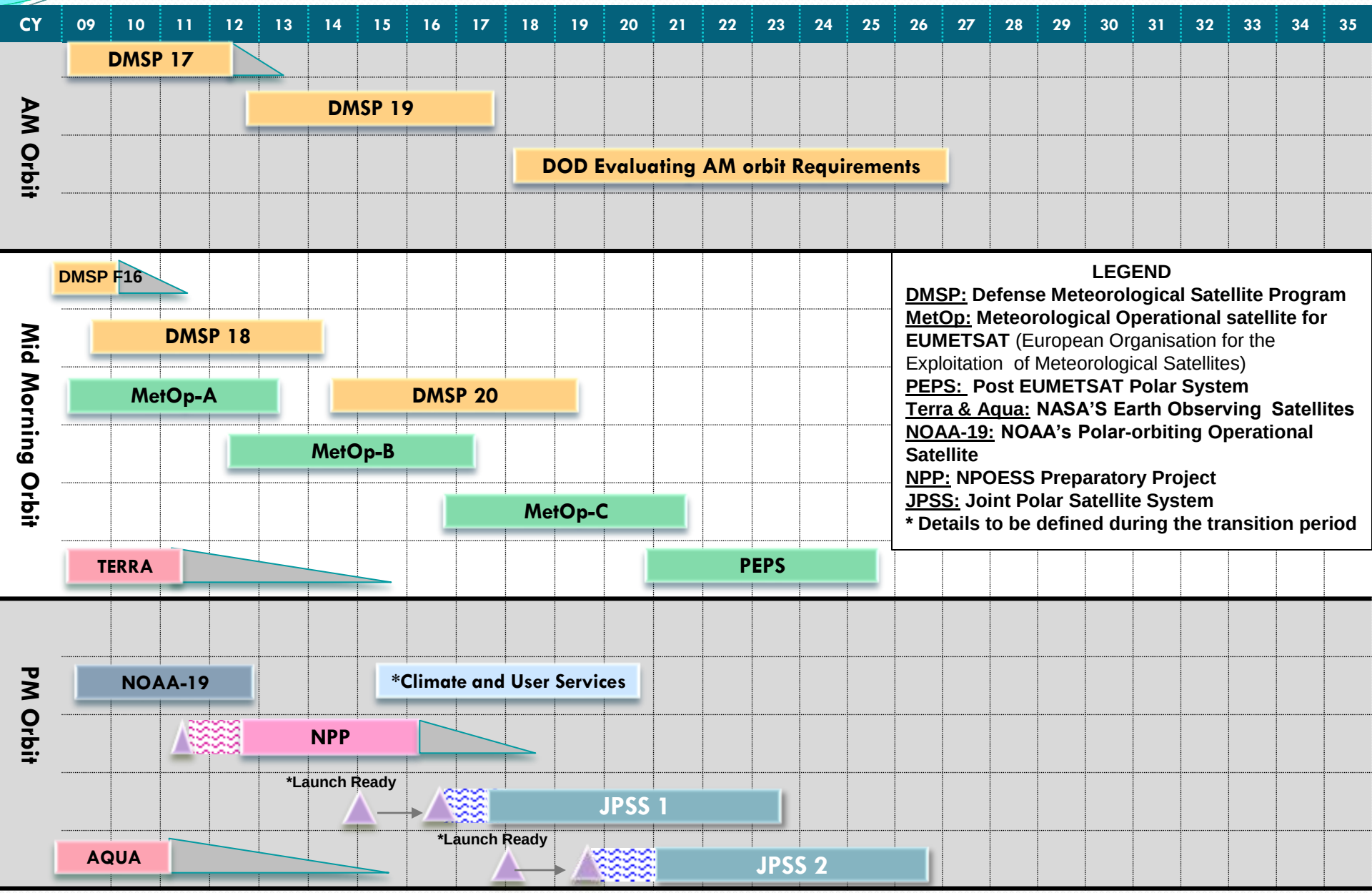
*Backup and South American Coverage beginning June 2010

Satellite is operational beyond design life

On-orbit GOES storage

Operational

Continuity of Polar Operational Satellite Program



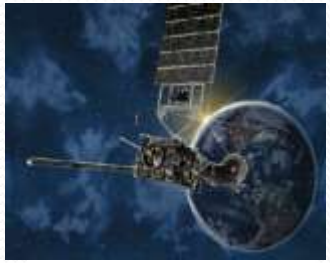
LEGEND

DMSP: Defense Meteorological Satellite Program
MetOp: Meteorological Operational satellite for EUMETSAT (European Organisation for the Exploitation of Meteorological Satellites)
PEPS: Post EUMETSAT Polar System
Terra & Aqua: NASA'S Earth Observing Satellites
NOAA-19: NOAA's Polar-orbiting Operational Satellite
NPP: NPOESS Preparatory Project
JPSS: Joint Polar Satellite System
* Details to be defined during the transition period

GOES-R

Provide environmental satellite data from geosynchronous orbits

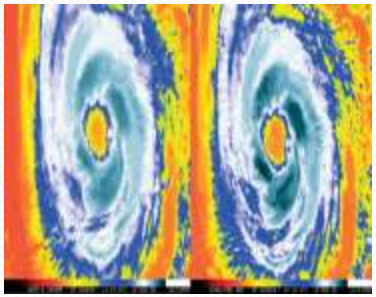
($ M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	Total ATB	Program Change	FY 2011 President's Request
PPA: Geostationary Satellite Systems							
GOES-R	465.0	0.0	667.5	0.0	0.0	62.5	730.0



GOES-R

- The Nation requires uninterrupted continuity of the operational geostationary environmental satellite data that would provide seamless transition from the GOES-N to GOES-R Series
- The Nation requires a operational GOES constellation that consists of two operational satellites and an on-orbit spare
- This requires continued development of the GOES-R instruments, spacecraft segment, and ground systems to meet the 2015 launch readiness date
- NOAA provides overall program management and total program funding. NASA leads the space segment including instrument development and launch services. NOAA leads the ground segment.
- Funding will be used to continue instrument, spacecraft, and ground system development

GOES-R

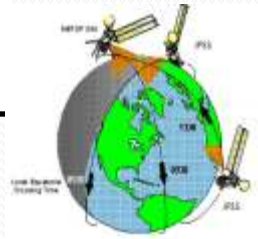


GOES-R
ABI image shown on right.

Joint Polar Satellite System

Provide continuity of environmental satellite data from polar orbits

($ M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	Total ATB	Program Change	FY 2011 President's Request
PPA: Joint Polar Satellite System							
Joint Polar Satellite System	288.0	26.0	382.2	0.0	0.0	678.6	1,060.8



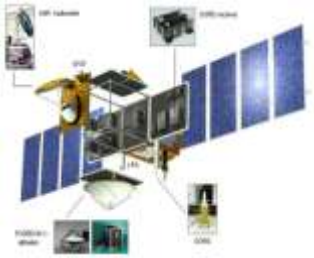
JPSS Orbital Diagram

- The Nation requires uninterrupted access to polar-orbiting operational environmental data for weather and climate monitoring. JPSS will provide continuity of polar-orbiting operational data from NOAA's Polar-orbiting Operational Environmental Satellites, NASA Earth Observing Satellites, the DoD's Defense Meteorological Satellite Program
- White House decision to restructure the NPOESS program divides responsibilities:
  - NOAA/NASA partnership is responsible for managing satellite acquisition in the afternoon orbit called the JPSS
  - Department of Defense responsible for managing satellite acquisition in the morning orbit
- NOAA leads the overall JPSS effort, partnering with NASA. Beginning in FY 2011, NOAA is responsible for total JPSS funding. NOAA/NASA and DoD will jointly utilize the ground system network
- Funding will be used to implement the NOAA/NASA activities related to JPSS including instrument development, acquisition of satellite buses, and providing ground system support for the launch of the NPOESS Preparatory Project in 2011

Jason 3 Altimetry Mission

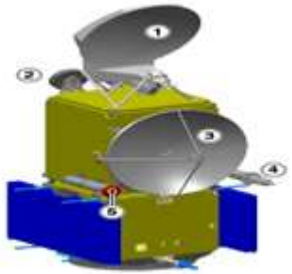
($ M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	Total ATB	Program Change	FY 2011 President's Request
PPA: Jason 3 – Altimetry Mission							
Jason 3 – Altimetry Mission	0.0	0.0	20.0	0.0	0.0	30.0	50.0

- The global science community requires continuity of space-based altimetry (i.e., sea surface height) observations that started over 20 years ago with TOPEX Poseidon, and continued with Jason-1 and Jason-2 satellites. These data provide an essential capability of measuring global sea level change that is associated with global climate change
- Jason-2 mission is a partnership among NOAA, NASA, EUMETSAT, and CNES (French Space agency)
- Jason-3 will also provide data that are important to assess and predict hurricane intensity, surface wave forecasts, and the monitoring of the development of El Niño/La Niña events
- The overlap between the Jason-2 and Jason-3 missions will provide opportunities for data calibration and validation
- Funding will be used to acquire Jason-3 to meet the 2013 launch readiness date



Jason Satellite

Ocean Surface Topography Mission Diagram



Jason 2 satellite

Climate Sensors
Restoration of Critical Climate Sensors

($ M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	Total ATB	Program Change	FY 2011 President's Request
PPA: Restoration of Climate Sensors							
Restoration of Climate Sensors	74.0	48.0	0.0	0.0	0.0	49.4	49.4

- The monitoring of climate change has profound implications for the global society and the environment
- The continuation of climate measurements from these instruments are critical to climate change research
- Funding will be used to:
  - Complete development of Clouds and the Earth's Radiant Energy System flight model 6 (CERES FM #6) and the Total and Spectral Solar Irradiance Sensor (TSIS FM #1)
  - Initiate new developments for follow-on CERES instruments
  - Initiate new developments for Ozone Mapping and Profiler Suites Nadir and Limb sensors

CERES Flight Model FM 6

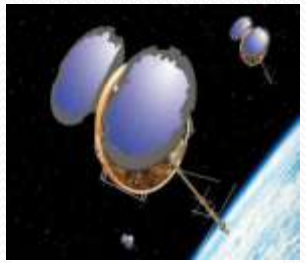
TSIS Sensors

OMPS sensor

COSMIC-2

GPS Radio Occultation

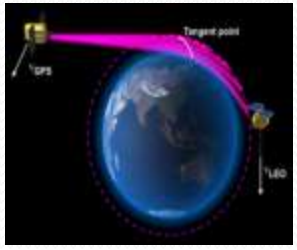
($ M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	Total ATB	Program Change	FY 2011 President's Request
PPA: COSMIC 2							
COSMIC 2	0.0	0.0	0.0	0.0	0.0	3.7	3.7



COSMIC Satellite

- The National Weather Service requires continuation of GPS radio occultation (GPSRO) data that it receives from the COSMIC-1 mission which was launched in April 2006. End of life of the COSMIC-1 mission is expected in 2011, and work to develop the COSMIC-2 mission must begin immediately
- COSMIC-1 provides real time global atmospheric temperature and moisture data through a GPS radio-occultation measurement technique
- This GPSRO data proved to be very valuable in improving the NWS forecast accuracy
- COSMIC-2 continues access by the NWS to this cost-effective data through a partnership among NOAA and NASA on the U.S. side, and Taiwan
- Funding will be used to begin procurement of the radio occultation sensors through the Jet Propulsion Laboratory

COSMIC Launch
April 2006



GPS RO Observations & Tropical Cyclone Forecasting

DSCOVR
Deep Space Climate Observatory Mission
a Space Weather Mission

($ M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	Total ATB	Program Change	FY 2011 President's Request
PPA: DSCOVR							
DSCOVR	0.0	0.0	0.0	0.0	0.0	9.5	9.5

DSCOVR Earth-watching instruments

- The National Weather Service Space Weather Prediction Center (SWPC) requires accurate and timely 1-4 day forecasts and warnings of geomagnetic storms that could adversely affect power grids, telecommunications, health and safety of astronauts, and the viability of satellite systems
- The SWPC is currently relying on NASA satellites that are currently operating beyond their design lives which is significant risk to SWPC's ability to provide the Nation with accurate and timely space weather forecasts
- NOAA has partnered with NASA and the Air Force to refurbish and launch DSCOVR as a space weather mission with launch readiness date of 2013
- Funding will be used to initiate refurbishment of DSCOVR satellite by NASA, and award of a contract to the Naval Research Laboratory to procure the Coronal Mass Ejection imager

Artist's concept of DSCOVR in space

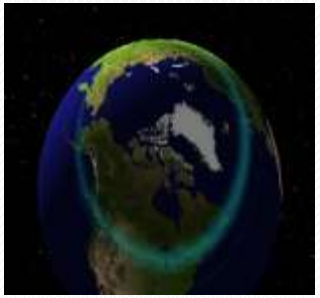
DSCOVR

POES (NOAA K-N Prime) and NOAA Instruments on MetOp Provide environmental satellite data from polar orbits

($ M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	Total ATB	Program Change	FY 2011 President's Request
PPA: Polar Orbiting Systems							
POES	65.4	0.0	43.1	0.0	0.0	(2.3)	40.8

POES Satellite

- Planned program decrease to reflect launch of last Polar satellite (NOAA N-Prime) and stage of development of the MetOp program
- Maintains continuity of polar-orbiting operational environmental data for weather and climate monitoring by the POES & MetOp satellites
- Funding will be used to:
  - Provide satellite and instrument anomaly support to the on-orbit POES satellites
  - Maintain the ground system for the POES satellites for their operational lifetime
  - Support the maintenance and annual testing of the U.S. instruments on the MetOp satellites



POES Detection of Record Particle Flows in Earth's Upper Atmosphere

Areas of Fire Risk Based on Satellite Vegetation Data

Data and Other System Investments: $16.9 million

PAC Account ($M)	FY 2009 Enacted	FY 2009 ARRA	FY 2010 Enacted	Terminations	Program Change	FY 2011 President's Budget
Comprehensive Large Array-data Stewardship System (CLASS)	16.5	0.0	18.5	(12.0)	0.0	**6.5**
EOS Archive Enhancements	1.0	0.0	1.0	0.0	0.0	**1.0**
Critical Single Point of Failure	2.8	0.0	2.8	0.0	0.0	**2.8**
NPOESS Data Exploitation	2.5	0.0	4.5	0.0	0.0	**4.5**
Satellite CDA Facility	2.2	0.0	2.2	0.0	0.0	**2.2**
Total Data & Other Systems Investments *	24.9	0.0	28.9	(12.0)	0.0	16.9

* Numbers may not add due to rounding

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Highlights: NESDIS FY 2011 Budget Changes

Budget Line	Program Change ($M)
ATB – labor & inflationary increases only	2.4*
Operations, Research, and Facilities (ORF)	
· IT Security	3.1
· Climate Data Records	11.0
· Data Center Operations	2.0
Procurement, Acquisition, and Construction (PAC)	
· Geostationary Operational Environmental Satellite R-Series (GOES-R)	62.5
· Joint Polar Satellite System (JPSS)	678.6
· Jason-3	30.0
· Climate Sensors	49.4
· Constellation Observing System for Meteorology, Ionosphere, and Climate-2 (COSMIC-2)	3.7
· Deep Space Climate Observatory Mission (DSCOVR)	9.5
· Polar-orbiting Operational Environmental Satellite K-N Prime Series (POES)	(2.3)
Total NESDIS FY 2011 Program Changes	847.6*

* ATB not included in the total

Summary: FY 2011 NESDIS Budget

- Implements IT security program to protect critical computing systems from hostile attacks
- Continues the Climate Data Record program
- Continues satellite acquisition (GOES, GOES-R, POES, Jason-3, climate sensors)
- Implements White House decision to restructure the NPOESS Program
- Implements NESDIS research to operations strategy by initiating two new satellite acquisition programs: COSMIC-2 and DSCOVR
- Preserves long-term satellite data continuity including key climate measures
- Maintains satellite operations, product development, and data management
- Builds on proven national and international partnerships to achieve mission success

Joint Polar Satellite System

DSCOVR

COSMIC Launch April 2006

Thank you for your continued support of our programs