



## FY 2016 NOAA Satellites Budget Comparison

### Update 1

#### President's FY 2016 Budget Request; Consolidated Approps, 2015 (P.L. 112-235)

This document provides an overview of the President's FY 2016 NOAA Budget request in comparison with the Consolidated Appropriations Act for FY 2015.

#### NOAA Satellites – FY 2015 Funding

Budget Authority, \$ in million	Consolidated Approps, 2015 (P.L. 112-235)	President's FY 2016 NOAA Budget Request
<b>Satellites</b>		
Geostationary Systems – R Series	980.838	871.791
Altimetry Mission - Jason-3	23.175	7.458
Polar Orbiting Systems - Joint Polar Satellite System (JPSS)	916.267	808.966
Polar Follow-On	0.00	380.00
Solar Irradiance, Data and Rescue (SIDAR)	7.300	0.500
Deep Space Climate Observatory (DSCOVR)	21.100	3.200
Space Weather Follow-On	0.00	2.500
COSMIC-2/Global Navigation Satellite System Radio Occultation (GNSS RO)	6.800	20.000
Satellite Ground Services	50.000	58.525
Systems Architecture and Advanced Planning (SAAP)	3.000	4.929
Projects, Planning and Analysis	25.200	30.488
<b>Total</b>	<b>2,033.68</b>	<b>2,188.357</b>

#### President's FY 2016 Budget Request for NOAA Satellites

In FY 2016 the President's budget request included \$2,188.357 million for NOAA satellites, \$154.677 million more than the funds appropriated for NOAA satellites in FY 2015.



## Geostationary Operational Environmental Satellite–R (GOES-R)

Budget Authority, \$ in million	Consolidated Approps, 2015 (P.L. 112-235)	President’s FY 2015 NOAA Budget Request
GOES-R	980.838	871.791
<b>Total</b>	<b>980.838</b>	<b>871.791</b>

### Mission

The [Geostationary Operational Environmental Satellite –R \(GOES-R\)](#) Series is a collaborative development and acquisition effort between NOAA and NASA to develop, deploy and operate the next-generation geostationary environmental satellite series that will provide timely and accurate weather forecasts, severe storm tracking, space weather monitoring, and meteorological research. The GOES-R series will incorporate new instruments with increased capability over the incumbent GOES-N series and will improve its ground system, which will provide better data products for National Weather Service (NWS) and other NOAA stakeholders.

### President’s FY 2016 NOAA Budget Request:

- The President requested \$980 million for GOES-R, \$109.047 million below its FY 2015 enacted budget. \$94 million is a planned program reduction, and “the FY 2016 request is decreased by \$15.0 million achieved by a one week reduction in carryover available to the GOES-R program from FY 2016 to FY 2017.” The reduced carryover amount “does not change the program’s content or life cycle cost.”
- The remaining funds are needed “to maintain instruments, satellite, and ground system developments that are all currently under contract in order to meet the launch commitment dates of the 2nd Quarter FY 2016 for GOES-R and 3rd Quarter FY 2017 for GOES-S.” Additional funds will be used “to continue the development activities for GOES-T and GOES-U to maintain their launch schedules. FY 2016 marks a critical juncture as the program prepares the GOES-R satellite for launch.”
- FY 2016 funding will support:
  - Completion of GOES-R satellite, ground system, and flight-to-ground integration and test activities;
  - Complete GOES-R satellite pre-ship, ship, and launch base activities;
  - GOES-R launch service activities, including launch vehicle integration and test, shipment to launch base, and launch base activities;
  - Launch of GOES-R;
  - Initiation of post launch satellite check-out and calibration activities;
  - Completion of fabrication of GOES-S spacecraft hardware and initiation of satellite-level integration;
  - GOES-S launch service activities;
  - Fabrication, assembly, and integration of GOES T&U instruments and spacecraft hardware

## Jason-3

Budget Authority, \$ in million	Consolidated Approps, 2015 (P.L. 112-235)	President's FY 2016 NOAA Budget Request
JASON-3	23.175	7.548
<b>Total</b>	<b>23.175</b>	<b>7.548</b>

### Mission

The [Jason-3](#) satellite is planned as a follow-on for Jason-2. Jason-3 is a joint satellite altimetry mission between NOAA, the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), and the Centre National d'Etudes Spatiales (CNES), the French Space Agency. Jason-3 will provide continuity of precise measurement of sea surface heights for applications in ocean climatology and ocean weather. NOAA is providing a microwave radiometer, precision orbit determination components [e.g., GPS, Laser Retroreflector Array (LRA)], launch services, ground system and operations, and associated engineering services for Jason-3. EUMETSAT and CNES are providing the spacecraft, altimeter, additional precision orbit components, ground system and operations.

#### President's FY 2016 NOAA Budget Request:

- The President requested \$7.548 million for JASON-3, a planned decrease of \$15.717 million.
- Jason-3 is slated for launch in the second quarter of this year, and "NOAA will support routine post-launch operations of the Jason-3 satellite to include ingestion, processing and distribution of the data, and providing essential engineering services to sustain operations in the event of space or ground based anomalies." NOAA will additionally "complete the evaluation of the Jason-3 satellite and instrument performance during the calibration and validation of all satellite data and will support continued Jason-3 satellite operations" per an "interagency commitment with EUMETSAT and CNES."
- The FY 16 President's Budget Request "supports NOAA's responsibility to provide post-launch operations for the Jason-3 mission. NOAA will work with NASA, OSTP, and OMB to transition the acquisition, development and sustainment of future space-based ocean altimetry systems to NASA."
- The President's proposed Budget also "supports NOAA's broad environmental mission and redefines NASA and NOAA earth observing responsibilities whereby NOAA will be responsible for satellite missions that directly contribute to NOAA's ability to issue weather and space weather forecasts and warnings to protect life and property.
- FY 2016 funding will support:
  - Initiation and continuation of routine operations

## Joint Polar Satellite System (JPSS)

Budget Authority, \$ in million	Consolidated Approps, 2015 (P.L. 112-235)	President's FY 2016 NOAA Budget Request
JPSS	916.267	808.966
<b>Total</b>	<b>916.267</b>	<b>808.966</b>

### Mission

The [Joint Polar Satellite System \(JPSS\)](#) is the United States' next generation polar-orbiting operational environmental satellite system. JPSS is a collaborative program between the National Oceanic and Atmospheric Administration (NOAA) and its acquisition agent—National Aeronautics and Space Administration (NASA). This interagency effort is the latest generation of U.S. polar-orbiting, non-geosynchronous environmental satellites. Established in February 2010 in the President's Fiscal Year 2011 budget request as the civilian successor to the restructured National Polar-orbiting Operational Environmental Satellite System (NPOESS), JPSS will provide continuity of critical, global Earth observations—including oceans, clouds, ozone, snow, ice, vegetation and atmosphere through 2028. The global environmental data from JPSS will be fed into Numerical Weather Prediction (NWP) models for forecasts and used for climate monitoring.

### President's FY 2016 Budget Request:

- The President requested \$808.966 million for JPSS, \$107.301 million below its FY 2015 enacted budget. \$82.3 million is a planned budget reduction, and “the FY 2016 request is decreased by \$25.0 million achieved by a one week reduction in the carryover available to the JPSS program from FY 2016 into FY 2017.” The reduction to carryover “does not change the program’s content and life cycle costs.”
- FY 2016 funding will support:
  - Operating and sustaining the S-NPP satellite which was launched October 28, 2011.
  - Continuing ground system operations for S-NPP under the Block 1.2X until it is retired, completing development and deployment of the new Block 2.0 upgrade, and performing integration testing of the Block 2.0 with the JPSS-1 flight segment to get ready for JPSS- 1 launch
  - Completing testing the JPSS-1 integrated spacecraft, preparing for JPSS-1 launch site integration and testing (I&T)
  - Continuing with preparation for launch vehicle and services for JPSS-1 for launch by no later than 2nd quarter of FY 2017
  - Continuing the development of JPSS-2 spacecraft and instruments
  - Supporting capability to launch JPSS-2 targeted by 4th quarter FY 2021

## Polar Follow-On

Budget Authority, \$ in million	Consolidated Approps, 2015 (P.L. 112-235)	President's FY 2016 NOAA Budget Request
Space Weather Follow-on	0.00	380.00
<b>Total</b>	<b>0.00</b>	<b>380.00</b>

### Mission

Polar orbiting satellites provide the primary input (up to 85%) of the data needed for NOAA's Numerical Weather Prediction models, the underpinnings of high impact weather forecasts. These data are increasingly important to emergency managers in the public and private sectors and are key inputs to critical decisions related to protection of life and property, such as evacuations and the staging of resources.

Polar Follow-ON (PFO) is critical to continuing NOAA's polar weather satellite observations after JPSS-2. PFO will achieve robustness in the polar weather constellation as early as FY 2023 and minimize the potential for gaps in polar weather data. The PFO implements a strategic procurement and management plan that will allow NOAA to move the polar satellite mission toward robustness as expeditiously as possible while realizing significant efficiencies and cost savings. The PFO consists of two primary missions: JPSS-3 and JPSS-4.

#### President's FY 2016 NOAA Budget Request:

- The President's budget requests \$380 million "to initiate PFO."
- The President's FY16 request "also invests in an Earth Observing Nanosatellite-Microwave (EON-MW), which is a miniature microwave sounder that approximates the atmospheric profiling capabilities of the Advanced Technology Microwave Sounder (ATMS) instrument, and provides some mitigation in the event of a launch or instrument failure on JPSS-1."

## Solar Irradiance, Data and Rescue (SIDAR)

Budget Authority, \$ in million	Consolidated Approps, 2015 (P.L. 112-235)	President's FY 2016 NOAA Budget Request
Solar Irradiance, Data and Rescue (SIDAR)	7.300	0.500
<b>Total</b>	<b>7.300</b>	<b>0.500</b>

### Mission

This request will develop and initiate an acquisition strategy to fly the Total Solar Irradiance Sensor (TSIS) instrument. TSIS was built by the Laboratory for Atmospheric and Space Physics at the University of Colorado at Boulder and consists of a suite of two instruments, the Total Irradiance Monitor (TIM) and the Spectral Irradiance Monitor (SIM). TIM is an active radiometer that monitors changes in Total Solar Irradiance at the top of the Earth's atmosphere. SIM is a prism spectrometer that monitors changes in Solar Spectral Irradiance as a function of wavelength.

As part of the SIDAR project, NOAA intends to continue an important collaboration with the French Space Agency (CNES) and the Canadian Department of National Defense (DND). CNES and DND are jointly providing the Search and Rescue Satellite Aided Tracking (SARSAT) system instrument and CNES is providing the Advanced Data Collection System (ADCS) instruments. The SARSAT and ADCS instruments have already been built and paid for by NOAA's Canadian and French partners, which have already contributed approximately \$100 million to the project.

### President's FY 2016 Budget Request:

- The President requested \$500 thousand for SIDAR, \$6.8 million below the FY 2015 enacted budget.
- NOAA requested this significant decrease "to plan for the accommodation of the Argos Advanced Data Collection System (A-DCS) and Search and Rescue Satellite Aided Tracking (SARSAT) instruments." Both are slated for launch in 2019.
- Additionally, "the Total Solar Irradiance Spectrometer (TSIS) instrument was developed by NOAA and transitioned to NASA in FY 2015." It will be launched and operated by NASA next year.
- NOAA "will continue to operate the Total Solar Irradiance Calibration Transfer Experiment (TCTE) instrument to provide the bridge between the Solar Radiation and Climate Experiment (SORCE) and TCTE. In FY 2016 and beyond, the SIDAR program will consist of A-DCS and SARSAT."

## Deep Space Climate Observatory (DSCOVR)

Budget Authority, \$ in million	Consolidated Approps, 2015 (P.L. 112-235)	President's FY 2016 NOAA Budget Request
DSCOVR	21.100	3.200
<b>Total</b>	<b>21.100</b>	<b>3.200</b>

### Mission

The maintenance and operations of NASA's [Deep Space Climate Observatory \(DSCOVR\)](#) satellite will allow continuity of solar wind data used for geomagnetic storm warnings. NOAA will operate and manage the DSCOVR mission as the front line sentinel to give notice of approaching geomagnetic storms with potentially calamitous consequences for terrestrial electrical grids, communications, GPS navigation, air travel, satellite operations, and human spaceflight. This program was developed in partnership NASA, which refurbished the satellite and developed the ground system, and with the U.S. Air Force (USAF), which provided the launch services for the mission.

DSCOVR will be positioned between Earth and the sun, observing and providing advanced warning of particles and magnetic fields emitted by the sun, known as solar wind. Like terrestrial weather in Earth's atmosphere, space weather refers to conditions, like solar wind, in near-Earth space. From its post at the Lagrange point 1 (or L1), approximately one million miles from Earth, DSCOVR will be positioned to provide early warning when the solar wind displays characteristics that cause a geomagnetic storm. Solar wind observations are the only data source to support 15 to 45 minute lead time for geomagnetic storm warnings.

DSCOVR will also carry two earth remote sensing instruments provided by NASA. The Earth Polychromatic Camera (EPIC) that will take continuous full disk images of Earth and the NIST Advanced Radiometer (NISTAR) that will take continuous full disk measurements of the earth's radiation balance. NOAA will provide the level 0 data stream to NASA, and NASA will provide data processing and all higher level data products.

### President's FY 2016 NOAA Budget Request:

- The President requested \$3.2 million for DSCOVR in FY 2016, \$17.9 million below its FY 2015 enacted budget.
- FY 2016 funding will support:
  - Continued support for "routine post- launch maintenance and operations for the DSCOVR mission."
  - Sustained "engineering support for the Mission Operations Center (MOC) located at the NOAA Satellite Operations Facility (NSOF) in Suitland, MD." In addition, "NOAA will provide mission operations, ground systems maintenance, data processing and archiving," as well as "on-orbit support and enhancements to the ground system."

## Space Weather Follow-On

Budget Authority, \$ in million	Consolidated Approps, 2015 (P.L. 112-235)	President's FY 2016 NOAA Budget Request
Space Weather Follow-on	0.00	2.500
<b>Total</b>	<b>0.00</b>	<b>2.500</b>

### Mission

NOAA requests an increase of \$2.5 million to analyze options from the Analysis of Alternatives (AoA) for critical space weather observations and to initiate development of the Space Weather Follow On program. The mission design life for the DSCOVR spacecraft ends in FY 2019. Thus, NOAA will initiate plans and studies in FY 2016 to ensure data continuity for solar wind data. The lack of a DSCOVR replacement will diminish NOAA's ability to provide timely and accurate geomagnetic storm warnings and other space weather services, leaving the U.S public infrastructure more vulnerable to impending space weather storms.

#### President's FY 2016 NOAA Budget Request:

- The President's budget requests \$2.500 million "to plan and initiate development of the Space Weather Follow On program."

## COSMIC 2

Budget Authority, \$ in million	Consolidated Approps, 2015 (P.L. 112-235)	President's FY 2016 NOAA Budget Request
Satellite and Ground Services	6.800	20.000
<b>Total</b>	<b>6.800</b>	<b>20.000</b>

### Mission

The Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC) activity is a six satellite constellation that was launched in 2006 in a joint collaboration between Taiwan, National Science Foundation, NASA, USAF, and University Corporation for Atmospheric Research (UCAR) as a research effort to explore a new, inexpensive atmospheric sounding technique using the U.S. Global Positioning System (GPS) as a sounding signal source. The results were so positive that NOAA started using this data operationally. COSMIC design life was reached in April 2011, one satellite has failed and 2 satellites are in degraded operation, leaving four of the original six satellites in operation.

COSMIC-2 is a continuation of the partnership between the United States (NOAA and USAF) and Taiwan to produce an operational constellation of 12 identical GNSS RO satellites. The COSMIC-2 constellation is expected to provide 10 times the number of daily soundings that COSMIC currently provides, which would increase the benefits to weather forecasting.

#### President's FY 2016 NOAA Budget Request:

- The President requested \$20 million for COSMIC 2, \$13.2 million above its FY 2015 enacted budget.
- FY 2016 funding will support:
  - Completion of “all IT security testing and verification in preparation of the Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC-2) launches”
  - Testing and certification by National Centers for Environmental Prediction (NCEP) of “all University Corporation for Atmospheric Research (UCAR) processing functions” in advance of the FY 2016 and FY 2019 launches
  - “Complete operational testing and validation of the Numerical Weather Prediction Models (NWP) for COSMIC-2. This testing requires 8–12 months of joint operations between NCEP and UCAR before the system can be deemed operational at NWS in support of the first COSMIC-2 launch”
  - Procurement of a set of six radio occultation (RO) sensors, which are “critical to help mitigate the impacts of a potential loss of sounders in that orbit”

## Satellite and Ground Services (SGS)

Budget Authority, \$ in million	Consolidated Approps, 2015 (P.L. 112-235)	President's FY 2016 NOAA Budget Request
Satellite and Ground Services	50.000	58.525
<b>Total</b>	<b>50.000</b>	<b>58.525</b>

### Mission

The goal of NOAA's Satellite Ground Services (SGS) program is to serve as the single organization for planning and execution of all common ground services for NOAA's satellites. NOAA provides satellite operations, data collection, data processing, distribution, and archiving for multiple satellites and will be adding new satellites (e.g., JPSS, GOES-R, DSCOVR, Jason-3) in the future. Many of the existing ground systems (GS), or ground system components, were developed and are operated specifically for each mission or mission set. The GS variations are usually driven by the latest technology available at the time of the GS development rather than differences in mission requirements. As a result of GS technology differences, the staffing for operations and maintenance of each mission is unique, allowing for only very limited cross-staffing and hardware redundancy. To improve efficiency, the SGS is developing a common design and architecture that will be implemented across NOAA and will allow for future cost savings.

### President's FY 2016 NOAA Budget Request:

- The President requested \$58.525 million for Satellite and Ground Services, \$8.525 million above its FY 2015 enacted budget.
- FY 2016 funding will support:
  - Continued implementation of capabilities to process satellite observations into useful products that meet the requirements of NOAA's operational centers and other external users;
  - Sustaining current and legacy ground systems in use at NESDIS facilities, including GOES and POES capabilities;
  - Continued development of the NPOESS Data Exploitation (NDE) capability, started in 2011, that produces products from the Suomi National Polar-orbiting Partnership (SNPP) satellite;
  - Building a foundation for sustaining upcoming satellite systems in NOAA, including the Joint Polar Satellite System (JPSS) satellites and the Geostationary Operational Environmental Satellite R-Series Program (GOES-R); and
  - Planning the transition of the next generation of polar and geostationary satellite programs into the common ground services

## **About the Space Foundation**

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