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NOAA'S FY2018 BUDGET REQUEST FOR SATELLITES

President Trump released a FY2018 “[budget blueprint](#)” on March 16, 2017 providing an overview of his FY2018 request for NOAA and other agencies. It includes no funding figures for NOAA’s satellite programs. The detailed request is not expected to be submitted to Congress for several weeks.

Congress has not yet completed action on NOAA’s FY2017 budget request. See our separate fact sheet on NOAA’s FY2017 budget request for satellites for the status of those deliberations.

Introduction

The National Oceanic and Atmospheric Administration (NOAA) manages the nation’s civilian weather satellite and other operational environmental satellite programs.

NOAA is part of the Department of Commerce and has a broad set of missions that include marine fisheries management, ocean and atmospheric research, and operation of the National Weather Service as well as its satellite programs.

NOAA’s satellite programs are part of NOAA’s National Environmental Satellite, Data and Information Service (NESDIS). The NESDIS budget is separated into two accounts: Operations, Research and Facilities (ORF) and Procurement, Acquisition and Construction (PAC). The PAC account contains funding for acquisition of new satellite systems *and is the only portion of the NESDIS budget tracked in this fact sheet.*

Congress appropriates funding to NOAA as part of the Commerce-Justice-Science (CJS) appropriations bill.

NOAA’s Satellite Programs

Responsibilities for government weather, land imaging, and earth science satellites are split among several agencies. NOAA manages the nation’s civilian weather satellites and, historically, other operational environmental satellite programs. NASA builds and launches earth science satellites for research and technology development purposes. The U.S. Geological Survey operates the government’s Landsat land remote sensing satellites. The Department of

Defense (DOD) has its own weather satellite program as well as classified satellites for intelligence gathering. This fact sheet covers only NOAA's satellite programs and only procurement, acquisition and construction, not operations (which are in the ORF account).

Weather Satellites

NOAA operates two complementary weather satellite systems, one in polar orbit and one in geostationary orbit.

Polar Orbit

Satellites in polar orbit circle Earth's poles, allowing them to view the entire planet. NOAA's current polar orbit satellites are called POES – Polar Orbiting Environmental Satellites. Once in orbit, they are given a designation of "NOAA" followed by a number. NOAA-19, the last of the series, was launched in 2009.

NOAA is now developing a new system called Joint Polar Satellite System (JPSS). JPSS is NOAA's replacement for its portion of the NOAA-DOD-NASA National Polar-orbiting Operational Environmental Satellite System (NPOESS) program that was cancelled in 2010 after years of schedule delays and cost overruns. When JPSS began, NOAA was criticized for its high cost -- \$12.9 billion for four satellites (a total that included about \$4 billion in sunk costs in NPOESS). NOAA reduced the cost from \$12.9 billion to \$11.3 billion by narrowing the definition of what is included in that estimate. As currently formulated, the JPSS program covers the costs of building and operating only the first two JPSS satellites, JPSS-1 and JPSS-2, plus the money NOAA spent on NPOESS. The next two satellites are in a separate budget line item, Polar Follow On, which is described below.

The first two satellites, JPSS-1 and JPSS-2, are expected to be launched in 2017 and 2021. They will be given numbers once they are in orbit. JPSS-1 will become NOAA-20.

NOAA also is part of an international/interagency team building a constellation of small satellites, COSMIC-2, to enhance the accuracy of forecasts using data from the polar orbiting satellites, as discussed below.

Because of the many years between the launch of NOAA-19 and planned launch of JPSS-1, NOAA is using a satellite developed by NASA, Suomi-NPP (S-NPP), as an operational weather satellite even though it was not designed for operational use. S-NPP was launched in 2011. NOAA officials and other policy makers have expressed concern in the past that NOAA-19 and S-NPP might cease functioning before JPSS-1 is launched and a "gap" in weather satellite coverage might occur. The head of NESDIS, Steve Volz, downplayed the chances of a gap at a [February 12, 2015 congressional hearing](#), but a Government Accountability Office (GAO) witness at the hearing was skeptical of those claims. One of GAO's concerns is that the JPSS-1 launch date may slip because of late delivery of instruments, especially the Advanced Technology Microwave Sounder (ATMS). Indeed, it has slipped, most recently from March 2017 to the "fourth quarter" of FY2017, which extends through September 30, 2017.

- **JPSS.** The Trump FY2018 budget blueprint does not specify any funding levels for NOAA satellite programs. Regarding JPSS, it says only that the request “maintains” the development of NOAA’s current JPSS (and GOES) satellites “to remain on schedule.”
- **Polar Follow On (PFO) and EON-MW.** The next two JPSS satellites are being procured under the PFO program. As of 2016, JPSS-3 was expected to be ready for launch in FY2026 and JPSS-4 in FY2031. See prior year versions of this fact sheet for a discussion of the controversy over the PFO program in FY2016 and FY2017.

The Trump FY2018 budget blueprint says the request “achieves annual savings” from the PFO program “by better reflecting the actual risk of a gap in polar satellite coverage....” Exactly what that means will have to await release of the FY2018 detailed budget request, but it suggests that the launch dates for JPSS-3 and JPSS-4 may slip.

- **COSMIC-2 GPS Radio Occultation.** The Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC)-2 program is a constellation of 12 very small (“micro”) satellites built by NOAA in cooperation with Taiwan and the U.S. Air Force. It is a follow on to COSMIC (also known as Formosat-3), a set of six microsattellites launched in 2006.

The satellites use signals from the Global Positioning Satellite (GPS) system for radio occultation (dubbed GPS-RO or GNSS-RO¹) to make measurements of temperature and water vapor throughout the lower parts of the atmosphere. When combined with measurements from polar-orbiting weather satellites, better weather forecasts are enabled.

NOAA’s goal is to have at least two sets of six microsattellites in low Earth orbit, one in equatorial orbit and the other in polar orbit. NOAA also funds the ground system for reception and processing of the COSMIC data.

NOAA originally planned to fund the construction and launch of the satellites, but private sector companies have emerged that want to provide RO data on a commercial basis. See prior year versions of this fact sheet information on the request and appropriations for COSMIC-2 and the debate over obtaining such data from commercial sources instead. NOAA has [stated](#) that as many as 50,000-100,000 RO measurements per day would be useful and COSMIC provides only 2,000-3,000, so there is ample opportunity for other providers of such data.

The Trump FY2018 budget blueprint also supports acquisition of such data from commercial sources saying it will “improve robustness of the low earth orbit satellite architecture by expanding the utilization of commercially provided data to improve weather models.”

¹ GPS is the U.S. satellite system for positioning, navigation and timing (PNT) data. Russia, China and Europe have their own systems (GLONASS, Beidou and Galileo). Collectively they are referred to as Global Navigation Satellite Systems (GNSS). The COSMIC-2 satellites can use any of the signals.

Geostationary Orbit

The other weather satellite system is in geostationary orbit 35,800 kilometers above the equator where satellites maintain a fixed position relative to a point on Earth. Such weather satellites are especially useful for monitoring tropical regions where hurricanes form. NOAA keeps one Geostationary Operational Environmental Satellite (GOES) over the eastern region of the United States and adjacent waters and another over the western region. Whatever satellites are in those positions are designated “GOES-East” and “GOES-West.” NOAA typically also keeps a spare satellite in between those two positions that can be moved quickly to replace a malfunctioning satellite if necessary (as happened in [2012](#) and [2013](#)). The GOES-13 satellite is now GOES-East and GOES-15 is GOES-West, with GOES-14 as the spare.

NOAA is procuring four new [significantly enhanced](#) GOES satellites – a block buy called the GOES-R series. Initially given letter designations (GOES-R, -S, -T and -U), they will change to numbers once they are in orbit. GOES-R was successfully launched in November 2016 and is now GOES-16. However, the series is still colloquially referred to as “GOES-R.”

The Trump FY2018 budget blueprint does not provide funding figures for GOES, but states that the request will maintain the development of GOES (and JPSS) “to remain on schedule.”

Other Operational Environmental Satellites

NOAA also is responsible for other satellite projects in partnership with NASA, the Air Force or other countries to obtain data to forecast “space weather” (DSCOVR), obtain ocean altimetry data (Jason-3), provide search and rescue capabilities via satellite (SARSAT), and collect data from ocean buoys around the globe (A-DCS).

Space Weather

- **DSCOVR.** The Deep Space Climate Observatory (DSCOVR) monitors “space weather” caused by particles ejected by the Sun that impact Earth’s atmosphere and can result in satellite failures or power outages on Earth, for example. It also has a camera that provides a constant view of Earth from its position at the Sun-Earth L1 Lagrange point between the Earth and the Sun (1.5 million kilometers from Earth). It was successfully [launched](#) on February 11, 2015.

DSCOVR originated in the Clinton Administration where it was championed by Vice President Al Gore. His goal was to have a satellite that provided a constant view of Earth to help remind everyone of the fragility of the planet and its climate. He named the spacecraft Triana, but it was harshly criticized by Republicans in Congress and dubbed “Goesat.” After a review by the National Academy of Sciences, science instruments were added to make it more scientifically valuable, but President George W. Bush suspended the program when he took office. The satellite remained in storage throughout most of the Bush term, but was resurrected and launched during the Obama Administration.

The Trump FY2018 budget blueprint for NASA (not NOAA) terminates funding for “DSCOVR Earth-viewing instruments,” an apparent reference to the Earth Polychromatic Imaging Camera (EPIC), which NASA built. NASA’s FY2017 budget book states that all operations associated with DSCOVR have been transferred to NOAA, however, so it is not clear what is left in the NASA budget. In any case, the Trump proposal does not apparently affect the space weather aspects of the mission that are most directly related to NOAA’s responsibilities.

- **Space Weather Follow-On.** NOAA requested small amounts of money in FY2016 and FY2017 (see prior year versions of this fact sheet) to begin analyzing alternatives for the next space weather satellite.

The Trump FY2018 budget blueprint does not mention this mission area.

Other Programs

- **Jason-3.** This is the third in a series of Jason satellites that provide ocean altimetry data following on the success of the Topex/Poseidon satellite. That satellite and the first two Jasons were experimental and funded by NASA and its French counterpart, CNES. Data collection transitioned into an operational mode and since NOAA historically was responsible for operational environmental satellites, Jason-3 was funded by NOAA and its European counterpart the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). NASA and CNES remained involved as partners. Jason-3 was successfully [launched](#) in January 2016.

In the FY2016 budget request, however, the Obama Administration [proposed](#) that NASA assume responsibility for all non-military environmental satellites other than weather and space weather. Therefore, future ocean altimetry satellites are to be funded by NASA; the expectation is that they will continue to be international.

NOAA will still fund Jason-3 operations, however. The Trump FY2018 budget blueprint does not mention this mission area.

- **Cooperative Data and Rescue Services (CDARS, formerly SIDAR).** In FY2015 and FY2016, NOAA requested funds for a Solar Irradiance, Data and Rescue (SIDAR) program to replace the Polar Free Flyer (PFF) in NOAA’s FY2014 budget request, which was zeroed by Congress. The goal is to find a way to launch three instruments – Total Solar Irradiance Sensor (TSIS), Advanced Data Collection System (A-DCS), and Search and Rescue Satellite-Aided Tracking (SARSAT) – that were intended to be launched on the cancelled NPOESS satellites (explained earlier). The JPSS spacecraft that replaced NPOESS are too small to accommodate these three instruments and NOAA has been trying to find an alternative way to get them into orbit. SIDAR was not popular in Congress, and the TSIS sensor was transferred to NASA.

By FY2016, what remained in this line item was funding for A-DCS and SARSAT. For FY2017, the account's name was changed to CDARS (the NOAA budget book does not describe this request in the text, but it is listed in the tables), although the House Appropriations Committee refers to it with last year's title -- "Solar Irradiance, Data and Rescue." See prior year issues of this fact sheet for information on what transpired in FY2015, FY2016 and FY2017. The Trump FY2018 budget blueprint does not mention this mission area.

Commercial Weather Data Pilot

Congress directed NOAA to initiate a commercial weather data pilot program in the FY2016 appropriations act to determine if weather data from commercial companies can be utilized in NOAA's weather models. Language in the accompanying explanatory report directed NOAA to seek to enter into at least one pilot contract, through a competitive process, to assess the potential viability of commercial weather data in its weather modeling and forecasting. NOAA officials expressed concern about whether commercial data will be accurate, reliable, timely, and can be validated. The pilot program is intended to answer those questions.

NOAA was required to submit an implementation plan for the pilot program. It provided the report to Congress in March 2016 and [made it public](#) in April. The pilot program will focus on radio occultation (RO) data, discussed earlier. See prior year versions of this fact sheet for funding in FY2016 and FY2017.

As noted earlier, the FY2018 Trump budget blueprint supports acquisition of data from commercial sources saying it will "improve robustness of the low earth orbit satellite architecture by expanding the utilization of commercially provided data to improve weather models."

Other NESDIS Satellite-Related Activities

The PAC account in NESDIS also funds satellite ground services; systems architecture and advanced planning; and projects, planning and analysis.

"Satellite CDA" is sometimes listed as part of the NEDSIC PAC account. It is a construction project and therefore not covered in this fact sheet.

**NOAA's FY2018 Budget Request for Satellite System Acquisition
(in \$ thousands)**

Program	FY2015 enacted	FY2016 enacted	FY2017 Request ⁴	FY2018			
				Request	House	Senate	Final
GOES-R	980,838	871,791	752,784				
Jason-3	23,175	7,458	4,357				
JPSS	916,267	808,966	787,246				
Polar Follow On (PFO) (EON-MW ^{Note 3})	N/A	380,000 (370,000) (0)	393,000 (383,000) (10,000)				
Coop Data/Rescue Services (CDARS)	7,300	500	500				
DSCOVER	21,100	3,200	3,745				
Space Wx FO	N/A	1,200	2,500				
COSMIC-2 (ground system) (new sats/data)	6,800	10,100 (10,100) (0)	16,200 (8,100) (8,100)				
Satellite Grnd Services	50,000	54,000	59,025				
Sys Architecture & Adv Planning	3,000	3,929	4,929				
Projects, Planning & Analysis	25,200	25,200	33,488				
Commercial Weather Data Pilot	--	3,000	5,000				
TOTAL	2,033,680	2,159,344	2,062,774				

Source: FY2015 and FY2016 enacted and FY2017 request data from Department of Commerce budget documents.

Note 1: Text and numbers in parentheses are subsets. NA = not applicable.

Note 2: This fact sheet does not track spending for the other NESDIS budget account, Operations, Research and Facilities (ORF), so the totals shown here may not conform to other sources. The ORF budget funds satellite OPERATIONS rather than acquisition and is not tracked in this fact sheet. The Senate

Appropriations Committee report usually includes another line – “satellite CDA facility” – that is not tracked in this fact sheet because it is a construction project, not a satellite system. The House Appropriations Committee report separates the satellite CDA facility from the other spending.

Note 3: The Earth Observing Nanosatellite-Microwave (EON-MW) project is variously listed in NOAA budget documents as part of PFO or separately.

Note 4: For action on the FY2017 request, see the FY2017 version of this fact sheet.