NOAA’S FY2017 BUDGET REQUEST FOR SATELLITES

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.

NOAA’s complete FY2017 budget request is available in NOAA’s FY2017 budget “blue book.” The portion of the NOAA/NESDIS budget request covered in this fact sheet is referred to in the blue book as NESDIS Systems Acquisition.

Congress appropriates funding to NOAA as part of the Commerce-Justice-Science (CJS) appropriations bill. Hearings on NOAA’s request are expected in the next several weeks.

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.
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).

- **JPSS.** For FY2017, NOAA is requesting $787.246 million for JPSS, a reduction from the $808.966 million appropriated in FY2016 because the program has passed its peak funding level.
• **Polar Follow On (PFO) and EON-MW.** The next two JPSS satellites are being procured under the PFO program. JPSS-3 is expected to be launched in FY2026 and JPSS-4 in FY2031.

The first PFO request was in FY2016 and it was quite controversial (see our [FY2016 NOAA fact sheet](#)), but Congress ultimately approved the full $370 million request.

The FY2016 request included $10 million for an Earth Observing Nanosatellite-Microwave (EON-MW) that was variously listed as part of the PFO request or as a separate request, so in some cases the PFO request was listed as $380 million. Congress denied the $10 million for EON-MW.

For FY2017, NOAA is requesting $393 million for PFO. Like last year, that includes $10 million for EON-MW, so the PFO request alone is $383 million as shown on page 35 of NOAA’s budget blue book. That document describes EON-MW as “a risk reduction mission aimed at mitigating the impact of a potential loss of the most critical microwave sounding observations in the event of a launch or instrument failure on JPSS-1.”

• **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 microsatellites 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.

The goal is to have two sets of six microsatellites 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. For FY2016, NOAA requested $20.1 million -- $10.1 million for the ground system and $10 million for new satellites -- but Congress approved only the funding for the ground system because of its interest in the possibility of acquiring future data commercially.

For FY2017, NOAA is requesting $16.2 million for COSMIC 2/GNSS RO: $8.1 million for the ground system and $8.1 million for RO data from polar orbiting satellites. It says

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¹ GPS is the U.S. satellite system for positioning, navigation and timing (PNT) data. Russia and China have their own systems (GLONASS and Beidou) and Europe is building one (Galileo). Collectively they are referred to as Global Navigation Satellite Systems (GNSS). The COSMIC-2 satellites can use any of the signals.
it will pursue the acquisition of the data “either through purchase and integration of commercial data or development of a second set of COSMIC-2 sensors.”

Geostationary Orbit

The other 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 GOES satellites – a block buy called the GOES-R series. At this point they have letter designations (GOES-R, -S, -T and –U), which will change to numbers once they are in orbit. GOES-R was scheduled for launch in March 2016, but in December 2015 NOAA announced a six-month slip to October 2016. The reasons were not specified.

The FY2017 request for GOES-R is $752.784 million, a reduction from the $872 million in FY2016 as the program has passed its peak funding level.

Other Operational Environmental Satellites

NOAA also is responsible for other satellite projects in partnership with NASA, the Air Force or other countries and a pilot program to acquire and utilize commercial weather data.

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 was successfully launched on February 11, 2015.

  NOAA is requesting $3.745 million for DSCOVR in FY2017, slightly more than the $3.2 million appropriated for FY2016. NOAA explains that the additional funding is to continue funding for a “tech refresh” of the ground system, anomaly support and IT security upgrades. NOAA says the satellite has experienced more anomalies than anticipated since its launch.

- **Space Weather Follow-On.** NOAA requested $2.5 million in FY2016 to begin analyzing alternatives for the next space weather satellite, but Congress appropriated about half that ($1.2 million). For FY2017, NOAA is again requesting $2.5 million.
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. The data collection is transitioning into an operational mode so Jason-3 is funded by NOAA and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), with NASA and CNES as partners in the program. Jason-3 was successfully launched in January 2016.

For FY2017, NOAA is requesting $4.357 million for JASON-3 operations. Future satellites to provide ocean altimetry data are to be funded by NASA and will continue to be international.

- **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 since-cancelled NPOESS satellites (explained earlier). The JPSS spacecraft that replaced NPOESS are too small to accommodate these three instruments and NOAA is 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. Congress approved the $500,000 request.

For FY2017, the account’s name has been changed to CDARS and $500,000 is again requested. (The NOAA budget book does not, in fact, describe this request in the text, but it is listed in the tables.)

- **Commercial Weather Data Pilot.** The final FY2016 appropriations bill included $3 million for a commercial weather data pilot program. Language in the accompanying explanatory report directs 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. The $3 million is to purchase, evaluate and calibrate such data. NOAA is requesting $5 million for FY2017. (NOAA’s budget tables use “commercial weather data pilot” as the name of this line item, but the Department of Commerce budget document calls it Competitive/Adaptive Data Exploitation.)

The PAC account in NESDIS also funds satellite ground services; systems architecture and advanced planning; and projects, planning and analysis.
# NOAA’s FY2017 Budget Request for Satellite System Acquisition

(in $ thousands)

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<tr>
<th>Program</th>
<th>FY2015 enacted</th>
<th>FY2016 enacted</th>
<th>FY2017 request</th>
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Source: Budget request data from Department of Commerce budget documents.

Notes: (1) This fact sheet does not track spending for the other NESDIS budget account, Operations, Research and Facilities (ORF). Text and numbers in parentheses are subsets. NA = not applicable.

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