

## **NOAA Satellite and Information Service: Polar-orbiting Satellite Launch Policy**

### **I. Purpose and Scope**

To establish objective criteria for determining launch dates for NOAA's polar-orbiting operational environmental satellites.

This Order applies to NOAA's atmospheric imaging and sounding satellites operating in the afternoon orbit (i.e., the Joint Polar Satellite System, the successor satellites to NOAA-18 and NOAA-19). This order does not apply to special purpose satellites that collect data other than atmospheric imaging and sounding or to secondary payloads on atmospheric imaging and sounding satellites.

The implementation of this Order shall be the responsibility of the National Environmental Satellite, Data, and Information Service (NESDIS) in consultation with other NOAA Line Offices and the NOAA Administrator.

### **II. Policy**

The civil operational polar-orbiting constellation shall consist of satellites in two orbits. The National Oceanic and Atmospheric Administration (NOAA) shall supply the satellites for the afternoon orbit and, since 2006, the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) supplies the satellites for the mid-morning orbit. This two-orbit constellation provides the data needed to provide accurate predictions to meet NOAA's weather forecasting, climate monitoring, and ocean and coastal observing requirements.

It is NOAA policy that the civil polar-orbiting environmental satellite program achieve a threshold of 90 percent probability of data availability from at least one satellite and a threshold of 70 percent probability of data availability from each of the two operational orbits (mid-morning and afternoon). Combining two satellites in different orbits, each with a 70 percent or better probability of availability, results in a 91 percent or better probability of operational data being available.

- If the satellites in a given orbit are launched at a rate that maintains the probability of having a functional satellite in that orbit at or above 70 percent, the probability of a satellite failing in that orbit is 30 percent or less. If two orbits are maintained, each at an availability of 70 percent, the probability of both satellites failing is 30 percent x 30 percent, or 9 percent ( $0.3 \times 0.3 = 0.09$ ). With a 9 percent chance of failure, there is a 91 percent chance of no failure. Thus, two complementary on-orbit satellites, each maintained at 70 percent probability of availability, allow the requirement for 90 percent operational data availability to be met. (EUMETSAT does not have an explicitly stated 70 percent launch policy, but their satellite replacement planning roughly equates to such a policy.)

- These probabilities are those deemed necessary to ensure that numerical weather prediction does not degrade due to the lack of satellite data inputs to the models.

The NESDIS Joint Polar Satellite System Office shall conduct a probability of satellite data availability, every six months, using the Generalized Availability Program (GAP) tool. JPSS launches shall be scheduled to occur no later than when the probability of data availability is projected to decline to 70 percent.

The critical sensors on polar-orbiting satellites are the imager, the infrared sounder, and the microwave sounder. If one of these three instruments fails on the operational satellite (i.e., the newest satellite in that orbit), and no similar instrument continues to provide acceptable data from one of the older satellites in that same orbit, then the launch call-up process described below shall be initiated.

### **III. Afternoon Orbit Launch Call Up Process**

Responsibilities:

- NESDIS Office of Satellite and Product Operations (OSPO). Assesses existing NOAA and EUMETSAT on-orbit assets and recommends actions that may postpone the need for a launch call-up or mitigates the loss or reduction of data during the call-up and launch campaign. The NESDIS Center of Satellite Applications and Research (STAR), in consultation with major users, determines the impact to satellite products and users as a consequence of data loss. This assessment should determine the quantitative loss of product output and/or the quality of data still being generated. Recommends call-up, if warranted.
- NESDIS Joint Polar Satellite System Office (JPSS). Coordinates all NPP and JPSS satellite sensor assessment activities, assesses the readiness of new satellites for launch, and supports briefings to higher management in NESDIS and NOAA, as appropriate. Maintains the official data availability analyses for the JPSS satellite constellation.

Factors to be Assessed:

- By the Office of Satellite Products and Operations:
  - Whether older polar spacecraft, in the required orbit with functioning instrument(s), are available to provide data continuity on at least an interim basis.
  - Product impact to users and their ability to compensate with other data sources (e.g., ancillary and/or other space-based platforms).
  - The operational condition of all in-orbit NOAA polar spacecraft. In particular, the extent to which other spacecraft or critical spacecraft instruments are displaying indications of early failure.

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- By the Joint Polar Satellite System Office
  - Availability of launch vehicles and spacecraft/launch vehicle integration facilities.
  - Possible conflicts in access to launch pads and launch support facilities.
  - Required post-launch calibration and validation requirements and timing to help identify length of potential data gap in coverage.
  - Ability of the ground system to manage near concurrent satellite acquisitions and data processing.
  - Likelihood of executing spacecraft end-of-life procedures, including a mandatory controlled deorbit or other procedures required by treaties and national space policy.

**Launch Call-Up Process:**

NESDIS OSPO informs NESDIS JPSS that a satellite call-up is warranted due the failure of a satellite or satellite instrument or other criteria resulting in execution of end-of-life procedures.

NESDIS JPSS determines if a satellite can be called up for launch and recommends call-up to the NESDIS Assistant Administrator (AA).

NESDIS AA briefs NWS AA to obtain concurrence with the call-up decision.

NESDIS AA notifies other NOAA AAs and NOAA's Climate Goal Lead.

NESDIS AA and NWS AA brief the NOAA Deputy Under Secretary (Operations), the NOAA Deputy Administrator, and the NOAA Administrator on the launch call up decision.

NOAA directs NASA to launch the next JPSS satellite into the specified orbit within the designated time frame.

Appropriate NOAA Headquarters corporate office directors notify the Department of Commerce, the Office of Management and Budget, Congressional committee staff, and the press.

#### IV Mid-Morning Orbit

The call-up of satellites for launch into the mid-morning orbit is the responsibility of EUMETSAT. NOAA, however, as a user of the mid-morning satellite data, has a strong interest in ensuring that critical imaging, infrared sounding, and microwave sounding data from these satellites continues without interruption. OSPO, STAR and the Office of Systems Development will work closely with EUMETSAT when one of their satellites is not meeting NOAA's mission needs. OSPO will ensure NOAA users are kept informed of satellite status and details impacting call-up decisions. If necessary, the NESDIS AA will recommend to EUMETSAT that a launch call-up take place.

Approved By:

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Date