The GeoXO Program: Cost and Schedule Baselines Are Established, But NOAA Should Evaluate Plans for the Central Satellite Mission and Revise Its Approach to Performance Gains to Provide the Best Overall Value

FINAL REPORT NO. OIG-23-028-A
September 20, 2023

U.S. Department of Commerce
Office of Inspector General
Office of Audit and Evaluation

UNITED STATES DEPARTMENT OF COMMERCE
Office of Inspector General
Washington, D.C. 20230

September 20, 2023

MEMORANDUM FOR: Richard W. Spinrad, Ph.D.
Under Secretary of Commerce for Oceans and Atmosphere and
NOAA Administrator
National Oceanic and Atmospheric Administration

FROM: Frederick J. Meny, Jr.
Assistant Inspector General for Audit and Evaluation

SUBJECT: *The GeoXO Program: Cost and Schedule Baselines Are Established, But NOAA Should Evaluate Plans for the Central Satellite Mission and Revise Its Approach to Performance Gains to Provide the Best Overall Value*
Final Report No. OIG-23-028-A

Attached for your review is our final report on the audit of the National Oceanic and Atmospheric Administration's (NOAA's) Geostationary Extended Observations (GeoXO) program. Our audit objective was to assess NOAA's progress in defining GeoXO's mission and establishing programmatic baselines.

We found the program should:

I. Evaluate its plans for the Central satellite mission.

II. Improve its approach to achieving performance gains.

In response to our draft report, NOAA concurred with all our recommendations and described actions it has taken, or will take, to address them. NOAA also provided technical comments, which we address in the Summary of Agency Response and OIG Comments section of this report. We considered the comments but did not make any changes to the report. NOAA's full response is included within the final report as appendix D.

Pursuant to Department Administrative Order 213-5, please submit to us an action plan that addresses the recommendations in this report within 60 calendar days. This final report will be posted on the Office of Inspector General's website pursuant to the Inspector General Act of 1978, as amended (5 U.S.C. §§ 404 & 420).

We appreciate the cooperation and courtesies extended to us by your staff during this audit. If you have any questions or concerns about this report, please contact me at (202) 793-2938, Kevin Ryan, Director for Audit and Evaluation, Systems Analysis and NOAA Programs, at (202) 750-5190, or Edward Kell, Director for Audit and Evaluation, Satellite Programs, at (202) 753-6125.

Attachment

cc: Jainey K. Bavishi, Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy NOAA Administrator
Michael C. Morgan, Assistant Secretary of Commerce for Environmental Observation and Prediction, NOAA
Benjamin Friedman, Deputy Under Secretary for Operations, NOAA
Stephen Volz, Assistant Administrator for Satellite and Information Services, NOAA
Karen Hyun, Chief of Staff, NOAA
Kelly Turner, Chief of Staff, National Environmental Satellite, Data, and Information Service, NOAA
Pam Sullivan, System Program Director, Geostationary Operational Environmental Satellite-R (GOES-R) and GeoXO Program Office, NOAA
Kevin Fryar, Chief of Staff, GOES-R and GeoXO Program Office, NOAA
Mary Ann Mausser, Audit Liaison, Office of the Secretary
Tanisha Bynum-Frazier, Director, Audit and Information Management Office, NOAA
Joel Yoffee, Alternate Audit Liaison, NOAA

Report in Brief

September 20, 2023

Background

The National Oceanic and Atmospheric Administration's (NOAA's) Geostationary Extended Observations (GeoXO) program will provide the next generation of satellites in geostationary earth orbit, replacing Geostationary Operational Environmental Satellite-R (GOES-R) Series satellites, in the early 2030s to mid-2050s. The GeoXO program (the program) is developing new technology and scientific advancements that will allow for improved environmental observations for weather tracking and forecasting and provide new capabilities to support NOAA missions. The program is the responsibility of NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) and, like other NESDIS satellite programs, is a partnership with National Aeronautics and Space Administration (NASA).

As currently planned, the GeoXO system will consist of three operational satellites at West, East, and Central locations over the Western Hemisphere. The program plans to launch six satellites.

The program has progressed through various stages of procurement. A key challenge for the program will be to mature the technology of new instruments and their respective subsystems. The program must ensure that new technology is sufficiently mature by the instruments' preliminary design review, planned for 2025. In addition, the program needs to identify the Central satellite's partner-provided instrument prior to the preliminary design review to resolve uncertainties related to it.

Why We Did This Review

Our audit objective was to assess NOAA's progress in defining GeoXO's mission and establishing programmatic baselines.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

The GeoXO Program: Cost and Schedule Baselines Are Established, But NOAA Should Evaluate Plans for the Central Satellite Mission and Revise Its Approach to Performance Gains to Provide the Best Overall Value

OIG-23-028-A

WHAT WE FOUND

Overall, we found that the program has defined its operational capabilities to support meeting its mission requirements. Also, the program has established cost and schedule baselines but continues to refine its initial requirements. In reviewing the program's mission baselines, we found that the program should evaluate its plans for the Central satellite mission.

The program's current plan to provide a high level of system availability for the non-core Central satellite mission would—according to NESDIS' own guidelines—result in little or no additional value. Revising the program's plans would enable it to put funds to better use. The estimated cost of the second Central satellite for fiscal years 2024 and 2025 is $32,800,000; implementing recommendation 2 will enable the program to potentially put these funds over the next 2 years to better use.

Specifically, we found that:

I. The Program should evaluate its plans for the Central satellite mission.

II. The Program should improve its approach to achieving performance gains.

WHAT WE RECOMMEND

We recommend that the NOAA Deputy Under Secretary for Operations ensure that NESDIS:

1. Updates GeoXO's Central satellite plans to align with the expected availability level to determine cost and performance tradeoffs.

2. Assesses the cost and performance tradeoffs of the second Central satellite to put its planned funds to better use.

We recommend that the NOAA Deputy Under Secretary for Operations direct the Assistant Administrator for Satellite and Information Services to:

3. Ensure remaining GeoXO procurements specify contract requirements for desired performance gains with threshold and objective values to provide more transparency for cost and performance tradeoffs.

4. Ensure future satellite system acquisitions define both threshold and objective contract requirements for desired performance gains.

Contents

Cover: Herbert C. Hoover Building main entrance at 14th Street Northwest in Washington, DC. Completed in 1932, the building is named after the former Secretary of Commerce and 31st President of the United States.

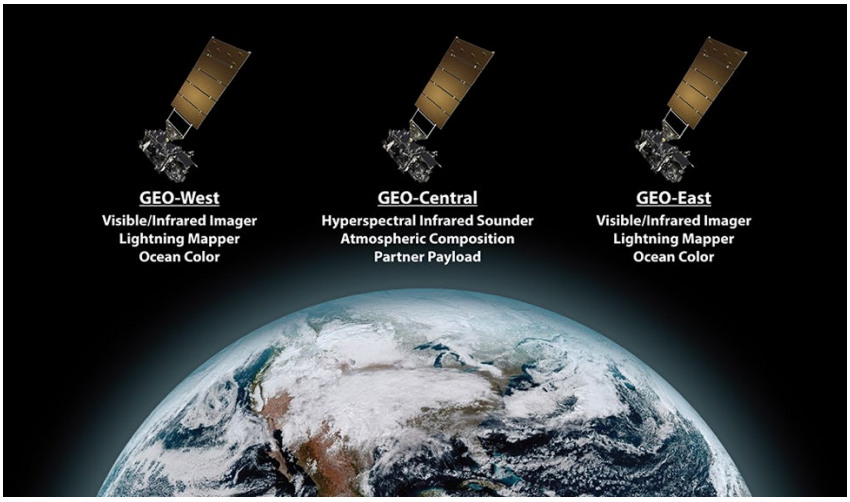
Introduction

The National Oceanic and Atmospheric Administration's (NOAA's) Geostationary Extended Observations (GeoXO) program will provide the next generation of satellites in geostationary earth orbit, replacing Geostationary Operational Environmental Satellite-R (GOES-R) Series satellites, in the early 2030s to mid-2050s. The GeoXO program (the program) is developing new technology and scientific advancements that will allow for improved environmental observations for weather tracking and forecasting and provide new capabilities to support NOAA missions. The program is the responsibility of NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) and, like other NESDIS satellite programs, is a partnership with National Aeronautics and Space Administration (NASA).

As currently planned, the GeoXO system will consist of three operational satellites at West, East, and Central locations over the Western Hemisphere, as shown in figure 1. The satellites will host Earth-observing instruments:

- West and East locations: Visible/Infrared Imager, Lightning Mapper, and Ocean Color Instruments
- Central location: Hyperspectral Infrared Sounder, Atmospheric Composition Instruments, and an instrument provided by another federal or international partner that has yet to be identified.

Figure 1. GeoXO System



Source: GeoXO Program

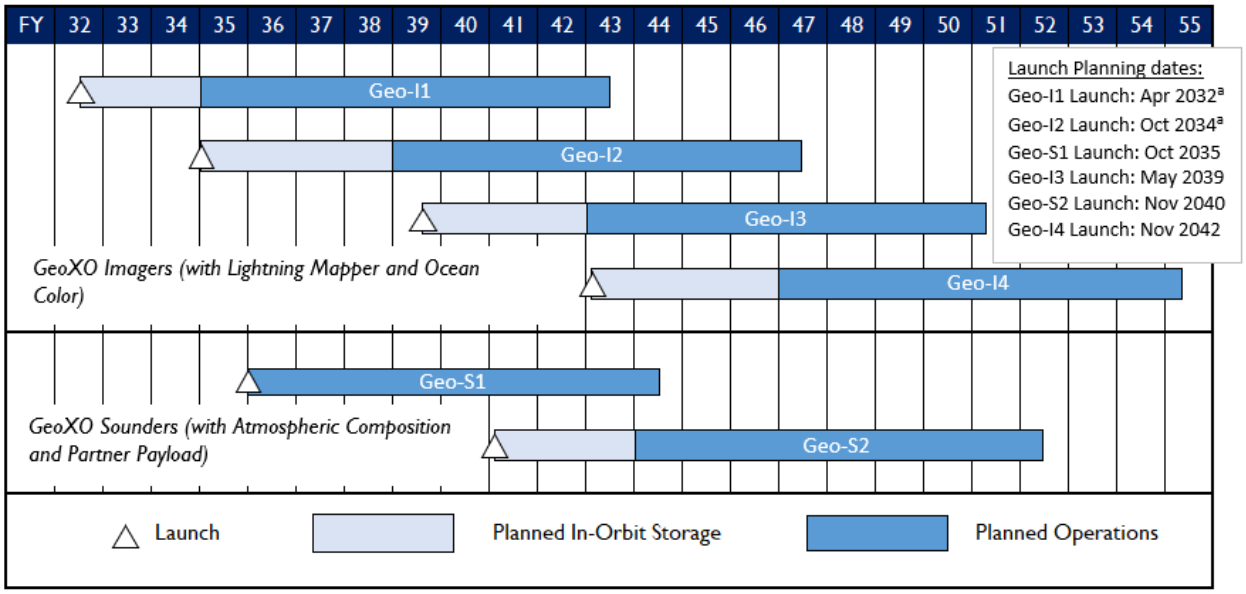
Note: Geostationary satellites maintain a constant view of the Earth from approximately 22,300 miles away.

GeoXO will continue some legacy capabilities of GOES-R series satellites and provide new observations as well. GeoXO requirements for visible/infrared imagery and lightning mapping will improve upon GOES-R capabilities for these observations. The hyperspectral infrared sounder, ocean color instrument, and atmospheric composition instruments will provide new

capabilities from geostationary orbit. For a description of the GeoXO instrument capabilities, see appendix B.

The program plans to launch six satellites in total, as shown in figure 2. The plan includes four West or East "imager" satellites (Geo-I1 to Geo-I4) and two Central "sounder" satellites (Geo-S1 and Geo-S2).

Figure 2. GeoXO Satellite System



Source: Office of Inspector General (OIG) derived from GeoXO program documentation

[a] Updated Geo-I1 and -I2 launch planning dates as of June 2023.

In December 2022, the U.S. Department of Commerce's (Department's) Deputy Secretary of Commerce approved the program's Milestone 2/3, allowing it to proceed to the development and execution phases of the Department's Acquisition Project Management Framework.[1] This baselined the program's life cycle cost estimate of $19.6 billion from fiscal year 2020 to 2055, with satellite missions operating from fiscal year 2032 to 2055.

The program has progressed through various stages of procurement. Starting in fiscal year 2021, the program initiated studies of industry conceptual designs to reduce risk for development contracts. In fiscal year 2023, the program awarded the imager and the sounder development contracts. The program plans to award contracts for the remaining instruments and spacecraft in fiscal year 2024.

[1] Department Administrative Order 208-16 is the implementing guidance for the *DOC* [Department of Commerce] *Acquisition Program and Project Management Framework* for all Department-wide programs and projects. Additional procedures, processes, and document templates can be found in the DOC *Scalable Acquisition Project Management Guidebook*, August 31, 2015, which provides Department project managers with the information needed to conduct cost-effective and efficient acquisitions.

A key challenge for the program will be to mature the technology of new instruments and their respective subsystems. To do this, the program will need to complete component and instrument testing in simulated launch and space environments such as vibration, thermal vacuum, and electromagnetic. The program must ensure that new technology is sufficiently mature by the instruments' preliminary design review, planned for 2025. In addition, the program needs to identify the Central satellite's partner-provided instrument prior to the preliminary design review to resolve uncertainties related to it.

Objective, Findings, and Recommendations

Our audit objective was to assess NOAA's progress in defining GeoXO's mission and establishing programmatic baselines. See appendix A for a more detailed description of our scope and methodology.

Overall, we found that the program has defined its operational capabilities to support meeting its mission requirements. Also, the program has established cost and schedule baselines but continues to refine its initial requirements. In reviewing the program's mission baselines, we found that the program should evaluate its plans for the Central satellite mission. The program's current plan to provide a high level of system availability for the non-core Central satellite mission would—according to NESDIS' own guidelines—result in little or no additional value. Revising the program's plans would enable it to put funds to better use (see appendix C).

In addition, we found that the program can improve its approach to achieving desired performance gains. By defining contract requirements as a range between the minimum capabilities that the program must deliver to users and the desired performance gains, the program would increase transparency into the costs of achieving such gains.

I. The Program Should Evaluate Its Plans for the Central Satellite Mission

In 2018, at the conclusion of NOAA's Satellite Observing System Architecture study *Building a Plan for NOAA's 21st Century Satellite Observing System*, NESDIS identified system *availability* as a strategic objective of its satellite constellations.[2] The term "availability" refers to the probability that a satellite system will fulfill its specified mission over time. Availability for a satellite system is primarily based on satellite reliability and intervals between launches. Reliability is the probability that a system will perform its intended function for a specified period in stated conditions. The reliability of a satellite generally degrades over time due to the space environment and wear; however, additional satellites increase overall system availability. More frequent launches of newer, more reliable satellites also increase a system's availability.

In planning its next-generation satellite systems, NESDIS has defined availability levels for systems providing High-Availability Products (HAPs), which are mission-critical products that the system must provide for mission success, and systems providing non-HAPs.[3] For the GeoXO program, the imager instrument is the only one that provides HAP capabilities. The Central satellite mission's two instruments—sounder and atmospheric composition—will provide non-HAP capabilities.

[2] The study, dated May 31, 2018, was conducted to inform decision-making related to NOAA's future environmental satellite systems. See U.S. Department of Commerce (DOC) NOAA. *Future NOAA Satellite Architecture.* Available online at www.space.commerce.gov/business-with-noaa/future-noaa-satellite-architecture/ (accessed August 2, 2023).

[3] The term "products" refers to data, information, user support, and reports that NESDIS provides to users.

There are three levels of system availability:

- *Minimum effective availability* is the failure level and is typically below the observation performance needed to sustain weather forecasting and warnings.
- *Maximum effective availability* is the point above which little or no additional mission value would be gained.
- *Expected availability* is between the minimum and maximum effective levels and defines trade-space (a range) where performance and cost trades can be established.

Required system availability levels, described as probabilities of mission success, differ from core capabilities (those that support HAP) and non-core capabilities (those that support non-HAP) as shown in table 1.

Table 1. NESDIS System Availability Levels (Percent probabilities of mission success)

Availability Levels	Core Capability (HAP)	Non-Core Capability (Non-HAP)
Minimum Effective	90%	50%
Maximum Effective	95%	90%

Source: NESDIS documentation supporting satellite system architecture plans

According to NESDIS' criteria for expected system availability, GeoXO's core systems (the West and East satellites) should be planned and built to maintain an operational availability between 90 and 95 percent over 15 years. Non-core systems (the Central satellites) should be planned and built to maintain operational availability between 50 and 90 percent over 15 years.

However, the program's current plan for its Central satellite missions will considerably exceed the NESDIS requirement for a non-core capability. The program plans to launch its second Central satellite approximately 5 years after the first satellite. According to the program's own scenario, this would result in the system's availability remaining above 90 percent for 15 years, from 2036 to 2051 (see figure 3).

Providing system availability above the maximum effective level (90 percent)—by NESDIS' own definition—results in little or no additional mission value, and the program may be missing an opportunity to balance performance and cost of those non-core capabilities.

Because the program is still in the early stages of availability planning for its missions and the GeoXO satellites are not yet designed, the program's scenario for the Central satellite mission is based on an availability analysis of the GOES-R imager satellite, which is the equivalent of a HAP, or core capability. The program will not perform an analysis specifically for its Central satellite missions until the system preliminary design review, currently

scheduled for 2025.[4] This analysis will incorporate reliability prediction models of the GeoXO instruments' actual designs.

Figure 3. Central Satellite System Availability (Planned Dates)

Source: OIG derived from GeoXO program documentation (*System Requirements Review*, August 2022)

Note: The shaded area represents the expected availability level of the Central satellite system, according to NESDIS requirements for its satellite constellations.

However, the program's contract documentation specifies HAP-level (or core capability) reliability requirements for the (non-core) Central satellites' instruments and spacecraft. Therefore, the availability curve for the Central satellite mission (based on the GOES-R core capability, shown in figure 3) will not significantly change once designs are complete. According to program officials, specifying HAP-level reliability requirements for all of the program's systems was not a significant cost factor.

If the program increased the interval between launches to allow system availability to fall within the expected availability range, then the Central satellite mission's lifetime could be extended. However, according to program officials, this would require an extension of the program's planned lifetime, which will end in 2055. NOAA and the Department's Milestone Review Board would need to evaluate the cost and feasibility of extending the program.

Program officials told us that a single Central satellite may have the reliability to meet the program's non-core availability requirement over the life of the program. The second Central satellite has an estimated life-cycle cost of $866.4 million.

[4] Program officials indicated that the contractor's designs will have accurate reliability predictions and models when the preliminary design is defined in 2025.

NOAA should consider the cost and performance tradeoffs of changing reliability requirements, extending the launch interval, or eliminating the second Central satellite to put funds to better use.[5]

Recommendations

We recommend that the NOAA Deputy Under Secretary for Operations ensure that NESDIS:

1. Updates GeoXO's Central satellite plans to align with the expected availability level to determine cost and performance tradeoffs.
2. Assesses the cost and performance tradeoffs of the second Central satellite to put its planned funds to better use.

II. The Program Should Improve Its Approach to Achieving Performance Gains

We found that the program is seeking to increase system performance for 13 of its 47 observation requirements. The program revised its requirements for contracts for all five GeoXO instruments in efforts to improve its satellites' observations. For example, the program increased the rate at which its ocean color instrument must update observations within its coverage area from every 240 minutes to every 180 minutes.[6] (See table 2 for details and more examples.)

The program conducted industry studies of its instruments and spacecraft to assess technology readiness, refine performance requirements, and establish achievable, low-risk development goals. Based on this effort, the program defined contract requirements for desired performance gains as single values (e.g., ocean color observations updated every 180 minutes) rather than as a combination of *threshold* and *objective* values. By specifying the desired performance gains as single requirement values, the program in effect makes them threshold requirements for the contractors. Threshold requirements are minimum acceptable performance levels. Contractors and program managers are more likely to prolong schedules and incur higher costs to overcome technical challenges to meet them.

According to systems engineering best practices, as threshold requirements flow from higher-level documents to lower-level, they should not change.[7] However, when performance gains are desired, they can be specified as objective values, which establish goals for improved performance within available resources. The trade space between threshold and objective values allows system developers to pursue increased performance without committing to a requirement that may be too costly or difficult to meet or provide

[5] We identified $32.8 million, the estimated cost of the second Central satellite for fiscal years 2024 and 2025, as funds that could be put to better use (see appendix C).
[6] The ocean color instrument's coverage area includes ocean along the Atlantic, Pacific, and Gulf of Mexico coasts; Puerto Rico; primary Hawaiian Islands; southern Alaska, excluding the Aleutian Islands; and U.S. Great Lakes.
[7] International Council on Systems Engineering. 2015. *Systems Engineering Handbook*, version 4. San Diego, CA: John Wiley & Sons.

minimal performance gain for the additional cost. With a properly designed award fee plan the program can incentivize a contractor to achieve desired performance gains.

Table 2. Examples GeoXO Contract Requirements for Performance Gains

Instrument Requirements	Program Level	Contract Level[a]
Imager Observations Update	15 minutes	10 minutes
Ocean Color Observations Update	240 minutes	180 minutes
Lightning Mapper Data Latency	20 seconds	10 seconds

Source: GeoXO program requirements documentation
[a] Requirements from the instruments' contract documents.

Program officials explained that their approach to defining requirements for desired performance gains also provides margin between program-level and contract requirements. In doing so, program officials hoped to avoid the need for approvals outside of the program when contract requirements cannot be met.[8] However, the program's approach obscures the costs of achieving these performance gains. By defining contract threshold requirements equivalent to higher-level requirements and defining objectives for desired performance gains, the program could better manage cost, schedule, and performance risk and provide stakeholders with greater transparency to cost and performance tradeoffs.

While GeoXO procurement actions are underway, instrument development efforts not yet on contracts could benefit from inclusion of threshold and objective requirements. Using threshold and objective requirements is a fundamental difference from how the program has defined requirements. However, our past work has shown that satellite programs should reassess programmatic assumptions in order to be more effective and efficient. We believe other NESDIS programs still early in the acquisition planning phases could also benefit from pursuing performance gains using this approach.

Recommendations

We recommend that the NOAA Deputy Under Secretary for Operations direct the Assistant Administrator for Satellite and Information Services to:

3. Ensure remaining GeoXO procurements specify contract requirements for desired performance gains with threshold and objective values to provide more transparency for cost and performance tradeoffs.
4. Ensure future satellite system acquisitions define both threshold and objective contract requirements for desired performance gains.

[8] The program would need the NESDIS Assistant Administrator's approval to waive its requirements. Adding margin to contract requirements provides a buffer to the program's requirements that reduces the likelihood that such approvals would be needed.

Summary of Agency Response and OIG Comments

In response to our draft report, NOAA concurred with all our recommendations and described actions it has taken, or will take, to address them. NOAA also provided technical comments, which we considered as described below. NOAA's full response is included in appendix D.

NOAA Technical Comment. NOAA stated, "NESDIS disagrees with the implication that NESDIS finds no value in the second Center satellite: the second satellite provides a spare capability, which would restore operations in the event of a launch or early failure of the first satellite." NOAA also stated that the second Central satellite is needed to meet the required maximum replacement time.

OIG Comment. Our report does not imply that NESDIS finds no value in the second satellite. Rather, our report compares NESDIS' documented guidelines for system availability with the program's plans for providing a high level of availability for the Central satellite mission. Further, our report does not prescribe any particular outcome with regard to the second satellite. Instead, our recommendations are to help structure a proper assessment of cost and performance tradeoffs, which should inform the program's plans.

NOAA Technical Comment. NOAA also stated the potential funds to be put to better use related to recommendation 2 do "not acknowledge the probable long-term life cycle cost increase if the recommendation is followed."

OIG Comment. Our recommendation does not prescribe a particular outcome of the recommendation, only that NOAA assess the cost and performance tradeoffs of the second Central satellite. The assessment would logically include consideration of long-term life cycle costs. NOAA would need to decide what action to take based on the results of the assessment.

We are pleased that NOAA agrees with our recommendations and look forward to reviewing its action plan.

Appendix A: Objective, Scope, and Methodology

Our audit objective was to assess NOAA's progress in defining GeoXO's mission and establishing programmatic baselines. To satisfy our objective, we assessed various aspects of the planning related to GeoXO satellite missions and programmatic milestones and the program's process for managing requirements.

To assess the extent to which NOAA had defined GeoXO's mission and established program baselines, we analyzed various aspects of the planning related to GeoXO satellites missions and programmatic milestones. We examined NESDIS and the program's approach to satellite availability and launch planning. We reviewed the NOAA Satellite Observing System Architecture Study that structured the availability guidance and the NESDIS Office of Systems Architecture and Advance Planning decision-making documentation. We compared estimates of availability from the systems requirement review and milestone review supporting documentation to NESDIS' and program's requirements established for mission performance. In addition, we reviewed NASA guidance related to program and project management requirements, risk classifications, and reliability standards. We also interviewed personnel from the GeoXO program and Office of Systems Architecture and Advance Planning to understand the availability and launch planning processes.

To assess requirements management, we identified applicable criteria from NOAA and NASA policies as well as industry best practices for systems engineering. We assessed the program's response and actions as a result of milestone reviews. We also met with program personnel to understand the requirements flow down process. We then traced and examined each observation requirement flowed from the program level to the contractor level for each instrument.

To better understand auditee perspectives on program plans, we interviewed key personnel from the Department's Office of Acquisition Management, NESDIS, and program leadership. We also observed the program's systems requirement review in August 2022 to gain deeper insight into the program's transition from project definition to project development phase.

In addition, we assessed internal controls that are significant within the context of our objective. This included examining the design of management controls as documented in program-level management plans, which incorporate NASA procedural requirements. We assessed the implementation of internal control through document reviews and interviews with key personnel to determine adherence to standards, procedures, and plans. We did not have any specific internal control weaknesses included within the findings of this report.

Although we could not independently verify the reliability of all the information we collected, we compared it with other available supporting documents to determine data consistency and reasonableness. Based on these efforts, we believe the information we obtained is sufficiently reliable for the purposes of this report.

We conducted our audit from August 2022 through May 2023 under the authority of the Inspector General Act of 1978, as amended (5 U.S.C. §§ 401-424), and Department Organization Order 10-13, as amended October 21, 2020. We performed our fieldwork remotely.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

Appendix B: GeoXO Suite of Instruments

Table 3. GeoXO Instrument Descriptions

Instrument	Description	Heritage
Imager	A multi-channel imager to observe the Western Hemisphere and provides data of the Earth's surface, atmosphere, and cloud cover.	Advanced Baseline Imager is the primary instrument aboard the GOES-R Series first launched in 2016. The Japanese Advanced Himawari Imager was an instrument on Himawari-8 and Himawari-9 launched in 2014 and 2016, respectively.
Lightning Mapper	A single-channel, near-infrared detector to locate and measure the intensity, duration, and extent of lightning flashes.	Geostationary Lightning Mapper is an instrument on the GOES-R Series first launched in 2016.
Sounder	A hyperspectral, infrared-sounding instrument that will provide real-time vertical profiles of atmospheric moisture, winds, and temperature. This will be the United States' first hyperspectral infrared sounder in geostationary orbit.	Cross-track Infrared Sounder is an instrument on the Joint Polar Satellite System first launched in 2011.
Atmospheric Composition	A multi-channel sensor that measures a wide spectrum of light from ultraviolet to visible.	Tropospheric Emissions: Monitoring of Pollution is an instrument on Intelsat 40e communications satellite launched in 2023. South Korea's Geostationary Environment Monitoring Spectrometer instrument is on the GEO-KOMPSAT-2B satellite launched in 2020.
Ocean Color	A multi-channel instrument that analyzes ocean data to provide observations (up to hourly) to assess ocean productivity, ecosystem change, coastal and inland water quality, seafood safety, and hazards like harmful algal blooms.	Korea's Geostationary Ocean Color Imager was flown on Communication, Ocean, and Meteorological Satellite that was launched in 2010.

Source: OIG adapted from GeoXO documentation and other government websites

Appendix C: Potential Monetary Benefits

Table 4. GeoXO Costs of Second Central Satellite for Fiscal Years 2024 and 2025

Finding and Recommendation	Funds to Be Put to Better Use
Finding I. and recommendation 2	$32,800,000[a,b]

Source: OIG analysis of GeoXO program documentation

[a] The estimated cost of the second Central satellite for fiscal years 2024 and 2025 is $32,800,000; implementing recommendation 2 will enable the program to potentially put these funds over the next 2 years to better use.

[b] The second Central satellite has an estimated life-cycle cost of $866,400,000.

Appendix D: Agency Response

UNITED STATES DEPARTMENT OF COMMERCE
Deputy Under Secretary for Operations
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

MEMORANDUM FOR: Frederick J. Meny, Jr.
Assistant Inspector General for Audit and Evaluation

FROM: Benjamin P. Friedman
Deputy Under Secretary for Operations
National Oceanic and Atmospheric Administration
Date: 2023.08.29 13:09:58 -04'00'

SUBJECT: *The GeoXO Program: Cost and Schedule Baselines Are Established, But NOAA Should Evaluate Plans for the Central Satellite Mission and Revise Its Approach to Performance Gains to Provide the Best Overall Value*
Draft Report

The Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) is pleased to submit the attached response to the draft report on the Geostationary Extended Observations (GeoXO) program. We reviewed the report and concurred with the recommendations.

We appreciate the opportunity to review and respond to your draft report. If you have questions, please contact Tanisha Bynum-Frazier, Director, Audit and Information Management Office at (301) 467-0832.

Attachment

Department of Commerce
National Oceanic and Atmospheric Administration
Response to the OIG Draft Report Entitled
The GeoXO Program: Cost and Schedule Baselines Are Established, But NOAA Should Evaluate Plans for the Central Satellite Mission and Revise Its Approach to Performance Gains to Provide the Best Overall Value
(August 2023)

General Comments

The National Oceanic and Atmospheric Administration (NOAA) appreciates the opportunity to review the Office of Inspector General's (OIG) draft report on the Geostationary Extended Observations (GeoXO) program definition. NOAA reviewed the draft report and concurs with the Office of Inspector General's (OIG's) recommendations. Comments and responses to the four recommendations are provided below.

NOAA Response to OIG Recommendations

Recommendation 1: Update GeoXO's Central satellite plans to align with the expected availability level to determine cost and performance tradeoffs.

NOAA Response:
We concur. The program will reassess the Central satellite launch date at Key Decision Point – C (KDP-C) when we have preliminary Spacecraft and Instrument design information to calculate GeoXO availability. We propose responding to the recommendation 90 days following the KDP-C milestone: This would be December 2025 given the current plan for KDP-C in the 4th quarter of Fiscal Year (FY2025). Please note that enacted FY2024/2025 funding levels may change the KDP-C date.

Recommendation 2: Assesses the cost and performance tradeoffs of the second Central satellite to put its planned funds to better use.

NOAA Response:
We concur. The program will reassess the need for the Central satellite, and its launch date at KDP-C, when we understand the preliminary reliability of the design and have more information about Congressionally-approved resources for the program. We propose responding to the recommendation 90 days following KDP-C: This would be December 2025 given the current plan for KDP-C in the 4th quarter of Fiscal Year (FY2025). Please note that enacted FY2024/2025 funding levels may change the KDP-C date.

Recommendation 3: Ensure remaining GeoXO procurements specify contract requirements for desired performance gains with threshold and objective values to provide more transparency for cost and performance tradeoffs.

NOAA Response:
We concur and propose to review the contract requirements and adjust the program requirements, as needed, to more closely match the contract requirements, which are reflective of the user needs for these observations. The proposed response date: August 2024.

Recommendation 4: Ensure future satellite system acquisitions define both threshold and objective contract requirements for desired performance gains.

NOAA Response:
We concur. The National Environmental Satellite, Data, and Information Service (NESDIS) has implemented a policy to provide "Threshold" and "Objective" performance levels in all future satellite systems acquisitions. This approach has been applied for the Space Weather Next Program and Near-Earth Observing Network (NEON) Program.

Recommended Changes for Factual/Technical Information

Page 4, 2nd paragraph, 4th sentence:
The current text states that the planned second Center satellite would "according to NESDIS' own guidelines - result in little or no additional value". NESDIS disagrees with the implication that NESDIS finds no value in the second Center satellite: the second satellite provides a spare capability, which would restore operations in the event of a launch or early failure of the first satellite. Further, the second satellite is needed to meet the GeoXO program level requirement for a maximum replacement time of 4 years."

Page 5, 5th paragraph, 1st sentence:
Similar to the comment above, NESDIS respectfully disagrees that the Central satellite mission provides no value.

Page 12, Table 4:
The quoted $32.8M in "funds to be put to better use" represent potential near-term savings, but this does not acknowledge the probable long-term life cycle cost increase if the recommendation is followed.

Editorial Comments

None

23 NOAA0 23 429 (Previously 31 NOAA0 31 429)