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NOAA's Future Geostationary Extended Observations (GeoXO) Mission

About every two decades since 1975, the National Oceanic and Atmospheric Administration (NOAA) has deployed a new generation of geostationary satellites. NOAA depends on continuous geostationary observational coverage over the United States to inform its weather forecasts. Given the high cost and long timeframe to develop a major satellite program (as defined in 33 U.S.C. §878a), Congress may be interested in tracking NOAA's progress on its next generation geostationary satellite mission, including any modifications, delays, and cost overruns.

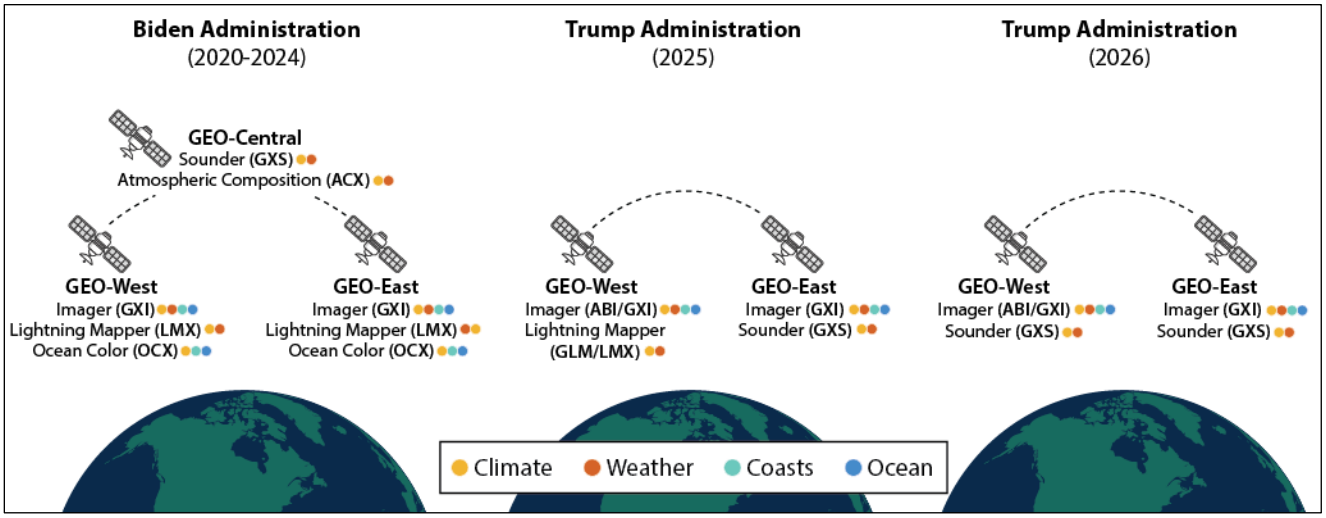
GeoXO Overview

NOAA's current operational two-satellite geostationary mission, the Geostationary Operational Environmental Satellites R Series (GOES-R Series), is expected to near the end of its operational lifetime in the early 2030s. In 2019, NOAA began defining requirements for its next mission, Geostationary Extended Observations (GeoXO). NOAA plans for GeoXO to continue and improve on the GOES-R Series' continuous observations over the Western Hemisphere through 2055, with the first GeoXO satellite launch date planned for 2032.

As conceived under the Biden Administration, GeoXO was set to be NOAA's largest procurement ever at $19.6 billion, covering GeoXO development, operations, and support from 2020 to 2055. Under the Biden Administration, GeoXO had planned for three operational satellites—GEO-West, GEO-Central, and GEO-East—with five total instruments that had been identified for climate, weather, coastal, and ocean applications (Figure 1). The mission would have had six total satellites (i.e., a backup for each operational satellite). The Department of Commerce (DOC) approved the Biden Administration's plans for GeoXO in December 2022.

In 2025, the Trump Administration determined that the GeoXO program had unsustainable costs and restructured its mission to focus solely on weather. The Administration reduced the number of operational satellites to two—GEO-West and GEO-East—and eliminated two instruments while assessing options for including versus omitting a third instrument (Figure 1). The mission plans for four total satellites (i.e., two backups). In January 2026, Congress addressed some of the proposed and implemented changes to GeoXO in the explanatory statement accompanying the FY2026 appropriations law (P.L. 119-74). Specifically, Congress stated that "the revised [GeoXO] mission architecture must include imaging and sounding ... instruments for all satellites with data quality standards that meet or exceed GOES–R requirements and to consider additional instruments if they can be accommodated." In April 2026, DOC approved a new plan for the GeoXO program that aligns with FY2026 congressional direction (Figure 1). NOAA estimates a total cost of $11.9 billion for the revised GeoXO program.

Figure 1. Evolution and Potential Applications of GeoXO Under the Biden and Trump Administrations



Source: CRS using National Oceanic and Atmospheric Administration (NOAA), "GeoXO Spacecraft & Instruments," May 29, 2024 (archived); April 6, 2026 (archived); and July 15, 2026.

Notes: Color dots reflect the instruments' anticipated climate, weather, coasts, and ocean applications as identified by NOAA. GeoXO Imager (GXI) and GeoXO Sounder (GXS) are planned to be new, improved GeoXO instruments under the Biden and Trump Administrations. Atmospheric Composition (ACX), Lightning Mapper (LMX), and Ocean Color (OCX) were planned to be new, advanced GeoXO instruments

under the Biden Administration. In 2025, the Trump Administration modified the GeoXO program to include Advanced Baseline Imager (ABI) and Geostationary Lightning Mapper (GLM) (current GOES-R Series instruments) on the first satellite launch for the GEO-West position. The next satellite launch for the GEO-West position would carry GXI and, if within the modified GeoXO program cost guidelines, LMX, according to NOAA. In 2026, the Trump Administration revised the GeoXO program to include ABI on the first satellite launch for the GEO-West position, with subsequent satellite launches including GXI. No satellites under this plan would carry either GLM or LMX.

GeoXO Instruments and Contracts

Both the Biden and Trump Administrations' plans for the GeoXO mission have included two instruments: GeoXO Imager (GXI) and GeoXO Sounder (GXS).

NOAA plans for GXI to collect real-time, high-resolution imagery. GXI is planned to be an improved version of the GOES-R Series' Advanced Baseline Imager (ABI), producing higher-resolution data compared with ABI. GXI would help NOAA meet its mission needs for "[s]hort-range weather forecasting, severe weather watches and warnings, and monitoring hazardous environmental conditions," including fires and flooding.

NOAA plans for the GXS to provide real-time moisture, winds, and temperature data in the troposphere (the atmospheric level where weather occurs). GXS would be a new instrument; the GOES-R Series does not include a sounder. Data collected by the sounder are expected to improve NOAA's numerical weather prediction and *nowcasting* (i.e., current conditions to conditions expected up to six hours into the future).

The Biden Administration's GeoXO program had planned for three additional instruments: Atmospheric Composition (ACX), Lightning Mapper (LMX), and Ocean Color (OCX). The second Trump Administration has eliminated these instruments from GeoXO (**Figure 1**).

NOAA had planned for ACX to measure ultraviolet to visible light. ACX would have been a new instrument for NOAA's observational fleet and an operational follow-on to a National Aeronautics and Space Administration (NASA) instrument. The instrument was to provide hourly observations of air pollutants to better understand the link between air quality and weather and climate events, among other objectives.

NOAA had planned for LMX to detect, locate, and measure lightning characteristics, such as its intensity, duration, and extent. LMX would have been an improved version of the GOES-R Series' Geostationary Lightning Mapper (GLM). LMX would have helped NOAA meet its mission needs for storm warning and nowcasting, including over U.S. coastal and ocean waters where data are limited. For example, increased lightning data over the ocean may inform how rapidly hurricanes intensify before making landfall.

NOAA had planned for OCX to provide ocean color data every two hours during the daytime over U.S. ocean waters. OCX would have been a new instrument and would have "solve[d]" some problems faced by existing U.S. satellites that collect ocean color data, according to NASA. OCX would have helped NOAA monitor "dynamic coast/ocean features, ecosystem change, water quality, and hazards."

Between 2023 and 2024, NASA, on behalf of NOAA, had contracted several companies to develop the GeoXO instruments and satellites. As of July 24, 2026, NOAA has "discontinued" the contracts for ACX, LMX, and OCX. As of the date of publication, the awarded GeoXO contracts, including those discontinued, appear as "in progress" on USAspending.gov. At least one discontinued contract had already outlaid nearly $50 million to the contractors. Some Members of Congress have raised concerns about the cancellation of these GeoXO contracts, noting the lack of notification to congressional authorizing committees and questioning whether the contractors would sue the federal government for termination costs.

Questions Congress May Consider

Congress may weigh the potential consequences associated with modifying the GeoXO program against the benefits of reducing the program's total cost. Outstanding questions Congress may consider include the following:

- How would GXI and GXS provide the data needed for NOAA to implement its statutory responsibilities?
- What other priorities could Congress support within NOAA with the cost-savings from the modified GeoXO program?
- How likely are modifications to the GeoXO program to lead to launch delay and subsequent data gaps?
- Some GeoXO instruments were to serve as improved follow-ons through 2055 to instruments currently in orbit. For example, improved atmospheric and lightning data from ACX and LMX were expected to assist wildfire prediction and response. What potential operational or research gains would have been provided by ACX, LMX, and OCX? How could these decisions impact NOAA's other missions?
- What existing or planned future federal assets (including ground-, ocean-, and space-based assets), if any, can fill the observation gaps from these eliminated instruments? How feasible would it be for the private sector to fill those observation gaps?
- Some stakeholders have cited the technical challenge of accommodating GXI and GXS (both the size of small cars) on one spacecraft. What are the possible impacts on cost and anticipated launch timelines, if any, of various solutions?

For Further Reading

For discussion of the GeoXO program and issues for Congress, see CRS Report R49026, *NOAA's Geostationary Extended Observations (GeoXO) Satellite Program and Issues for Congress*.

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