

GOES-R and GeoXO



QUARTERLY NEWSLETTER ■ JANUARY-MARCH 2024 ■ ISSUE 45

A note from Pam Sullivan, GEO director:



Excitement is building for the GOES-U launch, now scheduled for June 25, 2024. SpaceX has repaired the liquid oxygen leak

found during testing of the center core booster and launch preparations are back on track. The team is preparing for satellite fueling and encapsulation in the rocket fairing, conducting mission tests and rehearsals, and preparing for the remaining pre-launch reviews. I can't wait to see the final GOES-R Series satellite launch! Meanwhile, we are also working hard on GeoXO. The team conducted a successful kickoff meeting for the Sounder and work continues on the Imager. Evaluation boards are busy reviewing proposals for the spacecraft and the OCX, LMX, and ACX instruments. We plan to award the remaining GeoXO contracts by fall.

GOES-R HIGHLIGHTS

GOES-U arrived at Kennedy Space Center in Florida on Jan. 23, 2024, to undergo final preparations for launch. [Shipping a satellite is no small feat.](#) GOES-U is the size of a small school bus and weighs over 6,000 pounds! After packing GOES-U in a high-tech shipping container that acts as a mobile clean room, a crew drove the satellite from Lockheed Martin to Buckley Space Force Base in Aurora, Colorado, and loaded it onto a C-5M Super Galaxy cargo transport. GOES-U was then transported to the Astrotech Space Operations facility to begin pre-launch processing. [Learn more about GOES-U's road to launch.](#) [View photos of the road to launch.](#)



GOES-U arrival at Kennedy Space Center on Jan. 23, 2024. Photo credit: NASA

DID YOU KNOW:

The Compact Coronagraph-1 (CCOR-1) instrument that will fly on GOES-U will be NOAA's first coronagraph and the first operational coronagraph in geostationary orbit.

GOES-R HIGHLIGHTS (CONTINUED)

The **GOES-U Operational Readiness Review (ORR) was completed on Jan. 23-24, 2024**. The ORR examined the characteristics and procedures used in the system's operation and ensured that flight and ground hardware, software, personnel, procedures, and user documentation accurately reflect the deployed state of the system. The review established that the system is ready to transition into an operational mode – the flight and ground systems are ready to support pre-launch, launch, early operations, and post-launch testing. GOES-U was deemed ready for final processing before launch and mission operations. The Standing Review Board noted the team is highly-committed to mission success at both a personal and institutional level.

GOES-U Countdown Readiness Test (CRT) #3a was completed on Feb. 8, 2024. The test was conducted on the spacecraft simulator and exercised off-nominal scenarios. This test provided comprehensive terminal

countdown practice for the GOES-R flight project and Lockheed Martin Space team members.

The fourth GOES-U end-to-end (ETE) test was completed on Feb. 19, 2024. ETE tests serve as a validation of the compatibility of flight and ground hardware, software and communications interfaces in a mission operations context. ETE #4 was a launch site test.

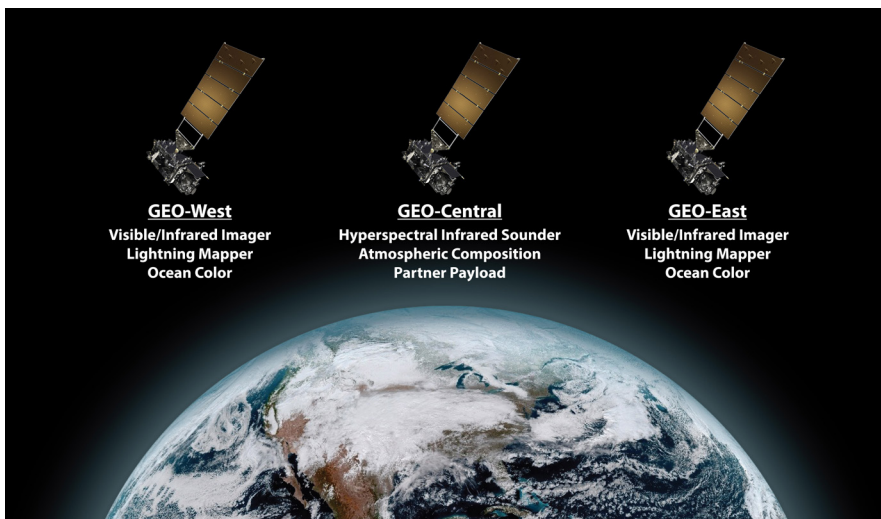
The fourth GOES-U mission rehearsal was conducted Feb. 26 – Mar. 1, 2024. Mission rehearsals use a satellite simulator and the ground system to train operations personnel and test the readiness of operational products and the ground system. They simulate both normal operations and what to do if a procedure doesn't go as planned. Mission rehearsal #4 focused on launch and orbit-raising critical events, including launch, backup orbit-raising plans, and geosynchronous station acquisition.

NASA and SpaceX are now targeting June 25, 2024, for the launch of GOES-U. SpaceX discovered a liquid oxygen leak during routine new booster testing in February. [The new launch date allows time for teams to fully repair and test the Falcon Heavy core booster](#). NASA and SpaceX teams have resumed preparation of the GOES-U rocket and are on track for the launch.



GOES-U road to launch timeline. Image credit: NOAA

GeoXO HIGHLIGHTS



The planned GeoXO constellation. Image credit: NOAA

The **Bulletin of the American Meteorological Society (BAMS) published a paper by GeoXO team members online on Jan. 29, 2024**.

["GeoXO: NOAA's Future Geostationary Satellite System"](#) highlights the new and improved observations that NOAA's next generation of geostationary satellites will provide. Given changes to the Earth system, technology improvements and the expanding needs of satellite data users, GeoXO will extend NOAA's current observation suite by adding three new instruments and one new spacecraft.

GeoXO HIGHLIGHTS (CONTINUED)

The GeoXO flight project held a GeoXO Sounder (GXS) kick-off meeting with BAE Systems on Feb. 27 – Mar. 1, 2024. The primary purpose of the meeting was to go through the GXS requirements documents line by line to ensure that the vendor and government team were on the same page with each requirement.

The first GeoXO Sounder (GXS) science team meeting was held on Feb. 2, 2024, at the University of Maryland Earth System Science Interdisciplinary Center (ESSIC) in College Park. The purpose of the meeting was to start discussions on key issues and innovative ideas to support the development and utilization of the GXS instrument. The GXS science team will be working on observing system simulation experiments (OSSEs),

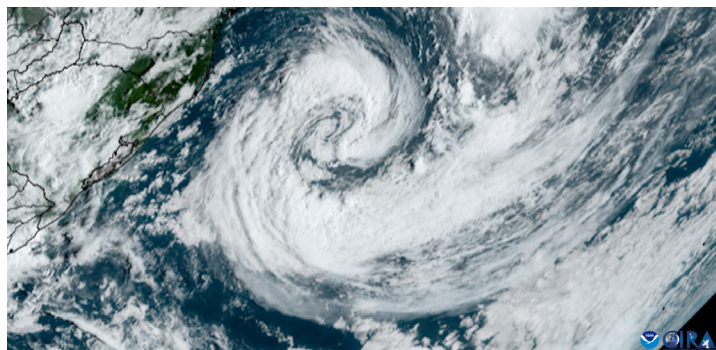
data demonstrations using partner proxy data, and the development of a GeoXO proving ground to ensure NOAA will be ready for GXS data on day one.

On Feb. 8, 2024, Pam Sullivan, director of the Office of Geostationary Earth Orbit Observations, presented “GOES-R to GeoXO: NOAA’s Geostationary Satellite Systems Today and Through 2050” as part of the National Weather Service (NWS) Total Operational Weather Readiness – Satellites (TOWR-S) Satellite Book Club (SBC) seminar series. Sullivan’s talk provided an update on the GOES-R program, including the plans for the GOES-U launch and transition to operations and an update on the GeoXO program addressing status, requirements and applications for the new instruments.

SCIENCE

A new research paper highlights the potential for valuable data on methane emissions from the GOES-R Advanced Baseline Imager (ABI). [“Geostationary satellite observations of extreme and transient methane emissions from oil and gas infrastructure,”](#) published in the Proceedings of the National Academy of Sciences of the United States of America (PNAS), highlights a case where researchers identified a large natural gas pipeline release and quantified total emissions. By comparing ABI imagery captured every five minutes, the researchers showed how emissions changed over time and determined the duration of the leak. Decreasing atmospheric methane emissions is an urgent priority to slow near-term climate change. Methane is second only to carbon dioxide in its atmospheric warming potential. With the right tools, methane leaks can be rapidly identified and halted. ABI’s successor, the GeoXO Imager (GX1), will have even greater observational capabilities. GX1 will improve the resolution of seven of ABI’s channels.

GOES-16 witnessed a rare event in the South Atlantic on Feb. 18, 2024, as Tropical Depression 01Q strengthened into Tropical Storm Akará. Tropical cyclones are rare in this part of the world due to strong wind shear, which disrupts their formation, as well as a general lack of disturbances that may develop into stronger systems. [Akará was the region’s first officially](#)

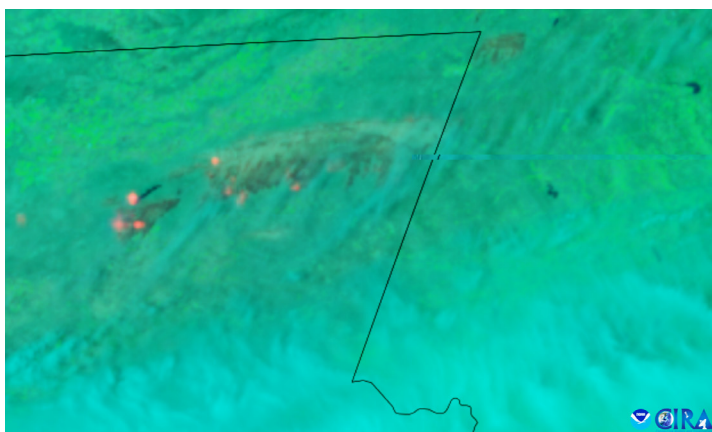


GOES-16 GeoColor imagery of Tropical Storm Akará on Feb. 19, 2024. Image credit: NOAA/CIRA

[recognized tropical storm since Iba in 2019 and only the third one there since Anita in 2010.](#)

For the second consecutive year, ice cover on the Great Lakes remained significantly below average February, which typically sees the peak of ice cover around 53 percent. [As of Feb. 11, 2024, total ice coverage across all lakes measured a mere 2.7 percent. Lakes Erie and Ontario were essentially ice-free.](#) This record low ice cover is largely attributed to unusually warm temperatures throughout the region in December, paired with the generally short duration of Arctic air blasts. GOES-16 has observed little ice on the Great Lakes this year.

The largest wildfire in Texas’s history broke out on Feb. 26, 2024, and quickly spread within days, fueled by dry, windy conditions. [By Mar. 4, the blaze, known as the Smokehouse Creek fire, had become one of the largest fires in U.S. history, burning over one million acres.](#) GOES-16 observed the fire in near real-time. GOES-16 helps to locate fires, detect changes in a fire’s behavior, and predict its direction. By combining data from multiple ABI channels, both a fire’s hot spot and associated smoke plume can be visualized.



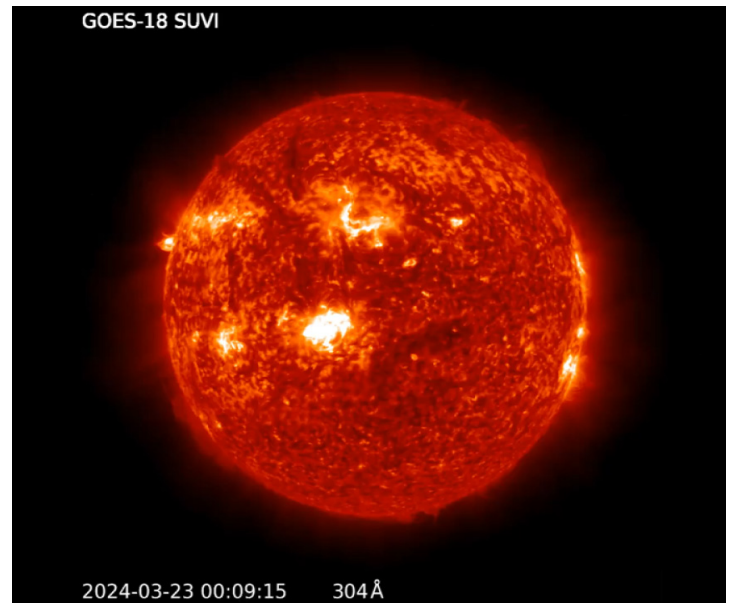
GOES-16 daytime fire temperature of fires, including the large Smokehouse Creek Fire, burning across the Texas Panhandle. Image credit: NOAA/CIRA

SCIENCE (CONTINUED)

Officials tested a new wildfire alert system during the Texas Panhandle fires in February 2024. Thousands of people received wireless emergency alerts on Feb. 26 and 27, warning of an eminent, dangerous wildfire on the landscape with the potential to expand. [These notifications utilized a first-of-its-kind process, benefiting from major advancements in fire and weather prediction technology.](#) NWS can monitor conditions on red flag days using infrared channels of the GOES-16 and GOES-18 satellites. [Following the initial detection and assessment of a fire through satellite imagery, NWS members notify local emergency management teams and state fire and forestry officials of the fire.](#) The NOAA/NWS Fire Weather Testbed, launching this year in Boulder, Colorado, will further test the new system.

On March 23–24, 2024, GOES-16 and GOES-18 observed numerous flares erupt from the sun, including a powerful X-class solar flare. [Additionally, a surge of extremely hot plasma, known as a coronal mass ejection \(CME\), raced toward Earth, resulting in geomagnetic storms and auroras.](#) The Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS) onboard both GOES-16 and GOES-18 detected the flare. The satellites' Solar

Ultraviolet Imager (SUVI) instruments viewed the flare and the initiation of the CME. Scientists expect solar activity to increase as we approach the peak of Solar Cycle 25.



GOES-18 SUVI imagery of solar activity on Mar. 23, 2024. Image credit: NOAA

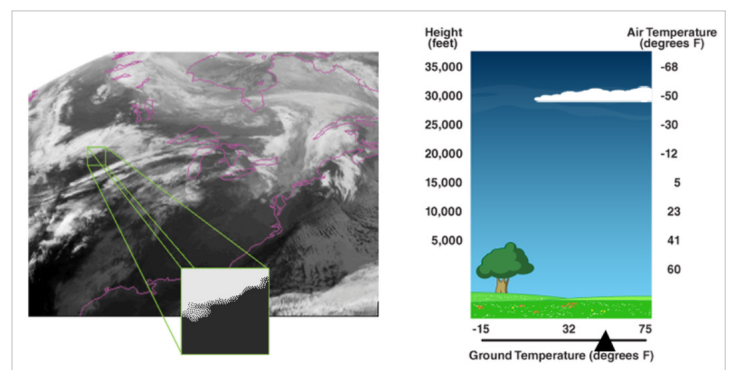
EDUCATION AND OUTREACH

The GEO Program, in partnership with JPSS, NOAA Satellite and Information Service (NESDIS), NASA Goddard Space Flight Center (GSFC), and the Cooperative Institute for Research in the Atmosphere (CIRA) produced five “Earth from Orbit” videos during the first quarter of 2024. [Earth from Orbit](#) is a series of short videos that showcases a compelling weather event, environmental hazard, or interesting meteorological phenomenon, as seen by NOAA satellites. A web article with additional information accompanies each video.

The GOES-U launch webpage went live on Jan. 17, 2024. The [webpage](#) provides information on the GOES-U mission, the benefits it will provide to the nation, and a variety of resources.



A new SciJinks simulation, based on a web application developed by the Cooperative Institute of Meteorological Satellite Studies (CIMSS), explains what the brightness of a cloud means. [Users can change cloud altitude and temperature to simulate the infrared images they see on TV weather shows.](#)



Simulation: What are those cloud images on TV? Image credit: NOAA SciJinks/CIMSS

A new SciJinks simulation, based on a web application developed by CIMSS, explains how cloud thickness changes how a cloud looks to a satellite. [The simulation allows users to learn about the different conditions that can cause changes in the appearance of satellite images.](#)

In honor of Women’s History Month in March 2024, the GEO Program profiled seven remarkable individuals who exemplify the spirit of innovation, dedication, and

EDUCATION AND OUTREACH (CONTINUED)

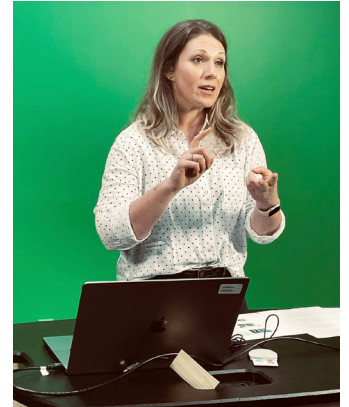
leadership and are helping to shape the future of how we monitor our constantly changing world. "[Celebrating Women in GEO](#)" tells the stories of women who are driving innovation and who have been instrumental within NOAA's geostationary satellite programs. Ultimately, the work these women do helps safeguard lives, protect communities, and preserve our planet's vital natural resources. Their contributions are also inspiring future generations to pursue careers in science, technology, engineering, and mathematics (STEM).



On March 6, 2024, NOAA published the second episode of its new Planet NOAA podcast. "[To the Stars and Beyond](#)" featured a roundtable discussion with Pam Sullivan, director of the Office of Geostationary Earth Orbit Observations, Bill Murtaugh from the Space Weather Prediction Center, and Richard DalBello from the Office of Space Commerce discussing how NOAA's presence in space positions global weather, water, climate and ocean observations. Sullivan explained NOAA's geostationary

satellites, what information they provide, how NOAA's presence in space informs weather predictions here on Earth, previewed the upcoming GOES-U launch, and provided information on the future GeoXO Program. The Planet NOAA podcast highlights how NOAA's impact is felt from sun to sea and everything in between.

The GEO Program began a "Virtual Visits" program in February 2024. Virtual visits bring GEO scientists, engineers and outreach specialists into K-12 schools, museums, science and visitor centers via web-based videoconferencing technologies. Students, teachers, and other educational partners connect live with NASA and NOAA experts for 30-45 minutes to learn more about NOAA's geostationary satellites and their benefits to daily life. The program conducted virtual visits in four schools in February and March 2024 in support of the GOES-U STEM engagement initiatives.



GEO senior outreach manager Erin McKinley speaks to 4th-grade students at Lincoln Elementary in Jamestown, North Dakota, on Feb. 28, 2024. Photo credit: NOAA

The GOES-U mission overview video was released on Mar. 26, 2024. [The video highlights the capabilities the final satellite in the GOES-R Series will bring](#) to weather forecasting, severe storm warning, and environmental hazard monitoring. The video also highlights the new CCOR-1 instrument that GOES-U will carry for NOAA's Space Weather Follow On mission.

CONFERENCES AND EVENTS

GOES-R and GeoXO personnel participated in the American Meteorological Society (AMS) Annual Meeting in Baltimore, Maryland, held Jan. 28 – Feb. 2, 2024. There were several GEO oral presentations and posters, and the meeting also provided an opportunity to engage with a variety of satellite data users from NOAA, NASA, other governmental agencies, international agencies, academia, and the private sector.



The Vernon Dvorak Memorial Session at the AMS Annual Meeting. From left to right, Mark DeMaria (CIRA), Dan Lindsey (NESDIS), Mike Brennan (NWS), Gary McWilliams (NESDIS), Joanne Dvorak (Vern's wife), Derrick Herndon (CIMSS), Holly (Vern's daughter), Eric (Vern's son), and Song Yang (NRL). Joanne expressed great appreciation for the AMS community for honoring Vern with the memorial session.

The GEO program participated in Maryland Aerospace Day on Feb. 13, 2024, in Annapolis, Maryland, along with NOAA Legislative Affairs and NESDIS. GEO provided materials and handouts, staffed the NESDIS table at the reception and engaged with legislators and industry. Maryland Aerospace Day is an event for aerospace industry professionals to network with legislators and government agencies. The event was hosted by the Maryland Chapter of the Aerospace States Association, with a mission to advance the Maryland aerospace community and facilitate state economic



NESDIS personnel with Maryland Lieutenant Governor Aruna Miller at the Maryland Aerospace Day reception. Photo credit: Executive Office of the Governor

CONFERENCES AND EVENTS (CONTINUED)

development within Maryland through industry networking, policy development, educational discussions, and focused events involving state-elected and other government officials.

The Office of Geostationary Earth Orbit Observations supported the NOAA Office of Education at the National Science Teaching Association (NSTA) National Conference in Denver, Colorado, on Mar. 20-23, 2024.

The program provided educational materials for the NOAA exhibit in the expo hall. Senior outreach manager Erin McKinley staffed the exhibit and also presented on GOES at the NASA Hyperwall exhibit at the conference. [The national conference brings science educators together to discover best practices and strategies to help shape the future of their work.](#)



NOAA exhibit at the National Science Teaching Association Conference. Photo credit: NOAA

AWARDS

Several GEO individuals and teams were honored with NESDIS and NASA awards during the first quarter of 2024.

2024 NESDIS Outstanding Support and Policy Team Member Award

- Pv6 Transition Planning Team

2023 NASA Agency Honor Awards

Outstanding Leadership Medal

- Alexander Krimchansky
- Joel McCorkel

Exceptional Public Service Medal

- Michael Shallcross

Exceptional Engineering Achievement Medal

- Randall Race

Exceptional Achievement Medal

- Brian Hall
- Gyanesh Chander

Exceptional Public Achievement Medal

- Stephen Sabia

Early Career Achievement Medal

- Amir Ibrahim

Group Achievement Award

- GOES-R LZSS GeoCloud Team
- Group Achievement Award: GOES-R Server Replacement Team

MEET THE TEAM

In this issue, meet Erin McKinley, GEO's senior outreach manager. In this role, Erin supports the missions by designing, delivering and managing education and outreach opportunities that inform the public about the impact the GOES-R Series and GeoXO have on their daily lives. This includes collaborating with the NASA Goddard Space Flight Center Visitor Center on public events, producing virtual live events for our NOAA and NASA colleagues to connect with schools, museums, and science centers, and managing outreach materials requests from groups across the country.

Erin began working on the GEO Program in December 2023, which kicked off her 12th year supporting NASA and its partners. Her NASA career started at NASA Johnson in 2006, and Erin moved to NASA Goddard in 2010 where she continued to support NASA Education for seven years. Erin feels extremely fortunate to have experienced incredible moments and met many accomplished individuals throughout her time at NASA. "I would say my most memorable professional achievement would have

been flying an experiment onboard NASA's C9 'Weightless Wonder' (also known as 'The Vomit Comet') in 2008, said Erin. "My colleagues and I experienced Martian, lunar and microgravity during our flight. It was phenomenal!"



Erin is a professional educator with 20 years of experience in child and adult education in the classroom, government agencies and the private sector. Her career began as a classroom teacher in Houston, Texas. "Never in my wildest dreams did I anticipate that my Bachelor of Science degree in Elementary Education from Iowa State University would help open the door to my NASA Education career," said Erin. "Inspired by my work for NASA Office of Education in virtual learning, I returned to Iowa State and earned a Master of Education degree in Education, Curriculum and Instructional Technology in 2013," she continued. Over the course of her career, Erin has supported education, learning, training and development initiatives for NASA, Amazon, the U.S. Air Force, the U.S. Department of State, and the National Institutes of Health.

UPCOMING EVENTS

GeoXO ACX Science Team Meeting

May 7-9, 2024

GOES-U Mission Rehearsal #5

June 4-6, 2024

GOES-R Data Products Cloud demo at L3Harris

June 24, 2024

GOES-U Launch

June 25, 2024

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