



THE CRITICAL PATH

A FLIGHT PROJECTS DIRECTORATE PUBLICATION ■ 2024 SPRING ISSUE

PACE
"First Light"
Images!

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will continue and advance the Legacy of the GOES-R Series

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ENABLING EXPLORATION AND EARTH + SPACE SCIENCE BY TRANSFORMING CONCEPTS AND QUESTIONS INTO REALITY

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COVER IMAGE: Located at Russia's eastern edge, the Kamchatka peninsula covers an area about the size of Colorado but contains more than 100 volcanoes stretching across the 1000-kilometer-long (620-mile-long) land mass. Kluichevskoi, one of the most active volcanoes in the world, is visible as a circular feature near the center of this image. CREDIT: NASA

A SpaceX Falcon 9 rocket with NASA's PACE (Plankton, Aerosol, Cloud, ocean Ecosystem) spacecraft encapsulated atop is rolled to the launch pad at Space Launch Complex 40 at Cape Canaveral Space Force Station in Florida on Monday, Feb. 5, 2024. CREDIT: SPACEX

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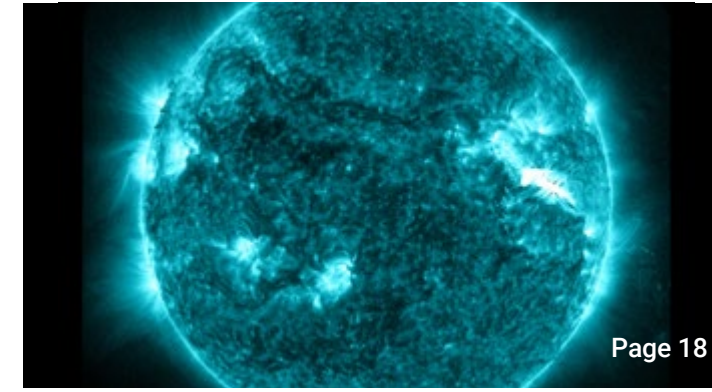
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Have a story idea, news item or letter for *The Critical Path*?

Let us know about it. Include your **name**, **phone number** and send it to:

✉ paula.l.wood@nasa.gov
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The deadline for the next issue is **September 16, 2024**


 DOWNLOAD ISSUE

Insights from the DIRECTOR



Cathy Richardson
Director, Flight Projects

Shaping the Flight Projects Directorate

I am extremely excited to have my first opportunity to contribute to FPD's Critical Path publication in my permanent role as Director. For the first half of the year, we have made some outstanding progress, onboarding new missions and efforts, and supporting our current portfolio. For those who are not aware, Goddard was awarded the new Lunar Environment Monitoring Station for Artemis 3 (LEMS-A3), assigned to Code 430, the Polarized Submillimeter Ice-cloud Radiometer (PoLSIR) assigned to Code 420, and is working in coordination with the Science and Exploration Directorate on establishing the Habitable Worlds Observatory Technology Maturation project. That is not to say that we are not continuing to adapt to a daunting budget environment that has greatly affected our missions and our team members. These situations have been extremely challenging but have brought pride to our Center as we have watched our teams rise and perform at their highest levels and seen the true power of your dedication, expertise, and perseverance.

We are now charting a new path forward, and in doing so, I want to reiterate my priority to supportive and consistent leadership at the Directorate and Division levels. We have seen strength and growth in shifting our management—Matt Ritsko has been critical to the Engineering and Technology Directorate and a reliable partner to our organizations, Marlo Maddox has brought a new passion to FPD, Leigh Forbes is pushing a vital path to support Earth science in alignment with our Goddard 2040 vision, and shifting Nick Chrissotimos to Planetary Science has brought

immeasurable expertise and growth to support that growing portfolio. Diverse opinions and perspectives have been invaluable to me and to Center leadership as we transform to support the Agency. Throughout the coming months, I hope to continue to build opportunities for open communication and feedback, especially as we navigate our current and future challenges. I encourage each member of our community to share their thoughts and ideas, remain open to change and inclusive decision-making, remain responsive to each other, and empower innovation and excellence from within.

By now, you have probably heard me focus on our two highest priorities within the FPD: 1) to build our organization as the prominent project management institution across the Agency and industry, and 2) to prioritize the development and succession planning of our workforce. Our portfolio remains robust and we are addressing new challenges to support our more traditional work as well as new kinds of projects that are now possible with commercialization, partnerships, and science integration. Institutionalizing our processes and fostering continual improvement are essential steps in this journey. We must also continue to nurture skills and talents that align with the evolving needs of our Center. These initiatives will also support our increasing dependence on project management for other new types of NASA projects for data archiving, the continued importance of our ground and operations projects, and our space communications organization, all of which support the science community worldwide.

In regards to project execution, as we chart our course into the future, given our current environment, it is crucial to reaffirm our commitment to meeting our obligations. By ensuring we make the right cost, schedule, and technical commitments and then meeting or exceeding them, we secure not only our present but also our trajectory into the years ahead. We must be proactive in seeking out ways to improve and question requirements that hinder rather than enhance our efforts. I also want each of our missions and divisions to ensure we are tailoring requirements to fit the specific needs of each mission as appropriate. We have seen some of our missions, such as QuickSounder (Code 471) and PoLSIR (Code 429), demonstrating these skills and the power of adaptability, pushing for progressive but realistic schedules via tailoring and streamlining. Our teams have several other examples where they are innovatively removing less important activities and unnecessary bureaucracy by working with our stakeholders to chart new paths that enable us to operate more efficiently and effectively. These efforts are directed

to help address the increasing pressure, stress, and burn-out on our work force, by ensuring our resources are applied where they are needed most.

I invite you to reach out to your project, division, or FPD front office staff, or to utilize our anonymous feedback link to keep an open flow of communication and input. I also encourage you to participate in various Center and FPD events, which will help to grow and strengthen our community. Together, we will continue to shape a future that reflects FPD's values and aspirations. Even with the immense challenges facing our teams, the Center, and the Agency, I am extremely excited to see us embrace this opportunity and successfully innovate, further our inclusivity, and build continuous improvements to position ourselves for success in Flight Projects' ever-evolving landscape.

Cathy Richardson
Director, Flight Projects
cathleen.m.richardson@nasa.gov



CONGRATULATIONS TO THE

GOES-U Team!



Congratulations to the Geostationary Operational Environmental Satellite (GOES)-U team on the successful launch of the fourth and final satellite in the current series of advanced weather satellites! GOES-U will take about two weeks to reach geostationary orbit. Once there, the satellite will be renamed GOES-19 and will provide continuous coverage of weather and hazardous environmental conditions across much of the Western Hemisphere. In addition to the critical role in predicting weather on Earth, the [GOES series of satellites](#) helps forecasters predict space weather near Earth that can interfere with satellite electronics, GPS, and radio communications. The GOES-U satellite has a new space weather instrument, the Compact Coronagraph-1, which blocks the Sun's bright light so scientists can observe the relatively fainter solar atmosphere. [Follow GOES-U's journey.](#)



The Flight Projects Directorate Diversity Equity Inclusion and Accessibility (DEIA)



The Flight Projects Directorate Diversity Equity Inclusion and Accessibility (DEIA) committee is eager to engage with you and their respective home organizations. Our committee members will work with their respective Division Chiefs to carve out time at a monthly standing meeting to discuss DEIA related topics. One of the first things you'll hear about is roadshow presentation that describes the FPD DEIA committee plan for activities and engagement and how it aligns to the GSFC DEIA Strategic Plan.

We are in the process of establishing committee member liaisons to each Employee Resource Group (ERG) at GSFC. ERGs are grassroots groups

focused on a characteristic or area of interest. The ERGs serve as a catalyst for inclusion through employee development, engagement, recruitment, retention, and educational outreach. By establishing relationships with the ERGs, the FPD DEIA Committee can maintain awareness of the challenges that the ERGs face, activities that they have planned, and identify opportunities for collaboration.

“You can't change what you don't acknowledge.”

Regina Jackson
co-author of *White Women: Everything You Already Know About Your Own Racism and How to Do Better*

o Find an ERG by center

The FPD DEIA committee's goals are to boost creativity and innovation, build a reputation that attracts talent, create a culture of trust, model inclusive behavior, encourage employee retention and empower employees to reach their full potential. These goals align with FPD's goal of positive project performance and mission success. This all starts with an honest conversation about the state of DEIA in our organization. ■

Risha George / Code 426
DEIA Committee

Interested in joining?
Please contact **Risha George** or **Bridget Resnick**.

Meet your FPD DEIA Committee Members:



2024-2025 Faces of Flight Projects Diversity, Equity, Inclusion and Accessibility (DEIA)

FPD DEIA ALLIES



CONGRATULATIONS TO THE PACE Team!

Congratulations to the Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) team on a successful launch on February 8, 2024 from Cape Canaveral Space Force Station atop a SpaceX Falcon 9 rocket. With science instrument operations already underway and data processing working well, the PACE mission will help us to better understand how the ocean and atmosphere exchange carbon dioxide. It will reveal how aerosols might fuel phytoplankton growth in the surface ocean. PACE data will benefit our economy and society by, for example, helping to identify the extent and duration of harmful algal blooms. PACE will extend and expand NASA's long-term observations of our living planet and take Earth's pulse in new ways for decades to come.



Learn More

Learn more about the PACE project:

o pace.oceansciences.org

For more PACE "First Light" Images, go to:

o pace.oceansciences.org/gallery_first_light.htm

CREDIT: NASA

Supporting Goddard's 2040 Strategic Vision:

The Future of the Flight Projects Directorate



How do we all as individuals, and collectively as an organization, fit into both NASA's and Goddard's 2040 vision of the future? This question may resonate with you, as it has with many of our colleagues across the Center. So what's next? What's next for the Flight Projects Directorate (FPD)? As we imagine a future vision of who we want to be as an Agency, Center, and Directorate – let's motivate and drive one another to embrace challenges, push boundaries, and define a vibrant future for flight project management at Goddard. To do so, we'll have to address several pivotal elements that will enable FPD to support Goddard's vision going forward.

Embracing Risk & Innovation

Goddard's legacy is based on providing innovative solutions and management for our projects above and beyond what is routine or safe; it's also about tackling some of the most challenging scientific, engineering, and technical activities identified within the scientific community. This approach will propel FPD's support within Goddard's 2040 vision – to continually innovate, explore, and expand our capabilities. We all can contribute to this vision by continuously evaluating our current operating environments and striving for excellence through both incremental and transformational improvements.

Prioritizing Employee Growth & Development

Within FPD, employee empowerment is paramount. FPD is working every day to continue to build resources for our employees; whether that is through coaching, training, mentoring, or development programs, we are committed to cultivating a culture of continuous learning and growth. We encourage every member of our organization to take ownership of your career, and contribute to the collective momentum. Supervisors, division management, the FPD front office, and our peer groups can all be leveraged to support these efforts.

Achieving Shared Goals: Making the Commitment

At the core of FPD's approach to supporting Goddard's 2040 strategic vision lies our commitment to excellence, innovation, and collaboration. As we navigate the complex landscape of space exploration – our interactions, both internal and external, will be guided by our shared goals.

Collaborations & Partnerships: Keys to Success

In Goddard's 2040 vision, collaborations and partnerships play a pivotal role. FPD should continue to embrace external collaborations, recognizing that shared management and technical authority can enhance project outcomes. By adapting our project management approaches and fostering a culture of curiosity and innovation, we can continue to be a catalyst for transforming the most challenging science and exploration concepts into reality.

Resilience Is Our Strength

Quite naturally, many of us may find change (especially when it is unexpected), to be challenging, difficult, and often times uncomfortable. However, it is through our agility,

both individually and collectively, that we ultimately discover how resilient we all are. As our Flight Projects Director Cathy Richardson has recently communicated, we are certainly experiencing lots of change and uncertainty both in our political landscape and fiscal environment. These changes require that we be flexible, resilient, and evolve as we reshape our priorities. This also presents opportunities for growth. Remember that projects like CCRS and OSAM, though impacted by external forces, have expanded our capabilities for the future and will continue to contribute to the growth and evolution of FPD and the Center.

Redefining & Improving Processes for the Future

As we embark upon our collective journey towards Goddard's 2040 vision, FPD is embracing change and looking forward to evolving our culture. From formulation office redesigns to improved data-driven decision-making through dashboards, we are laying the groundwork for a more agile and responsive organization. The entire management team across all of FPD will be instrumental in implementing these changes, and we will also be relying on the diverse perspectives from our entire organization. We encourage each and every team member in FPD, across every discipline, to push for process refinements, knowing management is here to support.

The Course is set for 2040 and Beyond!

In the ever-evolving landscape of scientific research, cutting-edge engineering, and technology development, the Flight Projects Directorate is poised to meet the challenges of Goddard's 2040 vision. By prioritizing innovation, collaboration, and adaptability, we will continue to push the boundaries of what is possible!

Marlo Maddox / Code 400

Deputy Director for Planning & Business Management (Acting)



GOES-U will continue and advance the Legacy of the GOES-R Series

NOAA's Geostationary Operational Environmental Satellites (GOES), supported by NASA, have been busy ensuring the continuity of geostationary satellite observations well into the future. The GOES-R Series advanced spacecraft, instrument and ground system technology is the Western Hemisphere's most sophisticated weather-observing and environmental monitoring system. Together, GOES-East and GOES-West observe

more than half the globe – from the west coast of Africa to New Zealand and from near the Arctic Circle to the Antarctic Circle. With the upcoming launch of GOES-U, the legacy of NOAA's geostationary observing system providing valuable forecasting data will continue, and with the addition of a new Compact Coronagraph instrument, advance space weather forecasting.

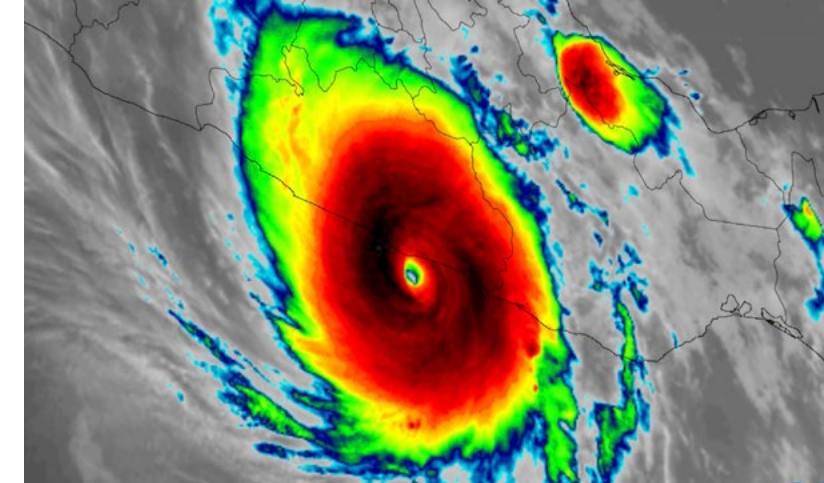
GOES-U arrived at NASA's Kennedy Space Center on January 23, 2024 onboard the U.S. Air Force C-5 Super Galaxy. CREDIT: NASA

Extending the scientific capabilities of GOES-R

GOES-U will help us prepare for two kinds of weather— terrestrial and space weather. Data from the GOES-R Series have transformed weather forecasting and environmental monitoring by improving severe weather forecasting and detection including hurricane tracking, increasing lead time for thunderstorm and tornado warnings, lightning threats, heavy rain and flash flooding. Additionally, public safety has been enhanced with early detection of low clouds and fog, air quality alerts and warnings, and better fire detection and intensity estimates. GOES-U will add to the global data record, allowing scientists to track changes in Earth's climate and provide critical information before, during, and after disasters strike.

Tracking and monitoring space weather phenomena have positive implications for communication and navigation technologies as well as keeping astronauts safe on orbit. Improved solar flare warnings can help prevent or minimize communication and navigation (GPS) disruptions. More accurate monitoring of solar wind can reduce potential hazards to spacecraft and astronauts living and working in space. Better monitoring of geomagnetic storms (aurora) can increase forecast accuracy in the northern and southern hemispheres.

Seven highly sophisticated instruments will provide advanced imagery and atmospheric measurements of Earth's Western Hemisphere,

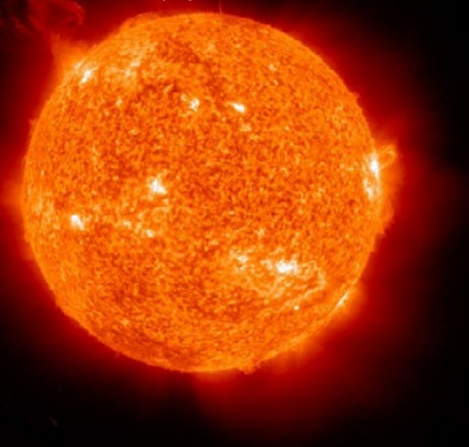


The Advanced Baseline Imager (ABI) instrument onboard GOES West captured Hurricane Otis as it made landfall near Acapulco, Mexico on October 25, 2023. CREDIT: CSU/CIRA & NOAA

real-time mapping of lightning activity and advanced monitoring of solar activity and space weather. The Advanced Baseline Imager (ABI) is the primary instrument on the GOES-R Series satellites for imaging Earth's weather, ocean and environment. Forecasters use ABI data for a wide range of applications related to severe weather, hurricanes, aviation, natural hazards, the atmosphere, ocean and cryosphere.

The Geostationary Lightning Mapper (GLM) is the first operational lightning mapper flown in geostationary orbit. Developing severe storms often exhibit a significant increase in lightning activity and GLM data can help forecasters focus on initial thunderstorm development and intensifying severe storms before they produce damaging winds, hail or even tornadoes.

The Solar Ultraviolet Imager (SUVI) and Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS) provide imaging of the sun and detection of solar flares. A new instrument, the Compact Coronagraph-1 (CCOR-1), images the solar corona (outer layer of the Sun's atmosphere) to detect and characterize coronal mass ejections (CMEs). The inclusion of the CCOR-1 instrument is part of NOAA's Space Weather Follow On (SWFO) mission and will be the nation's first operational coronagraph. Forecasters at the NOAA Space Weather Prediction Center rely on data from GOES-R instruments to issue forecasts and warnings for space weather events that can disrupt communications, navigation systems, and power grids and damage orbiting satellites. Data from



On February 15, 2022, the Solar Ultraviolet Imager (SUVI) instrument onboard GOES East observed a large and powerful eruption from the Sun. CREDIT: NOAA

the CCOR-1 instrument will serve as the primary source for information about impending geomagnetic storm conditions, allowing the Space Weather Prediction center to issue warnings one to four days in advance.

The Space Environment In-Situ Suite (SEISS) and Magnetometer monitor, respectively, energetic particles and the magnetic field variations that are associated with space weather. Together, observations from these instruments contribute to space weather forecasts and early warning of disruptions to power utilities and communication and navigation systems as well as radiation damage to orbiting satellites.

The end of an era

GOES-U is the fourth and final satellite in NOAA's GOES-R Series and will continue the revolutionary improvements brought by GOES-R, S, and T. GOES-U will be renamed GOES-19 when it reaches geostationary

orbit, approximately three weeks after launch. Following a successful on-orbit checkout of its instruments and systems, NOAA plans to put GOES-19 into operational service. GOES-19 will be positioned to monitor weather systems and environmental hazards affecting most of North America, including the continental United States and Mexico, as well as Central and South America, the Caribbean, and the Atlantic Ocean to the west coast of Africa. In this position, the satellite will be known as "GOES East."

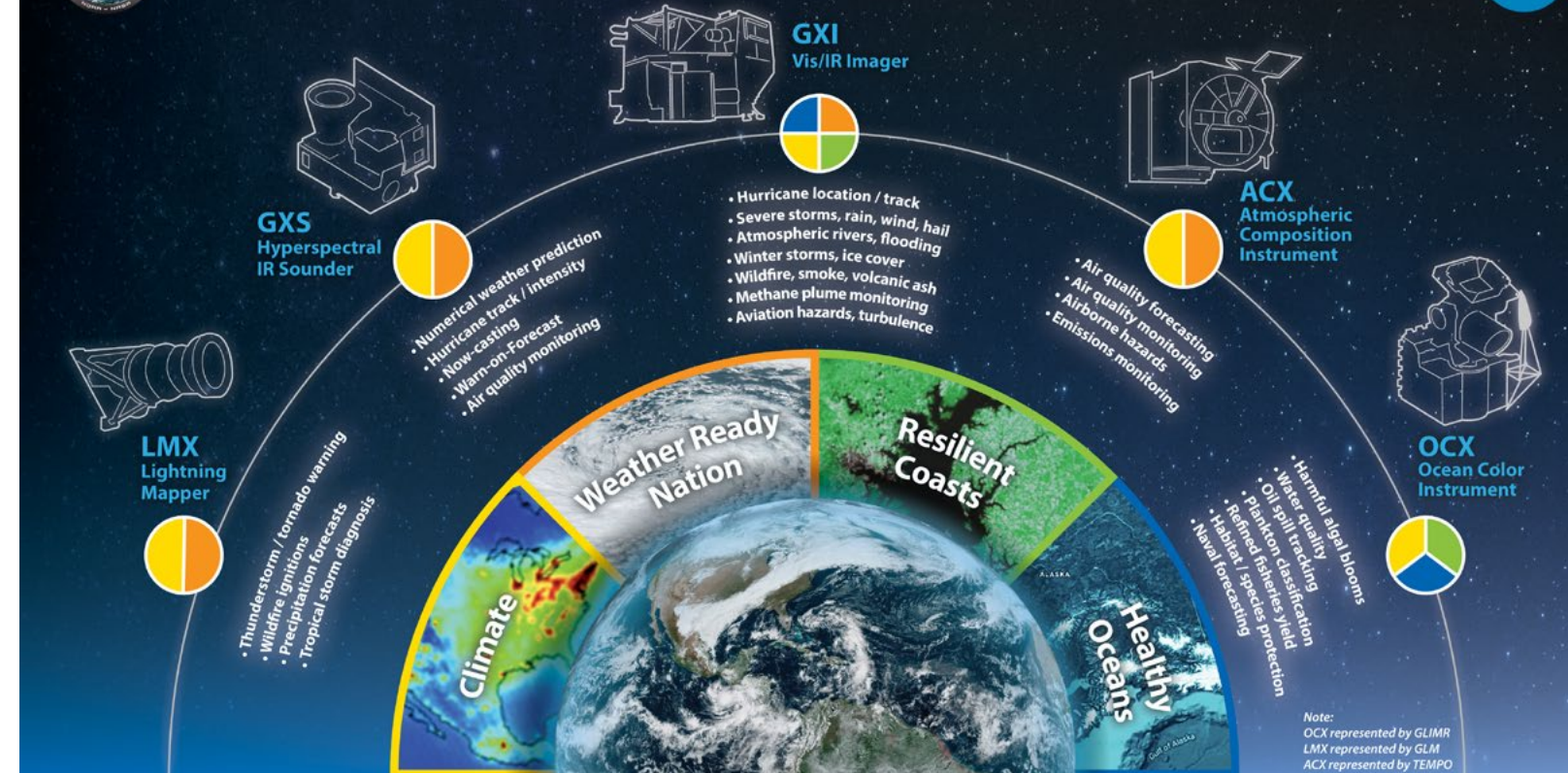
GOES-19 will work in tandem with GOES-18, which serves as "GOES West." Together, these satellites will watch over more than half the globe – from New Zealand to the west coast of



GOES-U undergoes testing at Astrotech in preparation for launch. CREDIT: NASA



Geostationary Extended Observations



GeoXO's capabilities will extend Earth observations and monitor the atmosphere, oceans and climate. CREDIT: NOAA

Africa and from near the Arctic Circle to the Antarctic Circle. The current GOES East (GOES-16) will become an on-orbit backup.

Looking ahead to the future of geostationary observations

As the curtain closes on the GOES-R Series, NOAA is working with NASA to develop the next generation of operational satellites in geostationary orbit called Geostationary Extended Observations (GeoXO). GeoXO will provide new and improved observations of the atmosphere, weather, and ocean to help address emerging environmental issues, respond to the effects of Earth's changing climate, and improve forecasting and warning of severe weather and hazards. GeoXO's advanced capabilities will help address our changing

planet and the evolving needs of NOAA's data users. NOAA plans for GeoXO to improve on GOES-R's visible and infrared imagery and lightning mapping capabilities, and plans for GeoXO to include hyperspectral sounding, atmospheric composition, and ocean color observations. GeoXO will begin operating in the early 2030s as the GOES-R Series nears the end of its operational lifetime.

A successful partnership continues

NASA and NOAA have closely collaborated over the last several decades on weather monitoring programs. The partnership has successfully deployed more than 60 weather satellites and will continue with the advent of the GeoXO program. NOAA oversees the GOES-R Series

Program through an integrated NOAA-NASA office, managing the ground system, operating the satellites, and distributing their data to users worldwide. NASA's Goddard Space Flight Center manages the acquisition and development of the spacecraft and instruments and built the magnetometer instrument for GOES-T and GOES-U. NASA's Launch Services Program, based at Kennedy Space Center, manages the launch services for the GOES missions.

GOES-U is set for liftoff aboard a SpaceX Falcon Heavy rocket from NASA's Kennedy Space Center in Florida in late June 2024. ■

Erin McKinley / Code 410
Senior Outreach Manager, GOES-R/
GeoXO Programs



NOAA-21 is Operational

Watch on YouTube



NOAA-21 is the third satellite launched in the JPSS series, to be followed by JPSS-3 and -4. CREDIT: NASA/ LAMONT HARVEY

NOAA-21 is now fully operational as the primary satellite in the National Oceanic and Atmospheric Administration or NOAA's fleet of polar-orbiting satellites in the **Joint Polar Satellite System (JPSS)** constellation. A joint mission between NASA and NOAA, JPSS provides critical data to improve the accuracy of 3- to 7-day weather forecasts—including extreme weather events—and monitor climate change.

Formerly named JPSS-2, NOAA-21 launched on November 10, 2022, from Vandenberg Space Force Base in California to join the NOAA-20 and Suomi National Polar-orbiting Partnership (NPP) satellites in orbit. Each JPSS satellite orbits the Earth from the North to the South Pole 14 times a day, providing complete global data coverage twice daily. These satellites take measurements and images that help monitor hurricanes, snowstorms, floods, wildfires, and also the ozone layer.

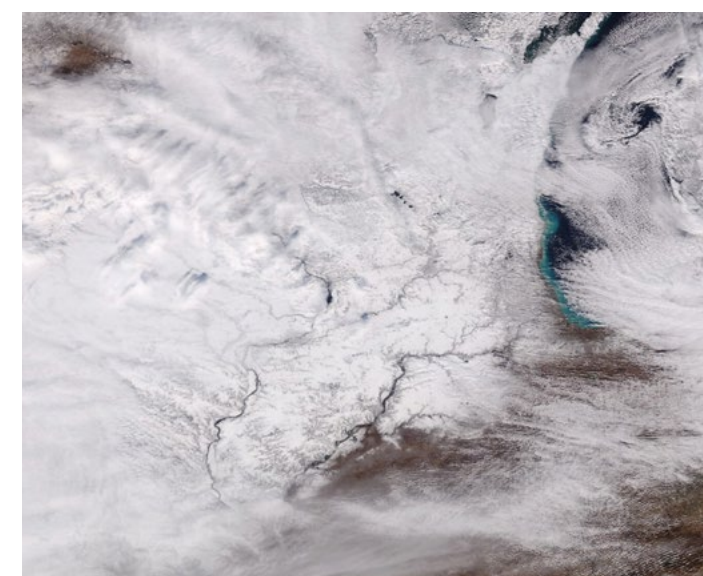
NOAA-21 completed its post-launch testing period ten months after launch. During this time, all the spacecraft's primary systems were checked, including the power system, communications system, computer and data system, and the propulsion system. The



Next in the series after NOAA-21, the JPSS-3 (foreground) and JPSS-4 (background) satellites are being assembled and tested at the Northrop Grumman Spacecraft Facility in Gilbert, Arizona. CREDIT: NORTHROP GRUMMAN

instruments were activated and outgassed to protect their sensors, then calibrated and checked through a series of satellite maneuvers to ensure they were performing as expected. Operational science testing was completed to inspect the quality of the instrument data sent back via the ground system. Once this phase was completed, NOAA validated all the satellite products before deeming them ready to use by the National Weather Service.

There are four instruments on board NOAA-21: the Advanced Technology Microwave Sounder (ATMS), the Ozone Mapping and Profiler Suite (OMPS), the Cross-Track Infrared Sounder (CrIS), and the Visible Infrared Imaging Radiometer Suite (VIIRS). These



The NOAA-21 satellite's VIIRS instrument captured this image of northern Illinois and southern Wisconsin blanketed in snow on January 11, 2024. CREDIT: NOAA

instruments gather vital measurements and data for daily and extreme weather forecasts as well as land and sea surface temperatures, rainfall rates, snow and ice cover, fire locations, smoke plumes, temperatures in the atmosphere, water vapor, and pollutants.

"NOAA-21 complements the operational on-orbit satellites in the JPSS constellation and will further the outstanding science that JPSS has provided since 2011. The series provides crucial weather and climate data to the world and the addition of NOAA-21 will further our mission to help protect lives and property around the globe," says Tim Walsh, Director of the Office of Low Earth Orbit (LEO) Observations, Code 470.

NOAA-21 continues the JPSS Program's tradition of providing excellent and critical data to users around the globe. The JPSS system of satellites will ensure data continuity for weather forecasting, climate monitoring, and much more, well into the 2030s. The next JPSS satellite will launch in 2027, with the final satellite in the series having a targeted launch date of 2032. Satellites from the JPSS series are designed to operate for seven years, with the potential for several more years. ■

Heidi Leach /
Code 470
Senior Science
Writer

**2023 JPSS Science Digest
is now available!**

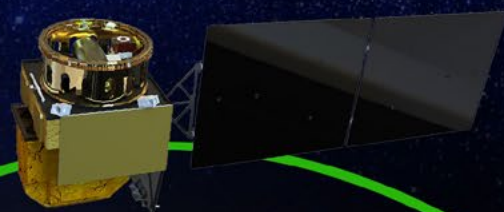
o www.nesdis.noaa.gov/jpss-digest

INTRODUCING

NOAA's Near Earth Orbit Network (NEON)

NASA and NOAA Prepare for the Future of Low Earth Orbit Observations

NASA and the National Oceanic and Atmospheric Administration (NOAA)'s partnership delivering critical weather and environmental observations to the public spans more than 50 years and 60 launches, and it includes NOAA's Joint Polar Satellite System (JPSS). As home to the joint program office for polar-orbiting satellites, Goddard is now working with NOAA on its new Near Earth Orbit Network (NEON) program, which will develop future low Earth orbit (LEO) environmental satellites that will supplement and eventually replace JPSS.



NEAR EARTH ORBIT NETWORK
NEON

Conceptual drawing of QuickSounder, the first in a new generation of low-Earth orbit environmental satellites in NOAA's Near Earth Orbit Network (NEON). CREDIT: SOUTHWEST RESEARCH INSTITUTE

In 2023, the JPSS program office within Goddard's Flight Projects Directorate was expanded to manage both the JPSS program and the NEON program and renamed the LEO Programs Division (LPD)/Code 470.

NEON, which completed Key Decision Point 0 in September 2023, will provide a new approach to developing the next generation global environmental satellite system by launching small- to medium-sized satellites with Earth-observing instruments more frequently. Low Earth orbit observations are critical for weather forecasting, environmental observation, climate monitoring, and public safety. Through the NEON program, a resilient constellation of LEO satellites that can be deployed quickly will enhance weather forecasting and disaster management of events like wildfires and floods, while also helping scientists study the effects of global climate change.

NEON will lay the groundwork for the next generation of LEO satellites before the final JPSS launch takes place in 2032. The first project in the NEON Program series is QuickSounder, which will serve as a prototype for NOAA's next generation of environmental satellites. This pathfinder mission will demonstrate NOAA's ability to launch small satellites within three years. QuickSounder

will fly a refurbished Advanced Technology Microwave Sounder (ATMS) instrument, like those flown on JPSS satellites. While environmental satellites usually take 10 years or longer to develop and launch, QuickSounder is expected to launch in mid-2026, less than 27 months after NOAA and NASA awarded its contract for development to the Southwest Research Institute. QuickSounder will lay the groundwork for the NEON program to leverage commercial investment, expertise, and innovation.

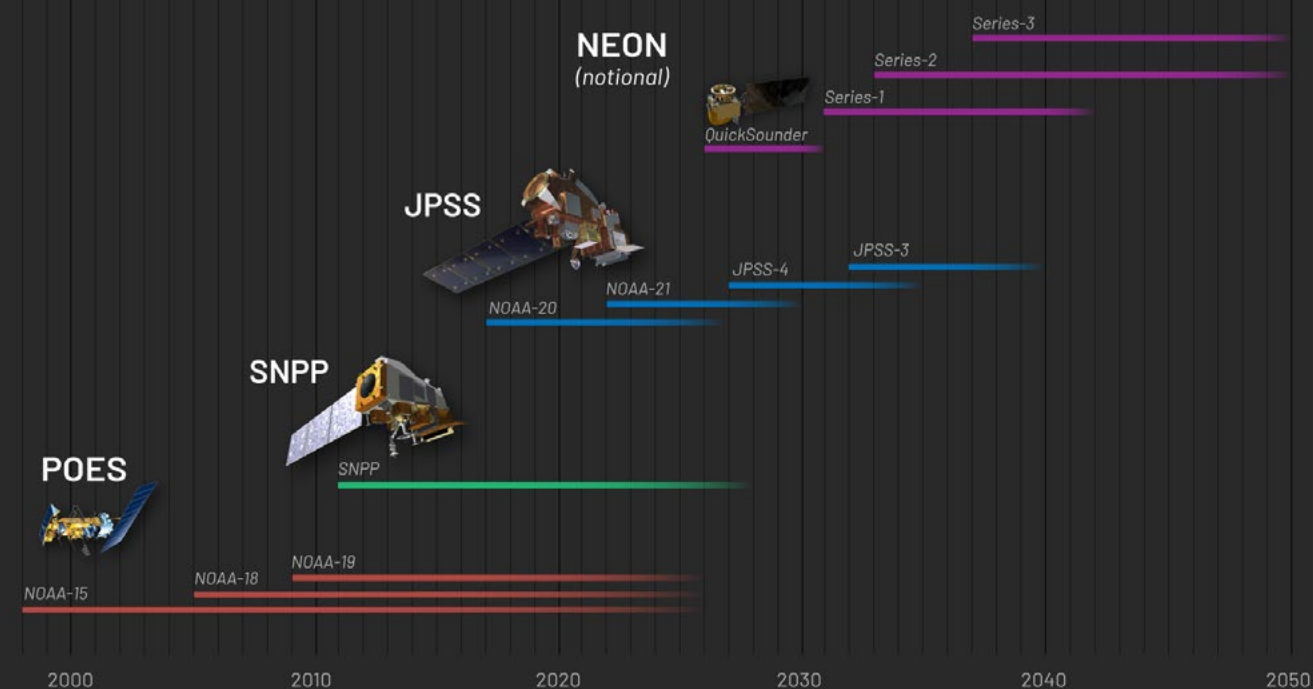
In the meantime, the JPSS program will operate its satellites through the late 2030s, continuing to provide the backbone observations needed to produce global, mid- and long-range weather forecasts. Building upon JPSS, NEON will continue, improve, and extend NOAA's global observations for weather forecasting, disaster management, and climate monitoring.

Michelle S. Birdsall / Code 470
LEO Programs Division, Strategic Communications and STEM Engagement Lead

Learn More

<http://nesdis.noaa.gov/neon>

Chart showing the progression of NOAA's low Earth orbit weather satellites, with the NEON program conceptualized. CREDIT: NASA/ VI NGUYEN



QuickSounder render credit: SwRI/Richard Menchaca

SW Next Program

The Space Weather Next (SW Next) program, a joint effort between the National Oceanic and Atmospheric Administration (NOAA) and National Aeronautics and Space Administration (NASA), aims to improve our understanding and prediction of space weather phenomena. Space weather refers to the conditions in space that can affect Earth and its technological systems, such as satellites, power grids, and communication networks. Space weather phenomena can have significant impacts on our daily lives. By improving our ability to observe and predict space weather, the SW Next program aims to mitigate these risks and minimize the impact of severe space weather events.

Exploring the Partnership between NOAA and NASA in Space Weather Research

Space weather, the study of the dynamic conditions in space that can impact Earth and its technological systems, is a field of growing importance. To better understand and predict space weather phenomena, NASA and NOAA have formed a collaborative partnership that brings together the expertise and resources of both agencies to enhance our understanding of space weather and its potential impacts on our planet.

Space weather refers to the conditions in space that can affect Earth's magnetic field, ionosphere, and upper atmosphere. These conditions are primarily driven by solar activity, such as solar flares and coronal mass ejections (CME). Space weather events can disrupt satellite communications, GPS systems, power grids, and even pose risks to astronauts in space. Understanding and predicting space weather is crucial for protecting our technological infrastructure and ensuring the safety of space missions.

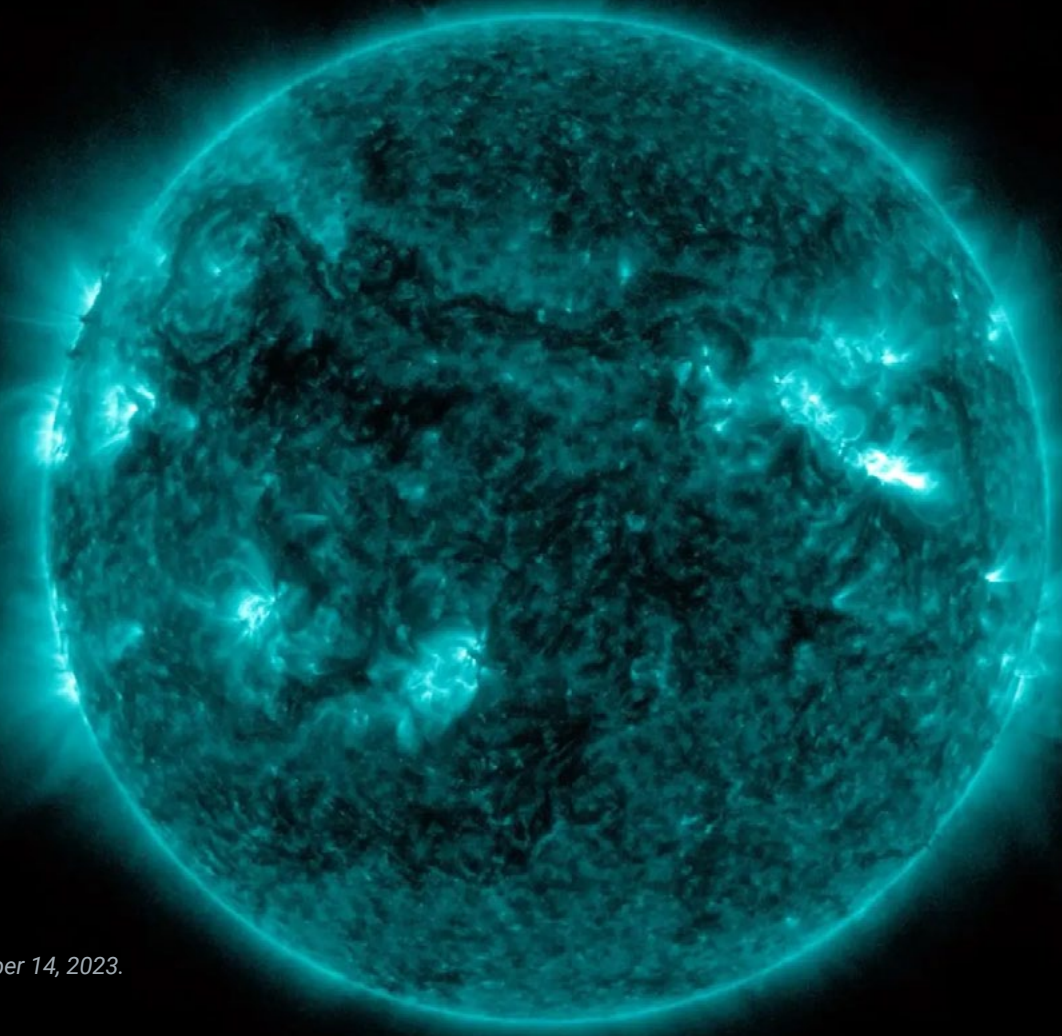
M 5.8 flare on December 14, 2023.
CREDIT: NASA

NOAA's Role

As the primary agency responsible for monitoring and predicting weather conditions on Earth, NOAA plays a vital role in space weather research. NOAA's Space Weather Prediction Center (SWPC) collects data from a network of ground-based observatories, satellites, and other sources to monitor solar activity and its potential impacts on Earth. The SWPC provides real-time space weather alerts, forecasts, and warnings to government agencies, industries, and the public.

NASA's Contribution

NASA's expertise in space exploration and scientific research complements NOAA's efforts in space weather research. NASA's missions, such as the Solar Dynamics Observatory (SDO) and the Solar and Heliospheric Observatory (SOHO), provide valuable data on solar activity and its effects on Earth. NASA also conducts research on the Sun-Earth connection, studying the interactions between the Sun's magnetic field and Earth's magnetosphere.



SW Next Program at Goddard

Space Weather Next (SW Next), a joint NOAA-NASA program located at Goddard Space Flight Center, within the Flight Projects Directorate's new Space Weather Observations Programs Division (SWOPD), will be responsible for the continuity of space weather data. Space weather phenomena pose a significant threat to critical infrastructure operations, modern technological systems, and human health. The effects of severe space weather on the electric power grid, satellites and satellite communications and information, aviation operations, astronauts living and working in space, and space-based position, navigation, and timing systems are wide-reaching. Space weather may have significant societal, economic, national security, and health impacts, ultimately threatening our nation's economic and national security.

An example of space weather phenomena, solar flares are large eruptions of electromagnetic radiation from the Sun. Large solar X-ray flares can change the Earth's ionosphere, which blocks high-frequency (HF) radio transmissions on the sunlit side of the Earth. As demonstrated in the image to the left, on December 14, 2023, a strong M 5.8 flare erupted from Active Region 13514. The flare eruption was linked to two hours of radio interference in parts of the US.

NASA's mission partner, NOAA, has served as the authoritative source of operational environmental information for the United States and for users around the world. Using satellites and other sources, the National Environmental Satellite, Data, and Information Service (NESDIS) collects critical environmental intelligence to promote and protect our nation's environment, security, economy and quality of life. NOAA has deployed space weather monitoring and warning capability as part of its mission through its existing Geosynchronous (GEO), Low Earth Orbit (LEO) and the Constellation Observing System

for Meteorology, Ionosphere, and Climate-2 (COSMIC) satellite programs.

SW Next is a loosely-coupled program, enabling observations of space weather, which require sampling throughout the Sun-Earth system and beyond. Observations are diverse, including both remote sensing of the Sun from multiple vantage points and in situ measurements at multiple locations in space. Instruments to observe space weather have distinct and different platform requirements including, depending on the kind of observation, specific attitude and pointing stability, magnetic

cleanliness, or maintenance of orbital position. Observational systems at the start of the program are in various states within their asset lifecycle. Some observations are made by systems that are new and ready to be deployed as part of a robust, resilient architecture and some necessary observations rely on systems that are well beyond their design life with an urgent need for technology refreshment. Programmatically, this diversity of instrumentation, platforms, orbital regimes, and need dates results in a loosely-coupled program of diverse individual implementation projects.

The SW Next program represents the next series of space weather observations across all orbital domains through a comprehensive architecture and coordinated program to ensure space weather products are available to meet user requirements starting at 2025 through 2050. The goal is a resilient architecture focused on meeting user needs. SW Next program architecture contains several heterogeneous space assets in various orbits, and the program scope will include infrastructure and services for communications, data processing, storage, and stewardship, and product dissemination. The program objectives require in situ and remote sensing capabilities

to measure the full range of space weather. Projects are formulated to meet program requirements and user needs, in line with available resources.

- The Sun-Earth Line (SEL) at Lagrange Point 1 (L1) and GEO (L1 Series) project will develop and launch observatories at the L1 orbit.
- The GEO Series project will implement GEO observational requirements.
- The combination of the L1 Series and the GEO Series will meet the SEL observation requirements and provide data continuity beyond the Space Weather Follow-On (SWFO) program and the Geostationary

Operational Environmental Satellite-R series space weather observations.

- Observations designated in the program architecture to be collected off-SEL will be covered by the European Space Agency (ESA) Vigil mission to Lagrange Point 5 (L5) with the addition of a NOAA-provided compact coronagraph. Its launch is planned for November 2029.
- As needed, LEO hosted instrument and/or Highly Elliptical Orbit (HEO) hosted instrument projects will be formulated to develop and deliver sensors to be flown on partner satellites, as well as provide associated data services.

L1 Series Project

The SW Next L1 Series project's mission is to continue and enhance the observation capability at L1 to meet space weather needs. The L1 Series project will consist of two satellites conducting space weather monitoring at Lagrange Point 1. The satellites will be launched several years apart as determined during formulation. This two-observatory approach will provide continuous measurements of the space environment, remote observations of the Sun, and timely data for the creation of products necessary to generate accurate forecasts of space weather disturbances. The project will develop and launch

both observatories, as well as establish associated ground systems necessary to maintain observational continuity of real-time solar imagery, solar wind, and other measurements as specified in project requirements.

L5 Project

The SW Next Lagrange 5 (L5) project is a reimbursable project that will provide a compact coronagraph (CCOR-3) to ESA for its Vigil mission to the Fifth Earth-Sun Lagrange Point. The L5 project will process CCOR-3 data and distribute other Vigil observations and CCOR-3 processed data for NOAA and NASA users. Once operational, the L5 project will support near-real-time delivery of space weather data

to NOAA's Space Weather Prediction Center (SWPC). The L5 project will continue to leverage NASA's multi-decadal partnership with NOAA. The CCOR-3 instrument is a white light coronagraph instrument to detect and characterize coronal mass ejections (CMEs). CCOR-3 is anticipated to be virtually identical to the SWFO-L1 CCOR-2 in instrument specs, with a radiator modification that is required due to the Vigil spacecraft configuration.

The L5 project will also provide a high-fidelity engineering model to support integration and test activities. The L5 project will be responsible for negotiating and ensuring compliance with any interface requirements for integration onto the ESA Vigil spacecraft.

User Engagement

Space weather may seem like a complex and distant concept, but its impacts can be felt here on Earth. Engaging the public in space weather research is crucial for raising awareness and fostering a sense of preparedness. User engagement is a key aspect of the program. It actively seeks input from various stakeholders, including operational environmental

prediction agencies, the space weather science community, and government departments and agencies. By understanding user needs and requirements, the program can better tailor its observational capabilities and provide more effective space weather products and services.

Overall, the SW Next program is a crucial initiative that aims to improve our understanding and prediction of space weather.

By leveraging partnerships, engaging with stakeholders, and implementing a comprehensive architecture, the program seeks to enhance our ability to mitigate the impacts of severe space weather events and protect our critical infrastructure and technological systems. ■

Elina Clavelli / Code 490
Technical Writer

Coming and Goings

September 2023 through February 2024



Comings

Matthew Morrow (596) to 472/ Joint Polar Satellite System (JPSS) Flight Project

Kristina Gonzalez (External) to 418/ GEOstationary and eXtended Orbits (GEO-XO) Project

Brian Hall (800) to 410/ Geostationary Operational Environmental Satellite-R Series (GOES-R) Program

Alexander Petrov (External) to 472/ Joint Polar Satellite System (JPSS) Flight Project

Isaac Mcginnis (380) to 400/Flight Projects Directorate

Brennan Nowak (495) to 493/ Space Weather Next Lagrange 1 (L1) Series

Leigh Forbes (590) to 420/Earth Science Projects Division



Goings

Joseph Jones (457) to 581

Brent Robertson (483) Retirement

Jerry Esper (400) to HQ

Rosa Avalos-Warren (457) to HQ

Matt O'Neil (401) to 592

John Blackwood (460) Retirement

Mark Brumfield (450) Retirement

Glenn Iona (460) Retirement

Alan Johns (443) Retirement

Bonita Seaton (443) Retirement

Cathy Peddie (460) Retirement

Andrew Peddie (460) Retirement

Robert Bauer (407) Retirement

Keith Walyus (420) Retirement

Angela Hodge (4502) to NAVSEA



Reassignments/ Realignment Details within Code 400

Susan Strege (401) to 472/Joint Polar Satellite System (JPSS) Flight Project

Charles Bacon (435) to 429/ Polarized Submillimeter Ice-Cloud Radiometer (PolSIR) Project

Kristen Brown (460) to 436/Deep Atmosphere Venus Investigation of Noble gases, Chemistry, and Imaging (DAVINCI) Project

Greg Dell (493) to 429/Polarized Submillimeter Ice-Cloud Radiometer (PolSIR) Project

Karen Rogers / Code 400
Administrative Officer

SAVING FERMI

AVOIDING SPACE COLLISION

On January 31, 2024, NASA's Fermi Gamma-ray Space Telescope performed its second-ever collision avoidance maneuver due to a conjunction with an ION Satellite Carrier, ION SCV-004, from the Italian company D-Orbit. ION SCV-004 is a CubeSat carrier and dispenser with an attached payload, launched on January 13, 2022; one of the CubeSats it carried is a Czech gamma-ray detector, VZLUSat-2, developed by the Czech Aerospace Research Centre (VZLU) in collaboration with other Czech companies and universities.

While Fermi is in fine shape today, continuing its mission to map the highest-energy light in the universe, the story of how it once again sidestepped a potential disaster offers a glimpse at an underappreciated aspect of managing a space mission: orbital traffic control.

Despite the apparent crowding in Earth orbit, there's usually a vast amount of space between individual objects. Close approaches – also known as conjunctions – with fragments, rocket bodies and active payloads remain infrequent events. Moreover, few of the potential conjunctions identified a week into the future will materialize.

Fermi's concept of operations to provide all-sky gamma-ray observations imposes no orbit maintenance requirements. Despite that, it does have on-board thrusters to deorbit at the end of its mission. At the end of Fermi's operating life, the thrusters were designed for a controlled reentry, safely targeting an ocean impact for the components that will survive atmospheric reentry, rather than falling in an uncontrolled manner or staying in orbit and contributing to the junk problem.

However, this was not the first time the Fermi mission was faced with this problem. On March 29, 2012, the Fermi team learned that a defunct Cold War spy satellite would pass too close for comfort on April 4, 2012. The two spacecraft were expected



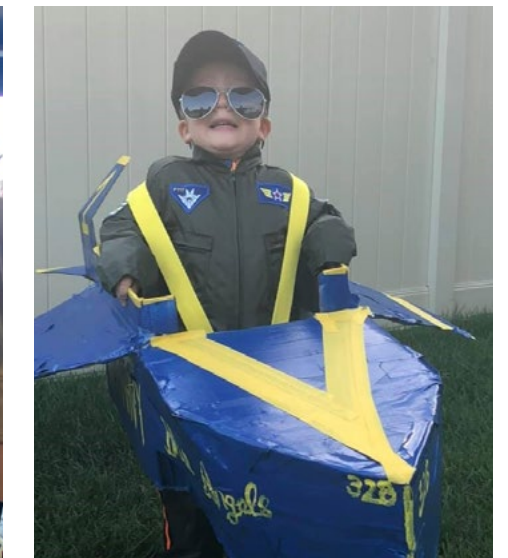
Winners of the 2023 Space Science Mission Operations (SSMO) Cup. (Left to Right) Rich Burns, SSMO Project Manager; Ben Holt, Fermi Flight Operations Team (FOT) Lead; Eli Elstein, Jennifer Byrd, Jeff Devine, Fermi FOT, Chuck McConnell, Fermi Mission Director. CREDIT: NASA

to occupy the same point in space within 30 milliseconds of each other, which meant that Fermi had to get out of the way. This required stowing the telescope's solar panels and communication antenna, which could have been damaged by the propellant, and using the reaction wheels to point it in the intended direction of travel. When those were done, it only took a one-second firing to move Fermi safely out of the way. With the burn done, the process was reversed in less than an hour and Fermi was back in operation.

The Fermi team have become experts at preparing maneuvers for potential conjunctions. However, the vast majority of threats evaporate, and the spacecraft's observations continue without interruption. Nonetheless, the team persevered through many nights and weekend preparation activities and stayed focused on preparing for the day when one of these conjunctions required a maneuver. Along the way, they identified several improvements to the maneuver planning and testing process. They even discovered several risks associated with maneuver execution that resulted in implementation of corresponding mitigations, inclusive of a flight software patch, thereby improving the robustness of Fermi's maneuver capability. On January 31, the conjunction that didn't evaporate arrived and the team had Fermi more robustly prepared than ever before. The first maneuver since 2012, a small, two-second thrust, executed flawlessly, enabling Fermi to continue its mission to monitor the gamma-ray sky. ■

Kelly Hyde / Code 444
SSMO Chief of Staff
Rich Burns / Code 444
SSMO Project Manager

Paula Wood's (460) great nephew (Colton) had his dreams come true when he got a personal meet and greet with his idols, the Blue Angels. Paula's son-in-law, Chris (a Maryland State Trooper), received the prestigious honor of escorting the Blue Angels to their hangar at Andrews Air Force base for the U.S. Naval Academy Air Show. Chris spoke of Colton's dream of becoming a Blue Angel someday and shared Colton's Halloween costume from a few years prior, which prompted them to invite Colton for a special meet & greet before the Air Show on May 22nd. Colton took many pictures, received autographs and a special shout-out as the Blue Angels drove away. As you can see in the pictures below, this experience is one that Colton will never forget!



left to right: Colton meets his 'Blue Angels' idol; with Maryland State Trooper, Chris; showing off his Halloween costume! CREDIT: PAULA WOOD



Congratulations to James Webb Space Telescope (JWST) Instrument Systems Engineer, Begoña Vila, for being awarded the 2024 Galician Excellence Title in the Sciences and Medicine Category. This award comes from the Spanish Association of Galician Entrepreneurs of Catalonia (AEGA-CAT), which is a civic and social organization made up of entrepreneurs that seek to extend their integrative and enthusiastic vocation outside the country of Spain. It is of special significance to Begoña as it originates from her

birth country, Spain. The award honors individuals who deserve to be recognized for their "profound human quality, their professional achievements and their contribution to the development of Galicia and its respect for the culture and traditions of their land".

Learn more about the organization at: <https://www.aegaca.org/>. The award website will reflect this year's recipients after the Gala dinner on July 5th in Catalonia, Spain, where Begoña will accept the award. For information on previous award honorees, go to: <https://www.aegaca.org/titulos-excelencia-galega/excelencias-2023>. Other categories of this award include Arts, Business, Solidarity Action, Sports, Communication & New Entrepreneurs.

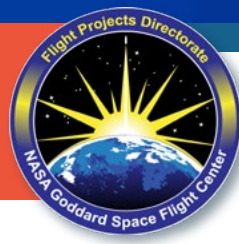


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Please send your inputs to Paula Wood. Include your name, phone number to:

✉ paula.l.wood@nasa.gov
☎ Code 460
📞 Ext. 6-9125

LENGTH OF SERVICE PERSPECTIVES FROM THE DIRECTORATE



NASA, Goddard, and the Flight Projects Directorate pride themselves on the dedication of our exceptional workforce. Please join us in congratulating the seven civil servant employees who reached career milestones over the past year. These team members have devoted substantial portions of their career to the Federal Government and their perseverance and commitment enables NASA's mission.

35 YEARS

Jean-Marie Denis

Project Formulation Manager



Reflecting, what has been the best part of working at NASA/GSFC/FPD?

The best part of working at NASA is the opportunity to work with diverse group of people with a common goal, trying to improve life of Planet Earth and exploring the universe for life elsewhere beyond Earth. The FPD offers the unique opportunity to interact with most of the other Divisions on Center. FPD values teamwork, which helps foster innovation and new ideas.

20 YEARS

Don Shinnars

White Sands Complex Station Director



Reflecting, what has been the best part of working at NASA/GSFC/FPD?

After explaining to someone what I do for NASA and they ask the question: "Do you work for NASA?" I'm very proud to state: "Absolutely!"

35 YEARS

Barbara Grofic

Associate Director (440)



If you had a nugget of advice to share, what would it be?

Stay open to new opportunities! Goddard has such a wide variety of ways to contribute, all of which can be quite rewarding. My career at Goddard has spanned three directorates, line/project and program management, software and systems engineering. If something looks challenging, go for it!

15 YEARS

Juli Lander

PACE Deputy Project Manager



Reflecting, what has been the best part of working at NASA/GSFC/FPD?

Working at Goddard has brought so many wonderful opportunities to work on a variety of interesting missions that really expand your thinking about the world and universe around us. And with each amazing project, you have the excellent team that embraces the feeling that we are all part of a huge Goddard family and all committed to success of every mission.

35 YEARS

Khrista White

LEO Program Support Manager (470)



If you had a nugget of advice to share, what would it be?

Thank someone every day - everyone's job at Goddard is important; while pursuing your goals - hold yourself accountable; serve others; work hard and play hard. Life's not a rehearsal. :)

40 YEARS

Joseph Sparmo

35 YEARS

David Content, Elizabeth Forsbacka, David Larsen, Robert Vik

25 YEARS

Sarah Austin-Blevins, Jacqueline Le Moigne-Stewart, Michael Seablom

20 YEARS

Lavida Cooper, Jeffrey Smith

15 YEARS

Amber Emory, Eric Moyer

10 YEARS

Dana Ostrenga

5 YEARS

Baran Sahin



CONGRATULATIONS TO THE GUSTO Team!



Congratulations to the Galactic/ Extragalactic ULDB Spectroscopic Terahertz Observatory (GUSTO) team! GUSTO launched on December 31, 2023, from McMurdo, Antarctica. Floating at over 120,000 feet above Earth's surface, GUSTO has broken the record as NASA's longest-flying heavy-lift balloon mission! Led by University of Arizona astronomer Chris Walker, GUSTO took flight on a zero-pressure balloon carrying a telescope with carbon, oxygen and nitrogen emission line detectors in search of clues about the stellar life cycle in our galaxy and beyond.

CREDIT: NASA

Learn More

- o More information about GUSTO's record-breaking mission

NASA Project Management (PM) Symposium

The NASA Project Management (PM) Symposium was held April 24-25, 2024 at the Langley Research Center in Hampton, Virginia. The PM Symposium is a pivotal event to convene the project management community to exchange insights, strategies, and methodologies. The symposium was designed to foster relationships, share lessons learned, and discuss best practices within the field. It was an initiative sponsored by NASA's Chief Program Management Officer (CPMO), Dave Mitchell, in collaboration with the Office of the Chief Engineer's Academy of Program/Project and Engineering Leadership (APPEL), aimed at steering the conversation towards tackling challenges in the PM world.



CPMO, Dave Mitchell, presented André Dress/472, Project Manager of JPSS Flight, with a Program and Project Management Excellence Award (PMEA). Congratulations, André!
CREDIT: MARK KNOPP/LARC



Donya Douglas-Bradshaw/435, Deputy Director of Mars Sample Return, participated on the State of PM Panel held on April 24, and shared insights, challenges, lessons learned, and best practices from throughout her career. CREDIT: MARK KNOPP/LARC

WHAT'S UP WITH OUR Flight Projects Development Program

The Flight Projects Development Program (FPDP) Cohort 5 traveled to Langley for the PM Symposium. Konrad Bergandy, Stephanie Vidal, and Neerav Shah, along with three of Langley's Project Ingenuity & Management Excellence Program (PRIME) participants, were panelists for the PM Development Program Panel, sharing their experiences and the value of participating in development programs.



(Left to Right) Steve Velotas (moderator), Jim Neilan (PRIME), Konrad Bergandy, Stephanie Vidal, Stephanie Harrison (PRIME), Neerav Shah, Yolanda Keiller (PRIME). CREDIT: MARK KNOPP/LARC



(Left to Right) Jim Neilan (PRIME), Konrad Bergandy, Stephanie Vidal, Stephanie Harrison (PRIME). CREDIT: MARK KNOPP/LARC

Both of Cohort 5's Capstone teams worked hard on their projects over the last year. The teams – Building Our Pipeline with Neerav Shah, Chris Strickland, and Stephanie Vidal; Lessons Learned with Konrad Bergandy, Carla Newman, Nikki Rawlings, and Ellen Shea Filipski – presented their findings to a full house of supporters on April 29. Completing their Capstone presentations was a big step leading to their graduation on May 20!



Congratulations to Cohort 5! (Left to Right) Back: Chris Strickland, Carla Newman, Konrad Bergandy, Neerav Shah. Front: Tynika (Nikki) Rawlings, Ellen Shea Filipski, Stephanie Vidal. CREDIT: KATIE MELLOSGSFC



Thank you to Walt Faulconer, the program facilitator, and Donna Swann, the program manager, on another successful cohort!
CREDIT: KATIE MELLOSGSFC

KNOWLEDGE MANAGEMENT Insights

Common Lessons

We have been busy capturing project lessons via Pause and Learns, one-on-one interviews, and group discussions. It's always gratifying to listen to project teams reflect on what they've learned and hear their recommendations for future projects.

Many of the lessons captured are highly contextual and project specific. Some of these lessons will be relevant to a subset of other projects, most notably follow-on projects, while others are commonly held and transferable to many projects. Following are some topics that have been frequently raised during recent lessons learned discussions.

Cultural Differences

Cultural differences between project partners can impact performance. These differences include the willingness to share information, how projects are organized, roles and responsibilities, reviews, mission assurance, technology, project terminology, and so on. There are multiple layers to cultural differences, which can take time to work through.

Recommendations:

- Hold early face-to-face meetings between project leads and subsystems teams.
- Assumptions can become the norm when things are not written down. Clearly document how the work will be done.
- Create an agreed-upon list of project terms. This is especially important when working with international partners.
- Leverage influence strategies like role modeling and reciprocity. Model how you expect to be treated.

Team Cohesion

Team cohesion is a necessity for any mission. This means having a group of people who are committed to the mission, work together, and trust each other.

Lessons:

- Cohesive teams have an open and collegial environment. Team members at all levels are supportive of others and share their knowledge.
- People are free to offer their opinions without being criticized.
- New team members onboard and merge easily into the workflow. They're able to call any coworkers with questions which helps accelerate their time to full performance.

Heritage

Lessons:

- Some projects found that they overstated heritage. Once discovered, it's important to state actual heritage versus the projected one.
- Project partners may follow a different heritage process than the one used by GSFC, i.e., a less rigorous one.
- Heritage can be about the people as well as the engineering. New people may not be as beholden to the original technology or instrument.

Recommendations:

- To determine heritage, ask: Is it heritage, a scaling up of a prior project, or a new technology development?
- Revisit the heritage review process, document, and refine it, to improve its efficacy.

Phase E Budgeting

Typically, a project does not focus on operations at the proposal stage. The focus is on getting to the launch pad. Hence, Phase E costs may not be looked at in enough depth. Costs can quickly add up on a multi-year project.

Lesson:

- A large complex project should hold greater Phase E cost reserves since the project will be learning ConOps throughout the project.

Roles and Responsibilities

Quite simply, organization charts do not adequately represent what it is that people do.

Recommendations:

- Create a dynamic roles and responsibilities document as an add-on to organization charts.
- Create communications and anomaly call trees since networks are organized differently across organizations.
- Clarify cross-cutting lines of authority and decision-making responsibility.
- Clearly define who should take charge of each document and process during integration.

Communications Tools

Communications tools are a common concern for project teams. One project had to contend with a surplus of identities for multiple communications tools, on top of complicated access requirements. Some project partners could use the communications tools while others were not given access.

Recommendations:

- Consolidate project communication tools when feasible.
- Identify a project-dedicated IT point of contact to reduce barriers to access.

Project Classifications

Class C and Class D classifications are a frequent topic of discussion. One Class D project's profile was not aligned to Class D mission criteria. This created confusion about resources allocation, risk management, and mission assurance. The project should have been reclassified if it had been allowed to continue.

A Class C project with a 5-year mission discovered that they needed to manage misperceptions about risk and quality. Vendors understood the Class C risk

posture, yet the project ran into internal resistance. The mindset was that a 5-year mission required the more expensive implementation and quality control of a Class B mission. A lot of time had to be spent explaining the differences between Class C and Class B parts, as well as justifying other decisions.

Lesson:

- This was and is a change management challenge.

Recommendation:

- To change a long-standing practice, provide a firm rationale for the change, upfront.

Agile Approach

A new process was recently tested by incorporating the agile methodology. The intention was to break the mold, go faster, and push the envelope as far as possible towards a commercial approach.

Lessons:

- Project managers set a compelling vision for the team to work in a new way.
- People at all levels were empowered to make decisions, save time, and improve efficiencies.

Recommendations:

- Delegate decision-making to lower levels and empower the people doing the work.
- Find team members who understand the mission's goals and complement each other. Don't get caught up in titles.

A new FPD Knowledge Management site is in development. Once the searchable site is completed, designated project team members will be able to submit lessons learned. These will be in addition to lessons captured during facilitated lessons learned discussions. ■

Judy Dickinson / Code 400
FPD Knowledge Management



Brian Hall

Geostationary Earth Orbit Programs Division (Code 410)
Deputy System Program Director

Born Eden, NC

Education BS in Civil Engineering, North Carolina State University

Life Before Goddard

Brian grew up in Eden, North Carolina, a small town in the northern central section of the state. Growing up, Brian developed a passion for understanding how things work and he often tagged along with his Dad, helping friends and family with home projects and working on vehicles. These experiences led Brian to focus on a future in engineering. While in high school, his initial plans were to pursue a degree in Aerospace engineering; however, advisors convinced him that civil engineering would be a better choice based on their assessment that there were limited opportunities the aerospace industry at that time. Brian attended North Carolina State University where he received a degree in Civil Engineering. After college, Brian set his sights on finding an engineering position that aligned with another of his goals, living near the coast. As Brian searched and interviewed for various jobs, he came across an advertisement for a civil engineering position at Wallops Flight Facility (WFF) on the Eastern Shore of Virginia.

Life at Goddard

Brian began his career working in the Environmental Branch at Wallops Flight Facility working as a contractor for Computer Sciences Corporation (CSC). A few months later, CSC approached Brian about filling an opening in the Mechanical Systems Branch supporting the NASA Sounding Rockets Program. Transitioning to this mechanical engineering position set the stage for Brian's 27+ years supporting NASA's suborbital programs. In support of the sounding rocket program, Brian had the opportunity to support scientific research and technology demonstration missions around the world. Brian's primary responsibility was the design and development of sounding rocket payload flight systems, along with the oversight of sounding rocket launchers and associated ground support equipment.

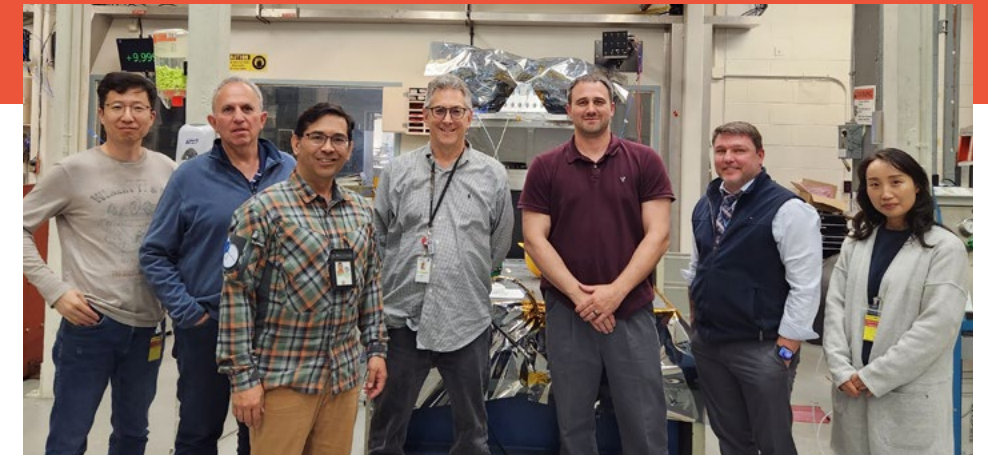
In 2004, Brian took a NASA civil servant position in the Range & Mission Management Office serving as a project manager. In this position, Brian led project management planning and

operations implementation for missions conducted from WFF's Research Range. One of Brian's most memorable career experiences was supporting the NASA Engineering and Safety Center with the development and test of a risk reduction initiative for an abort system developed for the Constellation Program.

In 2009, Brian moved to the Sounding Rockets Program Office to serve as the Technology Development Manager. In this position, Brian had the opportunity to work with stakeholders and customers to evaluate program capabilities and develop the near-term and long-range roadmaps to support NASA's research needs. A few years later, Brian would transition to become the Payload Systems Manager for the Program, providing technical management and oversight for the development of sounding rocket payloads and support systems. During his tenure with the Sounding Rockets Program, Brian took on several temporary positions to support leading other unique projects for the Suborbital and Orbital Projects Directorate. Brian served as the Orbital

Project Manager in a temporary position to evaluate WFF's role in the cubesat and small satellite arena, working closely with the Directorate to assess NASA's needs and WFF's potential role in the line of business. He also spent a few years managing WFF's support to the JPL-led Low Density Supersonic Decelerator (LDSD) project, where he led the development of the test article's avionics system, the balloon carrier system, and launch operations for the test campaign.

In 2019, Brian joined the Small Satellite and Special Project Office serving as a senior project manager. In this role, Brian managed the replanning and preparations for the test of a new Ultra Long Balloon development project for the NASA Balloon Program. Brian also took over leadership of the NASA Autonomous Flight Termination Unit (NAFTU) project which was in the process of developing and implementing software safety certification testing for a new capability sought to meet initiatives for "Launch Range of the Future" architecture and provide a critical launch vehicle capability for the emerging small launch vehicle industry.



In 2023, Brian became the Deputy Director for Strategic Integration and Development for the Suborbital and Special Orbital Projects Directorate. In this role, Brian's initial focus was facilitating technology transfer of the NAFTU to government partners and the commercial launch vehicle industry, as well as enabling the swift implementation of the NAFTU into operations at the WFF Research Range. He also provided Directorate technical leadership and oversight for activities across the suborbital program's portfolio.

In late 2023, Brian joined the Flight Projects Directorate as the Associate Director for the Geostationary Earth Orbit Programs Division, Code 410. Brian currently serves as the Deputy System Program Director for the GOES-R and GeoXO series satellites programs.

Life Outside Goddard

Outside of work, Brian's pride and joy are his two children. Brian's son, Camden, is in elementary school and daughter, Alanna, is studying at the University of Virginia. In addition to spending time with his children, Brian enjoys being outdoors bicycling, motorcycling, and boating. ■



From the top: Coronagraph testing for Coronal Diagnostic Experiment (CODEX), Alanna, Camden, and Brian at O's game, and Camden and Brian with Chewy CREDIT: ALL PHOTOS COURTESY OF BRIAN HALL



Caitlin Eubank Bacha

Dragonfly Ocellus (Code 430.3)
Instrument Project Manager (IPM)

Born Baltimore, MD

Education BS Aerospace Engineering, Virginia Tech, VA

Life Before Goddard

Caitlin was born in Baltimore, Maryland and raised in the Carroll County/Eldersburg area. Growing up, Caitlin was interested in anything rooted in science, technology, engineering, and mathematics. When she had the opportunity to attend college, her parents convinced her to focus her attention on engineering. She latched on quickly to her engineering studies at Virginia Tech and discovered her love of aerospace and, specifically, the area of propulsion. Through an internship opportunity, Caitlin was able to focus on propulsion research and worked with industries such as the Department of Defense, commercial, and NASA for the remainder of her college career. She received her undergraduate degree in Aerospace Engineering from Virginia Tech in 2004 and began her career at the Chemical Propulsion Information Analysis Center while working concurrently on Master's courses in Systems Engineering from Johns Hopkins University.

Life at Goddard

Caitlin began her NASA career in 2006 as a propulsion engineer contractor. After a few years working as a contractor, she found that the flexibility to work on different details and projects really appealed to her. When a civil servant position opened up, she immediately jumped at the opportunity. Early in her career, Caitlin began working propulsion system development for the Solar Dynamics Observatory (SDO), which she followed all the way through launch and early orbit in 2010. Her experience on SDO was an integration and test crash course and an exciting opportunity for a new engineer learning the design-to-build process. Between build and launch for SDO, Caitlin was simultaneously pulled to help the Lunar Reconnaissance Orbiter (LRO) project through its launch and early orbit in 2009.

Soon after SDO and LRO, Caitlin became the propulsion deputy and integration and test lead for the Global Precipitation Measurement (GPM) mission. She found she loved the puzzle of figuring out

how to best build the hardware and work through challenges as an integration coordinator. A year or two into GPM, Caitlin applied for an Associate Branch Head position for Goddard's propulsion group. Through this role, she was able to continue working on GPM while also diving into people management and learning the various requirements that come with first-line management.

Caitlin worked on GPM through launch and orbit in 2014 before immediately being pulled to help with the tail end of the launch activities for the Magnetospheric Multiscale Mission (MMS). Once MMS launched in 2015, Caitlin focused her attention on green propulsion research. She was offered an amazing opportunity to work an international partnership with Sweden and NASA to develop thrusters and a higher performing system for potential application to Science Mission Directorate missions. Her research involved better understanding alternative propellants that would save on volume and mass, and the partnership allowed for different testing and performance



Clockwise from left: Caitlin with husband Andrew and children Emily and Lucas; Caitlin and Chaser; Emily finding half of a megalodon tooth! CREDIT: ALL PHOTOS COURTESY OF CAITLIN EUBANK BACHA

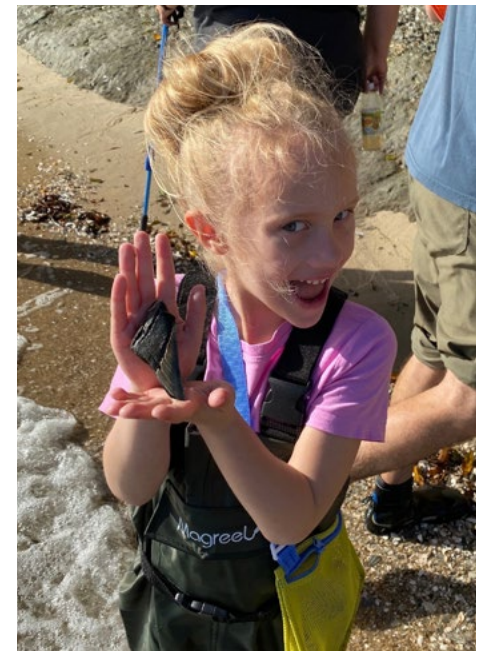
opportunities. Her role as the propulsion Associate Branch Head allowed her the flexibility to focus on research, branch out to the community, and bring propulsion work to the branch.

In late 2015, Caitlin transitioned to work with the Johns Hopkins University's Applied Physics Laboratory (APL) to solidify a partnership through Europa Clipper, allowing Goddard to build the propulsion system. Caitlin was charged with building the bipropellant propulsion system for Europa Clipper as the Product Development Lead (PDL) of the project's technical discipline, which later turned into a hybrid PDL/project management position. This was Caitlin's first real exposure to project management, and she immediately discovered how much it appealed to her. She helped the project develop its own infrastructure and navigated the challenges of continuing the project during the COVID-19 pandemic. Through this difficult time, she learned how to be a more effective manager, balancing the lessons learned of remote work and ensuring personnel

remained effective through long stretches of paused work.

After the Europa Clipper propulsion system was delivered to APL, Caitlin decided to focus on project management. In 2021, she took a detail in Code 430 to work on the Dragonfly Ocellus, which later turned into a permanent position. Ocellus is the navigational lidar for Dragonfly and is a unique and critical element to understanding landing and collision avoidance. This work is very different from her propulsion background, and it has allowed her to learn so much more on the technical side.

Caitlin's recent project management experience has given her varied exposure that she really enjoys, from electrical and optical mechanics to replans and budget challenges. She truly loves chemical propulsion work and navigating projects from concept development through implementation, launch, mission operations, and end-of-life disposal. Throughout her journey, Caitlin has learned the importance of communication and flexibility and she is eager to continue learning more.

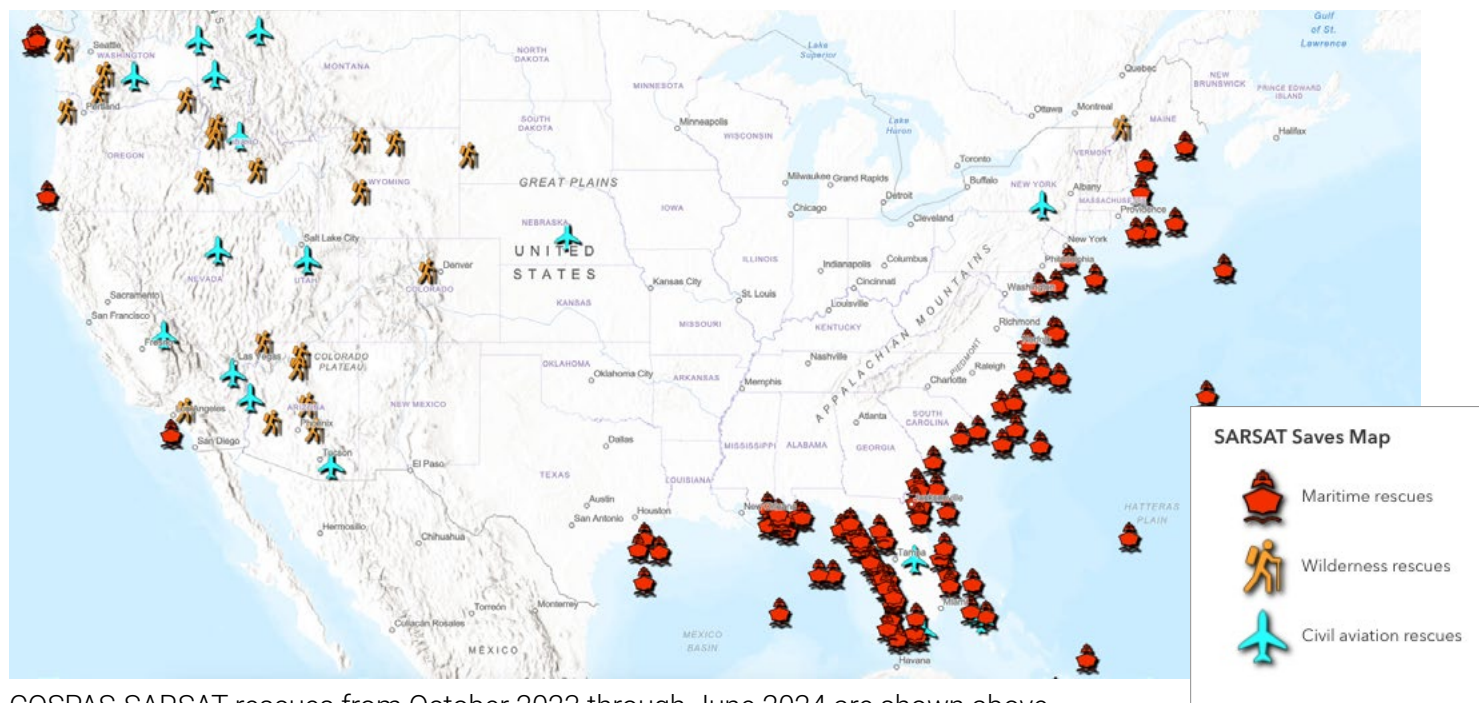


Life Outside Goddard

Caitlin has been married for 15 years to husband Andrew and has two kids, Emily (7) and Lucas (4). As a family, they enjoy being outside whenever they can, hiking and swimming. Caitlin and her husband are also avid skiers. Occasionally, Caitlin and her kids spend time fossil hunting in Calvert County, where they once managed to find half of a megalodon tooth! In her spare time, Caitlin likes to destress by going to the gym, running, and riding horses. Caitlin even has a horse named Chaser that lives nearby, and any free time she can spare is spent at the barn. ■

THE LATEST SAR SAVES

NASA'S SEARCH AND RESCUE (SAR) OFFICE CONTINUES ITS EFFORTS TO DEVELOP AND IMPROVE ON LIFE-SAVING DISTRESS BEACON TECHNOLOGIES.



COSPAS-SARSAT rescues from October 2023 through June 2024 are shown above.






DID YOU KNOW..?

In June, we celebrate and recognize Lesbian, Gay, Bisexual, Transgender and Queer (LGBTQ) Pride Month in honor of the 1969 Stonewall Uprising, which was a tipping point for the Gay Liberation Movement in the United States. In the United States the last Sunday in June was initially celebrated as "Gay Pride Day," but the actual day was flexible. In major cities across the nation the "day" soon grew to encompass a month-long series of events. Today, celebrations include pride parades, picnics, parties, workshops, symposia and concerts, and LGBTQ Pride Month events attract millions of participants around the world. The purpose of the commemorative month is to recognize the impact that lesbian, gay, bisexual and transgender individuals have had on history; locally, nationally, and internationally.

We want to be in the know!

If you have something to share, send it to Risha George. Include your **name**, **phone number** and send it to:

-  risha.george-1@nasa.gov
-  Flight Project Diversity and Inclusion Committee
-  Ext. 6-7433

CONGRATULATIONS TO THE ILLUMA-T & AWE Teams!

On December 5, 2023, NASA's Laser Communications Relay Demonstration (LCRD) and the new space station demonstration, the Integrated LCRD Low Earth Orbit User Modem and Amplifier Terminal (ILLUMA-T), successfully exchanged data for the first time. LCRD and ILLUMA-T are demonstrating how a user mission, in this case the space station, can benefit from a laser communications relay located in geosynchronous orbit. ILLUMA-T launched on November 9, 2023, as part of NASA's SpaceX 29th commercial resupply services mission. Following its arrival, the payload was installed onto the station's Japanese Experiment Module-Exposed Facility. ILLUMA-T and LCRD are a part of the NASA Space Communications and Navigation (SCaN) program's effort to demonstrate how laser communications technologies can significantly benefit science and exploration missions.



Learn More

- [More about ILLUMA-T](#)



Also on board the November 9 SpaceX launch from Kennedy Space Center, for installation on the International Space Station, was NASA's Atmospheric Waves Experiment (AWE). 'First Light' images have been captured, indicating the mission is operating as expected. AWE will provide global-scale observations of atmospheric gravity waves (AGWs) at the mesopause region, 54 miles (87 kilometers) above Earth.

CREDIT: NASA



Learn More

- [Updates on the AWE mission](#)

FLIGHT PROJECTS

UPCOMING LAUNCHES



TSIS



LEMNOS