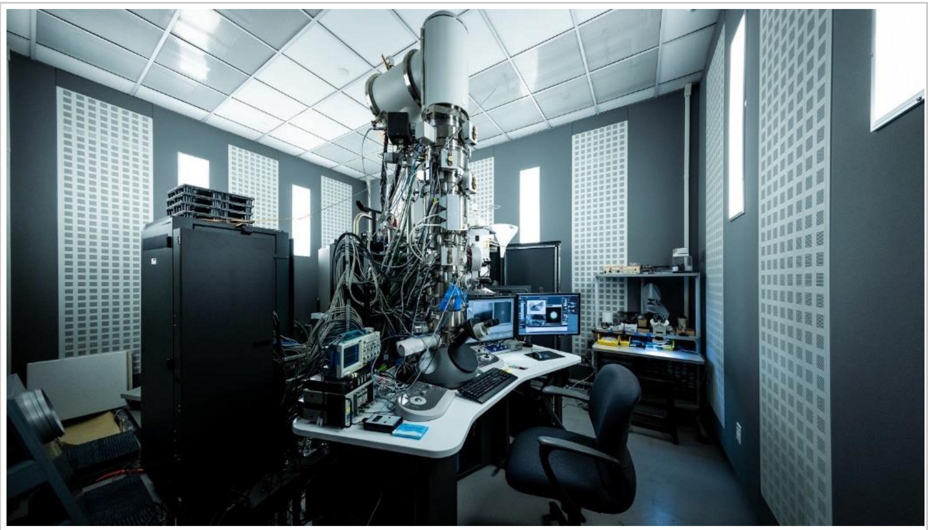
ORBITER NEWS

News, announcements, and more.

Take a Virtual Tour of Aerospace’s Microelectronics Lab

October 20, 2021

The Aerospace Virtual Tours allow you to digitally navigate through some of our world-class labs to learn more about the innovative and complex work our experts do every day to advance space capabilities. Be sure to check out what other virtual tours are available on Aerospace.org.



Thousands of microelectronic components are flying on every spacecraft, enabling them to complete critical missions. In Aerospace’s Microelectronics Lab, our experts study how they work, and more importantly, how they break. This knowledge helps our customers make smart decisions about what partsto use to ensure their systems are sufficiently reliable.

Aerospace investigates the entire life cycle of a component, including design, fabrication, how the component reacts to stress such as space radiation or extreme temperatures, and finally, conduct failureanalysis after the fact.

To accomplish all this, our lab features a suite of state-of-the-art tools, including CT scanners, a plasma focused ion beam, a transmission electron microscope, and more. Aerospace is able to investigate problems deeply and provide information that is unattainable by the vast majority of contractors.

Aerospace is constantly striving to improve our analysis capabilities and develop techniques in anticipation of problems in future materials, devices, and technologies. Our experts provide solutions when programs and customers have no other options.

Explore our **Microelectronics Lab** to learn more.

AeroCares Caps Off Milestone Year with New Goodness Ambassador Program and Volunteer Opportunities

October 18, 2021

A selection of employees who donated 100+ volunteer hours in 2021 (left to right: Joshua Kollat, Brian Habing, Frank Wong, Scott Houchin, Scott McLean)

At Aerospace, our people have a rich history of giving back and creating positive impact in their communities and causes they are passionate about.

The AeroCares platform provides a convenient year-round resource for employees actively engaged in volunteering, while also providing guidance to those considering volunteering and giving opportunities. This year, over 150 Aerospace employees participated in AeroCares by logging their volunteer hours, exceeding expectations and all previous yearly tallies by donating more than 5,000 hours of volunteer time, with 11 employees each volunteering over 100 hours.

"Last year, we had just over 1,000 volunteer hours logged in AeroCares. I wasn't sure we were going to make the goal of 5,000 volunteer hours given COVID and barriers to in-person volunteering, but our employees really amazed me and we achieved our goal," said Lauren Gandara, Outreach Coordinator for CorpComm and Public Affairs. "I love to see the ways in which our caring employees are giving back and making their communities better!"

To further promote community engagement, partnerships and outreach throughout Aerospace locations, AeroCares has added a new program. The new Goodness Ambassador program empowers local 'Ambassadors' to promote and become points of contact for their locations for giving and volunteering opportunities, while also building a community of employees that are passionate about volunteering.

So far, the following Aerospace employees have been selected as Goodness Ambassadors: Greg Henning (Albuquerque, N.M.); Larry Delucas (Huntsville, Ala.); Lael Woods (Fla.); Kenneth F. Harris (Greenbelt, Md.) and Lynda Chrisco (Colorado Springs, Colo.) If your site is not among those listed and you are interested in becoming a Goodness Ambassador, please contact cares@aero.org.

"Volunteering and connecting to people to get involved in STEM is a passion and love of mine," said Lynda Chrisco, Administrative Specialist in the Systems Performance Estimation and Algorithms Department.

Employees with an interest in volunteering as STEM mentors are strongly encouraged to consider two new mentoring opportunities. Aerospace, under Timothy Hall's leadership, has established a partnership with Frederick County Public Schools in Maryland to provide mentors to students planning to complete a Science and Engineering Fair project. This opportunity will provide students access to virtual mentors across a range of disciplines between November 2021 and March 2022. Aerospace, led by Larry DeLucas, has also launched a new program designed to help Alabama high school students explore exciting careers in space STEM by way of a series of lectures from several top scientists at Aerospace and universities around the country.

Employees interested in learning more about the Goodness Ambassador program, volunteering and upcoming STEM mentoring opportunities are encouraged to attend the Aerospace Cares Volunteer Interest Teams Meeting on **Tuesday, Oct. 19 at 9 a.m. PT**. For information about the meeting and a link to the event, click here.

Readying Lucy: How Aerospace Supported NASA's Asteroid Investigator for Space

October 14, 2021

In 1974, our understanding of human evolution was altered by the discovery of a 3.2 million-year-old fossilized human ancestor dubbed 'Lucy.' In similar fashion, NASA's Lucy mission looks to transform our current knowledge of the solar system and planetary origins. Later this week, the spacecraft will launch on a United Launch Alliance Atlas V rocket from the Cape Canaveral Space Force Station (CCSFS) in Florida.

This image shows the Lucy spacecraft being lifted onto its rocket in preparation for the opening of its launch window this Saturday. (Credit: United Launch Alliance)

During its 12-year journey, Lucy will gather valuable insights by studying seven Trojans and one main belt asteroid. In particular, Lucy will be the first mission to study the Trojans—two groups of asteroids sharing Jupiter's orbit thought to be remnants of the same material that formed the outer planets.

This illustration shows the Lucy spacecraft passing one of the Trojan Asteroids near Jupiter. (Credit: Southwest Research Institute/NASA)

The endeavor features unique characteristics: a long mission lifecycle, complex path to navigate, and multiple targets in independent orbits around the Sun. A program of this scope presents certain complexities, and The Aerospace Corporation was able to provide its technical expertise and experience to support NASA to ensure mission success.

A Long Mission Lifespan

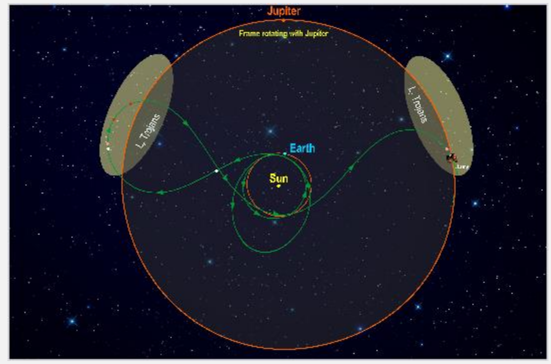
During its prime mission, Lucy will venture nearly 4 billion miles. The elaborate voyage will entail traveling more than three loops around the Sun and the utilization of special circular solar arrays to help the spacecraft receive the appropriate amount of solar power to carry out its mission when far away. Adding to its impressive total mileage, Lucy will be the first spacecraft to travel out to the distance of Jupiter and return to Earth's proximity—a maneuver necessary for the final gravity assist that will send the space probe back to conduct its final Trojan flybys.

"Lucy is an unusually long mission and has a particularly complicated path through the solar system because of the multiple targets it will study," said Allison Moeller, Senior Engineer Specialist in the Integrated Cost & Schedule Analysis Department at Aerospace. "Spacecraft go out and study things, but the different encounters did provide a level of complexity that was kind of new and took things to the next degree."

The longevity and numerous intended targets of study are distinctive qualities that presented challenges in understanding the mission's essential needs. Relying on the heritage of NASA's New Horizons and OSIRIS-REx—prior missions which carried the similar instruments onboard Lucy—allowed the team to better assess and identify potential risks. Looking at past success for guidance ultimately enabled personnel to reduce mission costs and achieve their timeline.

A Window of Opportunity

As a result of orbital mechanics and the intricate interplanetary course the spacecraft will need to navigate to reach all of its planned targets, the opportunity for launch is fixed. Starting on Oct. 16, NASA has a window of about three weeks to see Lucy take off from CCSFS. Even launching within this optimal period allows no room for error: its carefully calculated course means Lucy can only observe a subject once beforeproceeding to its next point of interest.



During its prime mission, Lucy will venture nearly 4 billion miles. (Credit: Southwest Research Institute/NASA)

Therefore, following a stringent schedule was essential during the development process and a factor thatAerospace helped maintain throughout its different capacities of support. Through its work, Aerospace helped verify that the mission was staying aligned with the target launch window.

“The value in our assessments is that we have the people with the expertise to look at the mission with a fresh set of eyes,” said Nishant Prasadh, Senior Member of Technical Staff in Aerospace’s Vehicle Design and Innovation Department. “Throughout different points in the development stage, we assembled teams of subject matter experts to review prior work and identify possible risks that may not be fully realized.”

By conducting evaluations throughout the project’s progression, Aerospace personnel were able to locate potential gaps, estimate their impact on the mission, and work with NASA to mitigate such hazards. Doing so assured that Lucy would be able to meet its deadline.

Heritage of Support Key to Future Success

Many factors are considered and various types of assistance are utilized to verify that the space probe is ready for lift off. Aerospace has lent its skillset to launch-related activities, with prior customer work continuing to be relevant: The Atlas V rocket that will take Lucy into space is the same version that Aerospace has certified for U.S. Space Force National Security Space (NSS) missions.

“Aerospace has offered different forms of support for NASA during the mission’s progression,” said Randall Williams, Systems Director in Aerospace’s Launch System’s Division. “From interacting with the launch provider through general observation activities at the rocket factory and launch site to compiling mission-specific preflight analyses leading up to launch, our personnel demonstrated Aerospace’s unique industry strengths.”

On launch day, an Aerospace team will monitor the countdown and lift offfrom the Spacelift Telemetry Acquisition and Reporting System (STARS) Mission Operations Center. Beyond acquiring, processing and displaying launch vehicle telemetry and related findings, STARS will also archive the information to be part of sample data. To confirm the nominal performance of the launch vehicle, Aerospace will conduct fleet surveillance operations. Procuring a comprehensive system-level view of the rocket’s functions is valuable since the same model has been employed for NSS missions.

Uncovering the Unknown

Inside the Astrotech Space Operations Facility in Titusville, Florida, the United Launch Alliance (ULA) payload fairing was secured around NASA's Lucy spacecraft on Sept. 30, 2021. (Credit: NASA)

Like the 20th-century discovery, which revamped our knowledge on the evolution of humanity, NASA's newest mission will shed light on our knowledge about the solar system. With the instruments onboard,Lucy intends to gain an in-depth view of its targets—ranging from the composition of materials to the surface temperature. The pieces of data gathered could help unlock a bigger picture.

"The fossil Lucy was meant to be something like a missing link, and that's what the motivation was for calling this mission Lucy," Moeller said. "The idea is that we're going to find a missing link: the history of giant planet formation. What NASA's Lucy is meant to do is go out there, study asteroids, learn more aboutthem, and hopefully provide more insight on how those planets were formed."

Once in space, patience will be required as the spacecraft conducts its multiple flybys and complex route. In the end, the information gathered by Lucy over its lifetime will have a great impact, much to the missionstaff's anticipation.

"Everyone on the team at Aerospace that I worked with really enjoyed getting to be a part of this," Prasadh said. "During the project design reviews, you could see how much this mission mattered to the NASA personnel working on the team—how much work they have put into it. The principal scientist's enthusiasm came through all the time when he talked about the places they were looking to explore."

This article has been ***published on Aerospace.org.***

Aerospace Demonstrates New Spacecraft Cyber Defense Capabilities at DEFCON 2021

October 12, 2021

The Aero Team at DEFCON (Back: Angela Chaikovsky, Nick Cohen, Ben Davidson, David Vivanco, Aaron Myrick. Front: Henry Howland, Ben Brostoff.)

Aerospace presented a compelling and well-received demonstration of spacecraft cyber defense at DEFCON 2021, a yearly event dedicated to expanding cyber protection knowledge and skillsets for hackers, IT professionals and government agencies. The demonstration was a highlight of DEFCON's space and spaceflight exhibition, which provides participants from the publicand private sectors with the opportunity to present technical concepts and innovations for providing reliable and secured operations.

“As participants, we were compelled to bring something beneficial to the space and aerospace community by proving the feasibility of cyber-concepts and methodologies that increase space system resilience and benefit the community as a whole,” said Sky Troyer, Senior Project Leader of Space Cyber Integration. “To this end, our presentation at DEFCON offers a new approach to spacecraft cybersecurity.”

Aerospace presented an interactive demonstration that enabled attendees of DEFCON, which took place earlier this summer, to monitor simulated space vehicle cybersecurity events and perform threat detection and assessment using a CubeSat prototype. The ‘event demonstrated the feasibility of onboard anomaly detection using machine learning and signatures to detect unusual command sequences and onboard cyber events, activities that were heretofore conducted by ground-based operators.

The Aerospace display at DEFCON’s Aero Village.

At present, defensive cyber operations for space rely on telemetry to downlink information from spacecraft to ground operations for data processing, resulting in turnaround time. Bringing this functionality onboard the spacecraft not only reduces the turnaround time for cyber-anomaly detection and response, it also increases options for threat mitigation.

The event also demonstrated the successful application of onboard sensor mechanisms, analytics and artificial intelligence, all of which can be queried by operators.

This new approach to anomaly detection is a potential game-changer, bringing space capabilities one step closer to a future of more autonomous cyberthreat response mechanisms that are integrated into spacecraft architectures. Aerospace’s presentation also underscored the benefits of defensive cyber operations to the space enterprise.


DEFCON attendees attempting the ‘Capture-the-Flag’ challenge.

As part of its presentation, Aerospace also invited audience members to participate in a ‘Capture-the-Flag’ (CTF) activity, in which participants addressed a series of challenges to find a flag hidden on an engineering model of a payload that Aerospace is launching on its own Slingshot spacecraft in February 2022.

One of the challenges required participants to find indications that an adversary had compromised spacecraft flight software, and track the adversary through logged cyber defense payload commands.

“We designed it so that people could sit down at a laptop and interact directly with that engineering model and it would act as though it were in space, even though it was 3 feet away,” said Nick Cohen, Senior Project Leader in the Cyber Defense Solutions department. “It’s meant to be a fun, engaging activity that gives people an opportunity to learn how spacecraft are operated, while also providing information about Slingshot and Aerospace.”

While spacecraft cybersecurity appears to be at an inflection point, the importance of community remains paramount to the Aerospace team.

“It’s important to engage the wider community in getting people thinking about cybersecurity for space systems, and that’s why it was important to reach out at DEFCON,” said Cohen. “The goal is to build a wider community of expertise for the U.S. government and companies that work on space systems, and get them to understandthe unique challenges that space systems have with regards to cybersecurity.”

Dr. Debra Emmons Named Aerospace’s New Chief Technology Officer

October 07, 2021

EL SEGUNDO, Calif., Oct. 7, 2021 – To deliver innovative space technologies and collaboration for the space enterprise of the future, The Aerospace Corporation (Aerospace) has selected Dr. Debra Emmons as vice president and Chief Technology Officer (CTO), succeeding Dr. Dave Miller, who will be transitioning back to academia in January 2022 after serving his planned three-year term as CTO.

Emmons will partner to deliver corporate technical strategies and investments that anticipate the needs of our customers in a time of great change.

As CTO, Emmons will oversee Aerospace’s Experiments Lab (xLab) and Aerospace’s innovation Laboratory (iLab), as well as the company’s Engineering, Science & Technology Hubs, and the Aerospace Technical Fellows program.

“Debra’s extensive technical knowledge and deep familiarity with our customers and the broader space community give her a unique perspective to shape Aerospace’s technology strategy during this dynamic time in space,” said Steve Isakowitz, Aerospace president and CEO. “In this role, she will ensure Aerospace’s innovation efforts are well-aligned to deliver high-impact technologies with velocity to meet the needs of the nation’s space enterprise.”

Emmons currently serves as general manager of the Communication Technologies and Engineering Division in the Engineering and Technology Group, which is responsible for delivering communications studies, analyses, and testing products. She also leads the corporation’s optical communications strategic initiative. Previously, Emmons served as assistant general manager in Aerospace’s Civil Systems Group, where she led a team providing objective technical analyses and assessments for national-interest space programs.

Emmons joined The Aerospace Corporation in 2003 as a project engineer and has twice been awarded one of Aerospace’s top honors, the President’s Award. She was honored in 2006 for providing crucial analysis of alternatives for the Hubble Space Telescope servicing and repair mission, and again in 2010 for providing technical studies critical to the Augustine Commission’s recommendations for future U.S. human spaceflight. Emmons was also selected as a recipient of the corporation’s Woman of the Year award in 2007. Emmons served on the Board of Directors of the National Space Club from 2010 to 2016.

Emmons earned bachelor’s and master’s degrees in electrical engineering from Cornell University, an MBA from the Imperial College of London, and a doctorate in systems engineering from The George Washington University.

Emmons will become vice president of Special Studies effective Nov. 6 and assume the role of CTO on Jan. 15 following Dr. Dave Miller’s departure and return to the Massachusetts Institute of Technology. Prior to joining Aerospace, Miller was director of the Space Systems Laboratory and the Jerome C. Hunsaker Professor in the Department of Aeronautics and Astronautics at MIT.

In additional officer news, senior vice president Ed Swallow will become Chief Financial Officer, succeeding Dave Radzanowski who is departing Aerospace to pursue other opportunities. Swallow was previously senior vice president for Civil Systems Group. With Swallow’s new role, Jim Myers, vice president Civil Systems Operations, will become senior vice president of Civil Systems Group. These changes also take effect Nov. 6.

Aerospace's Austin, Aldridge and Teets Among Schriever Wall of Honor Inductees

October 06, 2021

From left to right: Major Gen (Ret) Thomas D. Taverney, Dr. Wanda Austin, Lt Gen Michael Guetlein, Gen (Ret) Ellen Pawlikowski, and Edna Sugihara. [Credit: SSC]

Three Aerospace icons were recently inducted to the Schriever Wall of Honor, which is located on the campus of the Space Systems Command (SSC) and recognizes individuals who have made major contributions to the space and missile programs for the nation.

Dr. Wanda Austin and the Honorable E. C. "Pete" Aldridge, Jr., both former presidents and CEOs of Aerospace, and the Honorable Peter Teets, former Chairman of Aerospace's Board of Trustees, were among the 12 honorees unveiled for the 2020 and 2021 recipients. The ceremony was hosted by the Los Angeles Air Force Base (LAAFB) and the General Bernard A. Schriever Chapter of the Air Force Association (AFA-Chapter 147).

The Schriever Wall of Honor is named after Gen. Bernard A. Schriever, the architect of the Air Force's ballistic missile and military space program.

"Today, we pay tribute to the history of our organization and the incredible contributions of our honorees to the national security space mission," said Lt. Gen. Michael Guetlein, Commander of SSC, who referred to Schriever as the father of military space.

Guetlein also talked about the evolving modern space environment representing a pivotal time in history, noting that the nation's and allied warfighters are dependent on space capabilities, but that way of life is being threatened today.

"We must focus on maintaining the nations and our allies' strategic advantage in space," he said. "We must be focused on maintaining the advantage afforded to us by Gen. Schriever and by the hard work, determination and vision of our honorees."

Major General (Ret) Thomas D. Taverney, former Vice Commander of Air Force Space Command, also spoke at the ceremony, focusing on characteristics shared by the honorees that everyone can learn from.

He talked about how Austin – who led Aerospace from 2008 to 2016 and was the first African-American and first woman to hold the position – is the epitome of being a lifelong learner, and how in every meeting, she was always seeking to learn and understand.

“Be a lifelong learner,” Taverney said. “Never think you’re done. Never think you know everything you need to know. There’s always more to know. Be like Dr. Austin.”

He also talked about being dauntless, like Teets, whose distinguished career included serving as Under Secretary of the Air Force, Director of the National Reconnaissance Office, and President and COO of Lockheed Martin Corp. Taverney said Teets was not afraid to take on challenges others said was impossible, and that he essentially invented the term “assured access to space.”

In addition to Austin, Aldridge (Aerospace’s CEO from 1992 to 2001), and Teets, the 2020 and 2021 Schriever Wall of Honor inductees included: David Altman, Gen Lester L. Lyles, Dr. Ruben F. Mettler, Col Lonnie Q. Westmoreland, Norman R. Augustine, Col Frank S. Buzard, Col Oliver W. Fix, Gen Ellen M. Pawlikowski, and Ms. Edna Sugihara.

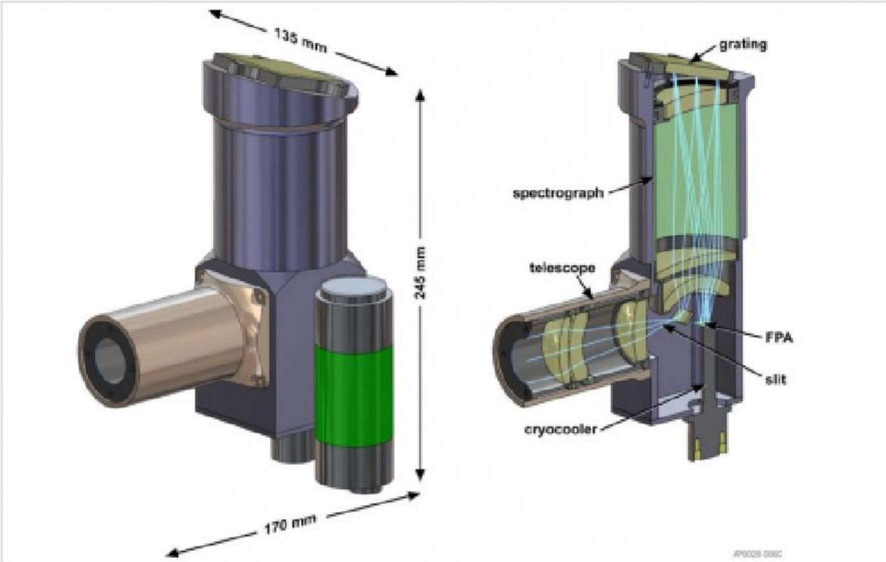
Seizing the Day and Night With CarbonWatch

October 05, 2021

Five percent of carbon emissions between the atmosphere, biosphere, and oceans are attributed to human activity. Although seemingly small, this amount disrupts the Earth’s natural carbon cycle and drives long-term climate change.

Being able to regularly identify and monitor the largest sources of carbon generation due to human activity will have a significant impact on how we manage solutions to reduce these types of greenhouse emissions. With the emergence of low-cost small satellites featuring advanced on-board Artificial Intelligence (AI) processing, The Aerospace Corporation has developed a novel carbon dioxide (CO2) and carbon monoxide (CO) remote sensing system called CarbonWatch®.

CarbonWatch® has the ability to measure prominent greenhouse gases regardless of visible light levels, providing a 24-hour day/night space-based remote sensing system. This day/night capability can help spot variability in near surface carbon plumes—a source for which few direct measurements exist.



CarbonWatch® has the ability to measure prominent greenhouse gases regardless of visible light levels, providing a 24-hour day/night space based remote sensing system.

Sensing in the Dark

Contemporary remote sensing instruments observe background concentrations of greenhouse gases but are limited in their ability to tease out human-made contributions. In addition, existing sensors are confined to when and what they can observe: able to only measure in daylight with long periods in-between revisiting the same geographic areas.

A group of Aerospace scientists and engineers responded to these technological limitations and looked to advance current industry capabilities by developing CarbonWatch®, which relies on mid-infrared spectral remote sensing capabilities.

“Shortwave and near infrared sensors require sunlight, whereas longwave instruments can measure carbon dioxide at night but cannot measure carbon monoxide,” said Dr. Katherine Saad, a research scientist in the Imaging Spectroscopy Department. “With mid-infrared, you get the best of the infrared spectrum.”

The instrument’s sensors can measure CO2 and CO signals independent from sunlight, using a simplified architecture that can be replicated and an automated onboard processing system. The device will measure exchanges from specific point sources, such as power plants, oil refineries, or wildfires. Scientists can then integrate this data with background CO2 measurements to parse out whichfacilities are producing carbon dioxide and exacerbating the global cycle’s imbalance.

“Observations by CarbonWatch® will inform scientists on the current status of carbon use,” said Dr. John Hackwell, an Aerospace Technical Fellow and the project lead. “The data collected can be applied to global

The instrument's sensors can measure CO2 and CO signals independent from sunlight, using a simplified architecture that can be replicated and an automated onboard processing system.

climate-related discussions, such as the Paris Agreement."

Strength in Numbers

To note if differing levels of carbon are emitted throughout a 24-hour period, the team envisions a constellation of 25 CarbonWatch® sensors to yield twice daily coverage of the Earth, unlike existing sensors. This future aim guided how the project was approached from the beginning and set the intent tokeep the instrument's burden on its host spacecraft as small as possible.

"Having multiple satellites means that if one of them fails, you haven't jeopardized your whole mission," said Hackwell. "Coverage will go down a little, but not a lot. Your mission is still intact. You can still observeand collect data."

In the end, the sensor is compact in terms of size, weight, and power. Noting the effect a payload can have on its future host, the team designed the instrument to be adaptable—able to be part of a larger bus or a standalone 12U CubeSat. Elements that are traditionally burdensome, such as a sensor's need to be actively pointed, were also removed. The technology scans nadir directly below at the Earth's surface at the orbital rate of the host spacecraft, observing roughly 100 km swaths at a time. The sensor was designed with proliferation and manufacturability in mind. CarbonWatch® is optimized tomeet the global greenhouse gas monitoring mission by using readily available parts for a low-cost production environment.

Using AI to Automate

A challenge for post-data collection is that the raw information from the constellation of spectral sensors is too much to send back to the ground. To overcome this potential obstacle, CarbonWatch® will have an onboard processing capability. Aerospace has been a pioneer in Artificial Intelligence/Machine Learning (AI/ML) for spectral remote sensing and is applying this strength to develop algorithms for processing the spectral data. Once trained, the algorithms will be completely automated and enable the spacecraft to send back identified emitters to the ground system.

Currently, the Aerospace team is finalizing and submitting proposals for CarbonWatch® to transition from concept to tangible reality. In the future, a constellation of these sensors could be observing during the day and night—collecting data to quantify emissions and provide a fuller image of how our activities affect the carbon cycle.

"CarbonWatch® will contribute to a broader understanding of Earth science, while also taking note of point emitters," said Hackwell. "Being aware of specific sources is particularly useful for future conversations about the effects of human activity on climate change.

October 2021 Obituaries

October 01, 2021

Sincere sympathy is extended to the families of:

- **Thomas Albright,** office of technical support, hired Aug. 15, 1988, retired Aug. 1, 2021, died Sept. 6, 2021
- **(Loren) Paul Nelson,** member of technical staff, hired Aug. 23, 1993, retired Aug. 1, 2010, died Sept. 26, 2021
- **Christopher Florentine,** member of technical staff, hired March 14, 2011, died Sept. 17, 2021
- **Robert Fraser,** member of technical staff, hired July 15, 1988, retired Aug. 1, 2015, died Sept. 4, 2021
- **Bert Fujiwara,** office of technical support, hired Feb. 13, 2006, died Sept. 10, 2021
- **Phyllis Leighton,** office of technical support, hired Feb. 3, 1964, retired June 1, 2001, died Sept. 8, 2021
- **Samuel Levine,** member of technical staff, hired March 20, 1961, retired May 1, 1995, died March 11, 2021
- **William Matsushima,** member of administrative staff, hired Jan. 16, 1964, retired Oct. 1, 1996, died Sept. 21, 2021
- **Frank Pelteson,** member of technical staff, hired Nov. 1, 1977, retired Oct. 1, 1993, died Sept. 4, 2021
- **Manuel Salinas,** member of technical staff, hired April 17, 1978, retired Sept. 1, 2019, died Sept. 18, 2021
- **Timothy Stark,** member of administrative staff, hired May 14, 1984, retired March 1, 2019, died Sept. 12, 2021
- **Albert Straubinger,** member of technical staff, hired June 29, 1962, retired Dec. 1, 1990, died July 19, 2021
- **Harry Umemoto**, member of technical staff, hired May 24, 1976, retired Dec. 1, 1990, died July 28, 2021

To notify Aerospace of a death and have it included in the Orbiter, please contact People Operations at (310) 336-5107.