

Expanding Integration Across Government and Commercial Space for Speed and Resiliency

December 30, 2022

Space-based capabilities play an integral role in enabling the everyday products and services people depend on, as a technological foundation that drives modern society and global infrastructure. As the pace of activity across the space domain has accelerated, the need to preserve these assets in orbit and ensure the accessibility that enables new capabilities in an increasingly congested and contested environment must be addressed collaboratively.

The Aerospace Corporation is dedicated to convening opportunities that drive the integration of these efforts across the nation's defense, civil and commercial space programs as well as international partners to advance solutions that emphasize speed and resiliency for space's hardest problems.

In December, Aerospace partnered with TechCrunch to bridge connections and conversations that tackle these challenging topics, focusing on breaking down legacy barriers and creating pathways that accelerate innovation. At TC Sessions: Space 2022 — which attracted over 1,000 attendees from diverse backgrounds and perspectives, including government, start-up entrepreneurs, venture capital, and academia — industry leaders and experts were able to engage in sharing insights and opportunities toward a shared mission.



Attendees from diverse backgrounds and perspectives attended TC Sessions: Space 2022 to engage in conversations about the current challenges, emerging opportunities and rising areas of interest in the future of space. (Credit: TechCrunch)

As a precursor the day before, Aerospace's Commercial Space Futures Office hosted the Voice of the Warfighter event, convening a venue for exchange between commercial industry and U.S. warfighters across the services and combatant commands. The discussions helped to inform commercial space companies of warfighters needs to support maturation alignment and future integration of innovations with government missions.

Shaping the Future of Space Leadership

Innovation and new ideas start with people. For the nation's space sector to succeed, it must nurture a robust and vibrant pipeline of diverse talent for future generations. Earlier this year, Aerospace President and CEO Steve Isakowitz announced the creation of [Space Workforce 2030](#), a consortium of 30 leading space companies committed to improving industry diversity and representation over the next decade.

At this year's TC Sessions: Space, Isakowitz [joined a panel](#) featuring Michael Edmonds of Blue Origin, Amy Pritchett of Pennsylvania State University, and Melanie Stricklan of Slingshot Aerospace to discuss the work they're doing to inspire, prepare and employ the next generation of scientists and engineers.

"As a space industry, we very much depend on innovation and entrepreneurship. If we're going to be successful, we've got to increase the pool of high-quality candidates who can come into this really exciting industry," Isakowitz said. "We've got to achieve a more diverse set of employees and workforce as we go forward. About a year ago, 30 leading companies in our industry, both large and startup got together and created something called Space Workforce 2030 with the goal of working together to try to enhance the level of diversity that we're seeing in our industry."

Read the [full article on Aerospace.org](#).



Aerospace partnered with TechCrunch to bring together industry leaders and experts, helping break down barriers within the enterprise by facilitating conversations that can help drive collaboration and innovation. (Credit: TechCrunch)

Aerospace Partners with SSC and Local Community for Salute to the Military

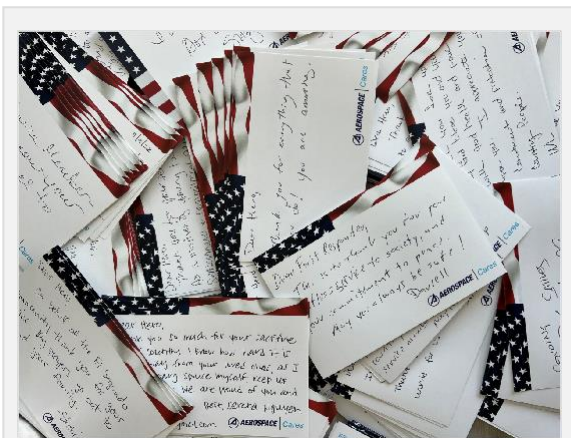
December 30, 2022

Aerospace continues to find ways to partner with its government customers, broader industry stakeholders and local communities to give back. In November, the Aerospace Cares and Aerospace Military Veteran's (AMV) partnered with the El Segundo Chamber of Commerce to host the "2022 Salute to the Military" celebration to honor active members and veterans of our nation's armed forces.

“Aerospace is fortunate to have strong partners across our community who support our military and our veterans and this luncheon provided an opportunity to recognize the service and sacrifice of all those who have served as members of our nation’s military throughout its history and strengthen our community relations,” said Lianne McGinley, Associate Director for Corporate Social Responsibility at Aerospace.



More than 120 people attended in person for the luncheon, which was hosted on Aerospace’s El Segundo campus. Attendees included representatives from various congressional districts, military members, veterans, nonprofits, local businesses, a variety of local aerospace companies operating within the community and more. As part of the event, Aerospace Cares hosted a letter writing campaign and attendees wrote more than 500 letters to active-duty military members and first responders serving around the world.



Hundreds of letters were written at the event and throughout Aerospace’s letter-writing campaign in support of veterans.

“As a person who served in the US Air Force for 27 years, when you’re deployed, you’re away from your family, you’re away from your loved ones,” said Charles Allen, National President of Aerospace Military Veterans (AMV) Group. “You don’t have a support mechanism like you usually do. There are times when you work really long hours and you feel a little lonely and disconnected. Operation Gratitude sent us postcards and it really lifted our spirits. It was a really good cause that I personally benefited from.”

Thanks to Jason Bayonne (Aerospace Environmental and Health Specialists) the event also featured the U.S. Marine

Corps Color Guard, 5th Battalion 14th Marine Regiment stationed at Seal Beach, which led the presentation of the colors. Additionally, AMV’s Daniel Plaster coordinated the Air National Guard Band of the West Coast, Guardian Brass Quintet played each branch’s song with active-duty military and veterans standing up to be recognized. The band also played the Space Force’s newly released song, *Semper Supra*, marking one of the first times the song was played live since its release in late September.

The event’s keynote speaker Col. Mia Walsh, base commander of Space Base Delta 3. Col. Walsh, who spoke about the importance of community relationships for the Los Angeles Air Force Base and how the military has come to rely on partnerships with companies like Aerospace.

She also spoke about the importance of diversity for high performance teams and the special relationship the Space Systems Command has with Aerospace. Allen and Marty Whelan, Senior Vice President of Defense Systems Group, also gave remarks.

“Besides inspiration, diversity in the military also allows for a variety of perspectives, which leads to better creativity and faster innovation,” said Walsh. “Diversity is not just about ethnicity – it is also about gender, culture, religion, age, and background. It is about bringing people together who have different ideas and it is about learning from others who didn’t grow up in the same location or with the same family structure or with the same money that you did.”

For many attendees, it was their first time on Aerospace’s campus and this event served as a great opportunity to connect with the local government and community.

“A lot of the community leaders had never been inside Aerospace before,” said Allen. “So, it was nice to help build the relationship between the community and Aerospace.”



Colors were presented by the U.S. Marine Corps Color Guard, 5th Battalion 14th Marine Regiment stationed at Seal Beach.



Col. Mia Walsh gave the keynote address and spoke about the special relationship between the Los Angeles Air Force Base and Aerospace.

This year also marked the first-year Veterans Day was celebrated as a corporate holiday at Aerospace, providing employees an opportunity to acknowledge and express their gratitude on this important occasion.

“I think it’s good to have the day off to actually reflect on Veteran’s Day and try to strengthen the cause of the veterans and the military and I appreciate the Aerospace leadership for that,” said Allen. “And when we have these community events that highlight the relationship between Aerospace, the community and the military, I think it’s great because it brings these partners together to work on a similar cause and I think we did that.”

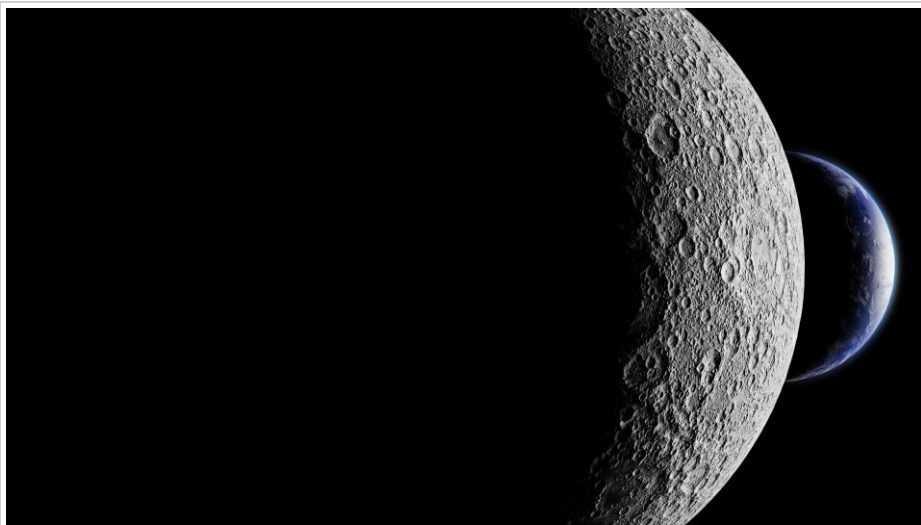
Aerospace Develops a Low Cost Cislunar Navigation Approach

December 19, 2022

Position, Navigation, and Timing (PNT) services in space are vital for actions such as maneuvering, formation flying, collision avoidance and constellation operations.

The Global Positioning System (GPS) is crucial to terrestrial and much of today's spacecraft navigation. But for cislunar space, a PNT solution that could simultaneously service many missions is not yet in place.

Government and commercial operators are looking to fly beyond Earth's geosynchronous orbit (GEO) belt into cislunar space for a range of new missions. Enabling such space operations requires a reliable PNT service. The Aerospace Corporation is meeting this need with a system called Inverted PNT (iPNT).



Aerospace engineers are designing a cislunar position, navigation, and timing (PNT) framework to support many future missions.

Designing the Navigation Framework for Cislunar Missions

“Here in the third decade of the 21st century, we have arrived at a point where U.S. and international organizations routinely operate beyond the GEO belt,” said Dr. Roberta Ewart, S5 Strategic Technical Advisor, Space Systems Command. “Motivations include science, commerce and advancing national interests. Operating at these distances creates a need for simple, scalable navigation systems. We also see a future where shared interests helps assure freedom of space navigation for government, science and commercial actors alike. Partnering on shared infrastructure is one way to bring about that future.”

Andre Doumitt, Systems Director in Aerospace's Commercial Space Futures Office, initiated the project based on a concept created by Dr. Tom Heinsheimer, Member of Technical Staff in Aerospace's Civil Systems Group Development Directorate. The iPNT design was built on the foundation of an Aerospace study that examined future cislunar missions and the architectural support necessary to meet customers' objectives. The conclusion of the internal study resulted in a call for mission-enabling PNT.

“There has been much investigation into how exquisite cislunar PNT services could be delivered with huge, complex, and costly architectures like GPS,” said Dr. Todd Sheerin, Senior Project Engineer in Aerospace's Advanced Development and Planning Division. “Our team, inspired by Dr. Heinsheimer, approached this challenge with a different mindset: What solution can we offer that would be extremely low cost, could be implemented in the near term, and work with existing technologies and infrastructure to the maximum extent?”

Read the [full article on Aerospace.org](#).

USSF-44: Space Force Successfully Completes First Mission on Falcon Heavy Rocket

December 12, 2022

On Nov. 1, 2022, a SpaceX Falcon Heavy rocket lifted off from Kennedy Space Center's Space Launch Complex 39A at 9:41 a.m. EDT, and successfully delivered the USSF-44 payloads into geostationary Earth orbit. This was the first time the United States Space Force (USSF) launched a National Security Space Launch (NSSL) mission on a Falcon Heavy rocket, which is currently SpaceX's most powerful rocket. It was also the first time that SpaceX performed a direct inject mission to geostationary orbit. This launch marked the fourth Falcon Heavy flight overall for SpaceX, and the first since June 2019. The Aerospace team worked tirelessly to successfully overcome several late breaking issues associated with mission trajectory and navigation, as well as propulsion and structural systems.

The USSF-44 payload was comprised of the Long Duration Propulsive EELV Secondary Payload Adapter -2 (LDPE ESPA)-2 Space Vehicle with hosted payloads, and the Shepherd Demonstration mission.

As with prior NSSL missions, The Aerospace Corporation provided the independent and objective assessments that gave the USSF and Aerospace leadership the confidence to proceed with the launch. This was a complex mission requiring a challenging ascent profile to near-geosynchronous orbit.



USSF-44 marked the first time SpaceX's most powerful rocket was used in support of a National Security Space Launch mission. (Credit: SpaceX)

“The days preceding the launch tested the grit and determination of our team, and I am very pleased with their ‘combined effort’ to mitigate several last-minute emerging issues,” said Akhil Gujral, General Manager for the Launch Systems Division. “Our teams remain laser-focused to place critical national capabilities to support our nation’s needs.”

The side boosters successfully returned to the launch site and land at their intended landing zones near Launch Complex 39A. They will be refurbished for a subsequent USSF launch, and then recovered and refurbished for a third USSF launch, which are both scheduled for later this fiscal year.

This mission represented a challenging integration flow and complicated by spacecraft readiness delays that tested the resiliency of the integrated team.

From evaluating various do-no-harm criteria (across multiple payloads) to evolving approaches to integrated operations, this mission established an excellent baseline for teamwork that will be used to manage similar missions throughout the NSSL manifest in the next few years.



“I am extremely proud of the USSF-44 mission team and honored to have walked this campaign with them,” said Dr. Walt Lauderdale, NSSL’s Chief of Falcon Systems and Operations. “Time and again I was impressed with how they dealt with the unexpected over the course of several years; they brought this mission capability to orbit on our first NSSL Falcon Heavy. Outstanding!”

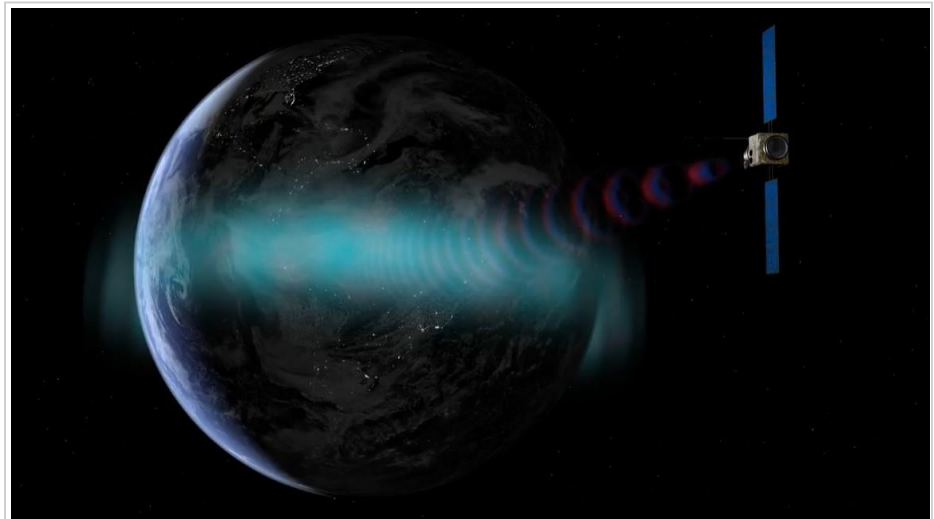
Finally, the team received a special note from just-retired Gen John “Jay” Raymond (Chief of Space Operations), who wrote: “I can’t think of a more exciting or meaningful last day in the job. Watching USSF-44 launch into orbit on a Falcon Heavy is something I will never forget! The beginning of a new era in Space. Keep leading!”

Ionosphere Mission SPORTs Aerospace Sensor

December 06, 2022

The ionosphere is a portion of Earth’s atmosphere where radiation from the sun creates a lot of electrically charged particles called “plasma”. The density of the plasma varies depending on the season, time of day, and other factors.

Sometimes there are density depletions near the equator known as equatorial plasma bubbles, and rapid changes in the density at the edges of the bubbles are known as “scintillation”. Radio signals transmitting from satellites to the ground must pass through the ionosphere and may be affected by the scintillation.



Aerospace developed a critical sensor to study the effects of ionosphere scintillation, a natural occurrence that disrupts radio signals, communications, and GPS navigation. (Credit: NASA)

Aerospace provided a critical sensor for an international CubeSat mission to study this phenomenon in hopes of

predicting its occurrence. This mission, dubbed SPORT, launched on Saturday, Nov. 26 onboard a SpaceX Falcon-9 rocket at 2:20 p.m. ET to the International Space Station from Launch Complex 39A (LC- 39A) at NASA’s Kennedy Space Center in Florida.

The Scintillation Hazard

According to the National Oceanic and Atmospheric Administration, “Severe scintillation conditions can prevent a GPS receiver from locking on to the signal and can make it impossible to calculate a position. Less severe scintillation conditions can reduce the accuracy and the confidence of positioning results.”

Since scintillation can adversely impact everything from GPS signals to communication to over-the-horizon radar, there has been a large amount of research trying to understand what causes scintillation, how to predict its occurrence, and how to mitigate its effects. However, the ability to predict scintillation remains elusive.

SPORT CubeSat

SPORT, which stands for Scintillation Prediction Observations Research Task, is an effort to study the formation and evolution of equatorial plasma bubbles which may, in turn, cause scintillation.

The 6U CubeSat that will assist in this endeavor is expected to launch on Nov. 22 from Kennedy Space Center’s Space Launch Complex 39A as part of a commercial resupply mission en route to the International Space Station.

“We want to know what are the background conditions pre-scintillation, and can we use that to determine when scintillation will occur?” said Dr. Rebecca Bishop, Aerospace’s lead on this project. “That’s kind of the holy grail in our field.”



Aerospace contributed the Compact Total Electron Content Sensor (CTECS), a GPS radio occultation (RO) sensor, for the SPORT mission.

Brazil built and will operate the CubeSat as well as maintain the ground observation network of radars, imagers, and scintillation monitors. On the U.S. side, NASA coordinated the launch and the CubeSat's instruments, including Aerospace's sensor and five other instruments provided by NASA and university partners. Both Brazil and the U.S. will analyze the data and collaborate on individual studies.

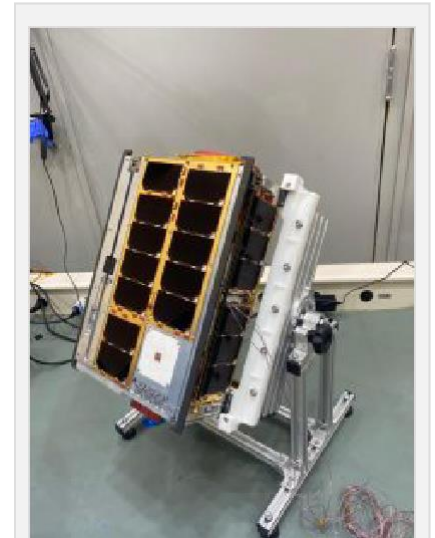
"Brazil is very, very interested in scintillation," Bishop said. Due to a large part of Brazil being located near the magnetic equator, and a feature known as the "South Atlantic Anomaly", Brazil experiences more scintillation than a lot of other countries.

The Compact Total Electron Content Sensor

Aerospace's contribution to SPORT is the Compact Total Electron Content Sensor (CTECS), which is a GPS radio occultation (RO) sensor. It receives the GPS signals and measures how they change as they pass through the ionosphere. From these measurements, the plasma density and a scintillation index can be extracted.

"Historically, GPS RO sensors are on the order of 5 kg and 20 watts, which is basically the same size and twice the power of a 3U CubeSat," Bishop said. "We developed this as a low-cost, low-mass, low-power GPS RO sensor for a CubeSat."

Aerospace adapted a commercial receiver by adding special software and a custom antenna to create CTECS. The 0.153-kg sensor fits nicely on the SPORT CubeSat, and together with the other five instruments, contributes to the valuable data [this mission will collect](#).



*The 6U CubeSat will help study the formation and evolution of equatorial plasma bubbles.
(Credit: NASA)*

December 2022 Obituaries

December 01, 2022

Sincere sympathy is extended to the families of:

- ♦ **Linda Ellis**, office of technical support, hired Nov. 24, 1970, retired Sept. 1, 2013, died Aug. 17, 2022
- ♦ **David Hargis**, member of technical staff, hired Dec. 10, 1962, retired July 1, 1994, died Oct. 12, 2022
- ♦ **Roland Ilsen**, member of technical staff, hired Nov. 17, 1980, retired Jan. 1, 1993, died Oct. 20, 2022
- ♦ **Glenn Light**, member of technical staff, hired Oct. 30, 1961, retired March 1, 2000, died Oct. 11, 2022
- ♦ **Frank Marshall Jr**, member of technical staff, hired Oct. 12, 1987, retired Oct. 1, 1993, died Aug. 14, 2022
- ♦ **Asha Mehrotra**, member of technical staff, hired May 29, 2007, retired Dec. 1, 2016, died Sept. 24, 2022
- ♦ **Robert Pedersen**, member of technical staff, hired Jan. 30, 1963, retired Nov. 1, 1991, died Aug. 3, 2022
- ♦ **Michael Riccio**, member of technical staff, hired Nov. 2, 1987, retired Aug. 1, 2014, died Nov. 19, 2022
- ♦ **Irving Shames**, member of technical staff, hired March 23, 1987, retired Dec. 1, 1994, died Sept. 1, 2022
- ♦ **William Stoelzner**, member of technical staff, hired Nov. 13, 1978, retired July 1, 1999, died Nov. 14, 2022
- ♦ **Jeannette Turcotte**, member of administrative staff, hired April 6, 1981, retired June 1, 2012, died Nov. 1, 2022
- ♦ **Zoltan Uzdý**, member of technical staff, hired July 23, 1979, retired Feb. 1, 1995, died Nov. 6, 2022

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

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