



Pacific International Space Center for Exploration Systems



NEWSLETTER

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SpaceX and NASA launch 2nd commercial crew mission to International Space Station



Above: The Crew Dragon "Endeavour" launches atop a Falcon 9 rocket on Apr. 23 from Kennedy Space Center. Credit: NASA

Four astronauts joined the International Space Station (ISS) crew late last month, marking the second-ever operational commercial crew flight conducted by SpaceX and NASA.

The crew launched in the early hours of Apr. 23 from Kennedy Space Center aboard a reused Crew Dragon space capsule and Falcon 9 rocket. The mission is the first to

send humans to space on a reused booster rocket.

The crew members were NASA astronauts Shane Kimbrough and Megan McArthur, ESA astronaut Thomas Pesquet, and JAXA astronaut Akihiko Hoshide. After safely arriving at the ISS, the crew has now started a six-month science mission.

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Message from the Director

As the 2021 legislative session comes to an end, I would like to reflect on all that happened during this session and thank those who supported PISCES throughout the process. After a long (and stressful) session, a bill is on the table that would transfer PISCES from the Dept.

of Business, Economic Development and Tourism to the University of Hawaii at Hilo. The bill that executes this transfer has yet to be signed into law by the governor, but we are hopeful that he will approve it.



Rodrigo Romo

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Mars Helicopter Completes 4 Test Flights, Extends Mission



Above: *Ingenuity's 2nd flight captured by the Perseverance rover on Mars. Credit: NASA/JPL-Caltech/ASU/MSSS*

Right: *Ingenuity navigates by tracking features on the ground using a black and white camera. This image of the ground also captures the helicopter's shadow. Credit: NASA/JPL-Caltech*

NASA-JPL's Ingenuity Mars helicopter successfully completed four test flights last month, exceeding demonstrations on Earth and making aviation history as the first aircraft to fly on another planet.

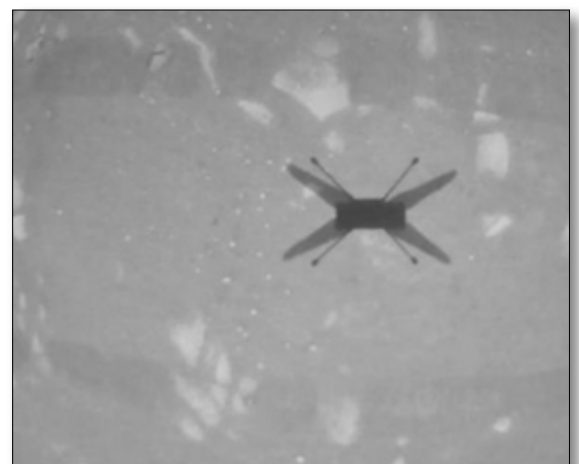
The helicopter's most recent flight was conducted on Apr. 30, lasting nearly two minutes and hovering more than 800 feet laterally at a top speed of 8 mph—faster and farther than any terrestrial test flight.

NASA called the aircraft's technology demonstration a resounding success, having achieved all its intended mission objectives by flight three.

"From millions of miles away, Ingenuity checked all the technical boxes we had at NASA about the possibility of powered, controlled flight at the Red Planet," said Lori Glaze, director of NASA's Planetary Science Division in a news release. "Future Mars exploration missions can now confidently consider the added capability

an aerial exploration may bring to a science mission."

With Ingenuity's flight systems exceeding expectations, NASA has opted to extend the helicopter's mission by 30 days and include an operations demonstration. Its new objectives will begin on the aircraft's sixth flight and involve more precise (and risky) maneuvers above the Martian surface. The new phase will largely explore how helicopter's can serve as aerial scouts to benefit future Mars (and other planetary) missions.



Applications Open for 7th Annual Women's STARS Program



Above: A student programs her smart robot during a workshop at the 2019 STARS program.

PISCES is resuming its STARS (STEM Aerospace Research Scholars) program this year after canceling last summer due to the pandemic. Applications for the

2021 program are now open and female students, ages 14 and up can [apply online](#).

This year, STARS will focus on hands-on workshops in aerospace, including rocketry and unmanned aerial vehicles. Students will also engage in a HoloLens augmented reality demonstration and have the chance to enter a rocketry competition.

Safety will be a top priority and guidelines will be in place to ensure the health and safety of students and staff. Due to ongoing restrictions, overnight accommodations will not be available this year. [Learn more >>](#)

Continued: SpaceX and NASA Launch 2nd Crewed Flight

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Their objectives include deepening our understanding of Earth's climate and making preparations for the Artemis missions to the moon. An important focus of research will be tissue chips—small devices that contain human cells enclosed in a 3D matrix. The research will examine how cells respond to stress, drugs and genetic changes in space and ultimately learn more about how spaceflight and microgravity affect the human body.

The newly arrived crew brings the current count of international astronauts aboard the ISS to 11. Crew 2 is scheduled to return to Earth no earlier than Oct. 31, 2021.



Left to Right: ESA astronaut Thomas Pesquet, NASA astronauts Megan McArthur and Shane Kimbrough, JAXA astronaut Akihiko Hoshide. Credit: NASA.

What's the HAPS (High-Altitude Platform System)?



Above: HAPSMobile's Sun glider HALE-UAV takes flight.
 Credit: AeroVironment.

By: Peter De Baets - Sr. Director, AeroVironment

Improvements in power electronics and composites have taken the latest generation of aircraft to new heights with the development of high-altitude platform system (HAPS). Solar powered, HAPS has the ability to operate in the stratosphere for long periods of time to provide continuous telecommunication services and are a compelling solution for rapid, flexible, global stratospheric infrastructure build-out. There is significant commercial and government interest in turning these vehicles into an important, new asset to be used in applications such as forecasting weather, monitoring natural resources and a variety of others.

The Japan-based telecommunications operator SoftBank Corp. and [AeroVironment, Inc.](#), a global leader in unmanned aircraft systems (UAS) headquartered in California, established HAPSMobile Inc. to create their own HAPS: Sun glider. HAPS vehicles, such as Sun glider, are more flexible than current satellite systems

as they can be re-tasked to fly to a new way point and the sensor suite can be upgraded in sync with rapid payload upgrade cycles. Sun glider's multi-mission capabilities include remote sensing, connectivity and over-the-horizon observations, making use of its extensive payload capability. Our goal at AeroVironment is to bring affordable assistance.

Before Sun glider, AeroVironment developed the high-altitude unmanned aerial vehicles [Pathfinder Plus](#) and Helios in partnership with NASA during the Environmental Research Aircraft and Sensor Technology (ERAST) program. The program explored the utility of high-altitude vehicles and marked the beginning of AeroVironment's longstanding relationship with Hawaii when flight demonstrations were completed over Kauai.

AeroVironment also flew a commercial telecommunication payload for Japan's National Institute of Information and Communications Technology (NICT) from Kauai. Local flight and test operations like these can tap into talent pools from nearby schools and community colleges and can help diversify Hawai'i's economy by growing engineering and technical workforce clusters in support of the aircraft's mission preparation.

Hawai'i has a favorable climate, good ocean port and airport infrastructure, and a strong community pull for these types of "high tech, green" programs. Its strategic geographic position in the Pacific also makes it the ideal location for flight operations of extreme endurance platforms, such as Sun glider, as they can be deployed over long distances with only a handful of global launch sites needed.

Cont: Message from the Director

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If so, the transition will present some challenges, but I believe PISCES will have more opportunities to secure research funding for outreach and workforce development programs while also maintaining a steady focus on the economic growth initiatives we are involved in.

In applied research, we are now close to finalizing two contracts for projects funded by NASA: one in collaboration with Masten Space Systems for a Phase 1 STTR grant, and the second with Swamp Works at Kennedy Space Center. Last month, we also collaborated on a NASA MUREP grant proposal spearheaded by Dr. Kim Binsted of UH Mānoa and a team including 'Imiloa Astronomy Center, Hawai'i Community College, Kea'au High School, Caterpillar, Paragon Space Development Corp. and Honeybee Robotics. If awarded, the grant will provide funds for three years to develop vertically integrated projects for students spanning from high school to graduate school.

In aerospace news, NASA has continued to impress with four successful flights of the helicopter Ingenuity on Mars, setting an unprecedented feat of achieving flight on another planet. Also, Space X launched its second operational crewed Dragon spacecraft to the International Space Station.

During last month's ASCE Earth & Space Conference, we presented a paper about our basalt research and the effects of mineral variation on basalt sintering. We also presented a paper highlighting and promoting our Hawaiian Analogs for Lunar Operation (HALO) program. Both papers were well received and have generated good interest from various parties.

This summer, with support from Caterpillar and Microsoft, we will be holding our 7th STARS Program for Hawai'i high school girls. Though reduced in scope compared to previous years due to pandemic safety measures, this year's program still promises to be an exciting event with workshops in rocketry, UAVs and augmented reality systems. The program will culminate with students competing in the first rocketry competition being organized by HSTM and PISCES with support from the County of Hawaii Department of R&D.

We will continue to track the progress of the crucial bill related to PISCES and maintain our hope that it will be signed into law, and that we may continue the work we have been doing for so many years.

A hui hou,

Rodrigo Romo
Program Director



Crew 2 Dragon capsule atop a Falcon 9 rocket the day prior to launch. Credit: NASA