



Pacific International Space Center for Exploration Systems



NEWSLETTER

In this Issue

Pg. 2:

NASA's Perseverance rover approaches Mars landing

Pg. 3:

Potential aerospace opportunities for Hawaii



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Economic Recovery in Hawaii: The Case for Aerospace



Above: HAPSMobile's unmanned aerial system platform could launch from Hawaii to provide wireless connectivity on the ground. Image courtesy of HAPSMobile.

During the past year, the COVID-19 pandemic has devastated Hawaii's economy and demonstrated the disadvantages of relying too heavily on tourism. With lockdowns, travel restrictions and people foregoing vacation plans, visitor counts have plummeted along with state revenues. As a result, unemployment claims and business losses are at an all-time high and the state is

now facing a nearly \$2 billion budget shortfall. With lawmakers looking toward options for economic recovery, tourism will no doubt continue to be a key player in Hawaii's future economy and growth. But the state is also at a crucial turning point when it can begin investing in the aerospace industry to reduce its dependency on visitors.

> *Continued on Page 3*

Message from the Director

January 28th marked the 35th anniversary of the day few of us will forget. Hawaii's own astronaut Ellison S. Onizuka, along with astronauts Francis Scobee, Michael Smith, Ronald McNair, Judith Resnick, Gregory Jarvis and Christa McAuliffe lost their lives in the Space Shuttle Challenger disaster. We all remember their crew

and honor their bravery to be bold enough to travel to space.

2021 has started with some great news in the aerospace sector. Virgin Orbit successfully delivered ten satellites into orbit from their small vehicle launched from the underside of *Cosmic Girl*, a modified 747 jet that

> *Continued on Page 4*



Rodrigo Romo

NASA's Perseverance Rover Approaches Mars Landing

After more than six months in flight, NASA's *Perseverance* rover will touch down on the Red Planet on Feb. 18 at noon PST, beginning a new era of scientific research on Mars.

Perseverance's core mission is to answer the burning question: did life once exist on Mars? It will explore an impact site known as Jezero Crater—a 28-mile-wide cauldron just north of the planet's equator. Scientists believe it once contained a lake capable of supporting life. If any place in the solar system might have contained life, Jezero crater is it. Perseverance will collect rock and soil samples to return to Earth for further study in the 2030s. They will be the first Martian rocks brought back by humans.

The rover is accompanied by the first planetary helicopter, *Ingenuity*, which is designed to complete five test flights in the thin Martian atmosphere. But first, NASA must overcome the not-small hurdle of putting the robot duo safely on the ground.

Landing on Mars is hard. NASA has four successful landings under its belt, which is promising considering that space agencies only succeed about 40% of the time. Everything must go right in an intricate sequence of maneuvers designed to gently place NASA's \$2.7 billion rover—the most advanced ever built—on Martian ground.

Upon entry of Mars' atmosphere,



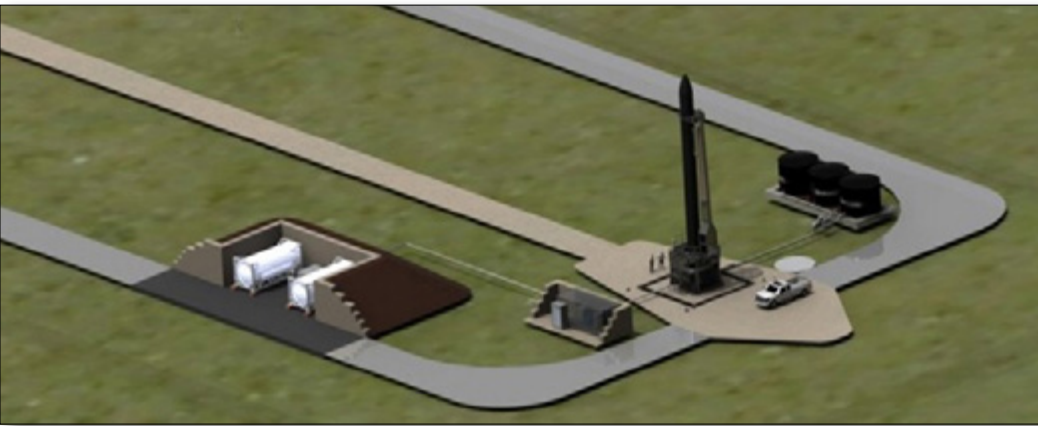
Perseverance will need to slow its flight from a furious 12,500 mph to 2 mph using a parachute and powered descent engine. The landing segment of the descent will incorporate a jet-powered sky crane, lowering the rover to the surface using three cables. This technique successfully landed NASA's *Curiosity* rover on Mars in 2012. Entry, descent and landing will happen over the course of seven minutes—also called the “seven minutes of terror,” because NASA will have no contact with Perseverance until after it lands.

Mars will be a hotspot for robotic touchdowns in February. NASA's mission will be followed by two additional landings within days: the UAE's first interplanetary probe *Hope* and China's first probe, lander and rover mission, *Tianwen-1*. NASA will broadcast the Perseverance rover landing live beginning at 11:15 a.m. PST on Feb. 18. [Watch it here >>](#)

Above: *Perseverance touches down on Mars aided by a jet-powered sky crane in this artist rendering. Credit: NASA-JPL.*

Mars will be a hotspot for robotic landings in February.

Cont: Economic Recovery in Hawaii: The Case for Aerospace...



> Continued from Page 1

Image courtesy of PSCH.

Developing aerospace could be a significant boon to Hawaii's economic recovery and sustain economic growth for years to come. Though not all sectors of the aerospace industry are suitable for the islands, the geographic positioning and geological features of Hawaii present a unique opportunity to create the foundations of a high-tech aerospace industry that could bring significant revenue and high-paying jobs to the State.

Small Vehicle Launch

Launch operations could include a small satellite launch facility to send payloads into low-Earth orbit. Rocket Lab has proven their Electron rocket as a reliable vehicle and are now leading the industry in small vehicle launches. The company is now working on a

system to recover and reuse their first stage boosters. Virgin Orbit recently succeeded in launching a small rocket from the underbelly of a modified Boeing 747. This widens the range of launch options since the jet can take off from any airport without the need for a spaceport.

UAS Launch & Maintenance

HAPSMobile, a subsidiary of SoftBank and minority owned by AeroVironment, has developed a UAS called the High-Altitude Platform Station (HAPS)—a large, solar-powered drone designed for stratospheric communication platform systems flying around 60,000 to 75,000 feet. These unmanned drones can stay airborne for six to 12 months and provide cellular and Wi-Fi connectivity

on the ground. The company is interested in building a launch point and maintenance base in Hawaii for a fleet of about 1,000 drones.

The project could bring in \$7 to \$10 million annually in research funds alone. A larger contribution to the State economy would be the creation of more than 200 high-tech jobs to maintain the fleet. The University of Hawaii is also looking at HAPS as a research platform to monitor fires, hurricanes, coral reef bleaching and other natural disasters.

One problem highlighted during the pandemic is the lack of widespread internet access across the State. Gov. Ige has made it a priority to provide internet access statewide to advance his concept of a "digital economy." The HAPS platforms could deliver a statewide solution.

Space Tourism

Aerospace opportunities can also complement Hawaii's existing tourism industry. A Silicon Valley company specializing in space tourism is interested in building a flight operations and manufacturing center in Hawaii.

> Continued on next page

> Continued from Page 3

The company aims to provide paying customers with a view of Earth aboard a stratospheric balloon and space capsule with 100 flights per year. The project would create about 200 jobs with salaries averaging more than \$60,000. The service would also support research and education related projects.

Virgin Galactic will also offer space flights for tourists. The company will launch its first suborbital flight out of Spaceport America in New Mexico and has expressed interest in launching from spaceports around the world. Hawaii could be one of these sites.

Conclusion

Recovering Hawaii's economy will take planning, innovation and collaboration. It will be critical to incorporate aerospace opportunities. Aerospace is a rapid-growth industry that could generate high-paying employment outside of tourism. Hawaii has the chance to use its unique advantages—found nowhere else in the U.S.—to foster a viable and sustainable aerospace sector. Bold action is needed to pivot toward this new industry and reap the rewards. The time to act for aerospace development in Hawaii is now.

PISCES Welcomes Baby Boy to 'Ohana

Geology Tech Kyla Edison gave birth to a beautiful baby boy last month. Canyon Kilo Hōkū Edison was born 6 lbs. 7 oz. on Jan. 13 at Hilo Medical Center. Kyla said his name is inspired by a cartoon as well as her love of geology. His middle name translates to "one who studies the stars." From all the staff at PISCES, congratulations to Kyla and her husband Matt!



Cont: Message from the Director

serves as a launch platform. The completed launch adds a new dimension to launch capabilities for small vehicles that can deliver payloads into orbit from a wide variety of locations.

At PISCES last month, we submitted three different proposals for NASA projects in collaboration with various companies. The proposals aim to develop new ways to build landing pads on the moon, and to test an innovative surface mobility tire design for lunar rovers.

We are a couple weeks away from NASA's Perseverance rover arriving on Mars. We are excited for this land-

mark event and hope everything goes as planned. If so, we will soon be seeing the the first helicopter hovering over the Martian landscape.

On a somber note, the Big Island lost a key member of its community with the passing of former mayor Billy Kenoi last month. Billy shared his Aloha everywhere he went and was always looking out for the well being of the community. We send our heartfelt condolences to the Kenoi family and keep them in our thoughts and prayers.

A hui hou,

Rodrigo Romo
Program Director