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PISCES HAWAII

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2016 Hawaii Aerospace Summit and Prototype Lunar Base

PISCES Program Manager Rodrigo Romo

This past month on Oct. 4th & 5th, I was privileged to participate in the 2016 Hawai'i Aerospace Summit in Honolulu. Representatives from various aerospace industries and agencies convened to discuss the future of aerospace technology and exploration.

Five organized panels discussed important topics in the sector during this annual event: Space Transportation, Unmanned Aerial Systems, Planetary Sustainability & Space Economy, Aerospace Education & Training, and Multinational/Public-Private Partnerships.

The list of attendees included distinguished individuals like Hawai'i Governor David Ige, as well as members of the Senate (Sen. Will Espero) and House of Representatives (Rep. Mark Nakashima). There were also members of academia, private companies, federal agencies (NASA), and military and economic development boards.

I had the opportunity to take part in the Planetary Sustainability panel along with representatives from NASA Ames' Space Portal and Verdigris Company. Our panel discussed innovative new technologies to support both Earth-based applications and exploration/resource utilization on other planetary bodies.

PISCES was strongly represented with Board Chairperson Henk Rogers as a member of the opening panel "Summit Overview: Aerospace in Hawaii – Opportunities and Benefits," and Board Member Dr. Luke Flynn serving on the Space Transportation Panel.

During his presentation, Henk Rogers made a bold call for the state of Hawai'i to become a leader in Space Exploration, proposing the construction of the world's very first prototype lunar base on the Big Island of Hawai'i.

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During his remarks, Rogers said "Make no mistake about it, humanity is going back to the moon, and we might as well be the ones to take humanity there."

This ambitious vision opens a new world of opportunities for younger generations in the Islands. PISCES will be actively involved in Rogers' plan - a plan that will involve students from high school and university levels. Designing and building a lunar base as if it were being built on the moon, will pose a worthy challenge and one that must be faced if we are to return to the moon. We are in the very early stages of seeing this vision come true, but there is already much thought being put into it.

With this task ahead, PISCES will be looking for partners and collaborators both domestic and foreign, private and governmental, academic and entrepreneurial, to join in the effort.

This November, we will present at the New Worlds 2016 conference in Austin on our research and work in robotic additive manufacturing and In-Situ Resource Utilization. We will be actively looking for potential STTR Calls to submit proposals and obtain funding to advance work on basalt manufacturing and advanced, closed-loop life support systems that could be applied to projects such as the HI-SEAS Mars simulation habitat on Mauna Loa volcano, or the lunar base project. I am excited about these inspiring possibilities and their potential to grow job and education opportunities, as well as long-term economic development in Hawai'i!

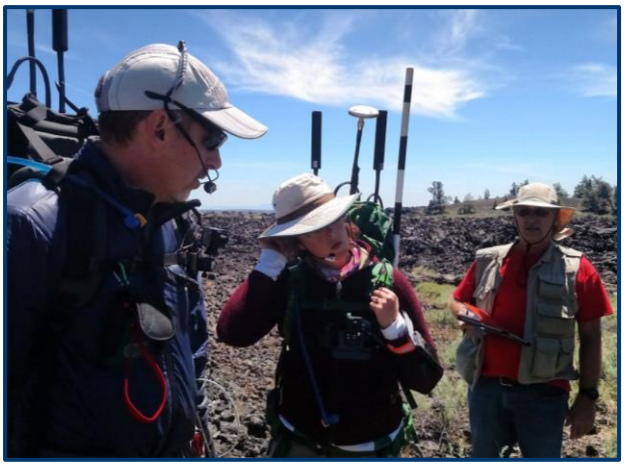
APPLIED RESEARCH

NASA BASALT Research Program Deploys to Hawai'i to Simulate Human Mars Mission

This November, PISCES is partnering with NASA's BASALT research group to conduct a full-scale Mars simulation exercise on the rugged lava terrain in Hawai`i Volcanoes National Park (HVNP). BASALT (**B**iologic **A**nalog **S**cience **A**ssociated with **L**ava **T**errains) is one of NASA's prestigious PSTAR (**P**lanetary **S**cience and **T**echnology **T**hrough **A**nalog **R**esearch) grant programs, combining their Science Directorate and Exploration Mission Directorates.

The main goal of BASALT is to develop the mission technologies and protocols necessary for anticipated human missions on the Red Planet. Future Mars astronauts will be able to use these valuable methods to research and operate on the Martian terrain, extracting samples for geologists, geochemists and astro-biologists to search for potential signs of microbial life.

The BASALT program is focused on researching different aspects of Mars' environment by studying two locations on Earth: HVNP on the Big Island of Hawai'i and The Craters of the Moon National Monument lava fields in Idaho. Flows in Hawai'i are representing "wet Mars," or the early Martian landscapes characterized by widespread basaltic volcanism and interactions with water. The Idaho lava fields are serving as analogs to present-day Mars or "dry Mars," where basaltic volcanism is rare and most evidence for volcano-driven hydrothermal activity is relict.



PISCES' John Hamilton (r) in the field at Craters of the Moon National Monument, Idaho, with two simulation astronauts.

The November BASALT exercise at HVNP will be rehearsed with two simulation astronauts on the lava flows of Mauna Ulu. Real-time communications will link these astronauts, while messages to and from scientists back on 'Earth' will see 5 and 20 minute time-delays to simulate the real-life signal delay between planets. Kilauea Military Camp at HVNP will serve as Earth mission control. Selected University of Hawai'i at Hilo students and PISCES interns will be part of the mission excitement.

"We are extremely excited to be involved in this cutting-edge project to lay the ground work for a human mission on Mars," said PISCES Education and Public Outreach Coordinator, John Hamilton. "And to be playing our role to help NASA and our country set foot on the Red Planet."

PISCES ROVER CONQUERS RUGGED TESTING- DISCOVERY CANADA GETS THE SCOOP

A film crew from the Daily Planet TV series of Discovery Channel Canada joined the PISCES team for a field test assessing the Helelani Rover's sensor and camera systems on October 27.

PISCES' rover is no stranger to rough terrain, and its most recent outing introduced it to a whole new level of off-road. On Oct. 27, the PISCES team explored a remote, lunar-like location on Hawai'i Island to test the robot's camera systems and sensors in preparation for anticipated scouting missions to seek out a prototype lunar base site. The event was caught on camera by the friendly crew of Daily Planet, an hour-long TV segment that airs weekdays on Discovery Channel Canada and covers everything from space robots to bio-engineering. The crew got a first-hand look at the rover's applications and capabilities – especially its gusto for traversing rugged terrain. On cue, the rover successfully maneuvered in and out of a four-foot-deep crater nestled amid boulders and jagged lava formations while capturing valuable landscape data and video.

"I'm very happy with the way the rover performed," said PISCES Program Manager, Rodrigo Romo. "This is the roughest terrain the rover has seen yet, and its systems and performance exceeded my expectations."

(L) PISCES Program Manager Rodrigo Romo pilots Helelani remotely from an on-site mission control. (R) Romo speaks to a group of local community and business leaders who came to see the first leg of the field test while learning about PISCES' mission in aerospace research and development in Hawai'i.

PUBLIC OUTREACH

Hawai'i Aerospace Summit

Left: (L-R): Dan Rasky (NASA Ames), Sen. Will Espero (HI), PISCES' Rodrigo Romo , Craig Campbell (Alaska Aerospace Corp). Romo attended the 2016 Hawai'i Aerospace Summit in Honolulu on Oct. 4 & 5 to discuss with members of the public and private sector the future of aerospace in Hawai'i, and how the state and others can benefit.

Education: Lunar/Meteorite Samples and Solar System Walk

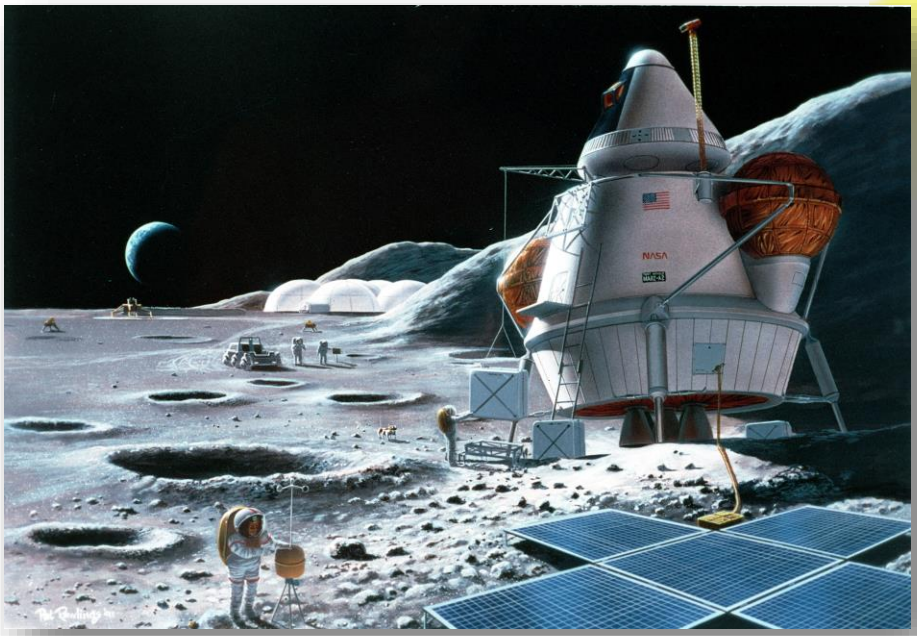
Above left: PISCES' John Hamilton visited students of all ages at several schools in Hilo to share and discuss lunar and meteorite samples provided by NASA. Middle: Hamilton also represented planet Earth during the Solar System Walk in Waimea on Oct. 26, where Canada-France-Hawai'i Telescope and W.M. Keck Observatories organized booths and activities to education the public about space science and exploration. Each planet was represented with its own tent, distanced proportionately from one another to reflect their real positions in space. Right: PISCES' Rodrigo Romo (L) and Christian Andersen sported fashionable footwear on Oct. 22 for the annual "Walk a Mile in Her Shoes" event in Hilo, a world-wide men's march to raise awareness of and end sexualized violence against women.

KTA Halloween Haunted House

Left: This year's KTA Haunted House in Hilo donned an outer space theme and PISCES was invited to support the event and provide inspiration to the many kids and families who attended. PISCES' Chris Yoakum tested visitor's knowledge of the solar system and space travel with a trivia game with prizes for playing. Several distinguished local organizations also participated in the action, providing fun activities and information about space science, including a portable planetarium. The KTA Haunted House was appropriately fashioned as an intergalactic space ship complete with views of the galaxy, teleporters, haunted corridors and scary aliens.

PISCES GUEST SPOTLIGHT

Building the Dream: Creating the World's First Lunar Base in Hawai'i



During the Hawai'i Aerospace Summit in Honolulu last October, PISCES Board Chairperson and entrepreneur Henk Rogers called for the construction of a prototype lunar base on the Big Island that could catapult the State of Hawai'i into the frontlines of the global aerospace industry. Rogers envisions a collaborative effort of multinational companies and agencies to create this facility, ultimately allowing humans to get a realistic feel for a lunar base environment while testing the technologies and protocols needed to make it a success on the moon. Here he delves into his vision for a lunar base in Hawai'i – one small step that could result in a giant leap for mankind.

With a rich history in providing support for NASA's Apollo lunar missions, Hawai'i is now in a prime position to become home to Earth's first prototype lunar base. With terrain that is geologically very similar to the regolith that blankets the surface of the moon, we can test and build structures using lunar-like materials to overcome the challenges it will take to do so in space.

We have the know-how and willingness to make this happen. Hawai'i is at the forefront of project-based education, and our students are ready to build and program robots that will carry out the construction phase necessary to complete a successful prototype here on Earth, with a real-life lunar base on the moon soon to come.

Being close to the equator, Hawai'i makes an ideal location for small satellite launches. This capability is what we collectively need to send payloads of robots into space. We can build, test and launch the robots that will complete the very first moon base.

Furthermore, Hawai'i has a diverse culture held together by a collective sense of family. The spirit of Aloha is real. People from all over the world have come to live in Hawai'i in peace and harmony. This is the culture that should exist on the moon.

In the Hawaiian Islands, we are strategically positioned as a U.S. state with close ties to Asia. Hawai'i also has a cultural history of exploration. Polynesians braved thousands of miles of open oceans to find Hawai'i. They were the boldest explorers this planet has ever seen. Following in this tradition, we are now ready to lead the next great exploration and migration of mankind: The Moon.

Henk Rogers, PISCES Board Chairperson