

PISCES NEWSLETTER

PACIFIC INTERNATIONAL SPACE CENTER FOR EXPLORATION SYSTEMS * HILO, HAWAII

MARCH, 2015

VOL #3 ISSUE #3



Moon RIDERS Students Honored at State Capitol



Above: Students from Kealakehe High School and 'Iolani School participating in PISCES' Moon RIDERS lunar flight experiment pose at the Hawaii capitol with lawmakers and PISCES staff on March 23.

Following a week of field-tests evaluating the space hardware for PISCES' student lunar flight experiment, the 'Iolani and Kealakehe Moon RIDERS teams paid a visit to the Hawaii state capitol in Honolulu on March 23.

The two teams were officially recognized with proclamations issued during a legislative session. Students also presented their work on the Moon RIDERS project to lawmakers and staff explaining how the experiment works and the results of their initial testing.



Above: Proclamations issued by the Hawaii State legislature honor and recognize the Moon RIDERS teams for their hard work and achievements.

MESSAGE FROM THE EXECUTIVE DIRECTOR

PISCES CELEBRATES MONTH OF HISTORIC "FIRSTS" IN MANNED SPACEFLIGHT AND PROJECT PROGRESS

Dear PISCES Friends and Family,

This March, PISCES celebrates a number of historic "firsts" in human spaceflight: Gemini 3, the first walk in space, and Apollo 9.

Fifty years ago on March 23, 1965, Gemini 3 launched into space as the first manned mission in NASA's Gemini program, carrying two men into space aboard the spacecraft nicknamed Molly Brown. Gus Grissom was the Command Pilot with John Young serving as the Pilot. The main goal of the flight was to test the maneuverability of the spacecraft over the course of three Earth-orbits.

This month also represents 50 years since Russian astronaut Alexei Leonov became the first human to conduct extra-vehicular activity (EVA), exiting his space capsule during the Voskhod 2 mission for a 12-minute spacewalk on March 18, 1965.

Apollo 9 launched on March 3, 1969, as the third manned mission in the United States Apollo space program and the first flight of the Command/Service Module (CSM) with the Lunar Module (LM). Its three-person crew, consisting of Commander James McDivitt, Command Module Pilot David Scott, and Lunar Module Pilot Rusty Schweickart, tested several aspects critical to landing on the Moon. The assessments included the LM engines, backpack life support systems, navigation systems, and docking maneuvers. The mission was the second manned launch of a Saturn V rocket. The flight of Apollo 9 was critical in proving the worthiness of the Apollo LM that would carry man to the surface of the moon.

March has also been a month of major milestone accomplishments for PISCES in its continuing quest to demonstrate planetary surface system technologies.

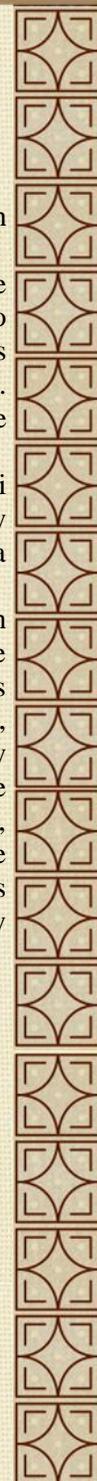
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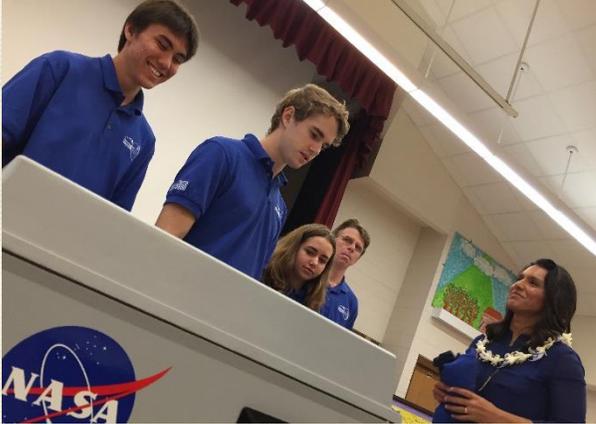


MOON RIDERS COMPLETE FIRST FIELD TESTS FOR LUNAR FLIGHT EXPERIMENT

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Rep. Tulsi Gabbard Pays Visit to Kealakehe Moon RIDERS



Above: Gabbard (right) with Kealakehe students.

Congresswoman Tulsi Gabbard met with Kealakehe High School robotics students March 13 to get a first-hand look at their work on the Moon RIDERS lunar flight experiment. Gabbard also attended the team's presentation to a group of Holualoa Elementary School students and parents, outlining the project's mission and educational value. Gabbard is a U.S. Representative for the 2nd District of Hawai'i and outspoken supporter of STEM programs.



Moon RIDERS students pose with mentors and PISCES staff at Hale Pohaku on Maunakea following a safety briefing in preparation for the tests.

Students from `Iolani and Kealakehe High School participating in PISCES' Moon RIDERS (Research Investigating Dust Expulsion Removal Systems) lunar flight experiment completed their first round of testing over the week of March 16-21.

Two teams each spent two days on the slopes of Maunakea evaluating various configurations of the experiment's NASA-built dust shield system aboard their mock-up lunar landers to determine its effectiveness in varying conditions.

"This whole week has been a very important part of developing and testing flight hardware for going to the surface of the Moon that we hope to do at the end of 2016," said PISCES Executive Director Rob Kelso. "This is the first opportunity we've had to come test it in the field."

Students garnered hands-on engineering experience, developing and managing the tests independently, while collecting valuable data for the experiment's configuration for flight.

Kelso called the trials a "tremendous educational experience for the students" who planned and executed the procedures with PISCES staff ensuring safety and providing infrastructure.

The Moon RIDERS students will now sift through their data and write reports to share their findings with NASA and the two participating Google Lunar XPRIZE (GLXP) teams in late Spring. The results will inform design changes to the experiment in preparation for a second round of testing next Fall.



Students at work: (L) `Iolani students prepare their mock-up lunar lander for testing at a PISCES analogue test site on Maunakea. (R) Kealekehe students assess their mock-up lander's configuration during testing.

Apply Now for the 2015 STARS Workshop! Deadline is Apr. 30, 2015.
 Visit: pacificspacecenter.com/womens-stars-program-2/



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PISCES AND PARTNERS INSTALL EXPERIMENTAL LUNAR SIDEWALK IN HAWAII

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Executive Message continued...

Under the project leadership of PISCES/Christian Andersen, PISCES installed a basalt-based sidewalk in Hilo. The 'lunar' concrete is an alternative to traditional cement. The sidewalk will be assessed over the course of a year to determine the performance of various binding agents in concert with basalt as a construction method for the Moon, Mars and Hawaii.

Additionally, PISCES completed a large, complex lunar analogue test for the Moon RIDERS lunar flight experiment at the PISCES test site on Maunakea. This test evaluated the engineering prototype unit of NASA's electrodynamic dust shield (EDS) to assess various flight configurations for installation on the lunar lander spacecraft to optimize EDS performance. The data collected will be analyzed over the next few months to determine changes to the EDS as it moves toward production as a flight-qualified unit.

March has been a very historic month for "space-firsts"... and also "firsts" in the aerospace program for Hawaii.

Until next time,

Res Gesta Per Excellentiam (Achievement Through Excellence).

-Rob Kelso, PISCES Executive Director



PISCES Executive Director Rob Kelso posing in front of a 1941 Stearman biplane with Harry Greene, a reserves military pilot.

PISCES Executive Director Rob Kelso was invited to be a guest speaker for the "Discover Your Future in Aviation" event at the Pacific Aviation Museum in mid-March to share his career experience working for NASA as a space shuttle flight director. During his visit, he got to take a spin in a WWII Navy biplane with military pilot Harry Greene, who let him fly the plane.



Above: Professor Lin Shen (standing) and civil engineering students from the University of Hawaii at Manoa pour the final section of concrete for PISCES' experimental lunar sidewalk in downtown Hilo.

PISCES laid the way to a sustainable future in space and Earth construction on March 12, installing Hawaii's first 'lunar' sidewalk in downtown Hilo.

The project is a joint collaboration with the Hawaii County Department of Research and Development, the University of Hawaii at Manoa, NASA, and Kodiak FRP Rebar.

The experimental sidewalk was poured with a volcanic basalt mixture instead of traditional concrete, and consists of three different slabs with varying binding agents. Each section will be evaluated by researchers over the course of one year to see how well they hold up over time.

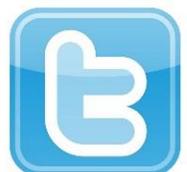
The basalt used in the concrete is extremely similar to the regolith (dirt) found on places like the Moon, Mars, and asteroids. Part of the project's goal is to develop a successful technique to utilize off-planet resources as building materials for future bases and colonies.

The experimental binders in each of the three sidewalk slabs include: fly ash basalt paver, baked basalt paver, and a fly ash binder reinforced with Kodiak FRP rebar composed of basalt. The volcanic-based rebar is stronger and lighter than its steel counterpart, as well as corrosion resistant.

The lunar sidewalk experiment has two significant benefits for Hawaii and space exploration. Learning to use the volcanic basalt fines – which are a waste product of Hawaii quarries – as an alternative building material could make the Islands more sustainable by sparing the costly environmental and economic effort of importing over 300,000 metric tons of Portland cement each year. For outer space, basalt-based concrete could enable the utilization of resources found on-site on other planets or celestial bodies, sparing the costly effort of transporting them from Earth.

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- [@PISCES_Hawaii](https://twitter.com/PISCES_Hawaii)



MOU SPOTLIGHT



Memoranda of Understanding signal growing global interest in Hawaii's aerospace industry

In our inaugural newsletter, PISCES announced that it had signed six MOU's. Since then, that number has increased to 16, with more on the way. We will feature one MOU per newsletter here.

WHO: Google Lunar XPRIZE

WHAT: International inducement prize challenging privately funded space teams to build, launch, and fly a robotic mission to the surface of the Moon.

WHERE: Culver City, CA

DATE of MOU: February 26, 2015

GOAL: To establish cooperative relations in conducting allied, synergistic efforts in the commercial space enterprise and education sectors.

PROJECT(s) WITH PISCES: Moon RIDERS Student Lunar Flight Experiment

WE ARE LIVE!!!

Check Out PISCES on the Web!



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MOU: a formal, written agreement that defines the roles and responsibilities of each party with respect to the program/project they are working on together.

WHY IMPORTANT: MOU's allow PISCES to form partnerships with both public and private sectors, thereby providing access to expertise and technical support from space agencies around the world. Such access is vital to the success of PISCES projects, and the expansion of Hawaii's economy and aerospace industry.

ABOUT US

PISCES is a Hawaii State Government Aerospace Agency located in beautiful Hilo, Hawaii. The research and education/training center is part of the State Department of Business, Economic Development, and Tourism (DBEDT), and conducts environmentally safe field demonstrations to test and validate innovative space technologies on Hawaii's volcanic terrain under the jurisdiction of the Hawaii State Department of Land and Natural Resources (DLNR).

Attention college students: Spend your summer working on the future of space exploration!

PISCES is seeking summer college student interns in the following fields: mechanical engineering, electrical engineering, geology, physics, volcanology, computer science, and construction.

Internship Projects

Robotics: outfit and program the PISCES planetary rover

Planetary Analogue Test Sites: seek out and survey lava tubes and skylights for use as planetary analogue testing sites.

Space Construction: construct a basalt-based, 10-meter lunar landing pad to test and utilize volcanic basalt building material.

The internship is from June 13 – August 8, 2015 and participants will work about 20 hours per week. Priority will be given to Hawaii residents and Hawaii college students.

For more information, visit: <http://pacificspacecenter.com/apply-for-an-exciting-summer-internship-with-pisces/>.

