PISCES NEWSLETTER

PACIFIC INTERNATIONAL SPACE CENTER FOR EXPLORATION SYSTEMS * HILO, HAWAII

FEBRUARY 2015 VOL #3 ISSUE #2

Seventh Grader Wins PISCES Science Award

Above: Parker School Seventh-grader Tierney Wold posing in front of her science fair project, "Going Ballistics" which earned her the PISCES Science Award.

Seventh-grader Tierney Wold received the PISCES Science Award on Feb. 7 at the 2015 Hawaii District Science and Engineering Fair held at `Imiloa Astronomy Center in Hilo on Hawaii Island.

The bright young Parker School student created an in-depth presentation called "Going Ballistics", which explained and demonstrated the functionality and aerodynamics of different rocket nose cones.

PISCES Test Logistics/EPO Manager John Hamilton, who served as a judge at the competition, presented Wold with the award during a ceremony held at the University of Hawaii at Hilo following the event.

One hundred thirty-seven projects were entered in this year's fair. The PISCES award acknowledges excellence in science projects enhancing space exploration, robotics, and engineering.

MESSAGE FROM THE EXECUTIVE DIRECTOR

MAKING NEW HISTORY WITH THE MOON

Dear PISCES Friends and Family,

February is a very historic month for space history.

The very first Apollo Saturn rocket AS-201, flown February 26, 1966, was the first unmanned test flight of an entire production Block I Apollo Command/Service Module and the Saturn IB launch vehicle. The suborbital flight was a successful demonstration of the service propulsion system and the reaction control systems of both modules, and successfully demonstrated the capability of the Command Module's heat shield to survive re-entry from low Earth orbit.

On February 3, 1966 Luna 9 became the first spacecraft to achieve a soft landing on the Moon – and any planetary body other than Earth - and to transmit photographic data back to Earth from the surface of another planetary body. It used a landing bag to survive the impact speed of 22 kilometers per hour (6.1 m/s; 14 mph).

This month, PISCES is adding another historic milestone in the exploration of the Moon with the announcement of a PISCES-sponsored Hawaii Student Flight Experiment to the lunar surface! The goal of this innovative STEM program is to develop, launch, fly, and land on the moon a Hawaii High School student-built lunar surface experiment, in concert with technology from the NASA Kennedy Space Center as a hosted payload on one of the upcoming Google Lunar XPRIZE (GLXP) lunar missions.

Spearheaded by PISCES, the project will be a collaborative effort with NASA, a Google XPRIZE team and students from 'Iolani School and Kealakehe High School to build and operate this experiment on the surface of the moon.

The flight program between PISCES, NASA and the two high schools has been underway since August.

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Pacific International Space Center for Exploration Systems (PISCES)
Phone: 808.935.8270
99 Aupuni Street, Suite 212-213
Hilo, HI 96720
Pisces.Hawaii.Gov

Rob Kelso, PISCES Executive Director

HAWAII HIGH SCHOOLS ANNOUNCED FOR LUNAR FLIGHT EXPERIMENT

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PISCES Submits Three Bills for Senate Approval

Early this month, PISCES submitted three legislative bills intended to further the Center's project goals and development.

The first bill, SB672, appropriates general funding for the Center to continue its planetary surface systems work enabling Hawaii to move to the forefront of the aerospace sector, as well as an additional appropriation for the acquisition of a central headquarters and testing facility.

SB 671 is a PISCES-led basalt rebar initiative requesting funds for an engineering study to determine how volcanic basalt can be used as an asset and potential new industry in the state of Hawaii. The study will assess if Hawaii's basalt can be used for material in manufacturing basalt rebar – a considerably lighter, and stronger alternative to steel rebar – while investigating the necessary energy support needed for production. The bill requests federal matching funds for the engineering study, to be conducted over a one-year period.

Special Fund bill SB1158 proposes the establishment of a special fund for the operation, maintenance and management of all of PISCES' projects, facilities, services, and publications. The bill also provides the ability for the Center to accept outside revenue.

The bills are currently being evaluated by legislative committees for further approval.

`Iolani and Kealakehe High School Students Shoot for Moon

Above: Student 'Moon RIDERS' from 'Iolani School (left) and Kealakehe High School.

PISCES is pleased to announce the two Hawaii high schools chosen to participate in the Moon RIDERS (Research Investigating Dust Expulsion Removal Systems) student lunar flight experiment.

Kealakehe High School in Kailua-Kona on Hawaii Island, and `Iolani School in Honolulu on Oahu have been selected for the unprecedented student project to develop, build, and fly an experimental spacecraft technology to the surface of the Moon, working in concert with NASA, PISCES, and Google Lunar XPRIZE teams.

The announcement was made on Feb. 20 at a joint-press conference held on campus at the two schools. Video messages of congratulations were presented by Hawaii Governor David Ige and Congresswoman Tulsi Gabbard, followed by a distinguished line-up of speakers representing state lawmakers and leaders in education, as well as student leaders in the project. Hawaii Department of Education Superintendent Kathy Matayoshi called the recognition of the students' work a "chicken-skin moment".

Kealakehe was chosen by the State Superintendent of Hawaii's Department of Education to represent all Hawaii public schools. `Iolani was selected for their standing as a top private school with advanced facilities. Both schools possess exemplary robotics programs supportive of the Moon RIDERS initiative that is tasking students with developing and building the experiment. Student teams began their work in August of 2014.

The experiment tests a NASA-developed technology called EDS (Electrodynamic Dust Shield) - a system that generates an electric current to remove the harmful and corrosive dust particles found on the Moon from external surfaces like spacesuits and spacecrafts. The students will test their mock-up spacecrafts equipped with the EDS at a PISCES analogue test site in March to ensure their readiness for launch. The launch and mission control locations have yet to be determined.

"NASA's technology could solve the dust problem in space and this lunar flight experiment will be the first time the dust shield is tested outside of the laboratory," said Rob Kelso, executive director of PISCES. "Not only will students gain real-world aerospace experience, but the design and test data they'll be gathering could be used in future space missions."

Testing for the EDS-rigged, mockup spacecrafts is scheduled to begin Mar. 16, 2015 at a PISCES planetary analogue test site.

To learn more about Moon RIDERS, visit: pacificspacecenter.com/moon-riders.

MOON RIDERS
Research Investigating Dust Expulsion & Removal Systems

Left: The logo for the Moon RIDERS lunar flight experiment, created by Kealakehe High School student Amy Lowe. The series of dots above the left-hand lettering represents both the Hawaiian Island chain, and specs of moon dust associated with the experiment's technology.

TECH BRIEF: BASALT REBAR

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Letter from the Executive Director Cont…

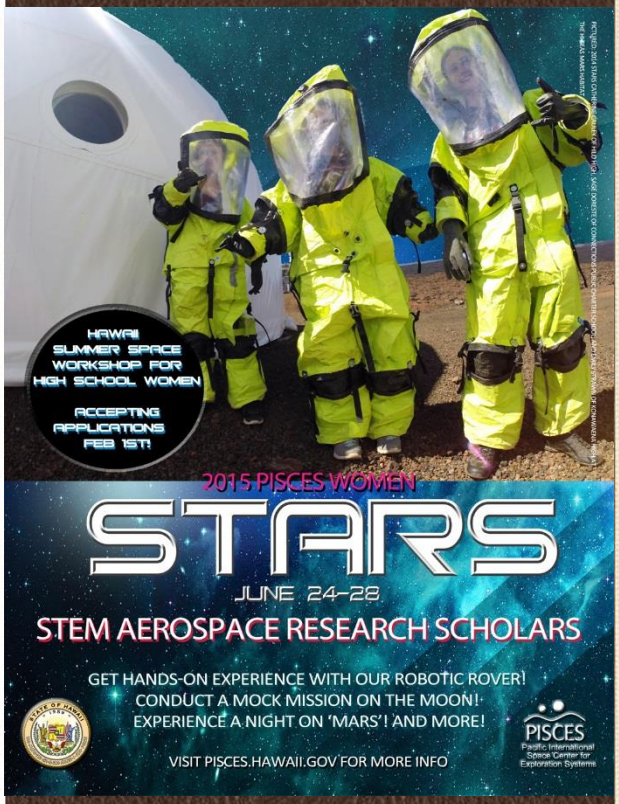
Testing of the dust shield engineering unit will be performed in March by the students at the PISCES planetary analogue test site on Hawaii Island. This test is to assess various flight locations and configurations on the mockup lunar landers.

We are proud of the wonderful opportunity to include Hawaii high schools into this project….a project that literally shoots for the Moon. To date, no high school has had an experiment on the lunar surface.

Until next time,

Res Gesta Per Excellentiam
(Achievement Through Excellence)

-Rob Kelso, PISCES Executive Director



The 2015 Women's STARS Program is now accepting applications for high school women on Hawaii Island! Log on to PISCES.HAWAII.GOV and scroll down to the "STARS" window to be directed to a link for the application.

Sustainable Construction Materials on Earth and in Space

Basalt rebar may be an industry waiting to be born in the State of Hawaii. Rebar, short for 'reinforcing bar', is traditionally made of steel or a mesh of steel wires and is used as a tension device to strengthen concrete and masonry structures.

The basalt-based rebar is born of basalt rock, a product of solidified volcanic lava. Abundantly found in the volcanically active Island of Hawaii, the construction-alternative could enable a sustainable product with dual uses on Earth and in space.

Basalt's properties have long been recognized for its strength and resistance. Basalt rebar is 25% lighter than steel, twice as strong, and is resistant to rust, alkali, and acids. Basalt has the same thermal expansion coefficient as concrete, making it a complementary match as a reinforcement material. The volcanic rock is also impervious to nuclear radiation, UV light, and biological contaminations. Compared with rebar made of fiberglass filaments, basalt is non-toxic and has greater temperature tolerance and resistance to corrosive elements.

The volcanic-rock turned building-material also allows for thinner, lighter panels and decks, enabling more flexible designs in architecture and construction.

Furthermore, basalt is the most easily found material on the Moon and Mars that can be utilized for construction. Developing its use on Earth could enable better methods for sustainably building off-planet in the future of space exploration.

PISCES has initiated a legislative bill to request funding for an engineering assessment for utilizing the abundantly-found basalt in Hawaii for manufacturing basalt rebar.

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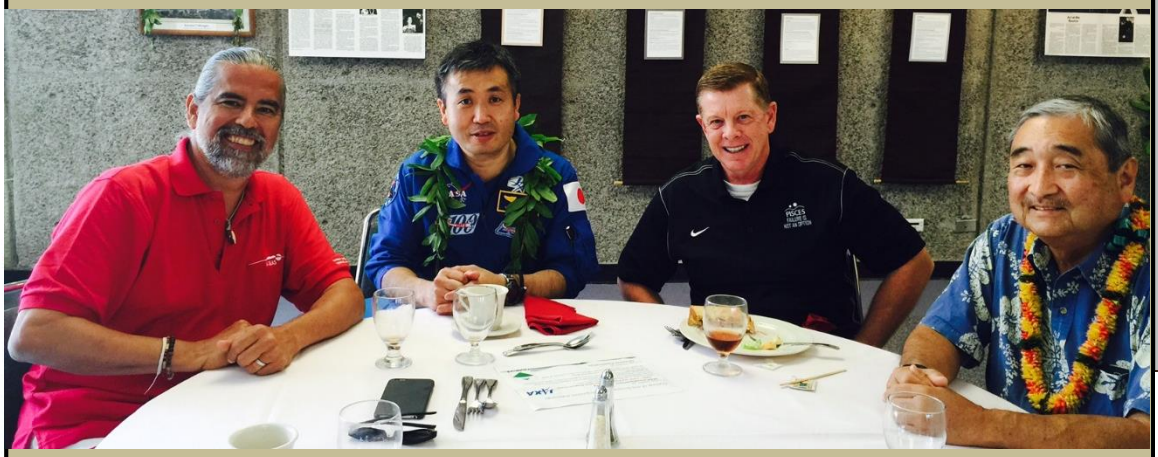
PISCES Commemorates Hawaii Astronaut Onizuka at Annual Event



Above: (L-R) PISCES Board Chairman Henk Rogers, JAXA Astronaut Koichi Wakata, PISCES Executive Director Rob Kelso, and KTA CEO and President Barry Taniguchi shown at the University of Hawaii at Hilo campus on Ellison S. Onizuka Day.

PISCES celebrated Hawaii astronaut Ellison S. Onizuka's 30th anniversary aboard his first spaceflight on January 24 during the annual Onizuka science fair held at the University of Hawaii at Hilo. The agency led a booth sharing its project work in aerospace research and development, and offered virtual spacecraft photos for kids. The student educational event drew a sizable crowd with robotics demonstrations, gravity exercises, agricultural displays and more. JAXA astronaut Koichi Wakata, the first Japanese astronaut to serve as commander aboard the International Space Station, was featured as the keynote speaker.

WE ARE LIVE!!!

Check Out PISCES on the Web!

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PISCES
Pacific International Space Center for Exploration Systems

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).

NASA's 'VolcanoBot 2' to Explore Hawaii Volcano

NASA is preparing to test a new robot on Hawaii Island that could enable future off-planet explorations in tight spaces. Engineers at the Jet Propulsion Laboratory (JPL) in Pasadena, California will deploy 'VolcanoBot 2' into the cracks and crevices surrounding Hawaii's active Kilauea volcano in March.

The robust, cylindrical-shaped bot is designed to create 3D maps of fissures and crevices that would be too dangerous for humans to explore firsthand. NASA hopes the bot will help scientists better understand how volcanoes erupt on Earth, and some day, on other planets.

"In order to eventually understand how to predict eruptions and conduct hazard assessments, we need to understand how the magma is coming out of the ground," said Carolyn Parcheta, a NASA postdoctoral fellow at JPL who created the bot. "This is the first time we have been able to measure it directly, from the inside."

The Bot's predecessor, was tested last year in May at Kilauea volcano. Its successor is considerably smaller, lighter, and equipped with stronger motors to traverse the depths of volcanic cracks.

VolcanoBot 2 (left) and its predecessor, VolcanoBot 1. Credit: NASA/JPL.