PISCES APRIL NEWSLETTER

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PISCES/NASA test Vertical Take-off/Vertical Landing Pad with a Rocket Motor

Photo Credit: Ena Media Hawaii pgs.4-5

PISCES–PAVING THE WAY TO MOON AND MARS THROUGH INNOVATIVE PARTNERSHIPS

Last year, I was privileged to be invited to join a special team that assessed an approach for NASA for returning to the Moon using commercial partnerships. The study was managed by my good friend, Charles Miller and titled: "Economic Assessment and Systems Analysis of an Evolvable Lunar Architecture that Leverages Commercial Space Capabilities and Public-Private-Partnerships".

Our team concluded that public-private partnerships, like those NASA has used in its commercial cargo and crew programs, could return humans to the moon for as little as $10 billion and within seven years.

This model of leveraging commercial partnerships could result in an "evolvable lunar architecture" and could eventually lead to a permanent human base at the lunar poles to convert water ice there for propellant that could be sold to NASA or other customers.

Within PISCES, we have effectively been using public-private partnership models for several years in performing some incredible joint research projects. During the past 3-years, PISCES has developed 17 strategic partnerships with various industries, internationals, and academia groups to further PISCES' work in technology development testing for Moon and Mars.

Here are some examples:

Lunar/Mars landing pad construction - A year ago, NASA Headquarters invited PISCES to become a strategic partner in a new project called "Additive Construction with Mobile Emplacement" (ACME). The goal of this project is to investigate technologies and methodologies for constructing facilities on the Moon, Mars and asteroids using planetary basalt material. PISCES, along with NASA Kennedy Space Center, Honeybee Robotics and the County Research and Development (R&D) of Big Island just recently completed the project of robotically-building a vertical takeoff/vertical landing (VTVL) pad from basalt material on the Big Island of Hawaii (**see page 4**). At the end of March, PISCES then completed a hot-fire of a 960 pound rocket motor on the launch pad to test the performance of the landing pad under engine plume loading.

MoonRIDERS lunar flight experiment – This is a unique public-private partnership led by PISCES called MoonRIDERS. This project is developing and testing a lunar surface flight experiment in the electro-dynamic removal of dust (EDS)…critical to systems for Moon and Mars. The project involves NASA, PISCES and two Hawaii high schools in a unique business arrangement. ***LETTER CONTINUED PG.3***

PISCES EXECUTIVE DIRECTOR ROB KELSO

Did you know?

ASTRO DAY KICKS OFF ON APRIL 30!!!

PISCES Project Manager

Rodrigo Romo was nominated

For Employee of the YEAR at the

Research Corporation for

The University of Hawaii!!!!

LETTER CONTINUED...

Flight to the Moon of the experiment is expected in late 2017 for critical flight testing/validation of this spacecraft system on the surface of the Moon.

One of the clear messages we are hearing from our Hawaii State legislature is interest in PISCES having a more economic development / business development focus for the future. High technology jobs and industries are an important strategic direction for our state in diversifying its economy, and we, PISCES, want to be responsive to that desire and direction. PISCES is assessing options to adjust and transform its focus to better blend economic development opportunities for the State of Hawaii with its already on-going efforts in applied research in planetary surface systems.

Whether economic development or applied research for planetary surface systems, PISCES is committed to public-private partnerships in making impossible projects a reality by working together.

Until next month,

ROB KELSO

EXECUTIVE DIRECTOR FOR PISCES

Achievement Though Excellence

PISCES PARTAKES IN JOURNEY THROUGH THE UNIVERSE

Earlier in March, employees of the Pacific International Space Center for Exploration Systems participated in the annual Journey Through the Universe outreach program with Gemini Observatory. The event lasted from March 7-11, and promotes sustained education in critical areas of science, technology, engineering and mathematics (STEM). According to Gemini, it is also a "celebration of exploration and the joys of learning science and astronomy."

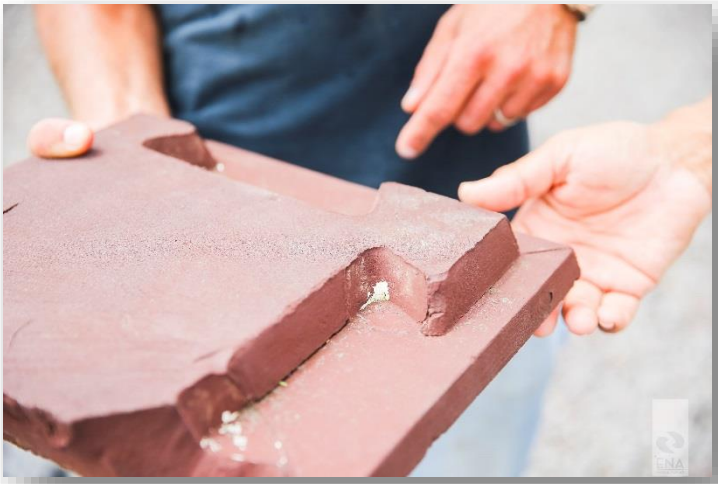
This was the 12th year of the event where scientists, astronomers, and engineers from all over visited various classrooms on the Big Island to teach them all about the wonderful world of science!

Polly Roth, PISCES administrator, was an ambassador for the event. She assisted a computer scientist during his presentation to a group of middle school students. Roth said the event was "a lot of fun!"

Throughout the years, JTTU has influenced more than 50,000 island students. This year Roth, along with PISCES Project Manager Rodrigo Romo, Test Operations Manager Christian Anderson, Test Logistics Manager John Hamilton and PISCES Executive Director Rob Kelso participated.

THE EPIC ROCKET MOTOR FIRING TEST

In March, PISCES tested the strength of the PISCES/NASA Vertical Take-off/Vertical Landing pad project with a 960 pound rocket motor. The event brought out a large crowd who waited with bated breath to see if the experiment would be a success or not. The pavers didn't hold up, but the engineers involved in the project believe the test will provide valuable information on how they can improve the durability of the pad in the future. *Photo Credit: Ena Media Hawaii.*



This picture shows one of the pavers PISCES made for the pad. This object was made out of pure basalt with no additives. *Photo Credit: Ena Media Hawaii.*

SAY CHEESE! A post experiment group shot of all the players involved with the project including representatives from NASA, Hawaii County, the State and more! *Photo Credit: Ena Media Hawaii.*

The basalt pavers seen in this above photograph did not successfully withstand the blast of the rocket motor. Video footage recorded during the test show the pavers being lifted up by the force of the blast. For more footage please visit the PISCES website at www.pacificspacecenter.com. *Photo Credit: Ena Media Hawaii.*

The following image shows the test site location on the Big Island of Hawaii where the rocket motor firing took place on March, 20th. *Photo Credit: Ena Media Hawaii.*

PISCES Project Manager Rodrigo Romo is seen here with the VTVL pad prior to the firing. *Photo Credit: Ena Media Hawaii.*