

PISCES NEWSLETTER

Pacific International Space Center for Exploration Systems * Hilo, Hawaii

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Pacific International
Space Center for
Exploration Systems



*Christian Andersen, PISCES Test
Operations Manager*

Christian Kauhiokalani Andersen started his career conducting research in inertial confinement fusion at Lawrence Livermore National Laboratory, Ecole Polytechnique, and Rutherford Appleton Laboratories.

As the Test Operations Manager, he's worked on a variety of PISCES projects in transitioning aerospace technologies to terrestrial applications and analog field testing.

Andersen has successfully managed and executed the local planning, logistics, and deployment of three NASA and CSA (Canadian Space Agency) analog field tests in 2008, 2010, and 2012. He's received three NASA Group Achievement Awards for his instrumental role in those tests and participation on the RESOLVE (Regolith and Environment Science and Oxygen and Lunar Volatiles Extraction) team. Of the successfully tested payloads, CheMin is now at Mars on the Curiosity rover and RESOLVE is scheduled for a lunar mission in May of 2018.

Andersen is also a Lecturer and Affiliate Faculty in the Physics & Astronomy Department at the University of Hawaii at Hilo, and the Vice-Chair of the Space Resources Technical Committee for the AIAA (American Institute of Aeronautics and Astronautics).

He holds a B.S. in Physics from San Jose State University and a M.S. in Engineering from UC Davis.

MESSAGE FROM THE EXECUTIVE DIRECTOR

Dear Friends of PISCES,

Summer is an exciting and wonderful time for PISCES. While we are still in the midst of considerable project development, I am spending much of my time on the mainland at strategic meetings in Florida, California, Texas and Washington, D.C.

Meanwhile, back at our headquarters in Hilo, PISCES is proudly sponsoring five interns from the University of Hawaii at Hilo to participate in 10 weeks of field and laboratory research - a most rewarding learning experience! Melissa Adams, Sayaalii Baker, Kevin Edwards, Nicolas Turner, and Krystal Schlechter will complete our 2013 Summer Internship Program this month.

We were also excited to witness the Bill Signing Ceremony recently held at the State Capitol, where Lieutenant Governor Shan Tsutsui signed the PISCES' authorization bill (SB1256) into law on behalf of Governor Neil Abercrombie to supply continued state funds for our programs throughout FY14.

Many thanks to our Public Information Officer, Mari-Ela David Chock for creating these most informative newsletters. We also will be rolling-out a new website as PISCES expands its outreach activities.

Mahalo for your continued support and interest in both Hawaii's aerospace industry and PISCES.



Rob Kelso, PISCES Executive Director

Pacific International Space Center for Exploration Systems (PISCES)

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PISCES BILL SIGNED INTO LAW

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PISCES Bill Signing Ceremony ~ Photo courtesy Lt. Governor Shan Tsutsui's Office

STATE AWARDS PISCES \$800,000

On July 9, PISCES was part of the Bill Signing Ceremony held at the State Capitol, with Lieutenant Governor Shan Tsutsui signing SB1256 into law on behalf of Governor Neil Abercrombie.

Under the legislation, PISCES will receive \$400,000 to continue its technology research, development and testing programs. This is in addition to the \$400,000 PISCES is receiving for FY 14 through the State Budget (Act 134).

These funds will specifically be used to cover operations and personnel costs, as well as to purchase equipment needed to support PISCES activities, such as robotics hardware and software.

“PISCES will provide a very unique growth opportunity for Hawaii in the aerospace industry and I think it will definitely be a major contributing factor to Hawaii as we start looking at ways to really diversify and strengthen our economy,” said Lt. Governor Tsutsui.

Thanks to the State’s investment in PISCES, our staff can continue pioneering innovative projects, which include purchasing a 3D laser printer that can manufacture space tools out of Hawaii’s basaltic lava rock. Because the island’s lava rock is similar to that on the Moon and Mars (also basalt-based), 3D printing technology could prove useful for future space explorers, who will need to make tools out of the materials on other worlds.

“If you’re living on the Moon or Mars, you can’t just go to the store to buy a wrench or a screwdriver. You have to learn how to live off the land, just as the Ancient Hawaiians did,” said Rob Kelso, PISCES Executive Director.

PISCES is also initiating a “lunar concrete” project, which involves constructing roads and sidewalks out of lava rock. This innovative process has two potential applications: (1) In outer space, astronauts could use it to build structures (landing pads, berms, shelters, and other structures) out of soils on the Moon, Mars, and other planetary bodies. (2) In Hawaii, this process could be used to build roads, sidewalks, and buildings - reducing the amount of concrete the State needs to import from the mainland, thereby helping advance Hawaii’s Clean Energy initiative.

PISCES STAFF

ROB KELSO, Executive Director

POLLY ROTH, Executive Assistant

CHRISTIAN ANDERSEN, Test Operations Manager

JOHN HAMILTON, Test Logistics/EPO Manager

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PISCES INVITED TO JUDGE AT LUNABOTICS

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FUN SPACE FACT

QUESTION: Can spiders spin webs in outer space?

ANSWER: YES!

Arabella, one of NASA's first eight-legged astronauts, proved that weightlessness can't stop her from weaving.



Arabella's space web ~ Photo courtesy NASA

In 1973, she blasted off into space on Skylab II as part of an experiment.

Judith Miles, a high-school student from Massachusetts, suggested the study.

Since the spider uses its weight to determine how thick its web material should be, and uses wind and gravity to help construct it, Miles wondered what would happen if the spider was weightless.

On Arabella's first day in orbit, microgravity threw her off. She spun sloppy webs. But by Day Three, she was spinning as if she were back home. Her webs were finer, but the pattern was the same, therefore proving that spiders can in fact spin Earth-like webs in space.

PISCES PARTICIPATES IN NASA'S 4TH ANNUAL LUNABOTICS MINING COMPETITION

It's considered the Super Bowl of lunar mining competitions, and PISCES was honored to be right in the middle of all the action, as the world's top robots went head-to-head at NASA's Kennedy Space Center (KSC) in Florida.

John Hamilton, PISCES Test Logistics/EPO Manager, served as an invited judge for the event, held on May 20-24.

"There's hope for the future when one sees all the extreme talent exhibited by these college students and their space mining robots!" said Hamilton.

Lunabotics is a university-level competition where student teams design and build an excavator called a Lunabot that can dig up and deposit at least 10 kg of simulated lunar regolith (moon dirt) within 10 minutes. This year, teams were judged based on more than just how much material they could excavate in the allotted time. Judges also factored into their scores a Lunabot's dust tolerance and projection capabilities, communications systems, vehicle mass, energy/power requirements, and level of autonomy.

The grand prize is the coveted Joe Kosmo Award for Excellence, which Iowa State University, in collaboration with Nebraska Indian Community College and Wartburg College, snatched this year, winning first place.

Lunabotics is one of NASA's Science, Technology, Engineering and Mathematics (STEM) programs. NASA hopes the competition will lead to the invention of an actual robotic miner that astronauts can use for deep space missions.

During last year's PISCES conference, the 2012 Lunabotics winners from the University of Alabama tested their robot at PISCES's analog test site.

PISCES is now working on hosting Lunabotics in Hawaii, where students will use the Center's analog test sites to compete in the international grand challenge.



John Hamilton, PISCES Test Logistics/EPO Manager, judging at the 2013 Lunabotics Mining Competition held at Kennedy Space Center

MOU SPOTLIGHT

**INTERNATIONAL SPACE EXPLORATION RESEARCH INSTITUTE
(ISERI), HANYANG UNIVERSITY, KOREA**

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 nine. We will feature one MOU per newsletter here, beginning with ISERI.

WHO: ISERI, the International Space Exploration Research Institute

WHAT: Planetary exploration research center

WHERE: Hanyang University, Korea

DATE of MOU: Nov. 15, 2012

GOAL: To Promote space exploration technology

PROJECT(s) WITH PISCES: Lunar/basalt concrete for road construction*

**Basalt: rock formed when lava cools down*

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 the public and private sector, thereby enabling [or 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).

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