

# PISCES NEWSLETTER

Pacific International Space Center for Exploration Systems \* Hilo, Hawai'i

MARCH, 2014

VOL 2 ISSUE 3



Pacific International  
Space Center for  
Exploration Systems



*Dr. Elliot Sanders,  
PISCES Senior Technologist*

Dr. Elliot Sanders leads the engineering and research for PISCES's 3D Laser Printing project.

He brings 25 years of research and development, integrating expertise in mechanical engineering, material science, biology, and chemical engineering processes which have led to advances in spinal, cardiovascular and neurovascular medicine.

Transforming ideas into realities is his favorite occupation and he's had the privilege of working on such projects as force-sensing robotic fingers, bio-prosthetic heart valves, cardiovascular and neurovascular stents, polymer fuel cells, and much more.

Dr. Sanders currently holds an affiliate faculty position at the University of Hawaii at Hilo's College of Agriculture, Forestry, and Natural Resource Management, where he is developing an engineering program and conducting research on mobility devices.

He holds a PhD in Engineering from Virginia Commonwealth University and a Master of Science in Biomedical Engineering from the University of Virginia.

## MESSAGE FROM THE EXECUTIVE DIRECTOR PISCES ROLE IN 2014

Dear PISCES Friends and Family,

In last month's newsletter, I shared with you PISCES's six major strategic tracts for the coming year:

1. Basaltic construction and fabrication
2. Integrated In-Situ Resource Utilization (ISRU): "PISCES Robotic Village"
3. PISCES Planetary Analogue Test Site (PPATS)
4. Implementation/operation of the NASA Laser Optical Ground Terminal
5. PISCES Lunar Surface Flight Experiment involving Hawaii High Schools
6. PISCES leading an international Robotics Mining Competition in Hawaii for Universities

These tracts outline dual-use technologies, designed for use both in space and here at home. Not only do they advance planetary surface systems technology, but they also can stimulate the growth of Hawaii's economy and workforce via strategic partnerships.

In our February issue, I outlined the focus for the first strategic tract – basalt construction and fabrication. This month, I'd like to talk about the second one on the list - Integrated In-Situ Resource Utilization (ISRU): "PISCES Robotic Village" (*cont. on page 3*).



Pacific International Space Center for Exploration Systems  
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# PISCES MOON ROVER DEBUT

MARCH, 2014

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## WE ARE **LIVE!!!**

PISCES has a **NEW** website!



[PISCES.HAWAII.GOV](http://PISCES.HAWAII.GOV)

### PISCES STAFF

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**POLLY ROTH**, Executive Administrator

**CHRISTIAN ANDERSEN**, Operations Manager

**JOHN HAMILTON**, Test Logistics/EPO Manager

**RODRIGO ROMO**, Project Manager

**MARI-ELA DAVID CHOCK**, Public Information Officer

**ELLIOT SANDERS**, Senior Technologist

**MAX KERR**, Robotic Technician

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## ROVER COMPLETES TREK FROM CANADA TO HAWAII

After weeks of travel, and months of waiting in anticipation, the PISCES rover has finally made it safely to Hawaii. The robotic spacecraft arrived in Honolulu on March 13, and made its first official public debut at the Pacific Aviation Museum Pearl Harbor's "Discover Your Future in Aviation" event on March 29.

PISCES acquired the rover from Ontario Drive Gear via an extended loan agreement. This 726-pound space vehicle is the size of a golf cart and is the first of its kind for the State of Hawaii. PISCES will primarily be using it for the Center's "Robotic Village" – an in-situ resource utilization (ISRU) research facility.

ISRU involves developing technologies that can take raw materials on other planets and turn them into resources needed for human survival in space. This Canadian rover for example, is designed to search the Moon for water and ice, which can not only be used to drink, but can also be broken down into hydrogen and oxygen – both of which are used to make rocket propellant. The rover will also play a central role in STEM education activities and public outreach events.

After its debut at the Pacific Aviation Museum, the PISCES rover will travel to its final destination – the Center's home base in Hilo on the Big Island of Hawaii.

***Mahalo to Ontario Drive Gear for giving PISCES this incredible opportunity to conduct research with this rover, as well as to the Pacific Aviation Museum Pearl Harbor for hosting our robotic spacecraft on Oahu!***



# PISCES ROBOTIC VILLAGE

## MESSAGE FROM THE EXECUTIVE DIRECTOR CONT.

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### FORMER PISCES INTERN LANDS PRESTIGIOUS NASA INTERNSHIP



MELISSA ADAMS

Astro-Geologist, Melissa Adams, a University of Hawaii at Hilo student who interned at PISCES last summer, is among the select few nationwide chosen for NASA's Sally Ride Internship. It's an opportunity so prestigious, only 10 internships total are available in the spring and fall semesters of each school year!

Melissa, who is Native Hawaiian, will be working for the Astromaterials Research and Exploration Science Directorate (ARES) at the NASA Johnson Space Center. Her mentors will be NASA scientists, Trevor Graff and Dr. Richard Morris.

The internship involves research on geologic Mars analogs. Findings will be used to support robotic missions to the Red Planet.

This opportunity is a result of Melissa's hard work, searching for hematite on Hawaii Island. She, along with John Hamilton of PISCES and Graff, found the mineral via satellite imagery, and its geologic properties happen to be similar to the hematite found on Mars.

Melissa received the distinguished NASA Certificate of Appreciation in recognition of her work, saying "her outstanding contributions and efforts...allowed the unique geologic environment of Hawaii...to serve as an extraordinary analog for understanding Mars."

**CONGRATULATIONS MELISSA! WE  
ARE SO PROUD OF YOU!!!**



A key requirement for space exploration is the ability to "live off the land" using indigenous resources found on planetary surfaces. PISCES has recently acquired a planetary rover on long-term loan from Ontario Drive Gear in Canada.

This rover will enable the development, testing, and validation of integrated resource extraction technologies. The goal is to develop and demonstrate end-to-end technologies associated with "dust to thrust" capabilities – extracting oxygen from Hawaii basalts, filtering the water, separating the water into hydrogen/oxygen, pumping the gases into a hydrogen fueling station, and transferring gases from the refueling station into gas cylinders on the rover – which in turn will expand Hawaii's role as a premier site for the development, testing and validation of planetary surface system technologies.

Through enabling State funds, PISCES will be the lead systems integrator of this "dust-to-thrust" technology development/demonstration.

As such, PISCES will lead activities between government agencies (NASA), academia and the private sector/industry to design, develop and test an integrated PISCES ISRU test facility with robotics, fuel cells, oxygen extraction, hydrogen storage, and aerial/hopper technologies.

Until next time.... Res Gestra Par Excellentium (Achievement Through Excellence).

-Rob Kelso, PISCES Executive Director

### PISCES PARTICIPATES IN 10<sup>TH</sup> ANNIVERSARY CELEBRATION OF HAWAII'S "JOURNEY THROUGH THE UNIVERSE"

From classroom visits, to educator workshops, a fun-filled family day at Imiloa and more, "Journey" week was filled with events celebrating Astronomy in Hawaii. The program is led by Gemini Observatory and was held from March 6-14. Members of the PISCES Team participated, sharing their space knowledge with students and the community.



TOP: PISCES Project Manager Rodrigo Romo with Ms. Nyra Dee's Chemistry Class at Hilo High BOTTOM: Ms. Casey Hanoa's 3<sup>rd</sup> Graders at Keaukaha Elementary during PISCES Test Logistics/EPO Manager John Hamilton's "Journey" classroom visit

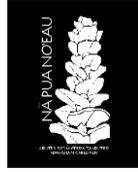


**PISCES Planetary Volcanism Workshop**  
May 28-30

Lunar Planetary Institute (LPI)  
Universities Space Research  
Association Building  
Houston, Texas

Click [HERE](#) for more information

# 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 13, with more on the way. We will feature one MOU per newsletter here.

**WHO:** *Na Pua No`eau*

**WHAT:** *Center for Gifted and Talented Native Hawaiian Children*

**WHERE:** *University of Hawaii at Hilo*

**GOAL:** *To help students in grades K-12 prepare for 21<sup>st</sup> century jobs in the aerospace sector by way of outreach efforts such as workshops, student and intern projects, and mentoring*

**PROJECT(s) WITH PISCES:** *STEM Education & Workforce Development*

**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).

### PISCES HIRES UH HILO STUDENT

Max Kerr, a Hilo High grad and a Computer Science Major at the University of Hawaii at Hilo, has been chosen for the part-time Robotic Technician position, working directly under PISCES Robotic Village Project Manager, Rodrigo Romo.

Max will help select hardware and software needed for the newly acquired PISCES rover, as well as programming.

His expertise stems from his time with the Hilo Viking Robotics club, where he was in charge of programming and wiring robots for the FRC and VEX competitions.

"Max represents everything we at PISCES are looking for in team members," says Romo. "He is a graduate of a local school and was instrumental in the success of Hilo High's robotics club. His creativity, skills, and strong work ethic makes him a perfect fit for this job. We are honored to have him join our ranks."

Max's first day was March 14. **WELCOME TO THE PISCES TEAM MAX!!!**



**Max Kerr, PISCES Robotic Technician**

