

# PISCES NEWSLETTER

PACIFIC INTERNATIONAL SPACE CENTER FOR EXPLORATION SYSTEMS \* HILO, HAWAII

SEPTEMBER, 2014

VOL #2 ISSUE #9



Pacific International  
Space Center for  
Exploration Systems



## PISCES Hires Former Intern and UH Hilo Senior



Melissa Adams, a former PISCES intern and recent Sally Ride Intern at NASA's Johnson Space Center (JSC), has just returned to the PISCES team!

Melissa is a Senior at the University of Hawaii at Hilo (UH Hilo) majoring in Geology and will be tasked with cataloging, organizing, and analyzing field data on local planetary analogue sites.

Last year she worked with Jacobs/NASA Scientist Trevor Gaff and PISCES Logistics/EPO Manager John Hamilton identifying rock samples on Mauna Kea that resemble those found on Mars. Her efforts earned her a 10-week stay at JSC as part of the highly prestigious Sally Ride Internship - established to inspire students in underserved backgrounds to pursue STEM-related fields (Science, Technology, Engineering, and Math).

Adams officially started work on Sept. 22, and says of her new employment at PISCES: "I feel blessed and honored to be working with such wonderful people again [and] am excited to work on the upcoming projects. I have already had great opportunities working with PISCES in the past and hope that I can be as much of an asset to them as they have been to me."

Read all about her exciting internship at NASA JSC in a Q&A on the next page...



## MESSAGE FROM THE EXECUTIVE DIRECTOR

### SETTING UP THE "GAME-WINNING" DRIVE

Dear PISCES Friends and Family,

As we enter the month of September, many people turn their attention to their favorite time of year – Football Season! Our favorite high school, college, and pro teams have been sweating out August to prepare themselves for the fall startup. My son Matthew, a senior wide receiver at Dawson High School, is included in this lineup, and like all players and fans, dreams of glory and victory at future championships.

In football, the game is often decided by inches - getting the next first-down or crossing the goal line. The difference between success and failure is often measured in those tiny increments.

PISCES and the advancement of technologies for the surface of the moon and Mars share much in common with the sweat and effort of these hardworking football athletes. Our team members have worked extremely hard this summer to get their creative projects "ready to play".

Rodrigo Romo and his robotics team worked tirelessly on the PISCES planetary rover, adding new avionics, flight software, communications systems, and navigation and imaging systems, and successfully testing the new upgrades at a PISCES analogue test site. PISCES' rover development now continues forward, with an extensive multi-day "shakedown" mission at the PISCES test site planned later this fall.

Chris Yoakum did an outstanding job of preparing the extensive PISCES FY14 annual report for delivery to the governor. Chris' efforts led to a well-executed "Hail Mary" in producing our best report to-date.

Christian Andersen and his team have been preparing the PISCES 'Lava Laser Lab' for months and are already achieving fascinating results sintering basalt as he characterizes the buildup of the system. Christian has also been working hard in preparing for the basalt construction of a "lunar sidewalk" in Hilo this fall - a joint project in partnership with the County of Hawaii.

John Hamilton spent months actively preparing for the PRISM (PISCES Robotic International Space Mining) Competition, the first university robotics mining challenge held on the Big Island which hosted six teams in an exciting head-to-head challenge this summer.

*(Cont. on page 3...)*

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Rob Kelso, PISCES Executive  
Director



# PISCES TECH BRIEF: 3D LASER PRINTING PROJECT BLASTS AHEAD

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## PISCES' Laser Lava Lab Boosts Its Man and Machine Power



(L-R) PISCES Executive Director Rob Kelso, Melissa Adams, and Jacobs/NASA Scientist Trevor Gaff at Johnson Space Center.

### **Q. How did it feel to be working at NASA's JSC?**

A. Working at JSC was a dream come true. I was extremely honored and excited and a bit fearful. I did not want to let my mentors down back home in Hilo nor did I want to let down my new mentors at JSC. Every time I passed the main gate and saw the sign for JSC I felt grateful. Learning in a place like that helped me to dream bigger. I now feel like I can accomplish any and all of my dreams.

### **Q. What kind of work did you do?**

A. My project involved studying a particular [type of] pōhaku (rock) from Pu'u Poli'ahu on Mauna Kea... considered to be a possible analog for a site inside Gale Crater on Mars. My job involved conducting instrumented analysis and assisting with data analysis and interpretations. The aim of this research is to obtain a better understanding of Mars. I was honored to work with Trevor Graff. He is the best, most patient, and encouraging mentor.

### **Q. What was most memorable?**

On several occasions I would be looking at the samples through a microscope or on a screen and my mind would go back to the place where I helped gather them on Poli'ahu. It would remind me of the wind and sun on my face, the smell of the clouds, and the sense of calm I felt. It was like I was at two awesome and amazing places at once.

### **Q. Did you get to eat any space food?**

A. I tried Astronaut Ice Cream. It tasted like a big dehydrated marshmallow.

### **Q. What's the most important thing you learned?**

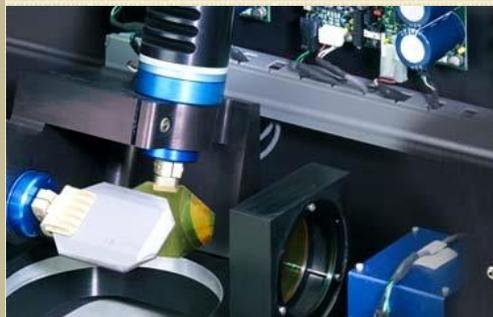
A. I trained on all sorts of instruments and equipment, made a lot of connections, utilized the knowledge that I learned in school, and learned a lot from my mentors. Tying those elements together, acknowledging the people who helped me get to where I am today, and applying those experiences to my future goals and dreams is the most important thing I learned. (Cont. on next page)...



PISCES' "Laser Lava Lab" located at the University of Hawaii at Hilo.

The PISCES' 3D Laser Printing Project is a leap closer to its goal of building robotic parts using volcanic basalt. The "Laser Lava Lab", home to researchers Dr. Elliot Sanders and PISCES Ops. Manager Christian Andersen - who are having a blast in the heat of their sintering research - is getting an upgrade with the introduction of a 'galvanometer.' A galva-*what* you ask? For anyone not familiar with the term, think of a laser light show. A galvanometer is the device used to refract the laser light in different directions using directional mirrors operating on rotating axis-motors. But Dr. Sanders and Andersen will not be having a disco party - at least not in the lab. The galvanometer will enable the production of intricately-designed 2D slices, intended to build a fully-formed 3D part. The galvanometer gets its direction from an advanced software program which commands and controls how the mirrors direct the laser, thus forming a design from the material it's blasting.

Fred Lord, a Physics and Astronomy student at the University of Hawaii at Hilo, is complimenting the Lava Lab's latest gadget with his wealth of knowledge and experience in these devices. With over 20 years of experience in laser light shows and solid know-how in operating galvanometers, Lord is providing invaluable volunteer work for PISCES and the Laser Lava Lab team. Mahalo Fred for your time, effort, and know-how!



Above L and R: Close-up and full-view of a Nutfield 3XB Galvanometer, similar to what will be used in the Laser Lava Lab.

# PISCES INITIATES FIRST CADETS IN WOMEN'S STARS PROGRAM

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## MESSAGE FROM THE EXECUTIVE DIRECTOR *Cont...*

Mari-Ela David Chock - our incredible Public Information Officer - led the STARS (STEM Aerospace Research Scholars) program this summer with a number of bright high school student women. The week-long program offers a fun and experiential approach to inspiring young women in STEM (Science, Technology, Engineering, and Math) related fields of study. Over the Labor Day weekend, the STARS team "Camped out on Mars" in the HI-SEAS (Hawaii Space Exploration Analog and Simulation) habitat on Mauna Loa, getting a real-life simulation of life on another planet.

Thus, every team member at PISCES is sweating in the 'heat', preparing for 'Game Day' when their project initiatives will be put to the test. Though there will inevitably be challenges and adversity ahead, we at PISCES are committed to overcoming the odds and persevering to a successful outcome. As the NASA adage goes, "Failure is not an option."

Our PISCES team, though small in number, always performs at a championship level. We are very proud of them for all of their continued successes and accomplishments.

MAHALO to our wonderfully talented, hardworking, and enthusiastic PISCES staff!

Until next time...Res Gesta Per Excellentiam (Achievement Through Excellence)

**-Rob Kelso, PISCES Executive Director**

## MELISSA ADAMS' Q&A CONTINUED...

**Q. What was most challenging about your 10-week stay?**

A. Getting used to the extra daylight hours, the highways, and getting my bearings oriented. The sun set around 8ish in Texas and that made it harder to overcome jet lag. The roads there are HUGE!! Six lanes on one side of the highway in some spots. It made driving around scary! And finally there were no mauka (to the mountain) or makai (to the water) points of reference to guide me so I got lost initially.

**Q. What are your plans now that you're back in Hawaii?**

A. To graduate in December, and take and score well on my GRE in October (fingers crossed). So I have to study, study, study!!! Then apply to grad schools and hopefully get time to holoholo (go out for fun) in the process. We will see!!

**Q. What would you say to students who are interested in studying/pursuing the sciences?**

A. The sky's the limit and it is never too late to pursue your dreams. Don't give up on yourself. Go for it!!

## Workshop Gives Young Women an Inside Look at Space Exploration



PISCES STARS (L-R) Strawn, Cauley, and Doreste standing in front of the HI-SEAS Habitat on Mauna Loa.

The first ever PISCES Women STARS (STEM Aerospace Research Scholars) program graduated its first group of eager cadets this last August. Catherine Cauley of Hilo High School, Sage Doreste of Connections Public Charter School, and Emily Strawn of Konawaena High School participated in the one-week, hands-on workshop designed to encourage more young women in STEM (Science, Technology, Engineering, and Mathematics) related fields.

The trio, accompanied by PISCES STARS Project Lead Mari-Ela David Chock, learned about ISRU (in-situ resource utilization), designed a lunar lander, conducted a mission on the Moon using MoonBots, test-drove the PISCES planetary rover, toured three observatories atop Mauna Kea, and caught a summit sunset, all while learning about Hawaii's cultural connection with the stars.

The grand finale was an overnight weekend adventure on "Mars" at the HI-SEAS (Hawaii Space Exploration Analog and Simulation) Habitat on Mauna Loa - making Cauley, Doreste, and Strawn the very first students to stay at the two-story, geodesic dome.

"Having these experiences, not only on this trip, but with doing the workshop with PISCES, it really helps you understand just how the science is done...and that's something I've always loved," said Cauley.

Plans for next year's STARS is already underway, with PISCES now looking at opening up the workshop portion of the program to teachers in the spring. This would be in addition to the student workshop held in the summer.

"For now, the program is open to high schools on the Big Island," said Chock. "But our goal is to expand it in the near future so we can make STARS available to all young women throughout the state of Hawaii."

MAHALO AGAIN TO DR. KIM BINSTED & THE HI-SEAS TEAM FOR ALLOWING OUR PISCES STARS TO EXPERIENCE "MARS"!!!



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- @PISCES\_Hawaii

# MOU SPOTLIGHT



# NOAA

## 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:** National Oceanic and Atmospheric Administration

**WHAT:** Federal Scientific Agency focusing on the conditions of the oceans and atmosphere.

**WHERE:** Silver Spring, MD

**DATE of MOU:** March 21, 2014

**GOAL:** To conduct atmospheric and/or solar research and monitoring and exchange data resulting from this research to enable the next generation of earth-space laser communications technology.

**PROJECT(s) WITH PISCES:** NASA Laser Communication Ground Station

**WE ARE LIVE!!!**

Check Out PISCES on the Web!



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

**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).

### NASA Announces Return of Manned Space Launches from U.S.

On Sept. 16<sup>th</sup>, NASA officials announced the return of manned spaceflight launches from the U.S. for the first time since the Shuttle program ended in July 2011.

NASA has awarded Boeing and SpaceX a commercial contract totaling \$6.8 billion to provide U.S. astronauts space transport to the International Space Station (ISS). The announcement signals the end of Russian dependence for manned space travel by NASA personnel.

The contract, known as the 'Commercial Crew Program', replaces the retired Space Shuttle program, which operated as the foundation of manned spaceflight for NASA for over 30 years. NASA officials hope the new contract will blast U.S. astronauts into orbit by 2017.

NASA Administrator Charles Bolden said the move "sets the stage for what promises to be the most exciting chapter in NASA and human space flight" and will allow the agency to focus on the more ambitious endeavor of manned missions to Mars.



Astronaut Piers Sellers during a 2006 spacewalk outside the now-retired Space Shuttle. Credit: NASA

