PISCES NEWSLETTER

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

MAY, 2014 VOL 2 ISSUE 5

Chris Yoakum,
PISCES Communications Associate

Chris Yoakum of Hilo is the latest addition to the PISCES Team.

The recent University of Hawaii at Hilo graduate is now taking on the Center's part-time Communications Associate position, assisting with internal and external communications at PISCES.

Yoakum started his journalism studies at the University of Nevada before transferring to the University of Hawaii at Hilo, where he graduated with a Bachelor's degree in Communications and a Minor in History.

During his last semester, Yoakum's talent for writing was recognized by the Big Island Chronicle. The newspaper published an article he wrote titled "Skaters Dream Big," which highlighted local efforts to build a multi-purpose skate-park and community plaza in Hilo.

As the new Communications Associate, Yoakum will be handling the PISCES website, newsletter, and social media updates, as well as coverage of PISCES-related events. His first day on the job was May 12.

MESSAGE FROM THE EXECUTIVE DIRECTOR

Dear PISCES Friends and Family,

Over the last few months, I have been sharing with you PISCES' 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 can also stimulate the growth of Hawaii's economy and workforce via strategic partnerships.

In our April issue, I discussed the third on the list – PISCES' Planetary Analogue Test Sites.

The fourth strategic area within PISCES is our focus on advanced space communications - namely the NASA Laser Optical Communications Ground Station.

Since the beginning of the Space Age, NASA has communicated with its spacecraft through the use of Radio Frequency (RF) ground antennas. However, the ever increasing data rate requirements from more and more sophisticated instruments on our spacecraft will soon outstrip our ability to support them with RF communications. Therefore, NASA has embarked on the development of technology for laser communications between its spacecraft and Earth. *(cont. on page 3)*

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LUNAR CONCRETE: WORK OFFICIALLY BEGINS!

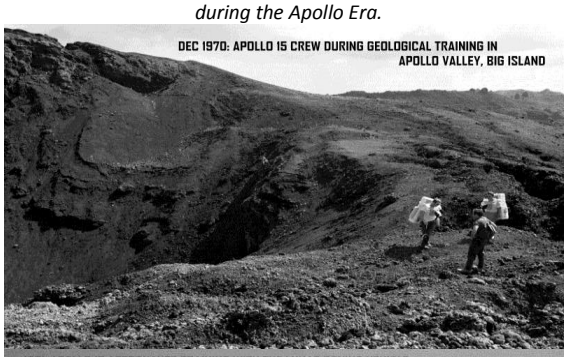
MAY, 2014 VOL # 2 ISSUE #5

Lawmakers Approve PISCES Resolutions

SCR 82: Honoring Apollo 11

Hawaii is now one of three states to join the movement to push for world recognition of the historic site where humans first set foot on the moon. Lawmakers have approved a PISCES Senate Concurrent Resolution urging the United Nations Educational, Scientific Cultural Organization (UNESCO) to preserve "Tranquility Base" as a World Heritage site amid a flurry of anticipated moon-missions spurred by the Google Lunar XPRIZE competition. Several launches are slated for 2015 and aim to land robotics on the moon's surface. The Resolution, which was drafted with assistance from the Hawaii Office of Aerospace Development, also recognizes Hawaii's key role in the Apollo missions. The Big Island's volcanic terrain, which is nearly a carbon copy of the moon's, provided essential training grounds for Apollo astronauts between 1965 and 1972. Hawaii also provided communication relays during the Apollo 11 spaceflight, and supported the recovery of the returning moon-men after their spacecraft splashed down in the Pacific Ocean about 800 miles from the Islands. The State of Hawaii will commemorate the 45th anniversary of the epic lunar landing on July 20th, 2014.

BELOW: Rare photos of astronauts training on the Big Island during the Apollo Era.



Article cont. at right…

PISCES AWARDED $25,000 GRANT FOR SUSTAINABLE CONCRETE

PISCES and the Hawaii County Research and Development Department are teaming up to test the future of space construction by developing a Big Island sidewalk made out of 'lunar concrete'.

The County R&D has awarded PISCES with $25K to emplace and test three to four slabs made out of volcanic basalt, which is nearly identical to the regolith (soil) found on the Moon and Mars.

The prototype sidewalk will be monitored and analyzed over a one-year period to determine how well it holds up compared to traditional concrete.

PISCES is working with an A-list of researchers from the University of Hawaii at Manoa, NASA Ames, and NASA's Kennedy Space Center on several prototypes using different 'glues', or binders, for each slab in the sidewalk.

If all goes well, the new construction material could save Hawaii the heavy environmental and economic cost of importing nearly 300,000 metric tons of Portland cement every year.

Making homegrown concrete would help make Hawaii greener by 'living off the land'. It would also help create jobs in the construction and technology sectors.

The target date for installation is August, and the exact location of this high-tech walkway has yet to be determined.

Stay tuned for more news about Hawaii's first lunar sidewalk!

LEFT: A sample of lunar concrete made from basaltic lava. PISCES has partnered with researchers to develop binders for this that could one day be used to build structures on other planets.

SCR 83: Lawmakers support PISCES-NASA Space Construction Projects

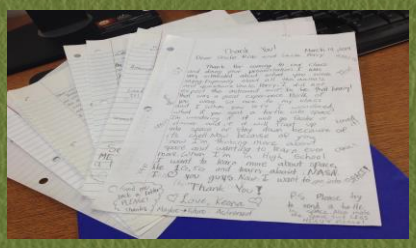
A PISCES-NASA initiative that could help Hawaii produce its own construction materials instead of importing them has received strong backing from Hawaii Lawmakers. Senate Concurrent Resolution 83 calls for State support in the development of "basaltic concrete" made from lava rock that could be used both at home and in outer space. The project could create jobs in manufacturing and technology in Hawaii, while making the Islands more sustainable. The initiative also involves building structures in Hawaii using 3-D printers and volcanic basalt. The project aims to build infrastructure in space using robotics and regolith to avoid the costly effort of sending construction materials to space. 3-D printers are already building houses using recycled materials on Earth. PISCES is one of four partners chosen by NASA to develop 3-D printing for construction in space. The Senate approved the PISCES Resolution on April 15.

NASA LASER COMMUNICATIONS GROUND STATION

MESSAGE FROM THE EXECUTIVE DIRECTOR CONT.

MAY, 2014 VOL #2 ISSUE #5

KEIKI SPACE TALK



KIDS SURE SAY THE FUNNIEST THINGS, DON'T THEY? BUT THEIR INNOCENT MINDS COME WITHOUT BOUNDARIES, WHICH MAKES THEM BRILLIANT AT SEEING THINGS IN A WAY US ADULTS DON'T. JUST CHECK OUT THESE SNIPPETS FROM LETTERS THAT 4TH GRADERS AT KAUMANA ELEMENTARY WROTE TO PISCES EXECUTIVE DIRECTOR ROB KELSO AFTER HE VISITED THEM DURING HAWAII'S "JOURNEY THROUGH THE UNIVERSE" EVENT LAST MARCH:

"Thank you for coming to our class and doing your presentation. When you left, I wondered, what if you sent a turtle into space? I'm wondering if it will go faster or slower and if it will float up into space or stay down because of its shell...Please try to send a turtle in space. Also, make the spacesuit LESS HEAVY please! I love you guys. Now I want to go into SPACE! Thank You!" ~Keona

"I learned lots of things from you like...you can send monkeys, dogs, ants, and a spider out to space and so I learned that animals can go into space but how do the animals control the spaceship because there are lots of buttons for the animal to control." ~Kawai

"...when we got to put on the [space]suit it was really fun and it helped me to see what I want to be. Even if the suit was heavy I still might be an astronaut. I'm really proud that you guys came to my school." ~Kealoha

"Does fire burn out in space or not? And also if there's water in the rocket and the rocket is by the sun does it evaporate or not?" ~Riel

"Thank you for telling us that when [the astronauts] have to use the bathroom they had to use pampers." ~Thaela

"You are really funny and fun. In the presentation some parts were really funny like how one of your friends didn't like jelly beans on Earth but he liked jelly beans in space." ~Jerzie

This new technology has recently been successfully demonstrated with the Lunar Laser Communications Demonstration (LLCD) experiment aboard the Lunar Dust and Atmospheric Environment Explorer (LADEE) spacecraft which recently ended its orbit of the moon. NASA plans to introduce laser communication with its spacecraft at the beginning of the next decade.

In order to prepare for this new operational laser communication network, NASA has begun working closely with PISCES in the planning of a global network of laser communication ground stations. Based on NASA's analysis of global clouds and weather, NASA has selected Hawaii as the very best location for its first operational laser communication station. This ground station would be emplaced to support laser communication milestones in the 2018 time frame and evolve into NASA's first operational laser communication ground station in 2020.

NASA envisions the establishment of the laser communication ground station as a three-phase project beginning with atmospheric characterization of the site in 2014, introduction of a demonstration laser communication ground station in 2016 to support the Laser Relay Communication Demonstration (LCRD) mission in 2018, and location of a long term operational ground station in 2020, which will serve as the first installation of NASA's future global network of laser communication ground stations.

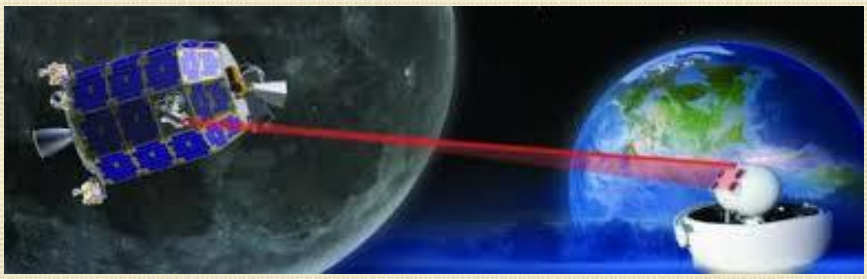
In addition to the infrastructure, this new technology will need technical experts that will not only support NASA's first laser communication station, but will serve as a technical resource for the entire network of laser communication ground stations as well. Therefore, it is envisioned that the University of Hawaii could provide the needed technical expertise beginning with support of our atmospheric characterization effort in 2014 and maturing to a center of excellence in ground-to-space laser communications in the future.

PISCES is honored to be working with NASA on the development and operation of the world's first laser optical ground station - located on the Big Island of Hawaii!

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

-Rob Kelso, PISCES Executive Director

Artist rendering of the LADEE spacecraft communicating via laser. Photo Credit: NASA



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- @PISCES_Hawaii

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

WHO: *Planetary Power*
WHAT: *Solar and hybrid energy technology for off-grid and remote operations*
WHERE: *Seattle, WA*
DATE of MOU: *July 18, 2013*
GOAL: *To create opportunities in workforce development, jobs, and advanced manufacturing in the aerospace and other sectors through the development of renewable energy technologies*
PROJECT(s) WITH PISCES: *Portable and Sustainable Renewable Power Generation*

WE ARE LIVE!!!

PISCES has a NEW website!

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).

PISCES PARTICIPATES IN HILO'S ASTRODAY

PISCES on May 3rd, participated in Hilo's 13th Annual AstroDay Festival, an event celebrating Astronomy and Hawaiian culture. PISCES was among the various presenters this year that contributed to the celebration, which featured more than 40 exhibits, interactive demonstrations, musical entertainment and fun activity areas throughout the Prince Kuhio Plaza – all designed for the whole family.

PISCES showcased the Center's planetary rover, the spacesuits borrowed from Heinlein Prize Trust, and a MoonBots demonstration, which was a big hit with the keiki. While the PISCES team hit the ground running the booth, PISCES Executive Director Rob Kelso hit the air waves doing an interview with radio announcer DC from KWXX.

AstroDay is Hilo's version of the international event, Astronomy Day. Gary Fujihara, a former telescope operator at Subaru Telescope and current Outreach Officer for the University of Hawaii Institute for Astronomy, founded AstroDay. Hilo's first one took place in April of 2002.