PISCES NEWSLETTER

PACIFIC INTERNATIONAL SPACE CENTER FOR EXPLORATION SYSTEMS
HILO, HAWAII

OCTOBER, 2014 VOL #2 ISSUE #10

Former PISCES Workers Selected for Current HI-SEAS Mission

Former PISCES workers Sophie Milam (left) and Neil Scheibelhut (right) are crewmembers in the latest HI-SEAS mission on Mauna Loa

Two former PISCES workers have been selected for the third and longest-yet HI-SEAS (Hawaii Space Exploration Analogue Simulation) mission, which began Oct. 15. Sophie Milam and Neil Scheibelhut will spend eight months in the Mars-like habitat with four other crewmates in a NASA-funded study designed to assess the social, cognitive, and emotional effects of long-term isolation.

Milam, a University of Hawaii at Hilo (UHH) graduate, has a strong interest in space exploration and education, and hopes to work in STEM (Science, Technology, Engineering, and Mathematics) outreach.

"I believe that mankind's future is space travel and that it is the responsibility of all to encourage the next generations of explorers to further our collective knowledge and inspire adventure," she said.

Cont. on Next Page…

MESSAGE FROM THE EXECUTIVE DIRECTOR

"BACK TO THE FUTURE" |Returning to the Surface of the Moon

We first landed on the moon in 1969, and we did it with computers no more powerful than a pocket calculator. We launched a rocket longer than a football field (the Saturn V was 365 feet tall), piloted it 240,000 miles through the cold, unforgiving vacuum of space, and planted an American flag on alien soil. Then we did it again — five more times.

Saturday, October 4th, marked the 57th anniversary of mankind's first tentative step toward that momentous achievement. Fifty-seven years ago, Sputnik I, reached escape velocity for the first time and orbited the Earth. The world's first artificial satellite was about the size of a beach ball (22.8 inches in diameter), weighed only 183.9 pounds, and took about 98 minutes to orbit the Earth on its elliptical path. That launch ushered in new a new era of political, military, technological, and scientific developments. While the Sputnik launch was a single event, it marked the beginning of the space age and ultimately, the space race between the U.S. and Soviet Union to the Moon.

Sputnik was a reality check that the U.S. took to heart as a nation. The space race that followed is one of the most exciting and dramatic stories in modern history. It was set in the Florida swamps surrounding Cape Canaveral, the hot suburbs of Houston, and the dark backdrop of outer space. Its characters were larger than life — a young and charismatic president who was assassinated before his vision for America's space program was realized; maverick test pilots with names like Shepard and Armstrong; a German rocket genius named Von Braun; famous flight directors like Christopher Columbus Kraft and Gene Kranz, and a host of sleepless engineers who perfected the science of making science fiction a reality.

Apollo 17 ended man's exploration on the lunar surface in December 1972. Lunar surface exploration was abandoned with the conclusion of the Soviet Union's Luna-24 sample return mission in August 1976. Luna-24 returned to Earth 170 grams of lunar soil. It was then, for the first time, data was obtained which suggested that there is water on the Moon.

(Cont. on page 3…)

Pacific International Space Center for Exploration Systems (PISCES)
Phone: 808.935.8270
99 Aupuni Street, Suite 212-213
Hilo, HI 96720
Pisces.Hawaii.Gov

Rob Kelso, PISCES Executive Director

HAWAII'S BASALT: WHAT MAKES IT SO SIMILAR TO MARS?

OCTOBER, 2014 VOL #2 ISSUE #10

Milam worked with PISCES during the 2008 and 2010 ISRU (in-situ resource utilization) field tests. She also led the APEC (Asia-Pacific Economic Cooperation) international rover demonstration for PISCES with the NASA Ames Exploration Rovers in 2011. She is now pursuing a Master's degree in Engineering at the University of Idaho in Moscow and working with the Intelligent Robotics Group at NASA Ames Research Center.

Scheibelhut has a medical background and served as an infantry medic in Iraq. But he's always had an interest in space exploration. The UHH graduate worked with PISCES during the 2010 and 2012 ISRU field tests alongside NASA Flight Surgeon Dr. Lou Moreno, during which time his interest was rekindled.

"As long as I can remember, the space program and astronomy interested me tremendously," he said. "As I got older, I kind of got away from that. But being able to work with NASA on the ISRU test, and volunteering at the Mauna Kea Visitor's Center really reignited that passion. Performing research that will help the space program is my focus now."

The third HI-SEAS mission is twice as long as any previous stay – and second only in duration to the Russian MARS-500 experiments conducted between 2007 and 2011. The crew will be continuously monitored using body movement trackers, surveillance cameras, and other methods as part of the study.

From everyone at PISCES, we wish Sophie and Neil all the best!

Stay connected with PISCES online with Facebook and Twitter:

- www.facebook.com/PISCESHawaii
- @PISCES_Hawaii

Finding Martian terrain close to home

Mauna Kea volcano towers above the clouds in the background of a lava field on the slopes of Mauna Loa. Volcanic basalt on Hawaii Island is strikingly similar to Martian soil.

Ever have the urge to see and feel what the surface of Mars is like? Rather than making the one-way, one year, 140 million mile journey (on average, depending on planetary positions and travel speed) you could pay a much shorter visit to the Big Island of Hawaii.

But how could Hawaii's terrain, rife with picturesque images of beautiful beaches, palm trees, and oceanscapes, possibly resemble anything close to the desolate appearance of the Red Planet you ask? The proof is in the Pu'u (meaning 'hill' or 'mount'), or rather, the volcano. Specifically, the tallest volcano on planet earth as measured from the bottom of the ocean, Mauna Kea. On the flanks of this magnificent behemoth lie a wealth of volcanic basalt with a nearly identical mineral makeup to the soil found on Mars.

In October 2012, scientists confirmed this fact when NASA's Curiosity Rover analyzed Mars' surface soil for the first time. Using an onboard laboratory known as 'CheMin' (short for **Che**mistry and **Min**eralogy), a marvel of modern technology that uses X-rays to assess mineral contents, Curiosity revealed the presence of significant amounts of feldspar, pyroxene, and olivine - the same minerals found in Mauna Kea's volcanic basalt. The finding indicates Mars had an abundance of volcanic activity at some point in time.

NASA's Johnson Space Center has developed a martian-simulant dirt known as 'Mars-1' following the discovery. Scientists created the simulant from basalt at Pu'u Nene Cinder Cone, which lies on the saddle between Mauna Kea and Mauna Loa on the Big Island.

But Mauna Kea's basalt not only closely resembles martian terrain, but also bears a very similar mineral composition to the surface soil of the moon. Resembling both Mars and the moon in makeup, Hawaii's basalt makes an ideal testing ground for planetary robotics before launch. It's also much warmer to visit, with the only threat of solar radiation being a light sunburn!

LETTER FROM THE EXECUTIVE DIRECTOR CONTINUED . . .

OCTOBER, 2014 VOL #2 ISSUE #10

PISCES STAFF "Hang Loose" AT LOCAL PARK

(L-R, Top to Bottom: Executive Director Rob Kelso, Executive Administrator Polly Roth, Test Logistics & Education/Public Outreach Manager John Hamilton, Operations Manager Christian Andersen, Public Information Officer Mari-Ela David Chock, Project Manager Rodrigo Romo, Communications Specialist Chris Yoakum, Robotics Tech Casey Pearring, Site Characterization Specialist Melissa Adams)

GET TO KNOW US!

Want to learn more about the PISCES team? Visit our website at Pisces.Hawaii.Gov and click on "PEOPLE" then "STAFF". Our bios are now posted, along with our emails. Need a speaker for your event? Feel free to contact us! We at PISCES are dedicated to community outreach, and are always willing to make ourselves available to tell our story.

Mahalo to Renata Walczuk of Walczuk Productions for the photos, taken at the beautiful Liliuokalani Gardens in Hilo, Hawaii!

Since that time in 1976, the moon's surface has been visited only once – and very recently. China's very first moon lander, the Chang'e-3, made a soft successful soft touchdown in December of 2013, deploying its Jade Rabbit lunar rover to traverse the dusty surface.

Reaching the Moon is very difficult. And landing on it is an even greater challenge. NASA's early lunar programs faced many failures before reaching the Moon. The Ranger series of spacecraft was the first U.S. attempt to obtain close-up images of the lunar surface. They were designed to crash land into the moon, transmitted snapshots back to Earth up until the moment of impact when the craft was destroyed.

Towards the end of 1962, the situation with the American Moon program looked bleak. The failure of Ranger 5 - launched on October 16, 1962 - was NASA's sixth consecutive lunar mission failure in three years. Ranger 6 followed in its predecessor's footsteps, successfully impacting the lunar surface, but failing to return imagery. Only 17 months after President John F. Kennedy committed the U.S. to landing a man on the Moon with Project Apollo, it was beginning to look as though Americans would never make it. If NASA could not get a simple unmanned probe to the Moon in working order, how could they hope to succeed at the much more complicated task of a manned lunar landing? But hope was renewed with Ranger 7's success. And Rangers 8 and 9 also completed their mission objectives, returning the first high quality images to Earth that would help Apollo mission planners determine the best landing site for mankind's first lunar visit.

Now that NASA's focus for space exploration has shifted away from the Moon to Mars and asteroids, the private sector is being encouraged to pick up where lunar explorers left off. And the Google Lunar XPRIZE (GLXP) – a space competition organized by the XPRIZE Foundation and sponsored by Google - has put up a generous incentive towards this end. The challenge calls for privately-funded spaceflight teams to successfully land a robotic craft on the Moon, traversing across the lunar surface with a rover while beaming back high-definition imagery to Earth.

As of June 2014, 18 GLXP teams are in the running, and five are expected to make the lunar object a success. The first launch attempts are anticipated by late 2015 or early 2016. Through these commercial space companies, the surface of the moon will once again be active grounds for exploration for the first time in nearly 40 years.

Time will tell if the private sector will succeed at the challenge of meeting with the Moon. But one thing is for certain — in the next 24 months a GLXP team is expected to attempt the risky journey, and history will look back on this time with the same importance as we look back on 1957. The setting and characters may be different, but the similarities remain. Despite disadvantages, we collectively stand poised to again embark on a most hazardous and dangerous endeavor — the exciting adventure of lunar surface exploration.

PISCES offers its prayers and "God-Speed" to these brave companies in the restart of exploration of the moon!

Until next time,

Res Gesta Per Excellentiam (Achievement Through Excellence)

-Rob Kelso, PISCES Executive Director

Right: One of the first close-up photos captured by NASA's Ranger 7 Spacecraft - the first in the series to successfully capture high resolution imagery of the Moon before impacting the lunar surface. The images were used by Apollo planners to determine a suitable landing site.

PISCES TO HOST WINNING MOONBOTS TEAM

The Google Lunar XPRIZE has announced the winner of the 2014 MoonBots Challenge, awarding Team Incredibots of Columbus, Ohio with a grand prize visit to PISCES. The team will arrive on Hawaii Island at the end of November for a world-class exercise of their robot at a PISCES planetary analogue test site.

The MoonBots Challenge is an international online competition for youth ages nine to 17 years old. It mirrors the Google Lunar XPRIZE Competition – an international contest challenging privately-funded space teams to land a spacecraft on the moon with a lunar rover for a grand prize of $30 million.

The 2014 MoonBots Challenge began in March, attracting entries from more than 300 teams across 24 countries in the interest of promoting STEM (Science, Technology, Engineering, Math) education. Applicants submitted videos answering the question, "Why should we go back to the Moon for good?" A panel of judges selected 25 teams and tasked them with building and programming a LEGO MINDSTORMS robot, along with a simulated lunar landscape for the bot to traverse.

Congratulations Team Incredibots on your success! We look forward to seeing you in Hawaii!

For more information on the 2014 MoonBots Challenge, visit http://moonbots.org.
To read about the Google Lunar XPRIZE, visit http://lunar.xprize.org/.

WE ARE LIVE!!!

Check Out PISCES on the Web!

PISCES.HAWAII.GOV

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).

LRO Discovery Will Rewrite Lunar Textbooks

New evidence gathered by NASA's Lunar Reconnaissance Orbiter (LRO) suggests volcanic activity on the Moon was still occurring during the age of the dinosaurs. The discovery is a significant shift in the geological understanding of the Moon, and implies that volcanic activity gradually slowed over time, instead of abruptly stopping about 1 billion years ago as previously thought.

The LRO evaluated specific rock formations, dating them to about 100 million years old. A well-studied lunar mare (basaltic lava plain that formed during a volcanic eruption) known as 'Ina' was dated to about 50 million years, and LRO's imagery found many more geologically similar features suggesting volcanic activity was widespread around the same time.

"This finding is the kind of science that is literally going to make geologists rewrite the textbooks about the Moon," said John Keller, LRO project scientist at NASA's Goddard Space Flight Center.

The discovery changes the understanding of the Moon's interior, and researchers are now reevaluating their view of the Moon's interior temperature.

Artist Rendering of NASA's LRO orbiting the Moon.
Credit: NASA Goddard