Planetary Science Institute

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Ribbon-Cutting Dedication of New PSI Wing in Tucson

by Alan Fischer

Cutting the ribbon: from left, Dr. Tim Hunter, Chair of the PSI Board of Trustees, Jessica Floyd, District Director for U.S. Representative Ron Barber, Dr. Mark V. Sykes, PSI's CEO and Director, and the Hon. Regina Romero, Vice Mayor of the City of Tucson.

The Planetary Science Institute dedicated its third Tucson facility on March 4 with a ribbon-cutting ceremony, featuring, from left, Dr. Tim Hunter, Chair of the PSI Board of Trustees, Jessica Floyd, District Director for U.S. Representative Ron Barber, Dr. Mark V. Sykes, PSI's CEO and Director, and the Hon. Regina Romero, Vice Mayor of the City of Tucson. On behalf of the Mayor and City Council, Ms. Romero proclaimed March 4, 2013, as "PSI Day."

The new 3,700 square-foot PSI Conference Center, located at 1700 E. Fort Lowell Road, Suite 110, includes offices for scientists and education/public outreach staff as well as a large conference room for meetings and workshops.

"We were bursting at the seams and needed more room. We needed office space for more scientists joining PSI as well as to accommodate the growing number of teachers wanting to attend our educational workshops," said Mark Sykes.

PSI's teacher professional development workshops — Project

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Mark Sykes displays the "PSI Day" proclamation presented by Tucson's Vice Mayor Hon. Regina Romero at the new facility dedication on March 4, 2013.

Photos by Alan Fischer

Inside this issue:

PSI Scientists Present a Wide Variety of Topics at LPSC

by Chris Holmberg and Emily Joseph

More than 80 PSI scientists and educators made over 110 oral and poster presentations at the 44th Lunar and Planetary Science Conference (LPSC) held in The Woodlands, Texas, March 18-22, 2013. Topics covered included the Mars Science Laboratory rover mission, Mercury MESSENGER mission, Dawn mission to Vesta, achondrite meteorites, lunar remote sensing, planetary cartography, asteroid analysis, exobiology, lunar impact cratering and many more areas of scientific study.

Among the many presenters from PSI was Senior Scientist Melissa Lane who was one of four panelists at the annual Susan Niebur networking event. This year the discussion was "Alternative Careers in Planetary Science." Each panelist represented a different road to their successful science career. Melissa is an example of a scientist working for a soft-money institute — PSI, headquartered in Tucson — while conducting her remote sensing studies of Mars from her base in Pennsylvania. (One of the other panelists works at NASA in policy and administration, another at a small state university, and the fourth person educates and advocates science as a writer and editor.)

PSI Research Scientist Marc Fries presented a poster on radar detection of meteorite falls, and gave a short talk on the potential of Raman instruments for space flight.

PSI Senior Scientist Rebecca Williams presented results on behalf of the Mars Science Laboratory (MSL) Science Team in a Special Session attended by over 500 people. She is a Participating Scientist on MSL and her talk entitled "*Curiosity's* Mastcam Images Reveal Fluvial Conglomerate Outcrops," demonstrated that Martian outcrops with rounded pebbles, diagnostic of water-transported clasts, are evidence of a sedimentary conglomerate on another planet (see full article on page 3).

The conference also offered numerous opportunities for forging and renewing collaborations and friendships, both among members of PSI and with the approximately 1800 other scientists who attended from around the world.

PSI Director Mark Sykes (center, in green) surrounded by forty-nine members of PSI's LPSC contingent gathered for dinner and spirited conversation at the Landry's Seafood at the Woodlands Waterway restaurant.

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Chris Holmberg, ***Editor***

Alan Fischer, ***Science Writer and Photographer***

Special thanks to Emily Joseph, Victoria Klocko, Carol Neese, and Elaine Owens

Flowing Water Transported Sand, Rocks Along Martian Streambed

by Alan Fischer

NASA's Mars Science Laboratory (MSL) *Curiosity* rover found evidence for ancient, water-transported sediment on Mars at a few sites, including the rock outcrop pictured here, named "Hottah."

The first surface science results from the mission provide the most definitive evidence yet of an ancient stream flow on Mars, as reported in a *Science* paper "Martian Fluvial Conglomerates at Gale Crater," published May 30, 2013.

"These sedimentary conglomerates, made up of cemented pebbles and sand, are the first definitive identification of this rock type on another planet," said PSI Senior Scientist Rebecca M. E. Williams, lead author of the report.

The size, shape, and arrangement of the pebbles embedded in these conglomerate rocks – from the size of sand particles to the size of golf balls – have telltale signs of water transport. The smooth, rounded shape of the pebbles occurs through multiple collisions within the stream. In addition, many of the pebbles are touching each other, a clear indication that the pebbles rolled along the bed of a stream.

Senior Scientist R. Aileen Yingst, a co-author on the paper, documented the roundness of the pebbles and demonstrated that these pebbles are significantly rounder than rocks of this size previously observed on Mars.

Three pavement-like rocks examined with the telephoto capability of MSL rover *Curiosity's* Mast Camera during the rover's first 40 days on Mars are the basis for the paper. Researchers also used the rover's laser-shooting Chemistry and Camera (ChemCam) instrument to investigate the material.

PSI Senior Scientist David T. Vaniman is a member of the ChemCam team, which provided chemical data on the composition of pebbles within the conglomerate.

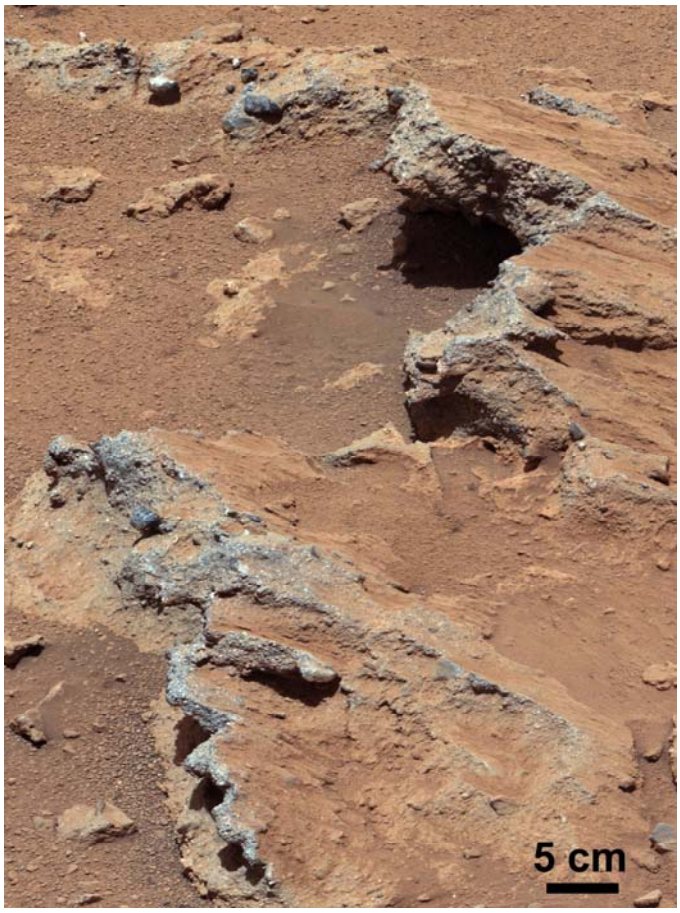
"The rounded pebble shape requires significant fluvial abrasion and indicates long-distance water transport of the pebbles, over at least several kilometers," Rebecca said. "Climate conditions on Mars at the time the pebbles were transported must have differed substantially from the cold, hyper-arid modern environment to permit water flows of such long distances."

"Sedimentary conglomerates are a common rock type here on Earth, and now we have found them on Mars. Geologists understand how to use the clues contained in streambed deposits to estimate former flow conditions, and we can apply this knowledge to determine the flow depth and speed on Mars," Rebecca said.

Knowledge of the size, shape, and arrangement of the material within the conglomerate allowed researchers to move from speculation about Martian river flow characteristics to a more direct estimate of how fast water moved, how deep it was, and over what length it traveled.

Rebecca and her colleagues estimate the Martian river in Gale Crater had velocities between 0.2 to 0.75 meters per second, depths between 0.03 to 0.9 meters, and traversed several kilometers. She explained, "The stream was flowing at a minimum speed equivalent to a walking pace – a meter per second – and it was ankle-to-hip deep."

Visit http://www.psi.edu/news/fluvialconglomerates.html to see an image of Martian fluvial conglomerates.



The rock outcrop pictured here, named "Hottah,"was found by the NASA Curiosity rover's Mastcam, on the 39th day of the mission (Sept. 15, 2012). This is one of several sites that provides evidence of water-transported sediment on Mars. Rounded pebbles — some the size of golf balls — within this sedimentary conglomerate indicate sustained abrasion of rock fragments within water flows that crossed Gale Crater. Scientists have determined the stream was flowing at a walking pace and the water was ankle–to-hip deep.

Image Credit: NASA/JPL-Caltech/Malin Space Science Systems

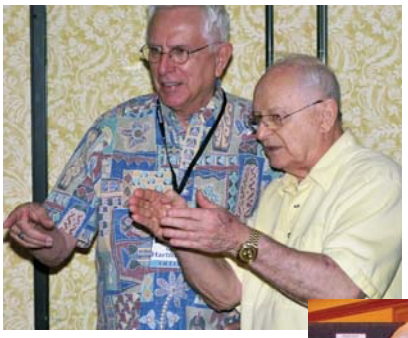
PSI at "Spacefest V"

by PSI Senior Scientist William K. Hartmann

"Spacefest" is the name of a series of conferences organized by Tucson Novaspace Gallery owners, Kim and Sally Poor, allowing the public to meet astronauts, attend talks and panel discussions on space themes, and collect space-related books, artwork, and memorabilia. In May this year, I participated in a Mars panel discussion with researcher Peter Smith, writer Kim Stanley Robinson, and others, and also displayed paintings.

There was a great moment for me this year as Apollo 12 astronaut Alan Bean came over to the artists' table to say that he liked the way I handled the light on a "portrait" I did of some large lunar boulders. We've had contact off and on for years, and I've always admired his lunar paintings, but this was the most detailed discussion I've had from him.

You can't beat having your lunar paintings critiqued in detail by a guy who actually walked on the Moon!



At the Spacefest V conference in May, astronaut Alan Bean (right), who explored the Moon's surface on the Apollo 12 mission, critiques one of PSI Senior Scientist Bill Hartmann's paintings of lunar rocks. *Photo by John Bowes*

The artwork being discussed at the Spacefest V conference (lower right) is an imaginary view of stratified basalt rocks tumbled down on the wall of a lunar crater. *Photo by Larry McGlynn*

Director's Note

These are both exciting and challenging times.

PSI scientists continue to make exciting discoveries throughout the Solar System. This includes identifying and studying a fossil stream bed on Mars, revealing details of a past environment where flowing water was far more plentiful than today! Comet ISON, which may be the brightest comet in over a century, was imaged by our scientists using the Hubble Space Telescope to reveal jetting activity as it approaches the Sun. Our scientists studied the effects of methane rain on Saturn's moon Titan using Cassini, putting together the pieces of its unique methane-based hydrological cycle.

We are also very pleased to announce the establishment of the Pierazzo International Student Travel Award, in honor of the late PSI Senior Scientist Betty Pierazzo. This is to support graduate student travel from U.S. institutions to meetings in foreign countries, and from foreign institutions to meetings in the U.S., helping to build international relationships in our planetary profession.

During a recent visit to Washington, DC, PSI CEO and Director Mark Sykes and Deputy Director Michael Gibbs visited both the House and Senate, NASA Headquarters, and representatives of businesses and other organizations engaged in planetary-related work.

On the challenging side, funding for NASA Solar System explorations was reduced by 20% from 2012 to 2013. Thanks to strong community engagement back in Washington, and the longstanding support we have enjoyed from Congress, Congress restored most of this money in March. Unfortunately, the administration chose to remove almost all of those funds through sequestration (a whopping 15% cut), and plans to continue to shrink planetary funding in future budget years. Considering the spectacular successes delivered by this program over decades, it does seem to be a strange choice, which can only be reversed through continued engagement with our political system by the planetary community and interested public.

A new area of concern is the sudden termination of most NASA education programs! This was a consequence of a massive reorganization of all government education programs, but there was no advance transition plan in place. Programs associated with NASA missions and research are being shut down by the new fiscal year. Sadly, these are some of the highest profile programs offered by the government, since students of all ages are engaged and inspired by our Solar System exploration program. It is a great context within which to present STEM subjects!

PSI scientists and education staff are privileged to have the opportunity to make new discoveries, advance our knowledge, and convey all this to students, teachers, and the public. It inspires our people to create real good that benefits everyone. We are ready to take on the new challenges of advocating for restoration of NASA planetary and education funds, while working to expand our funding base to keep the benefits of what we do flowing!

Mark V. Sykes
June 2013

Michael G. Gibbs Joins PSI

Michael G. Gibbs joined PSI in August 2012 as Deputy Director and Chief Advancement Officer. Born and raised in Michigan, he most recently lived in Baltimore, and when asked about his move to Arizona he replied, “I like it very much. I don’t have to shovel the sunshine!”

Michael Gibbs (far right), PSI's Deputy Director and Chief Advancement officer, is pictured at the Capitol College 2013 commencement where he serves as an associate professor. He is standing next to the State of Maryland Attorney General, Douglas F. Gansler, followed by Vic Maconachy, V.P. of Academic Affairs, and President Mike Wood (far left) both of Capitol College.

Michael has always been interested in politics and his work in advancement is intrinsically connected to the political world. He showed an early talent for fundraising when he raised $15,000 for a non-profit organization when he was just a teenager.

He was an adjunct faculty member at the Spertus College Center for Nonprofit Management and the DePaul University School of Education, both in Chicago, IL, and is the former Chief Advancement Officer for the Astronomical Society of the Pacific (ASP).

He is the lead editor and contributing author for the book "Science Educators Under the Stars: Amateur Astronomers Engaged in Education and Public Outreach," and co-editor for the ASP's conference proceedings from their 2007 and 2008 national conferences.

Michael coauthored several journal articles on topics such as professional development for in-service teachers and astronomy/space science education and public outreach. He earned his Ed.D. in 2002, as well as his M.S. in Management of Public Services in 1997 and a B.S. in political science in 1995. All three degrees are from DePaul University.

We are very pleased to welcome Michael into the PSI family!

PSI Scientist Joe Spitale: *Then and Now*

Joe Spitale joined PSI in July 2011 as a Senior Research Scientist. After a brief career in the late 1980s as an atheist lead guitarist for a well-known Christian rock band, he decided to pursue a more secure path that built on his early interest in astronomy and mathematics.

He attended Mount San Antonio College in Pomona, CA, for two years and then the California Institute of Technology (Caltech) in Pasadena, CA, receiving a B.S. in physics in 1995.

While at Caltech, he spent time working as an intern at the Jet Propulsion Laboratory studying spacecraft systems and observing Jupiter's atmosphere in the infrared. After graduation, he spent an additional year working at Caltech, performing image analysis for the Galileo mission.

He moved to Tucson in 1996 to enroll in the planetary science graduate program at the University of Arizona and received his Ph.D. in 2001, which focused on orbital dynamics of asteroids. From 2002 to 2011, he was an associate on the Cassini imaging team, studying mainly satellite and ring dynamics. Joe is currently funded to study Saturn's rings as well as the jets of material emanating from Saturn's satellite Enceladus.

In addition to his position at PSI, Joe is an adjunct lecturer at the University of Arizona, where he teaches a class on astrobiology. He also assists in the planning and execution of the planetary science graduate field class at the University.

Although we are *years* late in introducing Joe, we are no less delighted that he has joined PSI!

Joe Spitale in the 80’s...

Photo by Alan Fischer

And now, at PSI…

Ribbon-Cutting Dedication of New PSI Wing in Tucson *(Continued from front page)*

At the ribbon-cutting event, Mark Sykes (right) explains the proposed expansion plans of PSI Headquarters in Tucson to Jessica Floyd, of Arizona Rep. Barber's office, and Bob Stump, Chairman of the Arizona Corporation Commission. The new space would house an Atsa Suborbital Observatory training center for future operator-astronauts. *Photo by Alan Fischer*

WISER (Workshops in Science Education and Resources: Planetary Perspectives) — have been very popular with teachers from local school districts, said PSI Education Support Specialist Thea Cañizo.

"From their evaluations of our program we know that participants recognize the value of their interactions with PSI scientists and the in-depth information about Earth and space science that they receive," Thea said.

She added, "There are more teachers who want to participate in our workshops than we have space to accommodate. We have waiting lists of people who want to attend but aren't able to. With the new conference room we'll be able to greatly expand the program. More teachers translates to more students interested in science and STEM — science, technology, engineering, and mathematics — careers."

The ceremony, which was covered by the local media, attracted about 70 people and included the unveiling of plans for additional growth that will include new space for an Atsa Suborbital Observatory training facility for future operator-astronauts.

PSI's Atsa project will see observations taken by a human-tended instrument carried aboard a commercial XCOR Lynx spacecraft. That project will eventually be self-sustaining, as astronomers will be able to rent time for their observations.

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