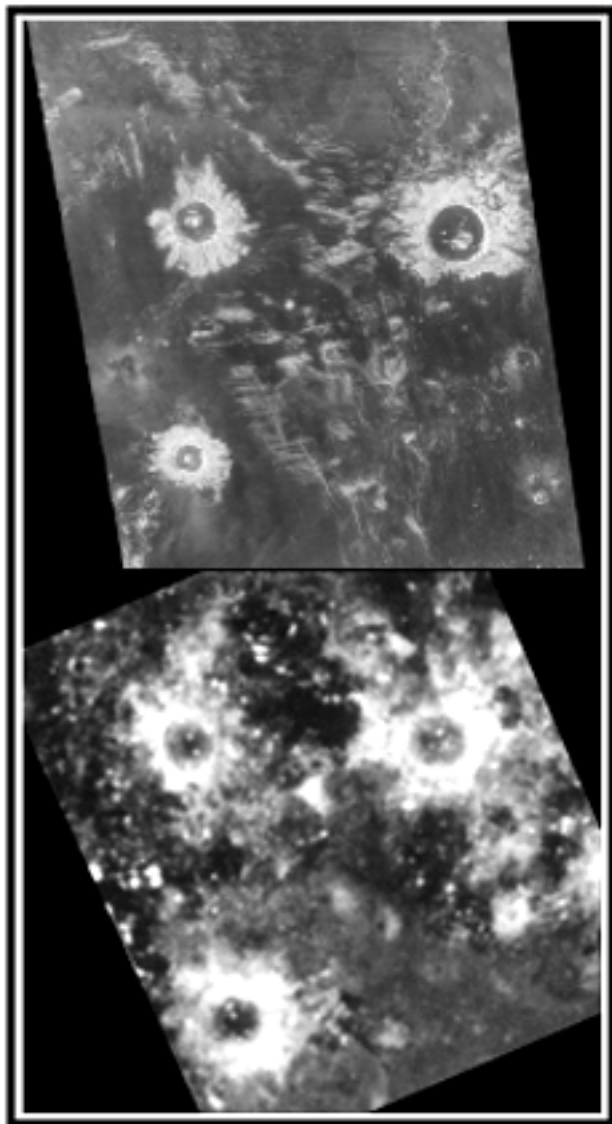

PSI NEWSLETTER

Winter 2003 Volume 4, No. 4



Craters Pit Venus vs. Moon

by Les Bleamaster



Large impact craters on Venus (upper) appear similar to the microscopic view of “zap pits” on an Apollo moon rock (lower).

The collisions of objects in space have major significance in our solar system. From the growth of planetesimals to the formation of the Moon, collisional events lie at the core of many fundamental theories about solar system evolution as well as potentially being both the seed and sap of life on Earth. The preservation of impact craters on the surfaces of many solar system bodies (including Earth) allows the study of their individual structure, size-frequency distributions, and the dynamics involved during their formation, all leading to a better understanding of the role of collisions through space and time.

At first glance, the two strikingly similar images to the left may appear to simply represent an increase in spatial resolution gained from Pioneer Venus to Magellan, they do not; nor do they show what fried eggs look like under a black light. These two images are of impact craters, however at greatly different scales and from vastly different bodies within the solar system.

Both images have long been public domain (NASA photojournal), however I have never seen such juxtaposition. The top image, from the Magellan radar data set of Venus, shows three large impact structures (Aglaonice-62.7 km, Danilova-47.6 km, and Saskia-37.3 km) with rough radar-bright ejecta and central peaks surrounded and embayed by smooth radar-dark lavas. The image below is a microscopic view of “zap pits” that pepper the surface of “Big Muley,” one of the largest samples to be returned from the surface of the Moon by the Apollo astronauts. The largest “zap pits” in this image measure ~1 mm in diameter. Virtually a microcosm of the first image, the bright areas are shocked rock filled with dark quenched glass.

Impact craters are observed on every rocky/icy body in the solar system and span nearly the entirety of time since its formation. As illustrated by these two images, impacts also operate at all spatial scales, from the imperceptible micrometeorite tap to the potentially catastrophic crash.

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PSI Welcomes New Associate Director,

Dr. Mark Sykes *by Donald R. Davis*

Dr. Mark Sykes joined PSI in October, 2003. Initially, he will be working half-time with a transition to full-time planned for 2004. Mark is a long time colleague; we first got to know him as a graduate student at the University of Arizona, specializing in infra-red observations of solar system dust. He was the first to recognize dust produced by asteroidal collisions in the data from the IRAS (Infrared Astronomical Satellites) in the mid-1980s. He has pursued a successful career in planetary science at Steward Observatory (University of Arizona); working amidst a tough gang of astrophysicists was the perfect training for coming to PSI.



Dr. Sykes has always been an activist in the community. He was instrumental in representing the broader interests of the planetary science community to both Congress and NASA during his tenure as Chair of the Division of Planetary Science of the American Astronomical Society in 2001. He continues to serve on NASA/NSF (National Science Foundation) advisory committees as well as maintaining an active program of research. Mark has many research interests which complement programs at PSI; for example, he heads the dust subnode of the Planetary Data System while PSI hosts the asteroid subnode.

In 2004, Mark will become Director of PSI under a transition plan approved by the Board of Trustees at the November, 2003 meeting. We look forward to having him lead the Institute into a new era of science stability and further growth.

Welcome, Mark!

Kepler Meeting is First in PSI's New Location

by Mark Everett

PSI hosted a meeting to plan a ground-based observing program for NASA's upcoming Kepler Mission on November 3 and 4, 2003. Mark Everett (PSI) and Steve Howell (formerly at PSI, now at NOAO in Tucson), along with Dave Latham (Harvard-Smithsonian Center for Astrophysics), Tim Brown (High Altitude Observatory), and Dave Monet (Naval Observatory) are on a team which plans to conduct a large stellar survey in order to locate the best target stars in advance of the 2007 launch of the Kepler Satellite. The Kepler Mission is designed to detect Earth-sized extra-solar planets transiting, or passing in front of, distant stars. Orbiting planets can temporarily dim stars as they block a minute fraction of the light.



Attending the premiere meeting in our new conference room are (from left), Mark Everett, Dave Latham, Tim Brown and Steve Howell.

PSI Mars Workshop

by David A. Crown

On November 10 and 11, 2003, PSI hosted a workshop that highlighted current research regarding the geology and surface characteristics of Mars. Specific areas of interest included the roles of ice and water in shaping the Martian surface under present and past conditions, the evolution of Martian canyon systems, and potential hydrothermal processes on Mars. The meeting was attended by 30 people, including Tucson-based and other PSI scientists and faculty, graduate students, and undergraduate students from the University of Arizona. The first day of the meeting, held at PSI's new facility in Tucson, consisted of scientific presentations and discussions of recent research and mission results. The second day of the meeting included a review and planning session for PSI's Mars program. This was an excellent opportunity for PSI's geographically scattered Mars scientists to update one another and plan future collaborative

work. The workshop was organized by David Crown, Bill Hartmann, and Les Bleamaster, with support from Frank Chuang, Elaine Owens, and Chris Holmberg. A special thanks to all of the out-of-town PSI scientists who traveled to Tucson to contribute to the success of the workshop.



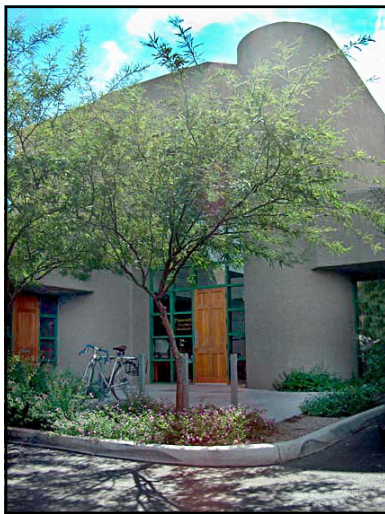
Cathy Weitz traveled from DC to discuss the Mars Exploration Rovers upcoming landings. (More Mars workshop photos on page 3.)

Our New Building!

by William K. Hartmann & Chris Holmberg

In September, 2003, we bit the bullet and made the Big Move from our old quarters on North 6th Avenue to our new building at 1700 E. Fort Lowell, in Tucson. Everyone liked the funky charm of our old location, a 1907 house refurbished for office space, but most of us really enjoy the spaciousness and modern style of our new location.

The move was prompted initially by the expansion of PSI in 2002, with the addition of researchers such as David Crown, Elisabetta Pierazzo and Elizabeth Turtle. In spring 2003, Les Bleamaster (post-doctoral researcher), and Frank Chuang, (research assistant) joined PSI. And this fall, we added Mark Sykes (Associate Director), Mary Bourke (researcher), Rose Early and David Tarico (research assistants).

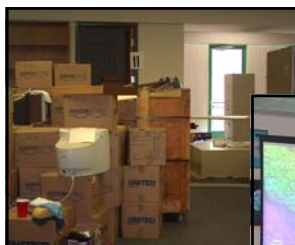


Entrance to our new building on Ft. Lowell Road in Tucson.

As shown by the accompanying photos (right), the move was a high-stress mess, with some damaged furniture and towers of cardboard packing boxes that took weeks to unpack. Frank Chuang, in particular, deserves credit for spearheading the move to unpack the library boxes and organize the new library and PSI lab space. This space includes a large open area that we have used to advantage for meetings. Elisabetta Pierazzo has organized and revitalized a highly successful PSI seminar series, following Wednesday's afternoon teas. This series has attracted guests such as Vic Baker, Jay Melosh, and Gareth Collins from the University of Arizona Lunar and Planetary Lab, and Anne Descour from the Spacewatch group.

The goal now is to buy the building as our long term "core headquarters" facility. We hope to move rapidly in this direction, which in turn may produce a funding drive to pay for the new quarters. If we can accomplish this, PSI for the first time will have a permanent, paid-for core headquarters that can serve as a stable base for future expansion, in which PSI can play a role as a long-term national facility in planetary science!

Before



After



David Crown presented his recent research results about Dao Vallis' evolution at the November 2003 Mars Workshop held in our new location. See article page 2.



Before



After

The conference area of our new office, during the move (top photo) and after unpacking (above).



Before



After

Frank Chuang surrenders to the chaos (upper), in the PSI lab/library area, during the move. The photo above shows the impressive result of four weeks of unpacking and organizing by Frank Chuang and Gil Esquerdo. Great work!



Our new conference area was also the venue for day two of the PSI Mars Workshop. See article page 2.

The Mars Olympics is Underway! Landings Imminent!

by William K. Hartmann

Three probes are on their way to Mars. Around Christmastime, the European probe Mars Express will attempt to put a lander package on the surface. In January, two Mars Exploration Rover missions from USA will also try to land.

As described by Cathy Weitz in our last issue, the two US rovers will be reminiscent of the plucky "Sojourner" rover that measured rock compositions during the U.S. Pathfinder mission of 1997, but bigger. They are designed to travel half a mile or more, and have much better cameras than earlier probes. The over-arching theme of all three rovers will be to look at sites where ancient waters may have ponded on Mars. One lands in the region of hematite deposits, described by Melissa Lane in our Winter 2002 issue. Another lands in Gusev crater, where an ancient riverbed seems to have emptied water. The European mission lands in the low plain of Isidis Planum, where water also may have ponded.

Will they find concentrations of salts or carbonates from evaporation of ancient Martian lakes? Will they locate new types of Martian rocks, different from the basaltic lavas and igneous rocks found so far by the Pathfinder and two earlier Viking landers among Martian meteorite rocks? Will their cameras reveal unexpected geologic formations? Stay tuned!

Season's Greetings from all of us at PSI!



The PSI Tucson staff wishes you a very Happy New Year! (From left): Frank Chuang, Jim Richard, Betty Pierazzo, Mark Everett, Carol Neese, Stu Weidenschilling, Mark Sykes, Don Davis, Elaine Owens, Rose Early, Chris Holmberg, David Crown, Gil Esquerdo, David Tarico, Kelly Yoder, Bill Hartmann, Dan Berman, Les Bleamaster, Mary Bourke and Steve Kortenkamp.

(Look for profiles of newcomers Mary Bourke, Rose Early, and David Tarico in upcoming issues.)



"Our" Mars Book Doing Well; Landings to Help

A TRAVELER'S GUIDE TO MARS, Bill Hartmann's non-fiction introduction to modern studies of Mars, is doing well, and PSI has a vested interest in it: 25% of the royalties will be donated to PSI to support our work and help the probable purchase of our new building in Tucson. A portion of the advance money was already used to help with image processing work at PSI, but we've been anxiously waiting to see if the first printing sold out, so that we could generate further royalties with a second printing.

The book was released in July. Reviews have been uniformly great, and the good news is that the entire first printing of 30,000 was shipped by Workman Publishing Company (New York) by September, thanks to the close approach of Mars and attendant media coverage. And Peter Workman did order a second printing of 11,000 copies. With the European Mars landing attempt in December, and two American attempts in January, we are hoping for more media coverage, more sales, and, eventually, more royalties.

"This book was an experiment to see if a book could help raise money for an institute," says Bill. "I think it's working. I've seen mention of the of the royalty donation in web chatter about the book, and with luck we may be able to raise another \$2000 or more as a direct contribution to the building purchase fund."

Hint to readers: **A TRAVELER'S GUIDE TO MARS** (\$18.95 with several hundred color and black & white photos), makes a great Christmas present and supports PSI! Contact PSI if you'd like to order a personalized copy for your gift recipients!

Director's Notes: The Perils of Exercising

Exercising an option, that is. Well, the move is done, the boxes cleared and we are settled into our new space. So, the next step in the game plan is to move forward on purchasing our building .

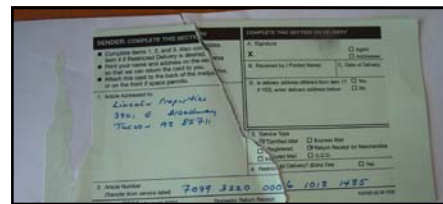
Recall that, as part of our lease, we included an option to purchase this office suite for \$659,000. This option expired on December 1, 2003, and I have spent more time that I ever wanted to exploring the intricacies and options for financing commercial real estate. Complicating the issue was our first appraisal valuing the property at \$520,000, substantially less than our potential purchase price. Gadzooks, did we significantly overpay for the building in our option? Further investigation, both by our broker and the bank, demonstrated that the appraiser did a lazy job of finding real comparable properties — hence the low appraisal. Convinced that we had a fair price and with mortgage money available, PSI exercised the option on Nov. 21, by sending a notice along with a \$5000 check.

Thinking all was in order, I relaxed— but too soon— as was revealed the following Tuesday when our landlord notified us that the letter and check had been neatly ripped in half by the US Postal Service (see photos). And, there was no signed return receipt from this certified letter. The postal carrier snarled "What do you want me to do about it?" when the recipient complained. Fortunately, all worked out in the end: with a bit of

Scotch tape, the check was repaired and the option exercise consummated. Stand by for an explanation from the Post Master in Tucson regarding quality standards (or lack hereof) for the USPS. Meanwhile, consider stock in FedEx, UPS or any other alternative for guaranteed delivery of critical documents— how can they lose with competition such as this?

Best Wishes For a Happy Holiday Season and all of 2004!

Don Davis
December 2003



Beware: Evidence of the postal service's mishandling of important, certified mail.

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PSI is also involved in many educational activities including school fieldtrip programs, popular articles and lectures, research internships for undergraduates, and training and mentoring young researchers at the graduate and postdoctoral levels.

Friends receive our newsletter detailing the activities of PSI's science and education programs. Additionally, the newsletter contains new scientific discoveries at PSI, as well as features on PSI scientists and their activities.

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- **Meteorite Member** (\$35): Receive the newsletter plus personal invitations to "members only" Institute events.
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choice of one of the following: A multicolor print of a W. K. Hartmann original painting, or a signed copy of *A Traveler's Guide to Mars*, Bill Hartmann's beautiful and fascinating overview of modern Mars research, illustrated by detailed photographs from the Mars Global Surveyor mission.

- **Planet Member** (\$750): All of the above plus an exclusive invitation to an annual private dinner and highlights of astronomy talk with Institute scientists.
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- Or you can become a **Supporting Member** (\$10,000 or more) or a **Sustaining Member** (\$20,000 or more) and receive all of the above as well as provide additional funds to be used by PSI scientists in research and educational activities.

If you would like to become a *Friend of PSI* through your tax-deductible contribution, please complete the form on the back page and send to our Tucson address.

Thank you!

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