

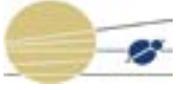
Major Support for LPL Field Trips from Laurel Wilkening

by Tim Swindle

Laurel Wilkening (right), Martha Leake (left), and PTYS graduate students on a field trip in the Pinacates in the 1970s.

Dr. Laurel Wilkening, a former LPL director, has made a bequest to LPL to fund the graduate student field trips for the long term. Laurel was one of the first faculty members hired when the Department of Planetary Sciences was formed in 1973. She was Department Head of Planetary Sciences and Director of LPL, from 1981 to 1983, then moved into the University of Arizona administration, eventually becoming the Vice President for Research. From UA, she moved to the University of Washington to become the Provost (chief academic officer), and later became Chancellor of the University of California at Irvine, before retiring to work with non-profit groups. While at UA, she was also instrumental in founding the Women's Studies program.

LPL has been having field trips to planetary analog sites since its inception. In the last three decades, Jay Melosh, Dave Kring, and Shane Byrne have all led many field trips, and several other members of the faculty have either led trips or assisted. The formal graduate student field trips have been ranked by alumni as one of the most important parts of their experience here, so as budget cuts came steadily in the last decade, LPL Director Mike Drake worked hard to find ways to continue to fund them. While we have established a less-than-ideal system that has provided some stability, Laurel's bequest means that the long-term future of the field trips is probably financially secure. In the (hopefully long) short term, we will continue to fund the field trips as we have for the last several years, and Laurel is helping us to have a trip further afield for next semester.



Welcome from the Director

Welcome to the latest edition of the LPL newsletter. More than usual, the last few months have been filled with transitions from a glorious past to a future we all hope will be at least as glorious.

For example, at a single celebration last May, we honored two key members of the OSIRIS-REx team who are retiring (including Peter Smith from LPL), celebrated a huge milestone for the mission (confirmation), and unveiled a portrait of the late Mike Drake, who led the proposals that resulted in the mission as well as directing LPL for 15 years. We also have welcomed two new faculty members, Walt Harris and Travis Barman, as well as this year's group of graduate students. These people are, obviously, the future of the laboratory.

But our future is intimately linked to our past. Former LPL director Laurel Wilkening has made a bequest that should fund the legendary LPL field trips for many future graduate students. And we haven't forgotten our past. The papers of LPL founder Gerard Kuiper, which are housed at Special Collections at the University of Arizona Library, have now been indexed, making them more available to interested historians. We are working with Special Collections on some other sets of papers from former LPL greats, and on finding ways to publicize and utilize the Kuiper collection. Of course, we have the usual run of amazing science results. The fact that the stunning science that our faculty, staff, and students perform can be considered "usual" is a testament to the amazing people that have built, and continue to build, LPL. Read and enjoy.

Timothy D. Swindle, Ph.D.
Department Head and Laboratory Director



Plumes of Saturn's Enceladus vary predictably, VIMS data show

The intensity of the jets of water ice and organic molecules that shoot out from Saturn's moon Enceladus depends on the moon's proximity to the planet, according to data obtained by NASA's Cassini spacecraft. The finding is the first clear observation that shows the Enceladus plume varies in a predictable manner. LPL's Robert Brown led the UA team that controls operation of the visual and infrared mapping spectrometer, or VIMS, instrument aboard the spacecraft Cassini. The team directed the observations taken by the VIMS instrument, collected the raw data and provided data to other scientists associated with the Cassini mission.

The finding adds to evidence that a liquid water reservoir or ocean lurks under the icy surface of the moon. Cassini, which has been in orbit around Saturn since 2004, discovered the geysers that form a bright plume emanating from Enceladus's south pole in 2005. The water ice and organic material, including hydrocarbons, nitrogen, and possibly phosphorous, spray out from several narrow fissures nicknamed "tiger stripes." Scientists had hypothesized for years that the intensity of the jets likely varied over time, but no one had been able to show that they changed in a recognizable pattern. The Cassini team was able to see the changes by examining infrared data of the plume as a whole, obtained by Cassini's VIMS instrument, and looking at data gathered over a long period of time.

The UA-operated VIMS instrument, which has analyzed a wide range of data including the hydrocarbon composition of the surface of another Saturnian moon, Titan, and the seismological signs of Saturn's vibrations in its rings, collected more than 200 images of the Enceladus plume from 2005 to 2012. The data provided by the UA scientists show that the plume was dimmest when the moon was at the closest point in its orbit to Saturn. It lit up relatively gradually to about three to four times in brightness when Enceladus was at the most distant point. This is comparable to moving from a dim hallway to a brightly lit office. The Cassini team put this data with previous models that suggested that the tiger stripes change shape based on the different ways Saturn's gravity puts stress on them, to deduce that it must be squeezing and relaxation of the moon that prevents or allows the spray to escape.



Cassini-Huygens is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology, Pasadena, manages the mission for NASA's Science Mission Directorate.



Department

LPL is excited to welcome two new faculty members starting Fall 2013—Drs. Travis Barman and Walt Harris both joined the LPL faculty as associate professors. Travis and Walt bring diverse and unique strengths to LPL and we look forward to many productive collaborations.



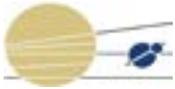
Travis Barman moved to Tucson from Flagstaff, where he worked as an astronomer at Lowell Observatory for seven years. Prior to Lowell, he was a post-doctoral fellow at the University of California, Los Angeles, and at Wichita State University. Travis received his Ph.D. at the University of Georgia. Travis' research primarily involves numerical modeling of exoplanet atmospheres. These models guide a number of observational programs to study various classes of exoplanets, from super-Earths to massive young planets. By comparing theoretical model spectra to real photometric and spectroscopic observations, a variety of planet properties can be deduced. Atmospheric structure (horizontal and vertical run of temperature and pressure), surface gravities, chemical composition, and global wind patterns are a few examples of the kinds of planet properties we seek through model observation comparisons. Travis is also heavily involved in a ground-based survey to directly image young exoplanets

using the Gemini Planet Imager (GPI). GPI is an extreme adaptive optics instrument being commissioned on Gemini-South this fall and, over the next several years, will be used to discover many young planetary systems. These discoveries will reveal new insights into planet evolution.



Walt Harris is an experimental planetary scientist with an interest in comets and the intersection between the space environment and the atmospheres of the planets and their satellites. He comes to LPL after serving for the past 6 years on the faculty of the University of California, Davis. Walt began his career at the Space Physics Research Lab at the University of Michigan where he earned his Ph.D. constructing and flying sounding rocket borne ultraviolet spectrometer to study the Jovian aurora. After graduating, he moved to the University of Wisconsin Space Astronomy Lab to work with the ultraviolet polarization group on a series of sounding rocket experiments, including two flights as principle investigator. While at Wisconsin, his research focus shifted toward ground and space based observations of comet atmospheres, and he began a collaboration with the space physics interferometry group centered on the development of all-reflective spatial heterodyne spectrometers. These areas now reflect the

core of his research. Walt's interest in comets is centered on the photochemical evolution of volatiles liberated from the nucleus with an emphasis on identifying compositional variations with time and active region. He uses a combination of existing custom-built instruments for these studies. He also has active programs to develop heterodyne spectrometers, which are compact remote sensors capable of delivering wide field high resolution spectroscopy of extended objects, for use at ground based telescopes and a variety space platforms. His current projects in this area include a prototype broadband instrument under construction at the Lick Observatory and an ultraviolet sounding rocket experiment to study the interplanetary medium.



Department



Dolores Hill Honored at White House

This June, **Dolores Hill**, co-lead of the *OSIRIS-REx Target Asteroids!* program, was honored as a White House Champion of Change for her “dedication to increasing public engagement in science and science literacy.” Through her work at LPL, Dolores, a senior research specialist, has been sharing her love of science (and especially meteorites) for 32 years.

Take a moment to read more about Dolores and her outstanding work promoting citizen science:

- Target Asteroids! Citizen Science: Tracking Near-Earth Asteroids for Science and Humanity.
- UA Meteorite Scientist Honored as White House Champion of Change.



Sprague Retirement

Senior Research Associate **Ann L. Sprague** retired on August 31, 2013, after a long career at LPL, where she began her work in 1984 as a Graduate Research Assistant. Ann is an LPL alumna, having earned her Ph.D. from LPL in 1990. Her dissertation topic was, “An Observational Comparison of Mercury and the Moon.” In 1990, she received the department’s Gerard P. Kuiper Memorial Award. A major focus of Ann’s research was theoretical and observational studies concerning Mercury, the Moon, Mars, Jupiter and Comet SL-9. She also worked in the areas of visible and mid-infrared spectroscopy, thermal modeling of rough planetary surfaces, and modeling aspects of planetary atmospheres. In 2003, Ann and Robert Strom published *Exploring Mercury: The Iron Planet*.

The LPL community extends best wishes for many happy adventures!

Recent Passings

With regret, we forward the news that two long-time LPL staffers recently passed away.

- **Sam Clapp** died on August 26, 2013. Sam was a project manager who worked on numerous spaceflight missions at LPL.
- **Ron James** was an instrument maker/designer for LPL and Steward. He also passed away in August 2013.

LPL extends sincere condolences to the family and friends of Sam and Ron.



Department

LPL Fieldtrip Fall 2013: Northern New Mexico and the KT Boundary Layer by Shane Byrne

This trip took us farther afield than any in recent memory, as we ventured into New Mexico and Colorado and logged about 1500 miles over five days. We had three great sites to visit and couldn't decide between them and so in the end decided to do everything.

First up was the Zuni-Bandera volcanic field in the El Malpais National Monument (this was pre-shutdown fortunately). We were lucky that our newest LPL faculty member, Christopher Hamilton, who has studied these lava flows, was able to join us. Out on the flows we were able to see the results of inflation, a process where molten lava is emplaced underneath a solid covering rather than flowing on the surface. Lava flows of this kind are likely to be the most common on the terrestrial planets. A nearby lava tube also sported an interior with perennial ice—lava tube caves are known on the Moon and Mars and may have icy interiors as well.

Our second main trip area was Valles Caldera near Santa Fe. This is the site of a large supervolcano that had its last major eruption about 1.2 million years ago. During that big eruption, the volcano produced prodigious quantities of volcanic ash that both drifted gently to the surface and later surged down the mountainside in pyroclastic flows. These thick ash deposits were welded together to form rocks called tuff, which we saw in Bandelier National Monument. This same volcanic activity caused the most recent caldera at this site to collapse leading to the 10-mile wide cavity within the Jemez mountains. Soon after this collapse, a resurgent dome began forming in the caldera and many smaller eruptions around its edge occurred over the next half million years decreasing in size as the volcanic activity petered out. We stopped at the last (and smallest) of these domes (Cerro La Jara) to take a look. We didn't expect to coincide with a drive of hundreds of cattle through the area, but they didn't seem to mind us.

After Valles Caldera we spent a rather cold night in an outlier of the Carson National Forest, but with views of the Rio Grande Gorge within walking distance made it worthwhile (even though we were shaking frost out of our camping gear the next morning). We had a very scenic drive through the southernmost portion of the Rocky Mountains toward southern Colorado for the last major stop of the trip.

Heat from the reentry of the KT impact ejecta cooked many of the dinosaurs on the spot! Those that survived died off slowly in a darkened chilled world made desolate by post-impact wildfires and acidified rain. Supervolcanoes and large asteroid strikes both cause a lot of environmental damage. Indeed the demise of the dinosaurs has been argued by some to be related to large-scale volcanism that was in progress at about the same time as the Chicxulub impact. Luckily the Earth and the life upon it are resilient, which is why we're here and driving around looking at the ghosts of these events 65 million years later! Sixty five million years from now there will be something alive doing the same for us.

Soda Dam



Photo: Ali Bramson

Jemez Mountains

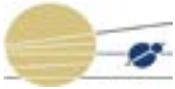


Photo: Catherine Elder

El Malpais Nat'l Monument



Photo: Ali Bramson



Outreach

Summer Science Saturday

The theme of this year's Summer Science Saturday was Jupiter and Beyond the Infinite! The day-long event, held on July 20, featured great kids activities like making paper rockets and planispheres, building volcanoes (like those on Io), and learning about physics, spectroscopy, robots, rockets, and so much more.

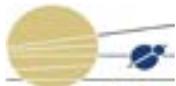
The OSIRIS-Rex Ambassadors helped to cool off the crowd with asteroid ice cream, handmade by each guest.

There were afternoon lectures by Professor Alfred McEwen ("Exploring the Solar System"), Research Associate Dr. Michael Sussman ("Uranus: The Planet that Woke Up"), and graduate student Rob Zellem ("Exoplanets: Exploration, Discovery, and Understanding").

The event also marked the first-ever LPL Spaceship Landing Contest (a.k.a. Egg Drop)—participants built egg spaceships and dropped them from increasing heights to determine whose spaceship was most sound. The winner of the contest was Yuhan Fu, an 8th grader at Esperero Canyon Middle School. PTYS graduate students Sky Beard, James Keane, Kelly Miller, and Ethan Schaefer did a magnificent job of planning and proctoring the Spaceship event.

Thanks to these volunteers and many others (graduate students and community members), Summer Science Saturday was a success, with approximately 750 Tucsonans in attendance.





Outreach

Kuiper Papers Indexed Online

The papers of LPL's founder, **Dr. Gerard P. Kuiper**, have been indexed online by the University of Arizona Special Collections Library.

The index is available at:

<http://speccoll.library.arizona.edu/collections/gerard-p-kuiper-papers>

This finding aid is an excellent resource for scientists and historians and provides fascinating insight into the life and career of one of the pioneers of planetary science.



Starlight Science Cinema

This summer, LPL graduate students, led by Rob Zelle, worked with the UA College of Science to develop and organize the Starlight Science Cinema concept. Starlight Science Cinema features free science-themed movies screened outdoors on the UA campus, hosted by UA scientists who talk about their research, conduct a Q & A about the movie's premise, and, when appropriate, debunk the films' scientific themes.

LPL grads took the lead for the first two outdoor movies, "October Sky" (hosted by Professor Peter Smith) and "Armageddon" (hosted by Professor Dante Lauretta). October's film feature, "The Day After Tomorrow," was hosted by the Department of Geosciences, with UA climatologist Julia Cole discussing the film. "A Beautiful Mind," hosted by the UA Math Department and featuring panelists Joanna Masel (Associate Professor, Ecology and Evolutionary Biology) and Lotfi Hermi (Assistant Professor, Mathematics), was featured on Saturday, November 2.

Kudos to all the students who worked to make these events a success!

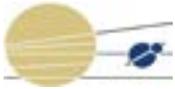
Teaching Teams Program Coordinator

Steve Kortenkamp has become the new Coordinator of the Teaching Teams Program (TTP). TTP, which is best-known for its support for preceptors in undergraduate classes, was originally developed by Professor Hal Larson. In recent years, Natalia deRoock has served as the coordinator, but Natalia is moving on to join her husband Roberto (who has also worked for TTP), who accepted a position at Arizona State University.

Steve has taught General Education courses in LPL for several years, and was the 2011 winner of the College of Science award for Innovation in Teaching. He has been working as Senior Scientist at the Planetary Science Institute, doing research on orbital dynamics and developing K-12 outreach programs. In addition, Steve is the author of more than a dozen children's books about space and space science.

We welcome Steve to his expanded role at LPL!





Graduate

New Graduate Students, Fall 2013



Patrick Harner; M.A. in Earth and Environmental Sciences, Wesleyan; B.A. in History, College of William and Mary; interests in remote sensing and geochemistry.



Molly Simon; B.S. in Geophysical Science, University of Chicago; interests in planet formation, extrasolar planets.



Tad Komacek; B.S. in Geophysical Sciences, B.A. in Physics (Astrophysics), University of Chicago; interests in planetary formation and evolution, extrasolar dynamics.



Xianyu Tan; M.Phil of Planetary Science, University of Hong Kong; B.S. in Geophysics, University of Science and Technology of China; interests in planetary dynamics, exoplanets, Kuiper Belt.



Margaret Landis; B.S. in Physics and Astronomy, Northern Arizona University; interests in impact cratering, disks, solar system formation.



Hannah Tanquary; B.S. in Physics (Astronomy) and Computational Physics, Eastern Illinois University; interests in exoplanets, minor planets, asteroids.



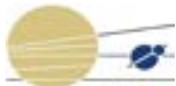
Sarah Peacock; B.A. in Astronomy-Physics, University of Virginia; interests in exoplanet atmospheres and astrobiology.



Tom Schad, Ph.D.

On July 24, Tom Schad successfully defended his Ph.D. dissertation titled, "Spectropolarimetry of Fine Magnetized Structures in the Upper Solar Atmosphere."

He has moved on to a position as Instrument Scientist at the Institute for Astronomy, University of Hawaii (Maui). Tom's dissertation advisor was Professor Joe Giacalone. Aloha, Tom!



Graduate

2013 NESSF Awards

Kudos to LPL graduate students with new or continuing NESSF (NASA Earth and Space Science Fellowship) Awards:

New for 2013:

- **Patricio Becerra**, “Wavelet Analysis of Martian Polar Stratigraphy from HiRISE Topography” (advisor: Shane Byrne)
- **James Keane**, “Stability of Asteroidal Regolith During Planetary Close Approaches” (advisor: Isamu Matsuyama)
- **Sarah Morrison**, “Multiple Planet-Debris Disk Interactions: Probing Planetary System Evolution” (advisor: Renu Malhotra)

Renewed for 2013:

- **Juan Lora**, “Modeling Titan’s Atmospheric Dynamics and their Interaction with Methane” (advisor: Joellen Russell)
- **Jamie Molaro**, “Thermal Stress Weathering in the Inner Solar System” (advisor: Shane Byrne)
- **Christa Van Laerhoven**, “Secular Dynamics of Multi-Planet Systems: Implications for the History, Physical Characteristics, and Habitability of Planets” (advisor: Rick Greenberg)

2013 Carson Fellowship to Tad Komacek

First-year graduate student **Tad Komacek** was named the recipient of the 2013 Carson Fellowship Award, which provides one academic year of support, including salary, tuition, and a small supply/travel stipend. Tad is currently working on modeling the effects of ohmic dissipation in hot Jupiter atmospheres, being advised by Dr. Tamara Rogers and collaborating with Dr. Adam Showman.

2013 NSF GRPF Award

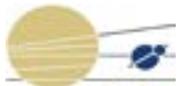
Congratulations to second-year LPL graduate student **Ali Bramson**, recipient of a NSF Graduate Research Program Fellowship GRPF). This prestigious fellowship provides funding and tuition deferment for 3 years. Ali’s academic advisor is Professor Shane Byrne. Three other LPL students have continued GRPF funding:

- **Melissa Dykhuis** (advisor: Rick Greenberg)
- **Davin Fleteau** (advisor: Daniel Apai)
- **Ethan Schaefer** (advisor: Alfred McEwen)

2013 GTA Award

Tony Nottke is the recipient of the Outstanding Graduate Teaching Assistant Award for Spring 2013. Tony earned the award for his work as a GTA for Professor Hal Larson’s PTYS 170A1 course. He is a doctoral candidate in the Department of Chemistry, with a minor in Planetary Sciences. His advisor is Professor Timothy Swindle. Tony previously received the GTA award for his work with Professor Larson’s Spring 2005 NATS 101 class.

Tony’s work in supporting the grading activities for Professor Larson’s mini-projects was noted as especially worthy of recognition. Recipients of the Outstanding GTA Award receive funds of up to \$1,000 to support travel to a professional meeting of their choice.



Outreach

International Observe the Moon Night

October 12 was a busy night on the UA campus—in addition to Starlight Science Cinema, LPL students, faculty, and staff participated in events for International Observe the Moon Night, organized at the UA by Sanlyn Buxner (PSI Education and Research Specialist) and the Planetary Science Institute. Several hundred visitors got a good look at Luna using telescopes set up on the UA mall and operated by LPL, Tucson Amateur Astronomy Association, and Students for the Exploration and Development of Space. Flandrau Planetarium made available its 16-inch Cassegrain telescope and Professor Emeritus Robert Strom presented a talk on “Early Lunar Exploration and the Apollo Program.” Dr. Steven Kortenkamp (PSI and LPL) discussed “A Brief History of Our Fascination with the Moon.”

To read more about the event, visit the following URLs:

- <http://www.psi.edu/news/observemoon2.html>
- <http://uanews.org/story/all-eyes-trained-on-the-moon>

LPL Orbits Ray Bradbury's Mars

Orbiting Ray Bradbury's Mars: Biographical, Anthropological, Literary, Scientific and Other Perspectives

Edited by Gloria McMillan, McFarland Publishers, 2013.

by Gloria McMillan

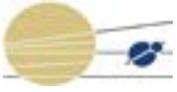
It was my great honor to work with such a diverse group of writers on this groundbreaking collection. For the first time, a team of writers—several based at the Lunar and Planetary Lab and at the Kuiper Circle—has taken on a major American science fiction writer, from a full range of intellectual perspectives. Of course, our essayists include literary scholars, those who take an anthropological perspective, as well as film critics. One essayist is a Native American cultural studies professor who grew up reading *The Martian Chronicles* on and off the reservation, engaging with its allegory of settlers and native Martians. Two film critics tackle the media's adaptations of Bradbury's Martian texts. But beyond these comparatively expected voices on the legendary science fiction writer Ray Bradbury, we also have essays by space scientists and one aerospace engineer.

The names most familiar to those at the Lunar and Planetary Lab will be **Peter Smith** (Foreword) and the Planetary Science Institute's Bill Hartmann, who did cover art. We also have an essay from Kitt Peak's **Chuck Dugan** (NOAO Project Astro coordinator) who is in The Kuiper Circle. Two NASA scientists, **Chris McKay** and **Carol Stoker**, who worked on the Phoenix Mars Lander project with Peter Smith, wrote about “naming of names” on Mars, both their activities and Bradbury's fictional “take” on giving Martian features new names. David Acklam, an aerospace engineer who is the Chair of the LPL Education and Public Outreach Kuiper Circle sub-committee, wrote an essay based upon the realities of a human “invasion” of Mars, how Ray Bradbury predicted many of the challenges.

We hope you will find this as exciting as we did in writing this book. We will have a book launch event at LPL as part of the Tucson Festival of Books next March. But meanwhile...I have two links for those of you wishing to buy our collection:

- **Amazon.com:** <http://www.amazon.com/Orbiting-Ray-Bradburys-Mars-Anthropological/dp/0786475765>
- **McFarland Publishers:** <http://www.mcfarlandpub.com/book-2.php?id=978-0-7864-7576-6>

Gloria McMillan, Ph.D., is a UA Associate (Research) and a member of the LPL Education and Public Outreach Kuiper Circle sub-committee.



Invest in LPL

Cavanagh Travel Gift

Travel, whether to conferences or to work in other laboratories, can be crucially important for students' career development, but is not always easy to fund. For the last several years, the Shandel Fund has provided some support for student travel, but the number of applications has, not surprisingly, exceeded the capacity of the single fund. This year, in addition to the Shandel Fund, **Dan Cavanagh**, the director of LPL's External Board of Advisors, helped to fund trips for three LPL students:

- **Kelly Miller** attended the Goldschmidt Conference (the annual meeting of the Geochemical Society) in Florence, Italy, and presented a paper there.
- **Michelle Thompson** traveled to Houston to work in the laboratories of NASA Johnson Space Center.
- **Cassandra Lejoly**, an undergraduate student minoring in Planetary Sciences, traveled to Denver to present her work at the meeting of the Division of Planetary Sciences of the American Astronomical Society.

Thanks to Dan for his support for these students (and thanks to all the students who keep dreaming dreams that make such support necessary).

Flag Presentations

Although Tucson area residents are aware of the things that people at LPL have done, they seldom identify them with LPL, but are more likely to think they've been done by "NASA" or "Kitt Peak." In an attempt to raise awareness of LPL itself among community leaders, **Dan Cavanagh**, the Chair of the LPL External Advisory Board, arranged with the staff of U.S. Representative Ron Barber to have a set of American flags flown over the U.S. Capitol on the 6th anniversary of the Phoenix Mars Lander launch (August 4). Dan then had these flags framed, and one each was presented at meetings of Visit Tucson (or Metropolitan Tucson Convention and Visitors Bureau), the Tucson Metropolitan Chamber of Commerce, and the Southern Arizona Leadership Council.



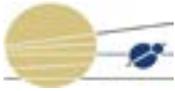
In the photo, LPL Director **Tim Swindle** presents a flag to Mike Hammond, Chair of the Board of the Southern Arizona Leadership Council and President of Cushman and Wakefield/Picor.



Shandel Award

LPL graduate student **Catherine Elder** received the 2013 Shandel summer travel award. The Shandel award funding helped support Catherine's travel to ETH Zurich, where she spent two weeks working with Professor Paul Tackley to model mantle convec-

tion in Io's mantle. Professor Adam Showman is Catherine's advisor. The Shandel Education Plus Fund in Planetary Sciences and LPL was established by a generous donor and friend of LPL for the purpose of supporting travel expenses outside the state of Arizona during summer break. The award is open to students in the Department of Planetary Sciences and Lunar and Planetary Laboratory who propose to fund study, museum visits, special exhibits, seminars, instruction, competitions, research and other endeavors that are beyond those provided by the normal campus environment and are not part of the student's regular curriculum during the recipient's school year.



LPL in the News

Links to the news stories below are available at: <http://www.lpl.arizona.edu/news/2013/fall>

VIMS data show water ice dug up by monster storm on Saturn---Cassini sees Saturn storm's explosive power.

Renu Malhotra's work featured in National Geographic article---Our Solar System: In the new story of the solar system, the future is a bit dicey, and it all began in chaos.

Dolores Hill honored as White House Champion of Change---Target Asteroids! program to engage the public in the UA-led OSIRIS-REx asteroid sample return mission.

"Europa Report" (LPL experts comment on the movie)---A mission to Europa, even a fictional one, is good news for planetary scientists.

LPL outreach activities among College of Science public offerings---UA presents a free science education, not to mention pizza, beer and movies.

Catalina Sky Survey discovery buzzes the Earth---Asteroid will zoom close past Earth, but it isn't a threat.

HiRISE looks up for view of potential "comet of the century" ISON at Mars---Earthlings may be treated to a dazzling celestial display this fall.

HiRISE social media feeds go Latin---Pictures of the surface of Mars, taken from NASA's (MRO), to be captioned in Latin on social media outlets.

Could OSIRIS-REx resource studies lead to the next gold rush? Asteroids could potentially hold millions of dollars of metals and NASA wants to figure out how to mine these celestial bodies. The new mission will be exploratory and could help NASA find new techniques that would make mining an asteroid a reality.

Plumes of Saturn's Enceladus vary predictably, VIMS data show---A study published in Nature describes the forces that control the jets of water and organic material that erupt from the icy surface of Enceladus.

Dolores Hill and Target Asteroids! program engage amateur astronomers.

Eric Christensen talks about Russian meteor strike, asteroids science and OSIRIS-REx.

Storms on Uranus, Neptune, confined to upper atmosphere, Hubbard and Showman show---Research shows massive jet streams and weather phenomena associated with them appear to be ripples on the surface rather than extending deep into the planets' interior.

HiRISE reveals hundreds of new Mars impacts each year---Taking before and after pictures of Martian terrain, HiRISE researchers have identified almost 250 fresh impact craters on the red planet.

HiRISE Mars photos capture unexpected views of red planet