Universe
Jet Propulsion Laboratory

Inside

June 3, 2005
Volume 35 Number 11

Griffin makes first JPL visit as NASA boss

By Mark Whalen

Dutch Slager / JPL Photolab

"I personally am going to be surprised if we don't find life on Mars."

"We live in the most fascinating time we can live in. So what are we going to do? Everything we have the money for."

Twenty-six years after he left JPL as a young engineer to begin a multitude of upward career moves, Mike Griffin returned to the Lab last week to discuss arguably his biggest and most important career challenge, that of NASA's new administrator.

Rather than deliver prepared remarks, Griffin led a candid question-and-answer session that covered a wide range of topics relevant to both JPL and the entire agency.

First, though, he professed happiness in returning to "a place I know well, admire greatly and just adore." Griffin worked at the Lab from 1977 to 1979, in the former Guidance and Control (343) and Automated Systems (347) sections.

"There's no higher level of technical talent in the world than you can find here at JPL. It's a place I'm always happy to come back to."

Griffin discussed NASA's top priorities. His goal is to close the gap between the retirement of the space shuttle in 2010 and the debut of its replacement Crew Exploration Vehicle, slated for 2014. There are a variety of methods for narrowing that gap, he said, including "more focused program management, or taking money from somewhere else. To a certain extent, technology money being planned as part of the exploration initiative will be deferred or will be realigned to go into the CEV.

"The question that I continually get is, 'Are you going to raid science or aeronautics [to pay] for manned spaceflight?' The answer is no."

This is a key issue for JPL in that the Laboratory is slated to manage the Space Interferometry Mission, proposed for a 2011 launch. Griffin said the mission will be deferred "for a little bit."

"Right now a whole bunch of things we're in the middle of executing are using all the money," he said. "I'm not taking money from SIM to feed exploration; I'm taking money from starting SIM so I can finish other science programs that are on the table.

"But it's very important," he added. "There is little we're doing in NASA that is more exciting than putting in place the capability to detect the existence and nature of planets in other solar systems. It might be a couple thousand years before the human race has the capability to go to one of those places. But to know they're out there, to possibly detect the signatures of life on such planets, would be an achievement almost beyond imagining."

Overall, how does the administrator see NASA's future?

"Over the next couple of generations, we're going to go where the technology can take us—the moon, Mars, near-Earth asteroids," Griffin offered.

In answer to an inquiry about NASA's intentions for new human explorations on the moon, he turned the question to the audience.

"It will be in part up to those of you who are scientists. How can I enlist and enroll science as well as engineering? The model I have for our activities on the moon is similar to our Antarctic outposts. Given that we're there, what kinds of things make sense to you to do, now that we've expanded this range of human habitability?"

Griffin's vision for the moon includes geology, fundamental planetary physics and studies of the satellite's origin. He said NASA should survey the moon for onsite resources, which will be "crucial to establishing a true space economy and a space infrastructure, transitioning from fundamental science to engineering science."

"And then when we get to Mars, we're going to expand our range even more and do even neater things. I personally am going to be surprised if we don't find life on Mars. Does it have DNA structure like life on Earth? Do life on Earth and Mars have a common origin or not? Either answer is fascinating.

"We live in the most fascinating time we can live in. So what are we going to do? Everything we have the money for."

While pursuing the human spaceflight agenda, Griffin expressed support for Earth science, calling it "one of the core pieces of our science portfolio."

"Following the president's announcement that we're redirecting NASA, that was taken by some to mean that we would be moving out of Earth science entirely," he said. "I believe that was not the administration's intention. We have obligations to the Earth science community, and to ourselves, to execute a balanced program of Earth science. You'll see some of that rebalancing over the rest of '05 and will see it as we move forward in '06."

Griffin urged the Earth science community to take note of the experience of the astronomy community and others to better set their priorities, to speak as a single voice. "My challenge to Earth science is to be a community, work within the academy structure, get a decadal survey done, hand me a set of priorities and I will work them all, consistent with the budget."

The administrator professed a pragmatic approach to the way NASA is operated.

"Like every one of you here, I am in public service because I deeply care about what we do. But we take in tax dollars from the working public and try to turn it into good products for them. Federal dollars should be spent to acquire knowledge, technology and processes that we do everything in our power to hand out to the rest of the public."

Griffin said he doesn't expect a significant change in the agency's workforce, and doesn't see adding or closing a NASA center. "The question is: How do I manage the organization I have today in order to produce

Continued on page 4

Dutch Slager / JPL Photolab

Mars Exploration Rover Project Manager Jim Erickson shows a rover model to Griffin, right, and NASA associate administrator for strategic communications Joe Davis, center. JPL Director Dr. Charles Elachi looks on.

News Briefs


Dr. Rosaly Lopes


Dr. Kasthuri Venkateswaran

Lopes earns communication honor

In recognition of her significant efforts over the past 20 years in public outreach and education—particularly among Hispanic groups and young women—JPL volcanologist DR. ROSALY LOPES has been named the 2005 recipient of the Carl Sagan Medal. This prize is awarded by the American Astronomical Society's Division for Planetary Sciences.

The organization said Lopes' work includes "innumerable public talks, media interviews, articles in magazines and newspapers, a book on planetary volcanism and major efforts to nurture and mentor young scientists." The Sagan Medal recognizes and honors outstanding communication by an active planetary scientist to the general public.

Lopes is an investigation scientist for the Titan radar mapper on the Cassini-Huygens mission to Saturn. Early in her career she served as curator of modern astronomy and deputy head of astronomy at the Old Royal Observatory in Greenwich, England, where she was heavily engaged in interactions with the public and media. Since joining the Galileo Near Infrared Mapping Spectrometer team in 1991, she took a leading role in communicating Galileo's results to the public and to teachers. Lopes is particularly active with Hispanic groups and has been an inspiration for many young people in her native Brazil.

She has written a popular book about volcanoes on Earth, and has edited an undergraduate book on planetary volcanism, in which all of the contributors are female scientists.

One NASA 'Center Best' bestowed

For his collaboration efforts across the agency, DR. KASTHURI VENKATESWARAN of JPL's Biotechnology and Planetary Protection Group has received a One NASA Center Best award. An expert in microbial analysis, Venkateswaran was among the first winners of the award, bestowed at all centers and at Headquarters.

Venkateswaran is acknowledged as an agency expert on questions related to microbial diversity and microbial monitoring of spacecraft and associated environments. He is regularly consulted by both senior management and scientists across NASA, industry and academia. Venkateswaran possesses broad cross-disciplinary knowledge and he seeks out unique collaborations to further advance multiple fields. Recently, he teamed with the Japan Marine Science and Technology Institute to participate in the first manned exploration of an Indian Ocean deep sea hydrothermal vent system to a depth of 2,500 meters.

The Center Best awards recognize individuals and teams who demonstrate One NASA behaviors of decision-making for the common good, collaborating to leverage existing capabilities and standardizing to achieve efficiencies agency-wide. Information about the 11 Center Best recipients and their outstanding achievements is available on the One NASA Web site at *http://www.onenasa.nasa.gov/TRIBUTES/Award_winners.htm.*

The agency-wide One NASA Team reviewed the 11 candidates and selected MELVIN FEREBEE of Langley Research Center as the agency "Best of the Best" award recipient. Ferebee was recognized for his role in creating the Systems Analysis Consortium. Ferebee's award features a map of the United States highlighting all the NASA centers, signed by all 10 center directors and the NASA Deputy Administrator.

Galileo data offer icy surprise

Scientists studying data from JPL's Galileo spacecraft have found that Jupiter's moon Amalthea is a pile of icy rubble less dense than water. Scientists expected moons closer to the planet to be rocky and not icy. The finding shakes up long-held theories of how moons form around giant planets.

"I was expecting a body made up mostly of rock. An icy component in a body orbiting so close to Jupiter was a surprise," said JPL astronomer DR.. JOHN D. ANDERSON, lead author of a paper on the findings that appears in the current issue of Science.

"This gives us important information on how Jupiter formed, and by implication, how the solar system formed," Anderson said.

"Amalthea is throwing us a curve ball," said DR. TORRENCE JOHNSON, co-author and project scientist for the Galileo mission. "Its density is well below that of water ice, and even with substantial porosity, Amalthea probably contains a lot of water ice, as well as rock." Analysis of density, volume, shape and internal gravitational stresses lead the scientists to conclude that Amalthea is not only porous with internal empty spaces but also contains substantial water ice.

CEC hosts June 18 events at campus

A dinner celebrating the Child Educational Center's 25th birthday and honoring DR. BRUCE MURRAY, Ret. Lt. Gen. CHARLES TERHUNE, and ERIC and ELYSSA NELSON will be held Saturday, June 18 at the Steele House on the Caltech campus, from 5:30 to 7:30 p.m. The special event celebrates and benefits the non-profit organization's 25 years of providing high-quality child care and educational outreach services to the Caltech, JPL and general communities.

Also that same evening is the Child Educational Center's 16th annual wine-tasting benefit, "A Taste of the Vineyard," from 6:30 to 10:30 p.m. at Caltech's Avery House. Guests will enjoy an evening under the stars sampling a variety of fine wines (including ZD Wines, Domain Drouhin, Bella Vineyards, Spelletich Winery and Zacamesa), sampling food from some of the area's finest restaurants (scheduled to participate: Restaurant Devon, Barbara's At the Brewery, Citrus Bistro, Restaurant Halie and Japon Bistro) and listening to live jazz from the Chad Edwards Quartet.

Additionally, the event will feature both silent and live auctions, where guests will be able to bid on a variety of unique items.

Tickets for 25th birthday dinner are $125 and include appetizers, full sit-down dinner and admission to the wine-tasting benefit. Tickets for wine tasting alone are $60 in advance or $70 at the door, and include a certificate for a complimentary dinner at Restaurant Halie in Pasadena and a Riedel burgundy wine glass.

Tickets for both events are available at the JPL Store, Caltech Book Store or the Child Educational Center. For more information, call ext. 4-3418.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meets Wednesdays at 11:30 a.m.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (the Wellness Place).

Codependents Anonymous—Meets at noon every Wednesday.

Lambda (Gay, Lesbian, Bisexual and Transgender Networking Group)—Meets the first Friday and third Thursday of the month at noon in Building 111-117. For more information, call Randy Herrera, ext. 3-0664.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in Building 167-111 (the Wellness Place).

For more information on any of the support groups, call the Employee Assistance Program at ext. 4-3680.

Monday, June 6

Earth and Space Science Colloquium—Alan Title, co-director of the Stanford Lockheed Institute for Space Research, will present "Understanding the Sun" at 11:30 a.m. in von Kármán Auditorium.

Tuesday, June 7

JPL Gamers Club—Meeting at noon in Building 301-227.

JPL Genealogy Club—Meeting at noon in Building 301-271.

Wednesday, June 8

JPL Amateur Radio Club—Meeting at noon in Building 238-543.

JPL Toastmasters Club—Meeting at 5 p.m. in conference room 167. Call Dirk Runge, ext. 3-0465, or visit *www.jplcaltechtoastmasters.com.*

Friday, June 10

Test Instrument Faire—Sponsored by the JPL Instrument Services Loan Pool, from 9 a.m. to 4 p.m in von Kármán Auditorium. Most major test equipment manufacturers and/or their distributors have been invited to participate. This is a great opportunity to see and operate their latest instruments as well as discuss your test instrumentation requirements with their applications engineers.

Monday, June 13

JPL Web Developers—Meeting at noon in 180-101. For more information, e-mail *webdev-chairs@jpl.nasa.gov.*

Mon.–Thurs., June 13–16

American Heritage Week—The Lab's annual spring celebration. For information, visit *http://izzy.heritage.htm.*

Tuesday, June 14

JPL Stamp Club—Meeting at noon in Building 183-328.

Wednesday, June 15

JPL Library Orientation—Stop by Building 111-104 at 11:30 a.m. for an overview of the Library's products and services, and learn how to access numerous electronic resources from your desktop. For more information, call the reference desk, ext. 4-4200.

Thursday, June 16

Clogging Class—Meets at noon in Building 300-217. For more information, call Shary DeVore at ext. 4-1024.

JPL Stories—Join Dr. Rosaly Lopes for "Volcano Adventures on the Earth and Planets" at 4 p.m. in the Library, Building 111-104. If you have questions about the story series or wish to participate, call Teresa Bailey, ext. 4-9233.

Thursday–Friday, June 16–17

Von Kármán Lecture Series—JPL research scientist Dr. Pamela Conrad will present "A Bipolar Year: What We Can Learn About Looking for Life on Other Planets By Working in Cold Deserts" at 7 p.m. Thursday in von Kármán Auditorium and Friday in Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. Thursday's lecture will be webcast at *www.jpl.nasa.gov/events/lectures/jun05.cfm.* For more information, call Public Services at ext. 4-0112.

Spitzer captures stars in formation

The saga of how a few monstrous stars spawned a diverse community of additional stars is told in a new image from the JPL-managed Spitzer Space Telescope.

The striking picture reveals an eclectic mix of embryonic stars living in the tattered neighborhood of one of the most famous massive stars in our Milky Way galaxy, Eta Carinae. Astronomers say that radiation and winds from Eta Carinae and its massive siblings ripped apart the surrounding cloud of gas and dust, shocking the new stars into being.

"We knew that stars were forming in this region before, but Spitzer has shown us that the whole environment is swarming with embryonic stars of an unprecedented multitude of different masses and ages," said Dr. Robert Gehrz, University of Minnesota, Twin Cities, a member of the team that made the Spitzer observations.

Previous visible-light images of this region, the Carina Nebula, show cloudy finger-like pillars of dust, all pointing toward Eta Carinae at the center. Spitzer's infrared eyes cut through much of this dust to expose incubating stars embedded inside the pillars, as well as new star-studded pillars never before seen.

Eta Carinae, located 10,000 light-years from Earth, was once the second brightest star in the sky. It is so massive, more than 100 times the mass of our Sun, it can barely hold itself together. Over the years, it has brightened and faded as material has shot away from its surface. Some astronomers think Eta Carinae might die in a supernova blast within our lifetime.

Passings


Dr. Mike Klein

DR. MICHAEL KLEIN, 65, manager of the Interplanetary Network Directorate's Deep Space Network Advanced Tracking and Observational Techniques Office, died May 14.

Klein had worked at JPL since 1969. He became supervisor of the Radio Astronomy Group in the Planetary Atmospheres Section in 1974. From 1981 to 1993 he was the JPL Program Manager for NASA's Search for Extraterrestrial Intelligence (SETI), which was a joint research effort conducted by NASA's Ames Research Center and JPL.

As part of his responsibilities for DSN science, Klein led JPL's participation in the Goldstone–Apple Valley Radio Telescope science education project, a partnership involving JPL, NASA and the Lewis Center for Educational Research in Apple Valley. He also served as science advisor for the curriculum development part of the project led by educators at the Lewis Center.

Klein published regularly in scientific journals and authored or co-authored more than 60 technical papers.

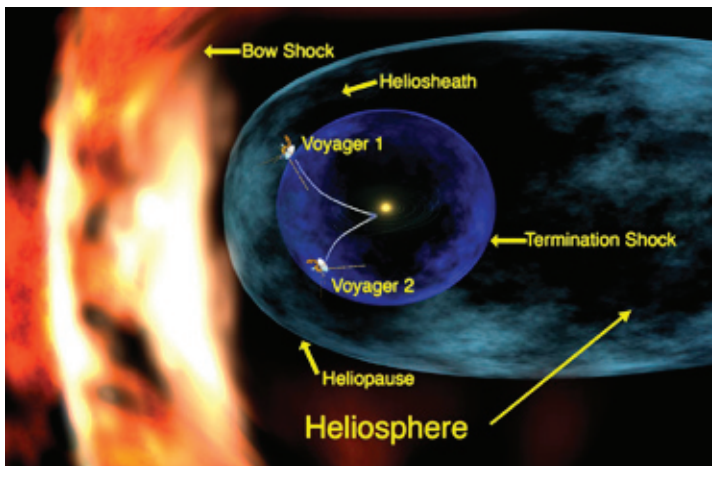
He is survived by his wife, Barbara; sons Michael and Tim; daughter Kristin; and six grandchildren. Services were held in Klein's home state of Iowa.

KENNETH JOHNSON, 87, a retired member of the technical staff in Section 356, died May 16.

Johnson worked at JPL from 1962 to 1980. He is survived by his wife, Vivian.

Voyager 1 at the solar system's final frontier

By Jane Platt



Dr. Ed Stone

JPL'S VOYAGER 1 SPACECRAFT HAS ENTERED THE SOLAR SYSTEM'S FINAL FRONTIER. It is entering a vast, turbulent expanse, where the sun's influence ends and the solar wind crashes into the thin gas between stars.

"Voyager 1 has entered the final lap on its race to the edge of interstellar space," said Dr. Edward Stone, the Voyager project scientist and a former JPL director. The Laboratory built and operates Voyager 1 and its twin, Voyager 2.

In November 2003, the Voyager team announced it was seeing events unlike any in the mission's then 26-year history. The team believed the unusual events indicated Voyager 1 was approaching a strange region of space, likely the beginning of this new frontier called the termination shock region. There was considerable controversy over whether Voyager 1 had indeed encountered the termination shock or was just getting close.

The termination shock is where the solar wind, a thin stream of electrically charged gas blowing continuously outward from the sun, is slowed by pressure from gas between the stars. At the termination shock, the solar wind slows abruptly from a speed that ranges from 700,000 to 1.5 million mph and becomes denser and hotter. The consensus of the team is Voyager 1, at approximately 8.7 billion miles from the sun, has at last entered the heliosheath, the region beyond the termination shock.

Predicting the location of the termination shock was hard, because the precise conditions in interstellar space are unknown. Also, changes in the speed and pressure of the solar wind cause the termination shock to expand, contract and ripple.

The most persuasive evidence that Voyager 1 crossed the termination shock is its measurement of a sudden increase in the strength of the magnetic field carried by the solar wind, combined with an inferred decrease in its speed. This happens whenever the solar wind slows down.

In December 2004, the Voyager 1 dual magnetometers observed the magnetic field strength suddenly increasing by a factor of approximately 2 1/2, as expected when the solar wind slows down. The magnetic field has remained at these high levels since December. NASA's Goddard Space Flight Center built the magnetometers.

Voyager 1 also observed an increase in the number of high-speed electrically charged electrons and ions and a burst of plasma wave noise before the shock. This would be expected if Voyager 1 passed the termination shock. The shock naturally accelerates electrically charged particles that bounce back and forth between the fast and slow winds on opposite sides of the shock, and these particles can generate plasma waves.

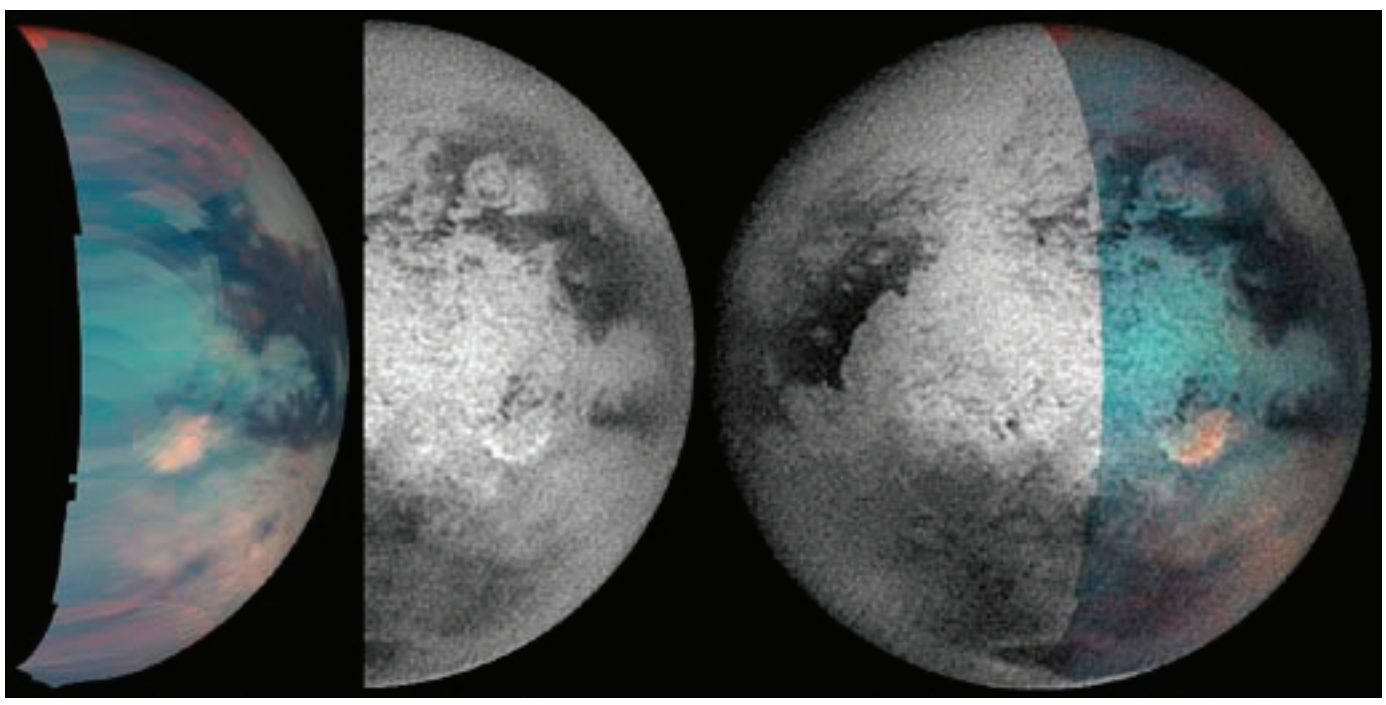
"Voyager's observations over the past few years show the termination shock is far more complicated than anyone thought," said Dr. Eric Christian, discipline scientist for the Sun–Solar System Connection research program at NASA Headquarters.

The result was presented May 24 at a press conference during the 2005 joint assembly meeting of Earth and space science organizations.

For more information about Voyager, visit *http://voyager.jpl.nasa.gov*.

Odd spot on Titan baffles scientists

By Carolina Martinez



The recently discovered infrared-bright spot on Titan (see http://www.nasa.gov/mission_pages/cassini/multimedia/pia07877.html) is the type of enigmatic feature that is best investigated by putting together as many different types of complementary information as possible. Cassini's varied array of scientific instruments is equal to the task. This montage shows the spot in infrared wavelengths from the visual and infrared mapping spectrometer on the left, from the imaging science subsystem in the center, and a combination of both data sets on the right. When put together, the two different views show more than either does separately.

Saturn's moon Titan shows an unusual bright spot that has scientists mystified. The spot, approximately the size and shape of West Virginia, is just southeast of the bright region called Xanadu and is visible to multiple instruments on the Cassini spacecraft.

The 483-kilometer-wide (300-mile) region may be a "hot" spot—an area possibly warmed by a recent asteroid impact or by a mixture of water ice and ammonia from a warm interior, oozing out of an ice volcano onto colder surrounding terrain. Other possibilities for the unusual bright spot include landscape features holding clouds in place or unusual materials on the surface.

"At first glance, I thought the feature looked strange, almost out of place," said Dr. Robert H. Brown, team leader of the Cassini visual and infrared mapping spectrometer and professor at the Lunar and Planetary Laboratory, University of Arizona. "After thinking a bit, I speculated that it was a hot spot. In retrospect, that might not be the best hypothesis. But the spot is no less intriguing."

The Cassini spacecraft flew by Titan on March 31 and April 16. Its visual and infrared mapping spectrometer, using the longest, reddest wavelengths that the spectrometer sees, observed the spot, the brightest area ever observed on Titan.

Cassini's imaging cameras saw a bright, 550-kilometer-wide (345-mile) semicircle at visible wavelengths at this same location on Cassini's December 2004 and February 2005 Titan flybys. "It seems clear that both instruments are detecting the same basic feature on or controlled by Titan's surface," said Dr. Alfred McEwen, Cassini imaging team scientist, also of the University of Arizona. "This bright patch may be due to an impact event, landslide, cryovolcanism or atmospheric processes. Its distinct color and brightness suggest that it may have formed relatively recently."

Other bright spots have been seen on Titan, but all have been transient features that move or disappear within hours, and have different spectral (color) properties than this feature. This spot is persistent in both its color and location. "It's possible that the visual and infrared spectrometer is seeing a cloud that is topographically controlled by something on the surface, and that this weird, semi-circular feature is causing this cloud," said Dr. Elizabeth Turtle, Cassini imaging team associate, also from the Lunar and Planetary Laboratory.

"If the spot is a cloud, then its longevity and stability imply that it is controlled by the surface," said Jason Barnes, a postdoctoral researcher working with the visual and infrared mapping spectrometer team at the University of Arizona. "Such a cloud might result from airflow across low mountains or outgassing caused by geologic activity."

The spot could be reflected light from a patch of terrain made up of some exotic surface material. "Titan's surface seems to be mostly dirty ice. The bright spot might be a region with different surface composition, or maybe a thin surface deposit of non-icy material," Barnes added.

Scientists have also considered that the spot might be mountains. If so, they'd have to be much higher than the 100-meter-high (300-foot) hills Cassini's radar altimeter has seen so far. Scientists doubt that Titan's crust could support such high mountains.

The visual and infrared mapping spectrometer team will be able to test the hot spot hypothesis on the July 2, 2006, Titan flyby, when they take nighttime images of the same area. If the spot glows at night, researchers will know it's hot.

For more information about the Cassini-Huygens mission, visit *saturn.jpl.nasa.gov* and *www.nasa.gov/cassini.* For additional images, visit the visual and infrared mapping spectrometer page at *wwwvims.lpl.arizona.edu* and the Cassini imaging team home page at *http://ciclops.org.*

Griffin

Continued from page 1

the best possible set of results that I can get for the money we're given? That's what I think about."

Griffin said he will direct missions to centers if he thinks the center is in danger of losing core capability and critical workforce. "It is my obligation to see that the capability we have today doesn't go away. And if I see federal centers or federally funded research and development centers in danger of losing core capability to build a spacecraft, I will assign them a mission and then I'll probably beat them fairly hard to get back some of the excellence they've lost.

"I don't want JPL doing a routine space mission; I want to buy a routine space mission from a contractor," he added. "On the flip side, I don't want a contractor doing something new and innovative that they probably don't know how to do. I don't want contractors losing money; that's not healthy for the space business.

"Government, including the federally funded research and development centers, exists to expand the range of what human beings know how to do."

Griffin believes Congress is going to fund activities the American people like and perceive as being well executed; they will not fund activities that they perceive as boring or pointless and poorly executed.

"The president has proposed the most exciting vision for the manned spaceflight program that could be proposed," he said. "If we execute it well, I believe appropriate levels of funding will follow.

"People want the space program to take them places where they haven't been and show them things they haven't seen."

Indeed, as one of NASA's charges is to inspire the next generation of explorers, Griffin recalled his youth in offering words of advice to planetary science summer-school students in the audience.

"I wanted to do nothing but work in the space business since I was 5 years old, so I understand how you feel and might want to be involved," he said. He urged them to pick the part of the space business they like and indulge their passion. "This is not the kind of activity you go into if you hope to make a lot of money. But if you want to do the neatest things that human beings are capable of doing, this is the business and this (JPL) is one of the places."

Letters

My family and I would like to thank all friends and colleagues at JPL and ITT DSN Industries for your condolences over the passing of my father. Your kind words of comfort and support are deeply appreciated. Thank you for all the cards, letters and the lovely plants.

Connie Dang and family

I would like to thank all my co-workers, friends, Division 32, my group and the various sections I support for the memorable and beautiful plant, wonderful cards with words of comfort and sympathy during the loss of my stepmother, who, at age 91 with a very strong heart fought a long battle with Alzheimer's. Our family will miss her love and inspiration.

Sherry Owen

My sincere thanks to close friends, all personnel in Division 26 and especially in Section 269 for your kind words of encouragement in regards to the passing of my father. The anthurium plant sent by JPL to my home was humbly received by my family and I. May love, grace and peace be with each one of you.

Herman Wagner Jr. and family

Classifieds

For Sale

APPLIANCES: washer/dryer, approx. 30 yrs. old, works nicely, large capacity, lovely green color, great bargain at $30 each/obo; dehumidifier, 4 yrs. old., works great, no longer need, $40/obo. 626/254-1523.

BABY ITEMS: white wood spindle crib/ mattress, perfect for a second baby, or to keep at grandma's, $15; highchair, fully adjustable, tray very easy to remove/replace, great for your home or grandma's, $10; red swing for tree or play structure, w/safety bar, attaches w/two ropes, $5. 626/254-1523.

BEDROOM SET, 1886 antique, 4-post double bed, large dresser and dressing table, both with detachable mirrors; bedside table and small rocking chair, make offer. 353-0272.

DISNEY VIDEOS: VHS, various titles, $3-$8 each. 249-3677, evenings.

FURNITURE: sofa bed, red pattern, $200; 4' dia. maple table & 4 chairs, $175: oak lawyers bookcase, $100; 14 cu. ft. chest freezer, $75; recliner chair, red pattern, $75; Nantucket rocker & sewing table, $175; misc. table & floor lamps, $25-$50 each. 818/636-5311 cell, 626/351-8129 evenings.

GARDEN FOUNTAIN, 3-tier rock with 2 ft., 3 ft., and 4 ft. bowls, $300. 243-8255.

GAZEBO, redwood, 18' x 14', w/bar and 4 stools, you disassemble and haul, must sell, $200/obo. 626/918-0822, 9 a.m.-4 p.m.

GPS NAV. UNIT, Garmin StreetPilot, black, rectangular, 4" by 7", sets on base or portable, 2 3/8" by 3.5" screen, batteries or auto power, unit includes a/c pwr. cable, 12 V pwr. cable, antenna w/6 ft. cable, PC serial port cable w/GPS input plug, one 64 MB data card, US and WorldMap software, excellent cond., 4 yrs. new, $400. 626/963-5727.

JEWELRY, ladies new Coach Metropolitan brown leather strap watch, $50; 14 K tricolor gold diamond cut bracelet, $140; 14 K two-sided 18" diamond cut necklace, $180. 653-9037.

LANGUAGE CD'S: Italian I, II, and III, Pimsleur Method, each course has 16 one-hour CDs w/two lessons each, $120 per course or $330 for all three. 395-6804, message or jkusmiss@netscape.net.

MISC: logging chain, $5; come-along chain (compresses fences, metal, etc), $10; wig, red, shoulder length, never used, $20; portable basketball set, adjustable (needs net), $200; fishing pole (saltwater), $25; baseball glove (small, left handed) & conditioner, good cond., $15; landscape oil painting, autumn tones, $100; antique cedar chest (lid needs repair), $75; trash can w/wheels, $5; '50s Motorola tv "shell," $20. 626/357-8210.

MISC: Danish modern dining room table w/6 chairs, 3 leaf inserts and china hutch (cherry wood), $500; Amana refrigerator, $100. 626/359-7666.

MUSIC PLAYER, Apple® iPod™ digital audio with 20 GB hard drive, stores up to 5,000 songs, pocket-size design measures just under 0.6" thick and weighs only 5.6 ounces, supports MP3, MP3 VBR, AAC, Audible, AIFF, Apple Lossless and WAV, comes with ear bud headphones, AC adapter, FireWire cable and USB 2.0 cable, brand new, $250. 790-3899.

NECKLACE, ladies Paloma Picasso daisy pendant, platinum, round brilliant diamonds from Tiffany's, .15 carat total, G color, VS clarity, on a 16" chain, paid $1,395, sell for $800. 653-9037.

ORGAN, Yamaha 415 electronic console w/13 pedals, 3 keyboards, 144 rhythm patterns, pd. $7,500, sacrifice for $2,000; PORT REPLICATOR for IBM Thinkpad, works with T20, T21, A20, A21, or X, R series, like new, $85; ULTRA ATA CONTROLLER CARD with cable, fits into 32-bit PCI 2.1 or 2.2 expansion slot on motherboard, brand new, $20. 790-3899.

RINGS: diamond anniversary, 1 carat, w/gift box, $750; diamond ring, 10 carat YG, w/gift box, $99. 364-1283.

ROCKING ARMCHAIRS (2), late 1960s vintage, wood is walnut finish, barrel shape w/curved spindle backs, orange crushed velvet seat/back cushions, pair $175. 249-3677, evenings.

SCANNER, brand new HP ScanJet 2400 in unopened box, 1,200 x 1,200 dpi, 48-bit color, USB interface, Win 98, 2000, ME, XP Pro, XP HE support, $29.99. 626/241-7084, Steve.

SPEAKERS: brand new Cyber Acoustics CA3090 3-piece subwoofer system for PCs, PDAs, DVDs, CDs, iPod, MP3, Playstation, Gamecube, Xbox, 26 watts, $19.99. 626/241-7084, Steve.

TROLL DOLLS, approx. 5,000, $1–$10 for very large ones. 248-5282, Sid Gordon.

TROPICAL PLANTS: plumerias, variety of colors/sizes; shell gingers. 626/444-6156, Annie & Bob DePonte.

WIG, auburn/brunette, short, never worn, human hair, $80. 364-1283.

Vehicles/ Accessories

'95 FORD Mustang GT, V8, 120K mi., clean, runs great, silver exterior, blk. interior, 5-speed manual, Mach 460 premium sound system, power seat, 4-wheel ABS, dual front airbags, 10 CD changer, a/c, rear spoiler and alloy wheels, $4,900/obo. 323/223-1057.

'99 GMC Jimmy 4 dr., V6, auto, air, power seats, 88K mi., gray w/gray leather, $7,400/ obo. 427-4138 or 991-7245.

'01 HONDA Civic EX coupe, manual 5-speed, a/c, wood grain trim, CD/am/fm, new tires, sun/moon roof, rear spoiler, alarm remote entry system, child safety seat anchors, green exterior/beige interior, good condition, 70K miles, $12,300/obo. 562/673-4851 or mctepos@hotmail.com.

'96 HONDA Accord LX 4 dr. sedan, 4 cyl., auto, champagne, a/c, ps., pw., pd., tilt wheel, am/fm/cass., original owner, clean int., 88K mi., $5,900/obo. 249-0012 or felsark-request @yahoo.com.

'90 HONDA Civic hatchback, 4-speed manual, 155,290K mi., base model, no a/c, good mechanical condition, slight body damage, $1,000/obo. cko@caltech.edu.

'94 LEXUS SC-400 sport coupe, black, tan interior, 79K mi., 2 owners, me for 8 yrs., superb cond., $11,500. 790-6185, tscheck@ mac.com, Tim Scheck.

'97 MITSUBISHI Eclipse, 2 dr., blk/tan, 5 spd., sporty & gas saver, vg cond., stereo am/ fm, CD, a/c, sunroof, one owner, no accidents, 99K mi., $5,500/obo. 626/961-8771, David.

'99 SAFARI TREK, the luxury of a high line 36' coach in 26', main cabin has a queen bed that lowers electrically from the ceiling, large rear bath w/loads of storage, completely self-contained w/many upgrades, one owner, only 13 K mi., $46,500. 790-0781 or 909/337-8588.

'99 TOYOTA Sienna XLE, loaded, 89K mi., original owner non-smoker, sable pearl (light beige/gold) w/leather interior oak (beige) color, alloy wheels, dual a/c, power everything (driver's seat, moonroof, windows/locks, sliding door, rear windows), keyless entry, high-end stereo w/CD, cruise control, a few minor dings but good condition, $14,900/obo. 730-9777.

SCOOTER, 3-wheel heavy duty senior citizen Amigo Baja w/batteries, charger, and basket, mint cond., $1,200/obo. 248-3912.

Free

CAT, pure white w/one green and one blue eye, 10 mo. old, spayed, vaccine, has record of services and result of blood exam, "half-feral," born in my yard, has been living with me for a couple months, still afraid of people but is not aggressive, she is looking for cat lover and loving home. piedra34@yahoo.com.

CATS, 2 American shorthair females, indoor only, sisters, both 3 years old, one is tortoiseshell, the other has lighter toned tortoise type markings, both very friendly/ personable, need good home, we are expecting our first child and want to move into an apt. w/more room for the baby. 951/966-6551.

DOG, male, 10 months, black terrier mix (maybe lab), neutered with all shots, some obedience training, good natured and smart, son allergic. 909/596-8068, Elaine or Santos.

FIREWOOD, oak, roughly 1/2 a cord, small to very large pieces. 626/485-3607, Jim.

Wanted

BABY STROLLER, double or tandem in good condition. 626/577-6773.

CAR, under $5,000, preferably a sedan or wagon w/manual transmission, less than 115K mi., needs to be new enough to have airbags. 626/796-6276, santi.udomkesmalee @gmail.com.

HOUSE TO RENT, married vegetarian couple, baby, and schnauzer puppy, 1 bd. OK for now, 2 bd. preferred, excellent tenants, very clean, wife is professional housekeeper who's managed property, struggling w/current housing market and need more room for newborn, close to JPL a plus, move date flexible. 951/966-6551.

HOUSE TO RENT, Spitzer/Caltech employee seeking 3 bd., 2 ba., in a good public school district, up to $2,500/mo., June/July occupancy. 213/952-1002, ardila@pha.jhu.edu, David Ardila.

ROOM TO RENT: visiting professor at Caltech interested in room from July 22–Aug. 10, walking distance to Caltech preferable. 626/437-5750.

SINGER, 20–26 years of age, influences: Sevendust, 311, Deftones. 626/357-8210.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present, for personal use. 790-8523, Marc Rayman.

VOLLEYBALL PLAYERS, coed, no beginners please, every Tuesday 8:00-10:00 p.m. at Eagle Rock High School, $4/night. 956-1744, Barbara.

For Rent

AGUA DULCE, 3 bd., 3 ba., large pool, spa, w/lots of stone work; freshly painted, hardwood floors, custom kitchen w/granite countertop, located on 8 acres w/oak trees and plenty of room for horses; pool service, gardener and water included; one-year lease, $2,500. 818/636-5311 cell, 626/351-8129 evenings.

ALTADENA, beautiful guest house, 2 story, 2 bd., 2 ba., large cedar closets, new carpet/ paint; 1,400 sq. ft., full kitchen, a/c, washer/ dryer, 1-car garage to share w/roommate, non-smoker, no pets, close to bus, quiet neighborh'd, $850 + sec. dep. 949/689-8103.

ALTADENA, furnished room, bedroom/bathrm. in nice, quiet neighborhood, use of kitchen, washer/dryer, $630, utilities included. 626/791-1899.

ARCADIA apt., 1 bd., 1 ba., living room, dining room, kitchen, a/c, heater, washer/dryer inside unit, $1,069. 626/576-7333.

ARCADIA apt., 1 bd., 1 ba., garage, washer/ dryer, a/c, stove, clean, spacious, walking distance to shops, exc. neighborhood, close to JPL, no pets, water/gardener/trash included, $969 +util./security dep. 626/576-7333 or cpl@caltech.edu.

ARCADIA, quiet studio, hardwood floors, close to mall, entertainment and restaurants, $650 + deposit. 714/296-0176.

ARCADIA, large studio, detached, separate entry, furnished, kitchen, laundry facilities, no pets, non-smokers, shared utilities, $850. 626/574-0226.

COVINA, side room (with separate entrance, kitchenette, microwave only), and bathroom, for one person only, quite small, utilities included, for quiet person, no pets/guests, close to Azusa Pacific University, beautiful and safe part of town (close to Citrus/Cyprus). 626/483-5538, Ana.

LA CANADA, Cape Cod–style family home; spacious 2,200 sq. ft., includes formal dining, family room, oversized living room, master suite, office, large laundry, workshop, 2-car garage, covered brick patio, pool; excellent floor plan w/main rooms all viewing pool and garden; French doors/windows, hardwood floors, plantation shutters throughout; on cul-de-sac, walk to La Cañada Elementary and Descanso; $3,775 includes gardener + pool service. 790-7088.

LANCASTER, brand new house, 5 bd., 3 ba., liv. rm., dining rm., lots of closet space, back yard, garage, spacious kitchen, close to College, first and last + security, family or share with roommates, lease with option to buy, $2,400. 626/926-1570, Shauntel.

MONTROSE, very private tiny guest house, full bath and 12' x 17' main room w/galley kitchen at one end, located in sunny spot, surrounded by mature trees at rear of deep lot, quiet residential area near Foothill and Ocean View, trash/gardener paid, street parking, $650. 248-7499, Jane.

MONTROSE duplex, 1 bd., 1 ba., den, yard, new carpet & paint, close to JPL, shopping and bus, no pets. $875. 248-9561.

MONTROSE house, 2 bd., 1 ba., den, hdw. floors, central heat, a/c, stove fireplace, gardener/water/trash pd., no pets, $1,445. 248-9561.

N.E. PASADENA, cute sabbatical house, desirable area, 2 bd., 1 ba., fully furnished, Jacuzzi, utilities included, $1,000/weekly, $2,800/mo. 626/422-8119.

PASADENA, 4 bd., 3 ba., house in Madison Heights area (91106), hardwood floors, central heat & air, fridge, stove, dishwasher, washer/ dryer, LR, FDR, breakfast area, garage, enclosed backyard, no smoking,
2 km from Caltech/OldTown, 10 km from JPL, gardener included, tenants to pay other utilities/services, $2,500 + security. 249-2043.

PASADENA, gorgeous, clean 2 bd., 2 ba., condo close to colleges/Old Town, brand new, looks/feels immaculate, very clean, feels like home, large outside patio for lounging, very roomy, amenities, assigned parking, a/c, w/d hookups, ceiling fan, dishwasher, microwave, balcony, deck, 12-month lease, deposit, $1,800, pet policy. 310/872-4693.

PASADENA house, close to JPL, 2 bd., 1 ba., den, family rm., living rm., dining rm., laundry, lg. kitchen, 1,900 sq. ft., beautiful, $2,300. 626/794-1598.

PASADENA, 1 of 3 bedrooms in charming house w/ JPL employees (late 20s), excellent neighborhood, near Orange Grove and Hill, easy 15-min. drive to JPL, gated parking, in-ground pool, patio, deck, built in BBQ, gardens, fireplace, HW floors, etc. $550, utilities included. 626/590-8844.

TUJUNGA house, 8 miles & 12 min. from JPL, beautiful in very quiet woodsy area, 1,600 sq. ft., 2 bd., 3 ba., + office/bonus room, attached 2-car garage & workshop, hardwood floors, central heat/air, refridge, dishwasher, stove, washer/dryer, move-in condition, serene environment, $2,200 + deposits. 352-7892.

Vacation Rentals

BALBOA ISLAND, cute, 2 bd., 1 ba., fully furnished upstairs apartment w/covered deck, just steps from bay on Little Island & short walk to main street, includes laundry/parking, sleeps 5, available weekly for summer, $1,200–$1,500. 626/351-9641 or bettyrs@earthlink.net.

BIG BEAR lakefront, luxury townhome, 2 decks, tennis, indoor pool/spa, beautiful master bd., suite, slps. 6. 949/786-6548

FLORIDA condo, beautifully furnished 2 bd., 2 ba., 2nd floor, on the surf of New Smyrna Beach, half-hour to Cape Canaveral, 90 min. to Disney World, quiet and relaxing, enjoy all the comforts of home, overlooking the Atlantic, BBQ, pool, game room, easy walk to stores/ restaurants. 760/ 439-7821, Darlene, dfhauge@yahoo.com.

FIVE-STAR RESORTS, local and worldwide, including Marriott & Hyatt, luxurious residential-style studios w/furn. kitchenette, starting at $60/night; 1 bd. w/full furn. kitchen & living rm., starting at $96/nt. 626/794-9579 or fivestarresorts@earthlink.net.

HAWAII, 1 week, Kauai, (Kapaa) 1 bd., sleeps 4, $90/night; 1 wk., worldwide choices, 1 bd., $100/night, expires 10/17/05. 364-1283.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn. phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps 4, laundry fac., low season $115/nite/2, high season $130/nite/2, $15/nite/ add'l person. 949/348-8047, jackandrandy@cox.net.

JACKSON HOLE, WYOMING condo bordering Grand Teton and Yellowstone National Parks, 2 bd. with loft, sleeps 6-8, cable, full kitchen, microwave, incredible Teton views. conniematt@sbcglobal.net.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, slps. 6-8, fully equip'd kitchen incl. micro-wave, D/W, cable TV, VCR, phone, balcony w/mtn. vw., jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL disc'nt. 626/798-9222 or 626/794-0455 or valeriee@caltech.edu.

OCEANSIDE beachfront, lovely 2 bd., 2 ba., single-level deluxe w/fireplace and ocean views, end unit, luxurious gated complex on sand w/game rooms, fitness room, pools, BBQs, Jacuzzi; 10-min. walk to pier or harbor, sleeps 6, JPL discount, www. beachvisitors. com, 760/433-4459, owner.

OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier or harbor, pool, spa, game rm., sleeps 4. 949/786-6548.

PLAYA DEL REY beachfront cottage, 2 bd., 2 ba., lower duplex, fully furnished, includes sheets and towels, cable TV, high-speed internet, stereo, wood burning fireplace, BBQ; patio on the sand, views of beach, ocean; new rental, all weeks now available starting June 17; $1,675/week (Friday to Friday), call asap to book 790-7088.

ROSARITO BEACH condo, 2 bd., 2 ba., furnished, ocean view, pool, tennis, short walk to beach on private rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.

JPL'S ONLINE NEWS SOURCE

http://dailyplanet

View this and previous issues of Universe at

dailyplanet.jpl.nasa.gov/ universe/index.php

E-mail us at

universe@jpl.nasa.gov

Universe

Editor
Mark Whalen

Design + Layout
David Hinkle, Audrey Steffan/ Design Services

Photography
JPL Photo Lab

Advertising
Anisia Sisikin

Universe is published every other Friday by the Office of Communications and Education of the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109.

Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted via e-mail to universe@jpl.nasa.gov *and are due at 2 p.m. on the Monday after publication for the following issue.*

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

Universe

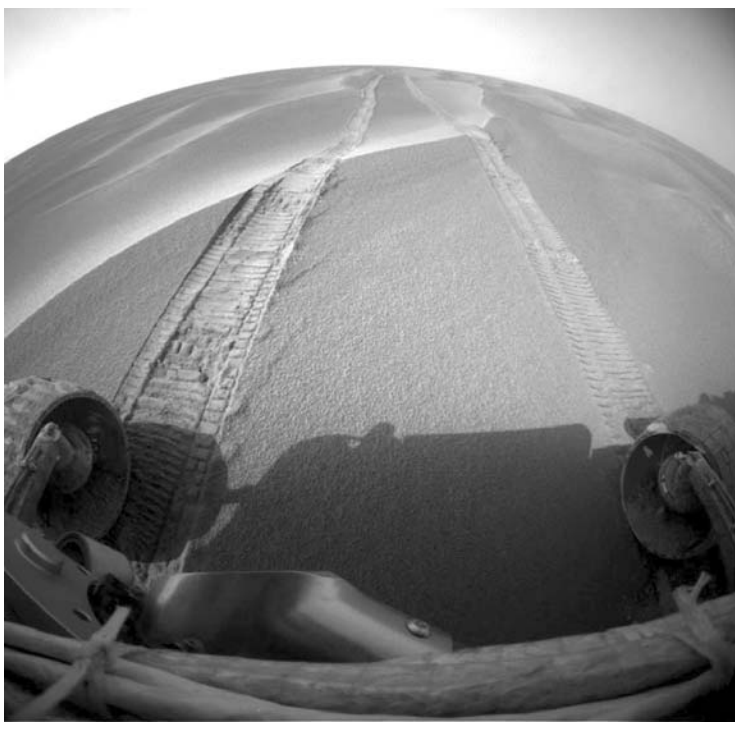
Jet Propulsion Laboratory

Inside

June 17, 2005
Volume 35 Number 12

Dig it: Opportunity knocks itself out

By Natalie Godwin



Opportunity's view is shown after it maneuvered out of a sandtrap.

Engineers and mission managers for JPL's Mars Exploration Rover mission cheered early this month when images from the martian surface confirmed Opportunity had successfully escaped from a sand trap.

From about 174 million kilometers away (about 108 million miles), the rover team at JPL had worked diligently for nearly five weeks to extricate the rover. The long-distance roadside assistance was a painstaking operation to free all six wheels of the rover, which were mired up to their rims in the soft sand of a small martian dune.

"After a nerve-wracking month of hard work, the rover team is both elated and relieved to finally see our wheels sitting on top of the sand instead of half buried in it," said Jeffrey Biesiadecki, a JPL rover mobility engineer.

Traction was difficult in the ripple-shaped dune of windblown dust and sand that Opportunity drove into on April 26. In the weeks following, the rover churned 192 meters (629 feet) worth of wheel rotations before gaining enough traction to actually move 1 meter (about 3 feet). The rover team directed the drives in cautious increments from May 13 through June 4.

"We did careful testing for how to get Opportunity out of the sand. Then we patiently followed the strategy developed from the testing, monitoring every step of the way," Biesiadecki said. "We hope to have Opportunity busy with a full schedule of scientific exploration again shortly."

Opportunity's next task is to examine the site to provide a better understanding of what makes that ripple different from the dozens of similar ones the rover easily crossed. "After we analyze this area, we'll be able to plan safer driving in the terrain ahead," said rover Project Manager Jim Erickson.

Both Spirit and Opportunity have worked in harsh martian conditions much longer than anticipated. They have been studying geology on opposite sides of Mars for more than a year of extended missions since successfully completing their three-month primary missions in April 2004.

"The first thing we're going to do is simply take a hard look at the stuff we were stuck in," said Dr. Steve Squyres of Cornell University, the principal investigator for the Mars rovers' science instruments. "After that, we will begin a cautious set of moves to get us on our way southward again. South is where we think the best science is, so that's still where we want to go."

Shortly after landing in January 2004, Opportunity found layered bedrock that bore geological evidence for a shallow ancient sea. Spirit did not find extensive layered bedrock until more than a year later, after driving more than two miles and climbing into a range of hills known as "Columbia Hills."

Images and information about the rovers and their discoveries are available at *www.nasa.gov/vision/universe/solarsystem/mer_main.html* and *www.jpl.nasa.gov/missions/mer.*

Possible Titan volcano discovered

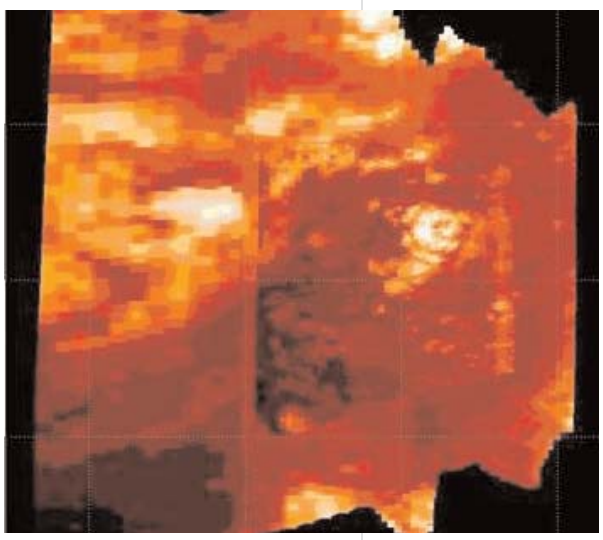
By Carolina Martinez

A recent flyby of Saturn's hazy moon Titan by the Cassini spacecraft has revealed evidence of a possible volcano, which could be a source of methane in Titan's atmosphere.

Images taken in infrared light show a circular feature roughly 30 kilometers (19 miles) in diameter that does not resemble any features seen on Saturn's other icy moons. Scientists interpret the feature as an "ice volcano," a dome formed by upwelling icy plumes that release methane into Titan's atmosphere.

The findings appear in the June 9 issue of Nature.

"Before Cassini-Huygens, the most widely accepted explanation for the presence of methane in Titan's atmosphere was the presence of a methane-rich hydrocarbon ocean," said Dr. Christophe Sotin, JPL distinguished visiting scientist.



Images from Cassini's visual and infrared mapping spectrometer instrument show a bright, circular feature (at center-right) with two elongated wings extending westwards. Scientists think this feature might be a volcano.

"The suite of instruments onboard Cassini and the observations at the Huygens landing site reveal that a global ocean is not present," said Sotin, a team member of the Cassini visual and infrared mapping spectrometer instrument and professor at the Université de Nantes, France.

"Interpreting this feature as a cryovolcano provides an alternative explanation for the presence of methane in Titan's atmosphere. Such an interpretation is supported by models of Titan's evolution," Sotin said.

Titan, Saturn's largest moon, is the only known moon to have a significant atmosphere, composed primarily of nitrogen, with 2 to 3 percent methane.

One goal of the Cassini mission is to find an explanation for what is replenishing and maintaining this atmosphere. This dense atmosphere makes the surface very difficult to study with visible-light cameras, but infrared instruments like the visual and infrared mapping spectrometer can peer through the haze. Infrared images provide information about both the composition and the shape of the area studied.

The highest-resolution image obtained by the visual and infrared mapping spectrometer instrument covers an area 150 kilometers square (90 miles) that includes a bright circular feature about 30 kilometers (19 miles) in diameter, with two elongated wings extending westward. This structure resembles volcanoes on Earth and Venus, with overlapping layers of material from a series of flows.

"We all thought volcanoes had to exist on Titan, and now we've found the most convincing evidence to date," said Dr. Bonnie Buratti, team member of the Cassini visual and infrared mapping spectrometer at JPL. "This is exactly what we've been looking for."

In the center of the area, scientists clearly see a dark feature that resembles a caldera, a bowl-shaped structure formed above chambers of molten material.

The material erupting from the volcano might be a methane-water ice mixture combined with other ices and hydrocarbons. Energy from an internal heat source may cause these materials to upwell and vaporize as they reach the surface.

Future Titan flybys will help determine whether tidal forces can generate enough heat to drive the volcano, or whether some other energy source must be present.

Black channels seen by the European Space Agency's Huygens probe, which piggybacked on Cassini and landed on Titan's surface in January 2005, could have been formed by erosion from liquid methane rains following the eruptions.

Scientists have considered other explanations. They say the feature cannot be a cloud because it does not appear to move and it is the wrong composition.

Another alternative is that an accumulation of solid particles was transported by gas or liquid, similar to sand dunes on Earth. But the shape and wind patterns don't match those normally seen in sand dunes.

The data for these findings are from Cassini's first targeted flyby of Titan on Oct. 26, 2004, at a distance of 1,200 kilometers (750 miles) from the moon's surface.

The visual and infrared mapping spectrometer instrument can detect 352 wavelengths of light from 0.35 to 5.1 micrometers. It measures the intensities of individual wavelengths and uses the data to infer the composition and other properties of the object that emitted the light; each chemical has a unique spectral signature that can be identified.

Forty-five flybys of Titan are planned during Cassini's four-year prime mission. The next one is Aug. 22, 2005. Radar data of the same sites observed by the visual and infrared mapping spectrometer may provide additional information.

For more information about the Cassini-Huygens mission, visit *http://saturn.jpl.nasa.gov.* The visual and infrared mapping spectrometer page is at *wwwvims.lpl.arizona.edu.*

News Briefs

JPL discount for July 4 Comet Bash

JPL is closed to family and friends during the July 4 weekend but here is someplace to take them that will make a Deep Impact.

Have an astronomically good time this Independence Day weekend with the Planetary Society's Comet Bash from 7:30 p.m. Sunday, July 3, to 1 a.m. July 4 at the Haugh Performing Arts Center of Citrus College, 1000 W. Foothill Blvd., Glendora.

The Deep Impact spacecraft is scheduled to encounter comet Tempel 1 at 10:52 p.m. Pacific time on July 3.

Purchase tickets online at *http://planetary.org/cometbash.html.* If ordered by June 19, Planetary Society members and JPL friends and family will pay $15 per ticket or two for $25. After June 19 it will be $18 per ticket or two for $35. For nonmembers the charge will be $18 (two for $33) and $10 (two for $15) for children through age 18 and seniors 65 and older.

Advance tickets are non-refundable. Tickets will be mailed.

For more information, call SUSAN LENDROTH at (626) 793-5100.

Phoenix to Mars begins launch prep

NASA has given the green light to a project to put a long-armed lander on to the icy ground of the far-northern Martian plains. The Phoenix lander, to be managed by JPL, is designed to examine the site for potential habitats for water ice, and to look for possible indicators of life, past or present.

The announcement allows the Phoenix mission to proceed with preparing the spacecraft for launch in August 2007. This major milestone followed a critical review of the project's planning progress and preliminary design, since its selection in 2003.

Phoenix is the first project in NASA's Mars Scout Program of competitively selected missions. Scouts are innovative and relatively low-cost complements to the core missions of the agency's Mars exploration program.

"The Phoenix Mission explores new territory in the northern plains of Mars analogous to the permafrost regions on Earth," said principal investigator PETER SMITH of the University of Arizona. "NASA's confirmation supports this project and may eventually lead to discoveries relating to life on our neighboring planet."

Like its namesake, Phoenix rises from ashes, carrying the legacies of two earlier attempts to explore Mars. The 2001 Mars Surveyor lander, administratively mothballed in 2000, is being resurrected for Phoenix. Many of the scientific instruments for Phoenix were built or designed for that mission or flew on the unsuccessful Mars Polar Lander in 1999.

"The Phoenix team's quick response to the Odyssey discoveries and the cost-saving adaptation of earlier missions' technology are just the kind of flexibility the Mars Scout Program seeks to elicit," said NASA's Mars Exploration Program director, DOUG MCCUISTION.

The cost of the Phoenix mission is $386 million, which includes the launch. The partnership developing the mission includes JPL; the University of Arizona; Lockheed Martin Space Systems, Denver; and the Canadian Space Agency, which is providing weather-monitoring instruments.

"The confirmation review is an important step for all major NASA missions," said JPL's BARRY GOLDSTEIN, project manager for Phoenix. "This approval essentially confirms NASA's confidence that the spacecraft and science instruments will be successfully built and launched, and that once the lander is on Mars, the science objectives can be successfully achieved."

Much work lies ahead. Team members will assemble and test every subsystem on the spacecraft and science payload to show they comply with design requirements. Other tasks include selecting a landing site, which should be aided by data provided by the Mars Reconnaissance Orbiter launching in August, and preparing to operate the spacecraft after launch.

For information about the Phoenix mission, visit *phoenix.lpl.arizona.edu.*

Preliminary design go-ahead for Juno

NASA earlier this month announced that a mission to fly to Jupiter will proceed to a preliminary design phase. The Juno mission, which JPL will manage, is the second in NASA's New Frontiers Program.

Juno will conduct an in-depth study of the giant planet. The mission proposes to place a spacecraft in a polar orbit around Jupiter to investigate the existence of an ice-rock core, determine the amount of global water and ammonia present in the atmosphere, study convection and deep wind profiles in the atmosphere, investigate the origin of the jovian magnetic field, and explore the polar magnetosphere.

At the end of the preliminary design study, the mission must pass a confirmation review that will address significant schedule, technical and cost risks before being confirmed for the development phase.

DR. SCOTT BOLTON of Southwest Research Institute, Boulder, Colo., is the principal investigator. Lockheed Martin Space Systems, Denver, will build the spacecraft.

NASA selected two proposed mission concepts for study in July 2004 from seven submitted in February 2004 in response to an agency Announcement of Opportunity.

The selected New Frontiers science mission must be ready for launch no later than June 30, 2010, within a mission cost cap of $700 million.

The New Frontiers Program is designed to provide opportunities to conduct several of the medium-class missions identified as top priority objectives in the Decadal Solar System Exploration Survey, conducted by the Space Studies Board of the National Research Council.

The first NASA New Frontiers mission will fly by the Pluto-Charon system in 2014 and then target another Kuiper asteroid belt object.

Nondisclosure agreement required

As a JPL employee, you may be asked to assist NASA by participating in evaluations of proposals received by the agency. To avoid any potential conflict of interest in these situations, JPL employees are cautioned not to disclose any proprietary information. If you are asked to assist NASA in this capacity, please read and understand Section 6.0 of the Conflict of Interest requirement (JPL Rules! DocID 58716).

If you are asked to be involved in an evaluation, you must sign the nondisclosure, "Agreement and Conditions for Evaluation of Proposals" from attachment G of the Prime Contract, NAS7-03001 (JPL Rules! DocID 68072), before you participate in the review. Members of the review team are advised they will be required to leave the team if unable/unwilling to comply. If NASA requests the use of a different form, it must be reviewed and approved by the General Counsel before you are able to sign it.

Once you have completed and signed the form, give one copy to the requesting NASA official, keep a copy for your files, and send a copy to the JPL Contract Management Office at mail stop 180-503.

Amateur Radio Clubs have annual test

The JPL and Caltech Amateur Radio Clubs will hold their annual Field Day test of emergency communications skills over the weekend of June 25.

From the clubs' temporary location atop Mount Gleason they will use Morse code, voice and digital modes to contact as many different stations as possible around the country. The event tests amateur radio operator readiness to provide emergency support during times when normal communications capabilities are inoperable due to earthquake, floods or other emergencies.

The event begins at 11 a.m. You are invited to visit the site, a 45-minute drive from JPL via Angeles Crest Highway. Non–radio amateurs can participate in making contacts or using telescopes in the excellent visual conditions of the hilltop location.

For more information, call JIM LUX at ext. 4-2075 or JAY HOLLADAY, 4-7758.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meets Wednesdays at 11:30 a.m.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (the Wellness Place).

Codependents Anonymous—Meets at noon every Wednesday.

Lambda (Gay, Lesbian, Bisexual and Transgender Networking Group)—Meets the first Friday and third Thursday of the month at noon in Building 111-117. For more information, call Randy Herrera, ext. 3-0664.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in Building 167-111 (the Wellness Place).

For more information on any of the support groups, call the Employee Assistance Program at ext. 4-3680.

Friday, June 17

Von Kármán Lecture Series—JPL research scientist Dr. Pamela Conrad will present "A Bipolar Year: What We Can Learn About Looking for Life on Other Planets By Working in Cold Deserts" at 7 p.m. in Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. For more information, call Public Services at ext. 4-0112.

Saturday, June 18

Child Educational Center 25th Birthday Dinner, Wine Tasting Event—The dinner will be offered from 5:30 to 7:30 p.m. at Caltech's Steele House, with wine tasting from 6:30 to 10:30 p.m. at Avery House. Dinner tickets are $125 and include admission to the wine-tasting benefit. The wine-tasting event will feature both silent and live auctions as well as samples from area restaurants. Tickets for wine tasting alone are $60 in advance or $70 at the door, and include a certificate for a complimentary dinner at Restaurant Halie in Pasadena. Tickets for both events are available at the JPL Store, Caltech bookstore or the CEC at 140 Foothill Blvd., La Cañada. For more information, call ext. 4-3418 or visit *ceconline.org/benefit.*

Monday, June 20

30-Meter Telescope Talk—Join Richard Ellis, Caltech astronomy professor and director of Caltech Optical Observatories, at 4 p.m. at Caltech's Beckman Institute Auditorium. The event is presented by the Caltech Management Association. For more information, e-mail *Dlorah.Gonzales@caltech.edu* or call (626) 395-8661.

Tuesday, June 21

JPL Hiking Club—A slide show titled "Yellowstone Off the Beaten Path" will be presented by David Coppedge at noon in Building 171-218.

Wednesday, June 22

"Evidence for Microbial Life in Mars Meteorites: Where This Hypothesis Stands Today"—Dr. Dave McKay, chief scientist for astrobiology at Johnson Space Center, will speak at 3 p.m. in von Kármán Auditorium.

"Genius to You, Father to Me"—Michelle Feynman, daughter of famed Caltech physicist Richard Feynman, will share her father's life in letters in this Caltech Management Association–sponsored talk at 4:45 p.m. in von Kármán Auditorium,

JPL Toastmasters Club—Meeting at 5 p.m. in conference room 167. Call Dirk Runge, ext. 3-0465, or visit *www.jplcaltechtoastmasters.com.*

David McCullough—The historian and author will give a talk about his new book, *1776,* at 8 p.m. in Beckman Auditorium. This free event is part of Caltech's Voices of Vision series. A book signing will follow the talk. For more information, call (626) 395-4652 or visit *www.events.caltech.edu.*

Thursday, June 23

Caltech Architectural Tour—Hosted by the Caltech Women's Club, from 11 a.m. to 12:30 p.m. Free and open to the public. Meet at the Athenaeum front hall, 551 S. Hill Ave. For reservations, call Susan Lee, (626) 395-6327.

Wednesday, June 29

Volunteer Professionals for Medical Advancement—Meeting at 10:30 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Thursday, June 30

JPL Golf Club—Meeting at noon in Building 306-302.

Spitzer captures echo of dead star's rumblings

By Whitney Clavin

An enormous light echo etched in the sky by a fitful dead star was recently spotted by the infrared eyes of the JPL-managed Spitzer Space Telescope.

The surprising finding indicates Cassiopeia A, the remnant of a star that died in a supernova explosion 325 years ago, is not resting peacefully. Instead, this dead star likely shot out at least one burst of energy as recently as 50 years ago.

"We had thought the stellar remains inside Cassiopeia A were just fading away," said Dr. Oliver Krause of the University of Arizona. "Spitzer came along and showed us this exploded star, one of the most intensively studied objects in the sky, is still undergoing death throes before heading to its final grave."

Infrared echoes trace the dusty journeys of light waves blasted away from supernova or erupting stars. As the light waves move outward, they heat up clumps of surrounding dust, causing them to glow in infrared light. The echo from Cassiopeia A is the first witnessed around a long-dead star and the largest ever seen. It was discovered by accident during a Spitzer instrument test. "We had no idea that Spitzer would ever see light echoes," said Dr. George Rieke of the University of Arizona. "Sometimes you just trip over the biggest discoveries."

The discovery is highlighted in last week's issue of the journal Science. For images and other information, visit *http://www.spitzer.caltech.edu/Media.*

Deep Impact looking for a smashing Independence Day

It will be fireworks on the 4th of July, but not as usual. Early on Independence Day, after flying some 431 million kilometers (268 million miles), the JPL-managed Deep Impact mission will hurl a copper-tipped impactor into the path of a comet while its mother ship looks on, the first time such a daring set of maneuvers has been attempted. Deep Impact is managed by Rick Grammier, who has been at JPL since 1988. His previous work includes Cassini, Stardust and X2000. Grammier, who joined Deep Impact a little less than a year before its January launch, discusses the mission with Universe.

By Mark Whalen

Tom Wynne / JPL Photolab

"Imagine three bullets in space. We're going to try to hit one of those bullets with the second bullet, with the third bullet in the same time and place, looking at the second bullet to see if it's hit the first one."

Why is now the right time for this mission?

Our target, Tempel 1, is one of the periodic comets that visits our solar system; it makes this journey into our solar system every 5 1/2 years. What's nice about Tempel 1 is it's not overly active or inactive. It's active in the sense that is has some jets, but not overly active such that its jets would make it too difficult to actually target and impact the nucleus as well as observe the results of the impact.

The science team wanted a comet that's been into and out of the solar system enough times to not be overly active—but not so many times as to become dormant—in order to answer some basic scientific questions, which the impact and subsequent crater formation will provide. Its orbit brings it relatively close to Earth, allowing Deep Impact to reach its target just six months after launch, a relatively short time for a deep-space mission. The geometry is right, because it's almost to its closest point to the sun.

We are targeting the impact to be on a sun-lit portion of the comet, so that when the debris and particles are thrown up, the event can be observed by the flyby spacecraft as well as by space- and Earth-based telescopes.

The impactor weighs more than 800 pounds. How did you determine its optimum weight? How were tests conducted?

A series of cratering tests was performed at Ames Research Center in order to determine the most effective size and shape of cratering mass we should use, based upon launch mass constraints and various models of cometary properties. We wanted to put the maximum amount of mass onboard for the best chance to make a good-sized crater. But the size of the crater is going to depend on the material properties of the comet. We chose copper as the cratering mass as it is relatively inexpensive and does not interact with water.

And that's part of why we're going there. How the crater forms is a key part of the science of the mission because that will tell us a lot about what those material properties are, in addition to getting the composition and makeup of the comet's interior.

The cruise to the comet seems to have gone very well. You didn't do as many of the trajectory correction maneuvers as you had planned.

That's true. The navigation and flight system performance have been highly accurate. We eliminated two of the planned TCMs. The final TCM will execute about 30 hours before impact and will be the final targeting maneuver prior to impactor release. The impactor is released 24 hours before impact and performs three targeting maneuvers starting about 90 minutes prior to impact.

How challenging will all this be?

This is an extremely difficult and incredibly challenging mission. Here's an analogy: imagine three bullets in space. We're going to try to hit one of those bullets with the second bullet, with the third bullet in the same time and place, looking at the second bullet to see if it's hit the first one.

When you're doing this at about 23,000 mph you know that in the blink of an eye it's all done. The nucleus itself is not resolved any earlier than about 18 hours prior to impact. That—combined with the comet's shape, rotation and jet activity—make it quite a challenge for the onboard autonomous navigation to correctly target and hit a lit portion of the nucleus. In addition, we want our flyby spacecraft to be independently solving the same problem, looking at the same spot that the impactor is targeting, and taking pictures of the crater's formation as well as the post-impact crater. Of course, we want the flyby to survive its subsequent passage beneath the nucleus and perform look-back imaging as the comet continues on its merry way.

In my experience, this is about as challenging as it gets.

You've relied on images from the Spitzer and Hubble space telescopes for estimates of Tempel 1's shape, size and rotation. Will these two also be able to see the impact?

Yes. Hubble, Spitzer and Chandra—as well as the Rosetta spacecraft—will be observing the impact. In fact, our previous TCM changed our time of arrival in order to enable the Hubble observations.

What can we expect to see here on Earth? Do you need a telescope or will binoculars be good enough?

Telescopes at Hawaii's Mauna Kea observatory and many other observatories will view the impact. Amateur astronomers with telescopes will have an excellent chance for good viewing, but it will be quite a challenge with binoculars. People may not be able to see the initial flash but might have better luck seeing the results of the impact for several minutes to several days later, depending on the quantity of debris from the impact. Some of the best viewing spots will be in California, Hawaii, New Zealand and the Yucatán in Mexico.

Let's compare Deep Impact to what might follow. The Mars program, for example, launches a progression of missions based on previous ones. What might Deep Impact lead to?

Well, besides adding a great deal to our body of knowledge about comets, Deep Impact will provide much better comet models for use by Rosetta and other cometary missions on the drawing board. It will also aid the study of asteroids, as some scientists believe a portion of those are dormant or extinct comets. Finally, from the knowledge gained regarding the comet's mass properties, one might also deduce from our mission what force would be required to nudge a comet or an asteroid off its course enough to avoid Earth impact.

How many people are on the Deep Impact team? Are you all feeling nervous, excited, confident?

We have about 120 people, including JPL, Ball Aerospace and the University of Maryland.

By and large, the team is excited, because this is such a unique, extremely difficult and challenging mission. We're doing something that's never been done before, and everyone knows that a myriad of things could go wrong that we have no control over.

Having said that, I know that they are driven as individuals and driven as a team to give this the best possible chance of success. They have worked very hard to get this far for a very, very long time. It's funny, but I think we are all ready for this to be completed and at the same time we all wish a little more time was available to test and tweak things more.

I'm very proud of this team and what they have accomplished under difficult circumstances. What a team of professionals! I'm constantly amazed at the wealth of talent.

Remodeled 190 cafe is now open

Carol Lachata / JPL Photolab

Lab Deputy Director Gene Tattini, second from right, cuts a ribbon to dedicate the refurbished 190 cafeteria on June 3. From left are Bonnie Gerszt, cafeteria liaison, and Margo Marshak, Caltech vice president of student affairs; at right is Andre Mallie of Caltech Dining Services. The cafe includes a new grill, wood-fired pizza oven, serving areas and seating.

JPL'S ONLINE NEWS SOURCE

http://dailyplanet

View this and previous issues of Universe at

dailyplanet.jpl.nasa.gov/universe/index.php

E-mail us at

universe@jpl.nasa.gov

Universe

Editor
Mark Whalen

Design + Layout
David Hinkle, Audrey Steffan/ Design Services

Photography
JPL Photo Lab

Advertising
Anisia Sisikin

Universe is published every other Friday by the Office of Communications and Education of the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109.

Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted via e-mail to universe@jpl.nasa.gov *and are due at 2 p.m. on the Monday after publication for the following issue.*

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

Letters

My wife and I would like to thank friends and JPL coworkers for their support at the loss of my wife's father, Gene Nelson. Many thanks to JPL Hospitality for the flowering plant and card that has helped us through this time of sadness.

Roger and Diane Klammer

Thank you to all who sent well wishes and/or attended my recent retirement event(s). The gifts and mementos will be treasured for years to come. More important, the opportunity to visit with many of you one last time as a member of the JPL family was greatly appreciated. Thank you also for your hospitality to my family. We all enjoyed the celebrations. I am looking forward to seeing or hearing from you in the future. JPL is a remarkable place, unique in the world, and it has been an honor to have shared it with you throughout my career.
Sincerely,

Larry Simmons

Heartfelt gratitude to my friends and colleagues here at JPL for their support after the sudden passing of my mother. Thank you for your kind words and sympathetic ears, your thoughtful cards, the lovely white cyclamen plant and the charitable donation in Mom's memory. Peace and love to all of you.

Bill Irion

Classifieds

For Sale

ARMCHAIRS, upholstered in neutral peach velour, tub style, great cond., very comfortable, avail. as matching pair, $75/ea., take both for $125. ssander@altrionet.com for pictures.

AQUA SHOES: Teva, size 5, worn once, excellent condition, was $40, now $20. 626/646-1937.

BABY ITEMS: step 2 Townhouse climber (jungle gym/slide), was $160, now $80; tugboat sandbox/pool w/cover, was $90, now $45; Little Tikes tugboat, excellent condition, was $40, now $20; Medela Pump-In-Style, exc. condition, $195; little red tricycle, like new, was $50, now $25. 626/646-1937.

BEDROOM SET, a steal, beautiful, almost brand new, wooden, very high quality comfortable mattress, mirrors, drawers, reading light, pictures available. 310/613-1107.

BICYCLE, Mountain Edge boys 24," 21-speed index shifting, vg cond., $40. 626/372-4239, Peter.

BICYCLES: boys 20" GT Dyno, exc. condition, $65; boys 16," with training wheels, $25. 626/798-1839.

CAMERA, Minolta Dimage 7i 5 megapixel, great cond., $500/obo. 626/281-8195, Frank.

DESK, for computer, solid oak, keyboard drawer, CPU tower storage, cable pass-thrus, brass hardware + more storage, 48" wide x 30" deep x 30" high, photos at www.pobox.com/~Mark.Johnson, $100. 661/263-2760.

DOG, miniature Dachshund, female, red, 6 mo., registered, all shots, $600. 832-3345.

FAX CARTRIDGE (model PC-102RF) for Brother machines, brand new, $20; DIET TAPES, Jenny Craig, set of 14, $25; COMPUTER POWER CONTROL CENTER, 5 power switches + 1 master switch, 5 surge-protected outlets + 2 modem/fax/phone jacks, new, $20. 790-3899.

FUTON MATTRESS, full size, $25; TV, 27" Toshiba, good picture, faulty tuner (but works great with a VCR providing the signal), buyer to pick up in Altadena, $25. 626/791-2784.

GARAGE SALE: Sat., June 18, 8:00-2:00; furniture, baby items, clothes, kitchen and household goods, vertical blinds, collectible plates, bears and misc., 1261 Oak Mesa Dr., La Verne. 909/596-4390.

LAWNMOWER, Craftsman Eagle 1, 5.3 horsepower, self-propelled, runs great. 626/614-1916.

MISC: Yamaha electronic keyboard, PSR-225 GM, key-sensitive touch response, 6-track song recording, used only for 6 mo., great condition, plus keyboard stand/cord, bought for $250, sell for $100; Hamilton Beach food processor, in-bowl storage, 350W motor, wide 8-cup bowl, 2 speeds plus pulse, rarely used, in package, $20; vacuum cleaner, Dirt Devil, 3 yrs. old, good cond., $25. 626/437-5750.

MISC: computer or TV table, $20; TV stand, $10; glass topped end tables and coffee table with faux stone pedestals, $25 each; Kenmore vacuum, $25. 626/351-9641 or Bettyrs@earthlink.net.

MISC: cherry wood, Danish, modern dining room set w/6 chairs and 3 leafs, matching hutch, $400; Amana refrigerator, $100. 248-7836.

MISC: TV, 32" Sony Trinitron console in full wooden cabinet, glass-covered storage, exc. condition, w/remote, #KV-32TW77 (this is considered furniture), $200; oak stereo cabinet on wheels, 36 x 24 x 17, tinted glass magnetic doors, $60; Kenwood multiple 5-disc carousel CD player, model DP-R791, 1-bit dual D/A converter, exc. cond., $50; Kenwood integrated stereo system, model KRX-891 w/digital tuner, twin dubbing cassette decks and amp., w/remote,$100. 626/398-4960.

MISC: logging chain, $5; come-along chain (compresses fences, metal, etc), $10; wig, red, shoulder length, never used, $20; portable basketball set, adjustable (needs net), $200; fishing pole (saltwater), $25; baseball glove (small, left handed) & conditioner, good cond., $15; landscape oil painting, autumn tones, $100; antique cedar chest (lid needs repair), $75; trash can w/wheels, $5; '50s Motorola tv "shell," $20. 626/357-8210.

MONITOR, Nanao CRT, 17," T2-17TS, 1-yr. money-back guarantee, $100. 790-0697.

NEIL DIAMOND TICKETS (2), Friday, Sept. 30, 8 pm, Staples Center; one is in sec.114, row 13, seat 16; the other is in sec.117, row 16, seat 14; $95 tickets, will sell for $50 each. 626/395-1801, Pat.

ORGAN, Yamaha 415 electronic console w/13 pedals, 3 keyboards, 144 rhythm patterns, pd. $7,500, sacrifice for $2,000; PORT REPLICATOR for IBM Thinkpad, works with T20, T21, A20, A21, or X, R series, like new, $85; ULTRA ATA CONTROLLER CARD with cable, fits into 32-bit PCI 2.1 or 2.2 expansion slot on motherboard, brand new, $20. 790-3899.

PHOTOGRAPHIC EQUIPMENT: Olympus bodies, $35-50, 35 mm f/2.8 $20, 200 mm f/4 $25; Vivitar 24 mm f/2.8 $25 and Series I 35-85 f/2.8 $50; iron 28-70 f/4, $40; tarblitz 80-200 f/4.5-5.5, $35; inder 1, $20; teleconverters, $5-10; Aubell 135 mm f/3.5, T mount, $10; Konica Autoreflex A body, $25; Kodak Carousel Projector, $60; slide carousels $2 each. 790-2900, Steve, evenings.

PIANO, upright, always one-family owned, dating to late 1800s, solid walnut with beautiful carved details, exterior is in beautiful condition, some work needed on inside, a true antique, located in El Monte. 246-1250.

PINBALL MACHINE, vintage 1974, Chicago Coin, Hollywood Play, perfect backglass, working order, just needs a little TLC and good home, $150/obo. 909/593-8950, Don.

POOL for kids, Little Tykes, blue, hard plastic, very sturdy quality construction, outer diam. 5', water area is 4' diam. and 1' deep if filled to brim, small integral slide, drain plug, $20. 626/303-1927.

REFRIGERATOR, Hotpoint 20.6 cu. ft., 5 yrs. old, good cond., clean, $200/obo. 323/342-9363.

REFRIGERATOR, "Kenmore 18," presumably 18 cubic feet, top/bottom fridge, glass shelves, very clean; came with house but we have our own fridge; can deliver if needed; new cost approx. $500; sell for $200/obo. 248-1557, Martin, or martin@fptek.com.

ROAD BIKE, Centurion Ironman, 58 cm (22.8") frame, Shimano 600 components, recently replaced tires/cables, metallic gray/tan, excellent riding cond., $95. 626/303-5814, Steve.

ROCKING CHAIR, Dutailier Glider, ideal for nursing or comforting a baby, blue upholstery, with non-gliding foot stool, 4 years old, excellent condition, paid $500, sell for $200. 626/351-8643.

SEWING MACHINE, Sears Kenmore, used once, $100; 1940s oak sewing machine table with stool, $100; B&G china, seagull pattern, 13 3-pc. sets, $325; 2 Stewart Moskowitz signed prints, $50. 626/445-2616.

SOFA, 7', beige, ultra suede, overstuffed, very high quality, vg cond., $725. 562/234-0718.

SOFA BED, full size, vg condition, neutral colors in subtle chevron pattern, buyer to pick up in Altadena, $100. 626/791-2784.

STEREO, Sony LBT-G2000 bookshelf system, w/3-disc CD changer, remote, owner's manual, $75. 323/342-9363.

VACUUM CLEANER, Shark Spectra EuroPro w/Hepa filter, extra wide, extra bags/filter incl., all gadgets intact, $40. 626/398-4960.

WASHER/DRYER, Kenmore stacked, dryer/gas, great condition, many wash & dry cycles, selectable water levels, hot/warm/cold water options, paid $900, sell $450 firm. 626/644-4342, staceyboland@gmail.com.

Vehicles / Accessories

'94 ACURA Integra HB, 4 cyl., 5 spd., white, moonroof, CD, power windows/locks, a/c, 1-yr.-old tires, well maintained, vg cond., $4,000. 364-9726 or 326-6549, cell.

'00 DODGE Durango SLT 4x4, loaded, auto/overdrive, 55K, 4.7L V8, 7 passenger, burgundy w/tan leather interior, cruise, tilt, front & rear air, am/fm radio, CD & cassette, dual airbags, privacy glass, luggage rack, running boards, alloy wheels, ABS, tow package, power seat/steering/windows/locks/mirrors, well maintained, $11,900/obo. 661/945-9984, Scott.

'97 FORD Thunderbird LX, V6, auto, 101K mi., silver exterior, gray leather interior, a/c, power seat/locks/windows, dual airbags, spoiler, alloy wheels, looks and drives great, $2,850 ($400 below Blue Book). 310/210-2061.

'93 FORD Taurus GL, ocean green, 4-door sedan, 125K mi., auto, 4 speeds, front airbags, power mirrors, am/fm/cassette, new tires/alt/batt/water pump/wipers, private owner, clean inside/outside, $850/obo. 626/437-5750.

'66 FORD Mustang Coupe, V8, 289, 4-barrel carb, blue/blue, black plates, always a California car, no accidents, excellent original shape, drives like new, mature owners, beautiful, $12,500. 626/296-3441.

'96 HONDA Accord LX 4-dr. sedan, 4 cyl., auto, champagne, a/c, ps/pw/pd, tilt wheel, am/fm/cass., original owner, clean int./ext., 88.8K mi., $5,900/obo. 249-0012 or felsark-request@yahoo.com.

'95 LAND ROVER Range Rover SE, V8, 4.0L, auto, 4WD, 138K mi., tan, leather seats, CD, ps/pw, dual airbags, moonroof, runs great, good cond., $6,500/obo. 626/296-9073 or 818/515-2461.

'85 MERCEDES 500 SEL, tip-top condition, new tires/paint, $4,950. 458-2353.

'94 MERCURY Sable, dark green sedan, automatic, 61.5 K miles, very clean, 3.8L, V6, prem. sound, ABS, front airbags, a/c, pw/pd/pseats, cc, tilt, $2,980. 323/845-9340.

'03 NISSAN Altima 2.5 S, 38,298 mi., airbag, abs, a/c, cc, tilt, pwr. seats/steering/windows/door locks/mirrors, tint, am/fm, gray w/gray interior, runs great, very reliable, exc. cond., $14,700/obo. 626/296-0055.

'93 SAAB 900S, 1 owner, loaded, alloy wheels, leather, power windows, white 4d sedan, 170K mi., excellent condition, $2,500/obo. 818/636-5311 days, 626/351-8129 eves & weekends.

'03 TRUCK RIM/TIRE SET, standard Chevrolet Silverado 3/4 ton truck, 8-lug, 16 x 6-1/2," low mileage, balanced, ready to mount, $250/obo. 909/593-8950, Don.

Wanted

JUNIOR TOASTMASTERS CLUB MEMBERS for "Teen Expressions," ages 12-17; mission is to provide training in communication and leadership skills; club meets every Friday evening 7:00 to 8:30 at Faith Community Church in West Covina; $10 fee per member for each 6-month term. 626/858-8400, Tadd Small.

SINGER, 20-26 years of age, influences: Seven-dust, 311, Deftones. 626/357-8210.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present, for personal use. 790-8523, Marc Rayman.

TURNTABLE for 12" LP records. 626/676-8872, cell or oberonsd@verizon.net.

VANPOOL RIDERS, full- and part-time, starts in Fontana w/stops in Rancho Cucamonga and La Verne, new 2005 Ford luxury 14-passenger van, full-time riders can qualify for a $50/mo. subsidy. Rhea Clearwater, 4-5831, Mike Taylor, 4-8343 or the Rideshare Office, 4-7433, for more information on vanpooling.

VOLLEYBALL PLAYERS, coed, no beginners please, every Tuesday 8-10 p.m. at Eagle Rock high school, $4/night. 956-1744, Barbara.

Free

CAT, indoor, needs loving home, beautiful female, age 4, color black. 551-9511, Robin, Tues.-Sat., after 2:30 p.m.

FUTON AND WOOD FRAME in vg/like-new cond.; I'm redecorating and need more room; futon cover is cream/tan (with a small print), frame is oak; need to be able to handle own move and transportation. 626/737-4000, Elsa.

ROUTER, D-Link + power cord, model DI-704 has 4 outputs, previously used for home network, works fine. 980-1638, Henry.

For Rent

ALTADENA, large 3 bd., 2 ba., fam., liv., kit., firepl., ceil. fans, sft. H2O & reverse osmosis, hrdwd flrs., new crpt. in fam. & bath., Jacuzzi, close to JPL, corner lot, lots of trees incld. apricot & plum, grdnr incl. 808/226-6598, gindifrench@yahoo.com.

ALTADENA, comprehensively furnished extended stay sabbatical house, 3 bd., study, boundary Angeles Nat'l Forest, 3 mi. from JPL, trail access, view, fireplace, oak floors, antiques, furniture, beds, dinnerware, utensils, pots/pans, all linens/towels, fine soaps, necessities included, just bring toothbrush/clothes, TV/DVD/VHS/DISH, wireless DSL, gardens, patio, parking, private, immaculate, avail. beg. July. 626/798-3235.

ALTADENA, room w/all necessities furnished: laundry, sheets, towels, dishes, TV, VCR, parking, small enclosed patio; close to JPL, very nice area next to Christmas Tree Lane, very quiet and clean, $600. 626/798-4821.

ARCADIA apt., 2 bd. + den, 1 ba., garage, upstairs unit, clean, spacious, washer/dryer in unit, a/c, stove, walking distance to shops, near Santa Anita Fashion Park, exc., quiet neighborhood, close to JPL, no pets, water/gardener/trash included, $1,499 + util., sec. deposit, available mid-July. 415-4175 or e-mail cpl@caltech.edu.

ARCADIA, large studio guest house, detached, separate entry, furnished, kitchen, laundry facilities, no pets, non-smokers, shared utilities, $850. 626/574-0226.

GLENDALE/EAGLE ROCK area, 1 bd. in a 3 bd., 1 ba., hwd. flrs., closet, laundry, kitchen privileges, utilities included, close to all, 15 min./JPL, $500. 323/340-8605.

N.E. PASADENA, cute sabbatical house, 2 bd., 1 ba., fully furnished, Jacuzzi, utilities included, $1,000/weekly, $2,800/monthly. 626/422-8119.

PASADENA, easy going, non-smoker housemate wanted, medium-sized bdrm. in a 4-bd. house, walking distance to JPL (2 blocks), central air/heat, fireplace, patio and backyard, laundry/kitchen privileges and wireless network, no pets, off-street parking, $700 + $500 deposit, utilities included. 626/807-0699.

PASADENA, large 3 bd., 2.5 ba., 2-story townhouse, centrally located betw. Caltech/JPL, nr. Old Town/Gold Line, vaulted bedrooms, fridge, stove, microwave, dishwasher, disposal, central heat, a/c, washer/dryer, fireplace, gated carport parking for 2 cars w/storage, complex has pool/hot tub, water/trash included, private patio, $1,800 + dep. 626/644-5699, Lucas.

PASADENA, North Linda Vista house, 2,400 sf, 3 bd. + 3 ba.; 5 min. from JPL; pool w/BBQ area, 2-car garage; gardener, water & pool service included; photos avail. on request; 1-yr. lease at $3,850/obo + sec. dep. 626/791-6101.

PASADENA, walking distance to Caltech, completely remodeled studio, 1 bd., 1 full ba., quiet st. off San Pasqual, $725 including utilities. 626/795-4235.

PASADENA, west Rose Bowl, charming furnished guest house, newly updated/painted, 2 lg. rooms, bath and kitchenette, catch bus to JPL or Old Town at Linda Vista/Lida, 1 block from house, all utilities except phone included, secure broadband cable internet connection provided, $1,075, deposit $1,075, 1 person, 1 car, no pets. 626/793-0147, Ruth.

TUJUNGA house, 8 miles/12 min. from JPL, beautiful, in very quiet woodsy area, 1,600 sq. ft., 2 bd., 3 ba., + office/bonus room, attached 2-car garage & workshop, hardwood floors, central heat/air, all kitchen & laundry appliances included, clean, move-in cond., trees & nature galore, serene environment, $2,200 + deposits. 352-7892.

Vacation Rentals

BALBOA ISLAND, cute, 2 bd., 1 ba., fully furn. upstairs apt. w/covered deck, located just steps from bay on Little Island & short walk to main st., includes laundry/parking, sleeps 5, avail. weekly for summer, $1,200-$1,500/wk. 626/351-9641 or bettyrs@earthlink.net.

FLORIDA condo, beautifully furn. 2 bd., 2 ba., 2nd floor, on the surf of New Smyrna Beach, 1/2-hour to Cape Canaveral, 90 min. to Disney World, quiet & relaxing, enjoy all the comforts of home overlooking the Atlantic, BBQ/pool/game room, easy walk to stores/restaurants. 760/439-7821, Darlene, dfhauge@yahoo.com.

GRAND TETON / YELLOWSTONE NATIONAL PARKS, visit in style, 2 bd. + loft, townhome, totally outfitted, borders Grand Teton with stunning view, sleeps 6, cable, microwave, etc., conniematt@sbcglobal.net.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps 4, laundry fac., low season rate $115/nite/2, high season rate $130/nite/2, $15/nite/add'l person. 949/348-8047, jackandrandy@cox.net.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, slps. 6-8, fully equip'd kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/mtn. vw., jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL disc'nt. 626/798-9222 or 626/794-0455 or valeriee@caltech.edu.

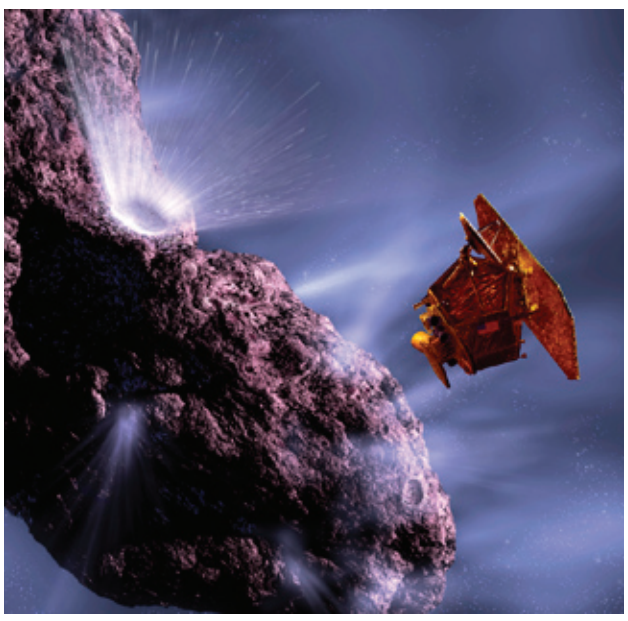
ROSARITO BEACH condo, 2 bd., 2 ba., furnished, ocean view, pool, tennis, short walk to beach on private road, 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906, Patrick DeCarolis.

universe

Jet Propulsion Laboratory

Inside

June 30, 2005
Volume 35 Number 13



Deep Impact on track for comet encounter

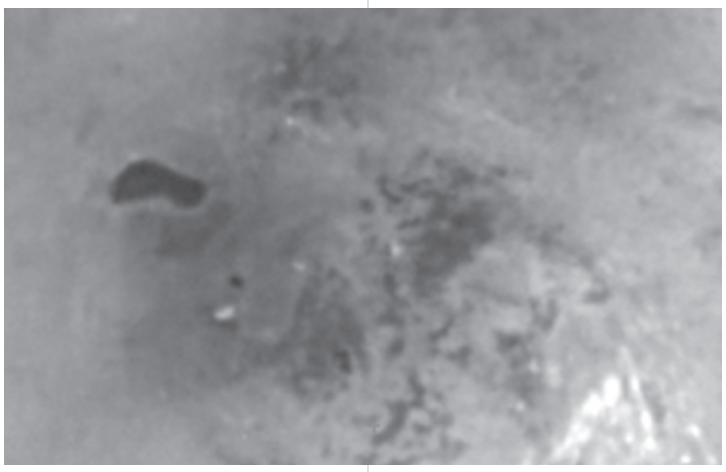
JPL's Deep Impact spacecraft observed a massive, short-lived outburst of ice or other particles from comet Tempel 1 that temporarily expanded the size and reflectivity of the cloud of dust and gas (coma) that surrounds the comet nucleus. The outburst was detected as a dramatic brightening of the comet on June 22 and is the second of two such events observed in the past two weeks. A smaller outburst also was seen on June 14 by Deep Impact, the Hubble Space Telescope and by ground-based observers.

"This adds to the level of excitement as we come down to the final days before encounter," said Deep Impact Project Manager Rick Grammier. "But this comet outburst will require no modification to the mission plan and in no way affects spacecraft safety."

Scheduled impact time is 10:52 p.m. Pacific time on Sunday, July 3. For the latest mission news, including multimedia, press kit and webcast details, log on to *www.nasa.gov/mission_pages/deepimpact/main/index.html.*

Lake-like feature seen on Titan

By Carolina Martinez



This view of Titan's south polar region reveals an intriguing dark feature that may be the site of a past or present lake of liquid hydrocarbons.

SCIENTISTS ARE FASCINATED BY A DARK, LAKE-like feature recently observed on Saturn's moon Titan. JPL's Cassini spacecraft captured a series of images showing a marking, darker than anything else around it. It is remarkably lake-like, with smooth, shore-like boundaries unlike any seen previously on Titan.

"I'd say this is definitely the best candidate we've seen so far for a liquid hydrocarbon lake on Titan," said Dr. Alfred McEwen, Cassini imaging team member and a professor at the University of Arizona. The suspected lake area measures 234 kilometers long by 73 kilometers wide (145 miles by 45 miles), about the size of Lake Ontario, on the U.S.–Canadian border.

"This feature is unique in our exploration of Titan so far," said Dr. Elizabeth Turtle, Cassini imaging team associate at the University of Arizona. "Its perimeter is intriguingly reminiscent of the shorelines of lakes on Earth that are smoothed by water erosion and deposition."

The feature lies in Titan's cloudiest region, which is presumably the most likely site of recent methane rainfall. This, coupled with the shore-like smoothness of the feature's perimeter, makes it hard for scientists to resist speculation about what might be filling the lake, if it indeed is one.

"It's possible that some of the storms in this region are strong enough to make methane rain that reaches the surface," said Cassini imaging team member Dr. Tony DelGenio of NASA's Goddard Institute for Space Studies in New York.

"Given Titan's cold temperatures, it could take a long time for any liquid methane collecting on the surface to evaporate. So it might not be surprising for a methane-filled lake to persist for a long time," DelGenio added.

Despite earlier predictions, no definitive evidence for open bodies of liquid has been found on Titan. Cassini has not yet been in a favorable position for using its cameras to check for glints from possible surface liquids in the south polar region.

"Eventually, as the seasons change over a few years, the convective clouds may migrate northward to lower latitudes," said DelGenio. "If so, it will be interesting to see whether the Cassini cameras record changes in the appearance of the surface as well."

"An alternate explanation is that this feature was once a lake, but has since dried up, leaving behind dark deposits," Turtle said. Yet another possibility is that the lake is simply a broad depression filled by dark, solid hydrocarbons falling from the atmosphere onto Titan's surface. In this case, the smooth outline might be the result of a process unrelated to rainfall, such as a sinkhole or a volcanic caldera.

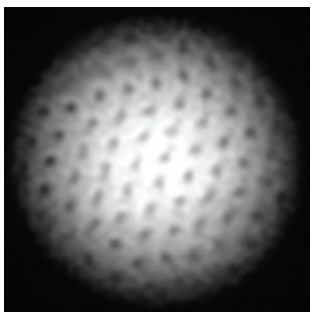
"It reminds me of the lava lakes seen on Jupiter's moon Io," said Dr. Torrence Johnson, an imaging team member at JPL.

"It is already clear that whatever this lake-like feature turns out to be, it is only one of many puzzles that Titan will throw at us as we continue our reconnaissance of the surface over the next few years," said Dr. Carolyn Porco, imaging team leader at the Space Science Institute in Boulder, Colo.

Thirty-nine more Titan flybys are planned for Cassini's prime mission. In future flybys the science teams will search for opportunities to observe the lake feature again and to look for mirror-like reflections from smooth surfaces elsewhere on Titan. Such reflections would strongly support the presence of liquids.

Whirling atoms dance into physics textbooks

By Jane Platt



Andre Schirotzek, MIT

Image shows a rotating superfluid made up of fermionic atoms.

NASA-funded researchers at the Massachusetts Institute of Technology have created a new form of superfluid matter. This research may lead to improved superconducting materials, useful for energy-efficient electricity transport and better medical diagnostic tools.

The research marks the first time scientists have positively created a friction-free superfluid using a gas of fermionic atoms, atoms with an odd number of electrons, protons and neutrons. The breakthrough happened on the night of April 13.

"It's a night I won't forget," said Dr. Wolfgang Ketterle, a Nobel Prize–winning physics professor at MIT who led the team of researchers. It was overwhelming to watch on our computers as the lithium atoms behaved in a way that no one had ever seen before."

To accomplish this experiment, Ketterle's team cooled a gas cloud of lithium atoms to nearly absolute zero (about minus 459 degrees Fahrenheit). They used an infrared laser beam to trap the gas, then a green laser to spin it.

A normal gas simply spins, but a superfluid can rotate only by forming quantum whirlpools. A rotating superfluid looks like Swiss cheese; the holes are the cores of the whirlpools. This is exactly what the MIT physicists observed that night.

In 1995, Ketterle and his team were among the first to create a Bose-Einstein condensate, composed of bosonic atoms that have an even number of electrons, neutrons and protons. In Bose-Einstein condensates, particles act as one big wave, a phenomenon predicted by Albert Einstein in 1925. That discovery earned Ketterle a shared Nobel Prize in Physics in 2001. Bose-Einstein condensates were later shown to be superfluids.

The new frontier became fermions. Fermions must pair up to have an even number of electrons, neutrons and protons, which allows them to form a Bose-Einstein condensate. Breakthroughs at MIT and several other institutions, including Duke University, produced Bose-Einstein condensation of fermion pairs loosely bound as molecules, but found no concrete evidence of superfluidity.

Over the past two years researchers have been looking for the "smoking gun" for fermionic superfluidity. Despite some hints and indirect evidence, it was not found until this research team's discovery.

Superconductivity is superfluidity for charged particles instead of atoms. High-temperature superconductivity is not fully understood, but the MIT observations open up opportunities to study the microscopic mechanisms behind this phenomenon.

"Pairing electrons in the same way as our fermionic atoms would result in room-temperature superconductors," Ketterle explained. "It is a long way to go, but room-temperature superconductors would find many real-world applications, from medical diagnostics to energy transport." Superfluid Fermi gas might also help scientists test ideas about other Fermi systems, like spinning neutron stars and the primordial soup of the early universe.

The MIT research was supported by the National Science Foundation, the Office of Naval Research, the Army Research Office and NASA's Fundamental Physics in Exploration Systems Mission Directorate. JPL manages the Fundamental Physics program.

The research was published in the June 23 issue of Nature.

5 JPL-led proposals win funding


David Diner


Lute Maleki


Tom Meehan


Delwyn Moller

NASA has awarded funding for 23 new investigations for instrument development under the Instrument Incubator Program. Five of the 11 JPL-led proposals were selected, as were four of six JPL submissions that include co-investigators. Instrument development will begin in fiscal year 2006.

The proposals, selected from a field of 82 submitted proposals, focus on high-priority science areas, including aerosol and trace gas measurements in the lower troposphere, ice topographic mapping and tropospheric winds measurements. The total funding for these investigations, over a period of three years, is approximately $62 million.

The main purpose of the Instrument Incubator Program is to identify, develop and, where appropriate, demonstrate new measurement technologies that reduce the risk, cost size and development time of Earth-observing instruments, and/or enable new observation measurements.

Summaries of JPL's winning proposals follow.

"A High-Accuracy Spectropolarimetric Camera for Aerosol Remote Sensing From Space." Principal investigator: David Diner, MISR principal investigator and a member of JPL's Science Division. Edgar (Ab) Davis of the GRACE Project is task manager and system engineer.

The objective is to demonstrate an imaging polarimetry concept based on the use of photoelastic modulators to achieve uncertainty in degree of linear polarization of 0.5% or better. This is a very challenging goal, particularly for an imaging sensor. The photoelastic modulators are envisioned as a key component of a next-generation multiangle, spectropolarimetric satellite imager that would be a successor to JPL's Multi-angle Imaging SpectroRadiometer, currently flying aboard NASA's Terra spacecraft. As a component of an integrated observing system consisting of satellites, aircraft and surface stations, such an instrument represents a significant advance in remote sensing of aerosols and their impacts on climate and air quality. The instrument would also provide new information on the properties of clouds and land surfaces.

"Atom-interferometer Gravity Gradiometer: An Instrument Prototype for Earth Science Observation Missions." Principal investigator: Lute Maleki, Quantum Sciences and Technology Group.

The extreme sensitivity and stability of the atom interferometer technique offers new capability for gravity mapping from space. This study proposes to further advance the technology of the atom interferometer-based gravity sensor by developing a portable prototype instrument—based on the group's current laboratory demonstration—that is portable and can be tested and validated in the field.

The successful development of this new technology will enable unprecedented Earth observation measurements and bring a breakthrough, ultra-sensitive gravity gradiometer to usher in a new era, beyond the GRACE capability, for precision gravity mapping at global as well as regional scales. The new capability will not only provide data for geodesy and oceanography, but also generate high-resolution data for planetary inner structure and dynamics. More importantly, this technology will produce high-stability data for time-dependent monitoring of dynamical processes on the surface and deep within Earth's mantle. In addition, this technology can be potentially used for gravity mapping of Mars and other planets.

"A GNSS Remote-Sensing and Ultra-High-Accuracy Precise Orbit Determination Instrument (GRSPI)." Principal investigator: Tom Meehan. Co-investigators: Yoaz Bar-Sever, George Hajj, Stephen Lowe and Lawrence Young.

In the coming decade, new global radio navigation signals for Global Positioning System (GPS) and the debut of Galileo, the European Global Navigation Satellite System (GNSS), will provide a wealth of signal sources for scientific study. The GNSS Remote-Sensing Instrument will be a prototype development designed to take advantage of these new signals, especially as they might be applied to scientific measurements of the Earth's atmosphere, oceans, ice and gravity. From low-Earth orbit, several hundred such signals per day can be observed from a single satellite as they reflect off the Earth's surface or refract through the atmosphere.

Re-configurable signal processing hardware provides a low-cost solution to making different classes of measurements as well as staying compatible with future GNSS signals. GRSPI will leverage JPL's 14 years of spaceborne GPS experience to design a fully functional prototype aligned with a path to a flight science instrument. Aircraft testing is scheduled for July 2008.

"A Ka-Band Digitally Beamformed Radar Interferometer for Topographic Mapping of Glaciers and Ice Sheets." Principal investigator: Delwyn Moller. Co-investigators: John Huang, Eric Rignot and Gregory Sadowy.

This effort proposes development of technology that addresses a NASA Research Announcement science priority of ice topographic mapping "capable of providing precise elevation and detailed imagery data for measurements on glacial scales for detailed monitoring of ice sheet and glacier changes." It will enable measurement and derivation of data products not obtained from any other current instrument, with a solution that offers high science value through the application of low-power, high-frequency, and therefore decreased mass radar instrumentation.

The proposal calls for the design, development and demonstration of a novel digital antenna system and associated digital beamforming, synthetic aperture radar, calibration, and height-retrieval algorithms that enable this unique mapping capability. The proposal includes delivery of a complete mission and system design, allowing follow-on efforts to insert this advanced technology into a future flight mission.

"Large Aperture, Scanning, L-Band Synthetic Aperture Radar." Principal investigator: Alina Moussessian.

Lightweight, large-aperture, electronically-steerable space-based radar antennas are required to address future Earth science measurement needs. One method to dramatically reduce the weight, volume and associated cost of space-based radars is to replace the conventional rigid manifold antenna architecture with a flexible thin-film membrane, such as JPL's membrane patch-array antenna.

The proposal will address the signal distribution architecture and interconnect technologies required for large arrays, without which future missions will not be possible. The completion of this task will demonstrate a fully functional proof-of-concept radar system with a 2 meter by 3.5 meter active membrane antenna integrated with transmit/receive modules and backend radar electronics. Data will be collected and analyzed using this radar.

JPL scientists were also selected as co-investigators on four winning proposals: Ernesto Rodriguez and Tony Freeman on "Glaciers and Ice Sheets Interferometric Radar" (Kenneth Jezek, Ohio State University, PI); Chip Miller on "Development and Evaluation of a 2-Micron Differential Absorption Lidar for Profiling CO_2" (Syed Ismail, Langley Research Center); Stuart McDermid on "Development of UAV-based Global Ozone Lidar Demonstrator" (Edward Browell, Langley Research Center); and Bill Wilson on "Development of an Agile Digital Detector for RFI Detection and Mitigation on Spaceborne Radiometers" (Christopher Ruf, University of Michigan, Ann Arbor).

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meets Wednesdays at 11:30 a.m.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (the Wellness Place).

Codependents Anonymous—Meets at noon every Wednesday.

Lambda (Gay, Lesbian, Bisexual and Transgender Networking Group)—Meets the first Friday and third Thursday of the month at noon in Building 111-117. For more information, call Randy Herrera, ext. 3-0664.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in Building 167-111 (the Wellness Place).

For more information on any of the support groups, call the Employee Assistance Program at ext. 4-3680.

Thursday, June 30

Clogging Class—Meets at noon in Building 300-217. For more information, call Shary DeVore at ext. 4-1024.

JPL Golf Club—Meeting at noon in Building 306-302.

Tuesday, July 5

JPL Gamers Club—Meeting at noon in Building 301-227.

Wednesday, July 6

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at La Cañada United Methodist Church, 104 Berkshire Place, La Cañada. Call (626) 794-1698 to leave a message for an ARC board member.

JPL Library Orientation—Stop by Building 111-104 at 11:30 a.m. for an overview of the Library's products and services, and learn how to access numerous electronic resources from your desktop. For more information, call the reference desk, ext. 4-4200.

Thursday, July 7

Investment Advice—Fidelity will offer one-on-one counseling in T1720. For an appointment, call (800) 642-7131.

JPL Gun Club—Meeting at noon in Building 183-328.

Friday, July 8

"MER Project: Stealing Success from the Jaws of Failure"—Mars Explor-ation Direc- torate Chief Engineer Rob Manning will speak at 12:30 p.m. in Building 180-101.

Sunday, July 10

"Doubt: A History"—Dr. Jennifer Michael Hecht, assistant professor of history at Nassau Community College, will speak at this Skeptics Society–sponsored lecture at 2 p.m. in Caltech's Baxter Lecture Hall. Tickets are $5 for Skeptics Society members, $8 for nonmembers, $5 for students. For more information, call (626) 794-3119.

Tuesday, July 12

Claremont Graduate University Open House—Claremont's School of Management will be featured from 11:30 a.m. to 1 p.m. in the 180-101 conference room. The university is currently offering three degree programs and three certifications that focus on both theory and application. For more information about the programs, visit *http://drucker.cgu.edu* or contact Robert Linka, director of recruitment/admissions, at (909) 607-7812. For questions on the open house, call Professional Development at 4-3750 or visit *http://hr/et.*

JPL Genealogy Club—Meeting at noon in Building 301-271. A program on the use of DNA testing in genealogy will be featured. Guest speaker will be Doug Miller, coordinator for the Land Surname DNA Project and a founder of the International Society of Genetic Genealogy.

JPL Stamp Club—Meeting at noon in Building 183-328.

JPL Web Developers—Meeting at noon in conference room 167, where there will be a talk on Web page security.

Wednesday, July 13

"Choosing your TIAA/CREF Income Options"—This workshop will be offered from 10 to 11:30 a.m. in Building 180-101. It is designed for employees who are within a few years of retirement and provides a comprehensive discussion of all of TIAA/CREF's income options.

JPL Amateur Radio Club—Meeting at noon in Building 238-543.

JPL Toastmasters Club—Meeting at 5 p.m. in conference room 167. Call Dirk Runge, ext. 3-0465, or visit *www.jplcaltechtoastmasters.com.*

JPL Library Orientation—Stop by Building 111-104 at 11:30 a.m. for an overview of the Library's products and services, and learn how to access numerous electronic resources from your desktop. For more information, call the reference desk, ext. 4-4200.

TIAA/CREF Enrollment Meeting—This workshop at noon in Building 180-101 is designed to assist employees newly eligible for the Caltech/JPL retirement plan with selection of investment options and the completion of their enrollment forms.

Thursday, July 14

Athenaeum Membership Briefing—Attend this session to learn about expanded membership eligibility to all regular full-time employees of Caltech and JPL (both exempt and non-exempt). To be held at 11 a.m. in Con-ference Room 180-101. If you plan to attend, RSVP to *athenaeum@caltech.edu.* Delectable sweets will be provided.

Clogging Class—Meets at noon in Building 300-217. For more information, call Shary DeVore at ext. 4-1024.

Saturday, July 16

Cassini Talk, Star Gazing Party—Dr. Kevin Grazier, Cassini investigation scientist, and Steve Edberg, JPL astronomer, will present a lecture on Cassini, followed by a look at the stars and planets through telescopes. To be held from 7:30 to 9:30 p.m. at the Eaton Canyon Nature Center, 1750 N. Altadena Drive, Pasadena. All ages are welcome; no hiking required. Requested donation is $3 per person. Kids under 2 are free; family discounts are available upon request. Reservations are requested for groups of 10 or more. For more information, call (626) 398-5420 or visit *www.ecnca.org.*

Saturday, July 30

JPL Dodgers Day—The Dodgers host the St. Louis Cardinals at 1:10 p.m. Tickets are $5 and include admission to the right-field pavilion and a pregame carnival that starts at 11 a.m. Purchase tickets on Lab at the JPL Store or the Credit Union, Building 218. At Caltech, tickets are available at the ticket office, bookstore and Human Resources. For more information, call Caltech Human Resources, (626) 395-8661.

In recognition of the outstanding accomplishments, performance and key contributions to NASA over the past year, the agency presented its annual Honor Awards on June 22 to JPL employees, subcontractors and partners.

NASA HONOR AWARDS

Richard Hasegawa / JPL Photolab

RECOGNIZE LAB'S BEST

Al Diaz, NASA Associate Administrator for the Science Mission Directorate, joined JPL Director Dr. Charles Elachi in presenting 146 awards in nine different categories. In addition, the ceremony included the winner of the new One NASA Peer Award. NASA established this award program in October 2004 to recognize individuals and teams who exhibit behaviors that contribute to the One NASA approach, which emphasizes a strong commitment to teamwork, tools and capabilities for greater collaboration.

Public Service Group Achievement Award

Given to a group of nongovernment employees in recognition of an outstanding accomplishment that has contributed substantially to the NASA mission.

2001 Mars Odyssey Spacecraft Team, Microwave Limb Sounder Gas Laser Team, Rosetta Alice Instrument Team, Rosetta Ion and Electric Sensor Team, Rosetta Orbiter Sensor for Ion Neutral Analysis Double Focusing Mass Spectrometer Team, Spitzer Space Telescope Archive Development Team, Spitzer Space Telescope Infrared Array Camera Commissioning Team, Spitzer Space Telescope Infrared Spectrograph Commissioning Team, Spitzer Space Telescope Multiband Imaging Photometer Commissioning Team, Spitzer Space Telescope Observatory Engineering Team.

Group Achievement Award

Given in recognition of an outstanding accomplishment that has been made through the coordination of many individual efforts and has contributed substantially to the accomplishment of the NASA mission. This award may be used to recognize the accomplishments of either a total government employee group or, as a team award, a group comprised of both government and nongovernment personnel.

2001 Mars Odyssey Flight Operations Team, 2001 Mars Odyssey Gamma Ray Spectrometer Team, 2001 Mars Odyssey Martian Radiation Environment Experiment Team, 2001 Mars Odyssey Project Management Team, 2001 Mars Odyssey Science Operations Support Team, 2001 Mars Odyssey Thermal Emission Imaging System Team, Arrayed High-Electron-Mobility Transistor Detector Team, Autonomous Sciencecraft Experiment Team, Aura Microwave Limb Sounder Ground Data System Development Team, Aura Microwave Limb Sounder Instrument Team, Aura Tropospheric Emission Spectrometer Instrument Team and Ground Data System Development Team, Canberra Deep Space Communication Complex Automation Centre of Excellence Temporal Dependency Networks Team, Cassini Attitude and Articulation Control System Team, Cassini Flight Team, Cassini Integrated Test Laboratory Team, Cassini Imaging Science Subsystem and Visible and Infrared Mapping Spectrometer Operations Team, Consultative Committee for Space Data Systems File Delivery Protocol Standard Development Team, Consultative Committee for Space Data Systems Proximity-1 Space Link Protocol Development Team, Conference Room Team, Employment Process Improvement Committee, Engineering and Science Directorate Reorganization Design Team, Global Differential GPS Team, Hyperspectral Quantum-Well Infrared Photodetector Imager Team, Inflatable Reflectarray Antenna Development Team, Information Services Operations Team, Keck Interferometer Team, Maintaining an Approved Procurement System Team, Mars Exploration Rover First Extended Mission Team, Mars Exploration Rover Second Extended Mission Team, Mars Express Image Processing Software Development Team, Mars Public Engagement Team, Mars Ultrahigh Frequency Relay Operations Team, Media Relations Office Team, Multimission Image Processing Laboratory Mars Exploration Rover Operations Team, Object-Oriented Technology Team, Office of Protective Services Administrative Security Group, Project Support Video Conference Team, Rosetta Microwave Instrument Team, Space Interferometry Mission PlanetQuest Diffraction Testbed Team, Space Interferometry Mission PlanetQuest Kite Metrology Testbed Team, Space Interferometry Mission PlanetQuest Microarcsecond Metrology Testbed Team, Spitzer Space Telescope Downlink Performance Improvements Team, Spitzer Space Telescope Education and Public Outreach and Public Affairs Team, Spitzer Space Telescope First-Look-Survey Science Team, Spitzer Space Telescope General Observer Cycle 1 Time Allocation Process Team, Spitzer Space Telescope Integrated Mission Efficiency Improvement Team (Engineering, Mission Sequence and Observatory Planning and Sequencing teams), Spitzer Space Telescope Multimission Integrated Support Team, Stardust Flight Team, U.S. Rosetta Navigation and Tracking Support Team, U.S. Rosetta Project Management Team.

Public Service Medal

Awarded to any individual who was not a government employee during the period in which the service was performed. The award is granted for exceptional contributions to the NASA mission.

William Boynton, Philip Christensen, Giovanni Fazio, D. Christopher Martin, George Rieke, John Scherrer, John Straetker.

Exceptional Scientific Achievement Medal

Awarded for unusually significant scientific contributions toward achievement of the NASA mission. This award may be given for individual efforts that have resulted in a contribution of fundamental importance in this field or have significantly enhanced understanding of this field.

Ichiro Fukumori, James Houck, Michael Watkins.

Exceptional Service Medal

Awarded for significant, sustained performance characterized by unusual initiative or creative ability that clearly demonstrates substantial improvements or contributions in engineering, aeronautics, spaceflight, administration, support or space-related endeavors that contribute to the NASA mission.

Magdy Bareh, Mark Boyles, George Carlisle, Willis Chapman, Izeller Cureton-Snead, David Deats, H. Kent Frewing, Mark Garcia, Gary Glass, Troy Dean Goodson, Brian Hammer, Candice Hansen, Edward Hirst, James Hodder, James Holden, Shin Mark Huh, Stephen Kulczycki, Danny Lam, John Martonchik, Richard Miller, Andrew Mishkin, Robert Mitcheltree, Leticia Montañez, Pablo Simon Narvaez, Brian Paczkowski, Deborah Padilla, Helen Paley, Robert Rasmussen, Charles Scott, Donald Sweetnam, Grace Tan-Wang, Nancy Van Wickle, Kenneth Yamane.

Exceptional Achievement Medal

Awarded for significant, specific accomplishment or contribution clearly characterized by a substantial and significant improvement in operations, efficiency, service, financial savings, science or technology that contributes to the NASA mission.

David Berry, James Border, Yi Chao, Gun-Shing Chen, Arthur Chmielewski, Brian Cooke, Polly Estabrook, Margaret Frerking, Samuel Gulkis, Michael Gunson, Robert Jarnot, Cynthia Kahn, Aaron Kiely, Eug-Yun Kwack, Gary Lau, Earl Maize, Justin Maki, Robert Mase, Andrew O'Dea, Herbert Pickett, Jeffrey Plaut, David Rider, Kirk Seaman, Zdenek Sekanina, Robert Sherwood, S. Terese Smith, Robert Toaz Jr., Bruce Waggoner, Guy Webster.

Exceptional Engineering Achievement Medal

Awarded for unusually significant engineering contributions toward achievement of the NASA mission. This award may be given for individual efforts or applications of engineering principles or methods that have resulted in a contribution of fundamental importance in this field or have significantly enhanced understanding of this field.

David Bayard, Johnny Kwok.

Outstanding Leadership Medal

Awarded for notably outstanding leadership that has had a pronounced effect upon NASA technical or administrative programs. The leadership award may be given for an act of leadership or for sustained contributions based on an individual's effectiveness as a leader, the productivity of the individual's program, or demonstrated ability to develop the administrative or technical talents of other employees.

Claudia Alexander, Blaine Baggett, Dennis Flower, Thomas Glavich, Samad Hayati, Robert Mitchell, Thomas Thorpe, Gregg Vane, Michael Werner.

Distinguished Service Medal

Awarded to any person in the federal service who, by distinguished service, ability or courage, has personally made a contribution representing substantial progress to the NASA mission in the interest of the United States. The contribution must be so extraordinary that the other forms of recognition by NASA would be inadequate. This is the highest honor that NASA confers.

Chris Jones, Gentry Lee, Firouz Naderi.

One NASA Center-Best for JPL

Kasthuri Venkateswaran.

Athenaeum available to all JPL employees

Recently, the Athenaeum, Caltech's premier faculty club, expanded membership eligibility to all regular full-time employees of Caltech and JPL (both exempt and non-exempt). This change was approved by the Athenaeum Board of Governors to recognize the valuable contribution made by each employee in achieving the Caltech/JPL academic, engineering and scientific missions. The bi-annual membership drive is currently underway at Caltech and JPL.

"Many new members are expected to join the Athenaeum's current membership of about 4,000 facility, trustees, alumni, staff, graduate students and Caltech Associates," said Cory Stevens, the JPL representative on the Athenaeum membership committee. Membership confers on employees privileges not found elsewhere. Members may dine there Monday through Friday, and they may also host wedding receptions or other events at the Ath, as the club is affectionately called. Two other major events are the holiday brunch and the Mother's Day brunch. The Ath is also a popular venue for end-of-year holiday parties because of the sumptuous winter theme décor.

Opened in 1930 on the Caltech campus, the building on the corner of California Boulevard and Hill Avenue has for decades served as an elegant place for meetings, dinners in the luxuriously appointed halls and private parties. The first formal event ever held at the club took place in February 1931 coinciding with a time when a very special guest, Albert Einstein, was working at Caltech and living with his wife at the Ath. That hotel room is now called the Einstein Suite and is one of 28 second-floor rooms available to members and their guests.

Monthly dues depend on the member's Human Resources employee classification level and range from $15.75 to $31.50. There is no initiation fee.

All JPL regular employees are invited to a membership briefing on July 14 at 11 a.m. in conference room 180-101. If you plan to attend, RSVP to *athenaeum.caltech.edu.*

JPL'S ONLINE NEWS SOURCE

http://dailyplanet

View this and previous issues of Universe at

dailyplanet.jpl.nasa.gov/universe/index.php

E-mail us at

universe@jpl.nasa.gov

Universe

Editor
Mark Whalen

Design + Layout
David Hinkle, Audrey Steffan/ Design Services

Photography
JPL Photo Lab

Advertising
Anisia Sisikin

Universe is published every other Friday by the Office of Communications and Education of the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109.

Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted via e-mail to universe@jpl.nasa.gov *and are due at 2 p.m. on the Monday after publication for the following issue.*

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

Letters

I want to thank my many friends at JPL for their expressions of support during the illness and passing of my wife, Judy. Your acts of kindness were appreciated by Judy and have been a source of comfort to me. I appreciate the words of encouragement, cards, flowers and contributions to the American Cancer Society from the Director's Office, the Astronomy and Physics Directorate, the Astronomy and Physics Experiments Office and my many friends and colleagues in the JPL family. Your thoughtful consideration has been impressive, and for that I am extremely grateful. Thank you!

John Wellman

I would like to thank my friends and co-workers from the Facilities Division for their kind thoughts and prayers on the passing of my beloved mother. She is at peace now. Also, thank you for the plant and flowers.

Myrna Snitowsky and family

My family would like to thank our friends and coworkers in Sections 387 and 386 for their support at the loss of my stepfather, Don Hays, on May 25. We'd also like to thank you for the lovely plant in his memory. We're grateful to our JPL family for always being there for us; your thoughtfulness and concern truly warms our hearts.

Tom & Rosemary Guerrero, Sections 2820 and 3817

I would like to thank Section 375 and all the others for my retirement luncheon on Friday, May 20. I was very much surprised and honored that so many attended! Thank you also for the great gift! A special thanks to Curtis Conemac and Dean Allen for their tremendous efforts on such short notice. Thanks again to everyone; I'll always cherish that luncheon!

Don George

Retirees

The following JPL employees retired in June:

Michael Carney, 44 years, Section 314B; Jan Loreman, 41 years, Section 333B; Samuel Petty, 41 years, Section 3330; Larry Simmons, 40 years, Section 7000; Joanne Kennedy, 35 years, Section 4300; Terry Fisher, 34 years, Section 3760; Sandra Bedrossian, 29 years, Section 1112; Larry Preheim, 28 years, Section 3860; Donald George, 26 years, Section 375; Jeanie Hascher, 13 years, Section 1110.

Classifieds

For Sale

BABY ITEM, Evenflo Megasaucer, baby can swivel, bounce, play music, stand or sit for exercise or entertainment, several developmental toys attached to saucer, excellent condition, $20. 502-0768, Raquel.

BED: king-sized mattress, box spring and frame, firm, exc. cond., $375. 626/794-0081.

BED, twin, cherry headboard and gently used Beautyrest mattress & box spring, exc. cond., $275. 249-2420.

CEILING FAN w/light fitting, 48," like new, brightly colored, suitable for kid's room, $50, e-mail for pics: mvozoff@hotmail.com. 272-1994, Max.

COMPUTER, brand new Toshiba Satellite S114 notebook, carrying case and Canon PIXMA iP1500 photo printer in unopened box, $750. 626/241-7084, Steve.

COMPUTER DESK, solid oak, $100, photos available on request. rbecker5@earthlink.net, 626/574-9664.

DESK, wood (no veneer), light honey color, glass top, approx. 32" x 58", two bread boards, drawers include 1 file drawer, top-center drawer has built-in compartments, could use refinishing, otherwise a great desk, $45; chair, matches desk, solid wood, $5, pictures available. 909/596-4390.

DRESSER, Lane, + matching cedar chest, dresser has 9 drawers and matching double mirror, exc. cond., $150/obo for all 3 pieces. 626/791-7645.

DINING SET, Ikea, table with glass top and 4 chairs, mint cond., $70/obo. 626/376-0473.

ELECTRONICS TEST EQUIPMENT, vintage (1950s oscilloscopes, VTVMs, tube tester, etc.) and large number of vacuum tubes from '40s, '50s and '60s. 790-2013.

FURNITURE: butcher's chopping block, solid end-grain maple, 24" x 24" x 10," stands 34" high on 4 legs, $250; plan hold rack, stores plans, charts, maps, with roll-around wheels and 10 clip bars, good condition, $75; office desk, wood, 34" x 60", 6 drawers including one file drawer. 957-8346.

FURNITURE: sofa dual-recliner and love seat, contemporary w/pub-style back and deep stitched contours in soft textured abstract fabric, light color, $580 for a set, or can sell separately; computer desk, dark brown, $20. 626/799-7593.

INVERSION TABLE, Hang Ups, F5000III, hang upside down for back relief, paid $300, used 10 times, like new, sell for $175/obo. 626/577-2882.

JEWELRY: 14 K tri-color gold diamond cut bracelet, $140; 14 K two-sided 18" diamond cut necklace, $200. 653-9037.

JEWLERY: ladies YG 16 diamond cross pendant, (.75 t.c.w. of baguettes and round diamonds), w/16" chain, paid $310, sell for $160. 323/697-7261.

KIDS' POOL by Little Tykes, blue hard plastic, very sturdy quality construction, outer dia. 5', water area is 4' dia. and 1' deep if filled to brim, small integral slide, drain plug, $20. 626/303-1927.

LOVESEAT w/pop-up foot rests, built-in pillow back, subtle pattern and soft colors, 60" long, 36-37" high, exc. cond., great for college student apt., $250, buyer responsible for pick-up, photos available via e-mail. 626/470-5303, 9 a.m.-3:30 p.m. weekdays.

MISC: carpet shampooer (needs washer replacement on handle), $15; wig, red, shoulder length, never used, $20; fishing pole (saltwater), $25; baseball glove (small, left handed) & conditioner, good cond., $15; landscape oil painting, autumn tones, $100; antique cedar chest (lid needs repair), $75; trash can w/wheels, $5; '50s Motorola TV "shell," $20; antique pot w/handle, $10. 626/357-8210.

MISC: garden weed whacker, used twice, exc. cond., $25; Danish modern cherry wood dining room set w/6 chairs and china hutch, $400. 626/359-7666.

MISC: sofa, 8' long, light blue floral chintz upholstery, heavy, solid construction, excellent condition, $175/obo; drapery, matches sofa, floor-length tie-back panels and valance, vg condition, 2 sets, $60; drapes, loose weave, cream with pink dots, floor length, 2 sets, $60, drapery has been cleaned and is on hangers, photos available. 909/596-4390.

MISC: large oak "teacher desk," 6 drawers, 2 pull-out writing surfaces, $250; Trek child's 6-speed red mountain bike, 12.5" frame, 20" tires, $80; premiere raised aerobed, used once, $95. 359-3644.

PHOTOGRAPHER'S KIT, Canon EOS Digital Rebel camera, with 18-55 mm and a 28-300 zoom lens, equipped w/matching polarizing filters for each, a 512 MB flash card, Li-ion battery pack, software instructions, disks and a tarmac bag for all the items, $1,200. 957-8926, 5-9 p.m. or 618-8771, cell/day, Mark.

RINGS: diamond anniversary (1 CT) w/gift box, $750; diamond (10 K YG) w/gift box, $99. 393-5164, Valerie.

RECLINER, swivel/rocker chair, sea foam color, exc. cond., approx. 36-37" high, $185, photos available via e-mail, chair color matches color in loveseat, buyer responsible for pickup in Monrovia. 626-470-5303, 9 a.m.-3:30 p.m., weekdays.

SHOES for girl toddler, Stride Rite, pink hearts w/lights, brand new, size 8, paid $45, sell for $25. 714/280-6488.

STROLLER TRAVEL SYSTEM, Eddie Bauer, great cond., only right back brake broken, one hand closure, large bottom basket, adj. seat, canopy, parent tray w/sunglasses and cup holders, removable car seat from car to stroller also great cond., all hunter green/tan plaid, very classy, $75. 265-9425.

TELESCOPE, 8" Dobsonian reflector, $100. 626/797-4453, Joe.

TROPICAL PLANTS, plumerias, variety of colors and sizes; shell gingers. 626/444-6156, Annie & Bob DePonte.

WRIST COMPUTER, Suunto S6, great for the sports enthusiast, $250/obo. 364-1283, Valerie.

WATER SKI package deal, 1 pair double skis, 2 singles incl. 1 Ho Premiere, 2 extra boots for singles, 2 Ski-Master vests (S&M), tow rope, $200/obo. 626/576-3942, Dick.

Vehicles/ Accessories

'02 BMW 325i 4-dr. sedan, 2.5 inline-6, 5 spd. manual, power locks/mirrors/windows, CD, keyless entry & alarm, white on sand leatherette, exc. cond., only 20K mi., free maintenance until 48K mi., $22 K. olmg@caltech.edu.

'03 GMC Sonoma truck, 3-door extended cab, SLS trim, economical 4-cyl, one owner, auto, 15,700 miles, AC, power steering, tilt wheel/ cruise control, CD player, alum. wheels, tachometer, heavy duty suspension, white color, exc. cond., under warranty, sell at Kelly Blue Book trade-in value of $10,750 firm. 952-0047.

'97 HONDA Civic LX, 4-dr. sedan, automatic transmission, 73K mi., a/c, stereo, am/fm, dual airbags, white exterior/gray interior, good clean cond., alarm remote entry system, original owner, $7,000/obo. 323/254-6438, Ben.

'95 LAND ROVER Range Rover SE, V8, 4.0 L, auto, 4WD, 138K, tan, leather seats, cd, ps, pw, dual airbags, moonroof, runs great, good condition, $6,500/obo. 626/296-9073 or 818/515-2461.

'97 MITSUBISHI Eclipse GST, 2 dr., silver w/gray interior, 5 spd., loaded, rims, a/c, CD/ tape stereo, spoiler, additional upgrades etc., exc. cond., orig. owner, clean title, 114K mi., $8,700, negotiable. 661/433-8126, Eldrin.

'98 MERCEDES CLK, a dream car sold under value, 92K mi. w/one owner, non-smoker, no pets, exc. cond., 2-dr. silver coupe w/black leather interior, automatic everything, all the luxuries you expect from a Benz, registration paid for full year, $14,700. 542-6424, Patricia, after 6 p.m.

'03 NISSAN Altima, 2.5 S, 38,298 mi., airbags, abs, a/c, cc, tilt, p/seats/windows/steering/door locks/mirrors, tint, am/fm, gray with gray interior, runs great, very reliable, exc. cond., $14,000/obo. 626/296-0055.

'01 TOYOTA Corolla CE, manual trans, 4 dr., 43K mi., only oil changes required, white w/minor scratches, tires recently replaced (4 Michelins), $7,995. 626/577-2882.

'99 TOYOTA Camry LE, black, auto, a/c, am/fm/cass/CD, very nice stereo, cruise control, dual airbags, all power, no accident, 90K mi., black tinted windows, vg cond., well maintained, $7,100/obo. 831-2923.

TRANSMISSION OIL, Dextron/Mercon, Chevron and Certified Brands, 5 cases left, $14 per case of 12. 249-6071.

Wanted

BOOSTER SEAT, used, to buy for car, for a 3- to 4-year-old, in good condition. 626/577-6773.

COMPUTER w/color monitor and CD drive, needed for toddlers to learn how to use computer. 714/280-6488.

HOUSING for visiting professor and family for 1-yr. sabbatical, apartment/condo/house, 2-3 bd., 2 ba., unfurnished/furnished, 1-year lease, close to JPL, around $1,500/month, start Aug. 5-15. 626/794-2431.

HOUSING: seeking 3-4 bedroom house in Arcadia, ready for immediate occupancy. gehrleinmt@aol.com, Mike.

JUNIOR TOASTMASTERS CLUB MEMBERS for "Teen Expressions," ages 12-17, mission is to provide training in communication and leadership skills, club meets every Friday 7-8:30 p.m. at Faith Community Church in West Covina, $10 fee per member for each 6-month term. 626/962-7909, Tadd Small.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present, for personal use. 790-8523, mrayman@alumni.princeton.edu, Marc Rayman.

SINGER, 20-26 years of age, influences: Seven-dust, 311, Deftones. 626/357-8210.

Free

BBQ, Weber charcoal kettle grill, may need replacement grates. 626/398-3649.

For Rent

ALTADENA, beautiful ranch-style house in quiet neighborhood, two blocks from national forest trails, 3 bd., 2 ba. (master jet bath), 1,350 sq. ft., carport, gardener included, $2,100. 314-5891, landlord.

ALTADENA, for lease, large 3 bd., 2 ba., fam., liv., kit., firepl., ceil. fans, sft. H2O, reverse osmosis & more, hrdwd. flrs., new cpt. in fam. & bath, Jacuzzi, close to JPL, corner lot, lots of trees incl. apricot & plum, grdnr. incl. 808/226-6598, gindifrench@yahoo.com.

ALTADENA, charming 2 bd.,1 ba. house near Christmas Tree Lane, hardwood floors, fireplace, appliances, whole-house fan, fenced backyard, fruit trees, roses, $1,850, negotiable (includes water, gardener, trash), see www.alumni.caltech.edu/~chrisc. 626/794-9579, eves.

ARCADIA apt., 2 bd.+den, 1 ba., garage, upstairs unit, clean, spacious, washer/dryer in unit, a/c, stove, walking distance to shops, near Santa Anita Fashion Park, exc. quiet neighborhood, close to JPL, no pets, water/ gardener/trash included, $1,499 +util., security deposit. 415-4175 or e-mail cpl@caltech.edu.

ARCADIA house, new large custom 2 story, 5 bd., 3 full ba., 2,464 sq. ft., Corian countertops, stainless steel appliances, maple wood floors, cat 5 E fully wired, security alarm, central air, end of a cul-de-sac, center of quiet private gated community w/pool, BBQ and spa, near 210/605/10 freeways and City of Hope, $3,395. 310/766-1711.

LA VERNE home, 4 bd., cac, near schools, fwy. 909/593-7004.

MONTROSE apt., 2 bd., 1 ba., a/c, garden, off-st. pkng., lndry., view, trash/wtr./grdnr. pd., 10 min/JPL, walking dist. to Montrose Mall, $1,250. 248-4637.

PASADENA, Caltech's health educator seeking non-smoking, cat-friendly roommate to share 2 bd., 2 ba. condo, 2 blocks from campus, unfurnished bedroom/private bath available, amenities include central air/heat, fireplace, large balcony, lots of closet space and laundry, terrific location, avail. August 1, 1-year lease, $800 + 1-mo. security deposit. 626/833-2961, Jane, or msw204@hotmail.com.

SUNLAND, large 2+1, 3 closets, patio, newly remodeled, carport, storage cabinet, 4 unit building, quiet, nice landscape, built-in oven, and cook top, new carpet, parking, laundry, dining area, marble counter bar, must see to appreciate, kitchen stained ash hardwood cabinets, consider pets, AC, large bathroom, $945. 248-7610.

TUJUNGA duplex, 9 mi. to JPL, lg. 2 bd., 1 ba., w/small yd. on cul-de-sac, stove and a/c included with w/d hookups, gardener and water paid by owner, close to library & shopping, move-in cond., $1,400+deposits. 353-4669.

Real Estate

ESCONDIDO, golfers paradise timeshare (Lawrence Welk Villa), fixed week #23 w/high RC/trading value, Wild Animal Park Zoo & Sea World are close by, spacious 1,600 sq. ft., 2 bd., 2 full ba., all the amenities, includes a cathedral vaulted ceiling and outside veranda overlooking a beautiful 18-hole golf course, $10,500. 249-6071.

Vacation Rentals

BIG BEAR LAKEFRONT luxury townhome, 2 decks, tennis, indoor pool/spa, beautiful master bd., suite, slps. 6. 949/786-6548.

BROOKINGS, OREGON, Moosehead Lodge at the Winchuck River Estuary, fully furnished 3 bd., 2 ba., one mile from California border, walk Pelican Bay beach with tide pools, surf and driftwood, fish the Pacific or wild rivers along Southern Oregon/Northern California coast, enjoy the Redwood and Siskiyou National Forests. 800/221-8175, www.mooseheadlodgeoregon.com.

CAMBRIA, ocean front house, exceptional white water view, accommodates up to 4 people, all amenities provided. 702/256-1359, ereynolds2@cox.net.

CAYUCOS, vintage saltbox residence, downtown, 2 min. to beach and pier, sleeps 15, or occupy one of the 3 separate units: 1-bd. studio cottage, 2-bd. apt. or 3-bd., 2-ba. unit; each w/kitch., patio or deck, decorated like B&B; see weekly summer rates/photos at www.thesaltbox.com. 248-7499, Jane.

FLORIDA condo, beautifully furnished 2 bd., 2 ba., second floor, on the surf of New Smyrna Beach, half-hour to Cape Canaveral, 90 min. to Disney World, enjoy all the quiet, relaxing comforts of home, overlooks the beach and Atlantic, BBQ, pool, game room, easy walk to stores and restaurants. 760/439-7821, Darlene or e-mail dfhauge@yahoo.com.

GRAND TETON/YELLOWSTONE NATIONAL PARKS, visit in style, 2 bd. + loft townhome, totally outfitted, borders Grand Teton with stunning view, sleeps 6, cable, microwave, etc. conniematt@sbcglobal.net.

HAWAII, Maui condo, NW coast, ocean-front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps 4, laundry fac., $145/nite/2, $20/nite/add'l person. 949/348-8047, e-mail jackandrandy@cox.net.

HAWAII, Maui, Westin Ka'anapali ocean resort, 7 nights, Oct. 30-Nov. 6, 5-star luxury on the beach, 1 bd. w/full furnished kitchen and living room, private balcony, washer/dryer, sleeps 4, sofa bed in living room, 900 sq. ft., $250/night/ obo, view resort at www.westinkaanapali.com. fivestarresorts@earthlink.net.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, slps. 6-8, fully equip'd kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/mtn. vw., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL disc'nt. 626/798-9222 or 626/794-0455 or valeriee@caltech.edu.

OCEANSIDE, on the sand, charming 1-bd. condo, panoramic view, walk to the pier or harbor, pool, spa, game rm., sleeps 4. 949/786-6548.

ROSARITO BEACH condo, 2 bd., 2 ba., furnished, ocean view, tennis, pool, short walk to beach on priv. rd., 18-hole golf course 6 mi. away. 626/794-3906.

TIMESHARES, many locations, 1 bd. (upgrades may be available), upscale accommodations with kitchens, great for families, worldwide, great rates. 364-1283, Valerie.