# Universe

Jet Propulsion Laboratory

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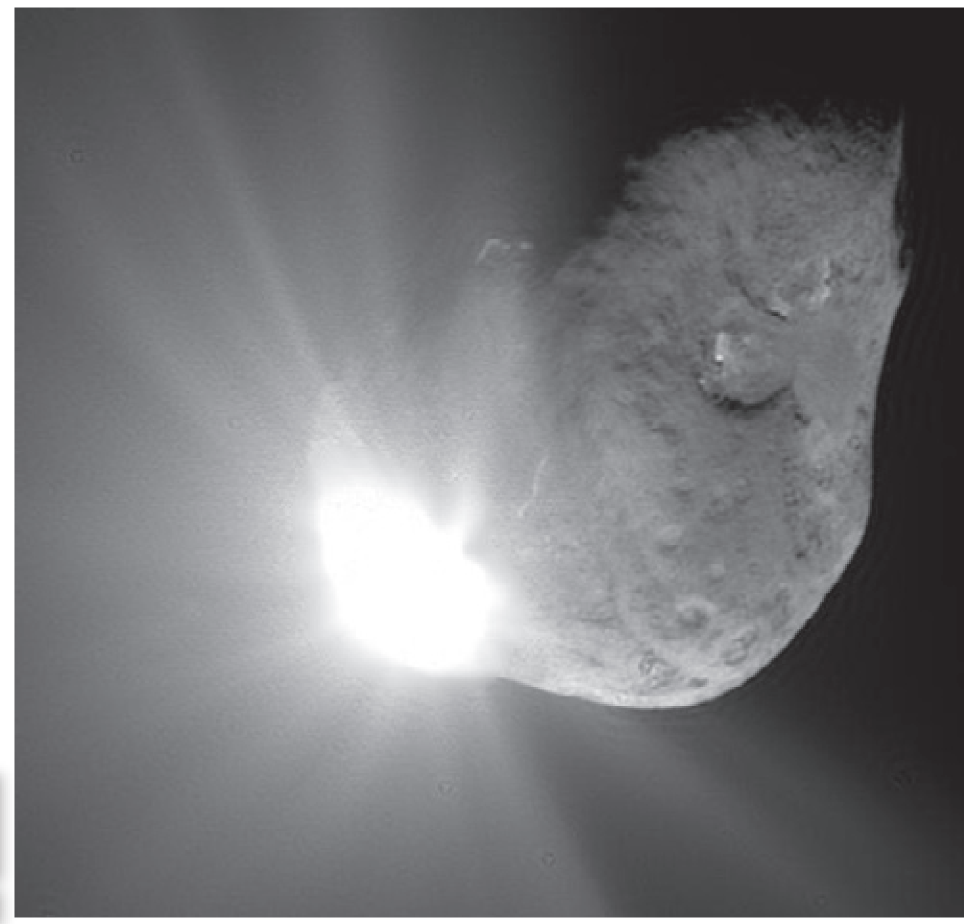
Inside



Tom Wynne/JPL Photolab



Deep Impact blasts celestial fireworks

# SMASHING!

*This spectacular image of comet Tempel 1 was taken 67 seconds after it obliterated Deep Impact's impactor spacecraft July 4. The image was taken by the high-resolution camera on the mission's flyby craft. Celebrating the achievement are, from left, NASA's Al Diaz, JPL's Gentry Lee, Dr. Charles Elachi and Tom Gavin, and NASA's Dr. Orlando Figueroa. At bottom, Deep Impact Project Manager Rick Grammier (left), Deputy Project Manager Keyur Patel and Principal Investigator Dr. Mike A'Hearn at post-impact press conference.*

AFTER 172 DAYS AND 431 MILLION KILOMETERS (268 MILLION MILES) OF DEEP-SPACE STALKING, Deep Impact successfully reached out and touched comet Tempel 1. The collision between the coffee table–sized impactor and city-sized comet occurred at 10:52 p.m. Pacific time on July 3.

"What a way to kick off America's Independence Day," said Deep Impact Project Manager Rick Grammier of JPL. "The challenges of this mission and teamwork that went into making it a success should make all of us very proud."

"This is one of the most daring and risky missions JPL has ever undertaken," added JPL Director Dr. Charles Elachi. "We have blazed a new trail of exploration for future generations to follow."

NASA Administrator Mike Griffin conveyed to the JPL/Ball Aerospace team his "warmest congratulations and heartfelt appreciation for a mission 'well done.' They've made us proud, once again."

In the week following the celestial collision, data from Deep Impact's instruments indicated an immense cloud of fine powdery material was released when the probe slammed into the nucleus of comet Tempel 1 at 6.3 miles per second.

The cloud indicated the comet is covered in the powdery stuff. The Deep Impact science team continues to wade through gigabytes of data collected during the encounter with the 3-mile-wide by 7-mile-long comet.

"The major surprise was the opacity of the plume the impactor created and the light it gave off," said Deep Impact Principal Investigator Dr. Michael A'Hearn of the University of Maryland. "That suggests the dust excavated from the comet's surface was extremely fine, more like talcum powder than beach sand. And the surface is definitely not what most people think of when they think of comets—an ice cube."

How can a comet hurtling through our solar system be made of a substance with less strength than snow or even talcum powder? "You have to think of it in the context of its environment," said Pete Schultz, a Deep Impact scientist from Brown University. "This comet is floating around in a vacuum. The only time it gets bothered is when the sun cooks it a little or someone slams an 820-pound wakeup call at it at 23,000 mph."

The data review process is not overlooking a single frame of approximately 4,500 images from the spacecraft's three imaging cameras taken during the encounter. "We are looking at everything from the last moments of the impactor to the final look-back images taken hours later, and everything in between," added A'Hearn. "Watching the last moments of the impactor's life is remarkable. We can pick up such fine surface detail that objects that are only 4 meters in diameter can be made out. That is nearly a factor of 10 better than any previous comet mission."

The final moments of the impactor's life are important, because they set the stage for all subsequent scientific findings. Knowing the location and angle the impactor slammed into the comet's surface is the best place to start. Engineers have established the impactor took two not-unexpected coma particle hits prior to impact. The impacts slewed the spacecraft's camera for a few moments before the attitude control system could get it back on track. The penetrator hit at an approximately 25-degree oblique angle relative to the comet's surface. That's when the fireworks began.

The fireball of vaporized impactor and comet material shot skyward. It expanded rapidly above the impact site at approximately 3.1 miles per second, and the crater was just beginning to form. Scientists are still analyzing the data to determine the exact size of the crater. Scientists say the crater was at the large end of original expectations, which was from 50 to 250 meters.

The celestial collision and ensuing data collection by the nearby Deep Impact mothership was the climax of a very active period for the mission, which began with impactor release about 24 hours before impact. Deep-space maneuvers by the flyby craft, final checkout of both spacecraft and comet imaging took up most of the next 22 hours. Then, the impactor got down to its last two hours of life.

"The impactor kicked into its autonomous navigation mode right on time," said JPL's Shyam Bhaskaran, the Deep Impact navigator. "Our preliminary analysis indicates the three impactor targeting maneuvers occurred on time at 90, 35 and 12.5 minutes before impact."

At the moment the impactor was vaporizing itself in its collision with comet Tempel 1, the Deep Impact flyby spacecraft was monitoring events from nearby. For the following 14 minutes the flyby craft collected and downlinked data as the comet loomed ever closer. Then, as expected at 11:05 p.m., the flyby craft stopped collecting data and entered a defensive posture called shield mode, where its dust shields protected the spacecraft's

continued on page 2

Photo by Gay Hill

## Comets 'rock around the clock' on Lab

*The year was 1957. Margaret Dix was a teenager, living in her hometown of London, England. An avid Bill Haley and the Comets fan since the early '50s, it was to her utmost delight that she won a contest that allowed her to travel on "The Rock & Roll Express" train from Waterloo Station to greet the renowned rockers as they arrived for their English tour. On the train to the event, caught up in the moment, the young girl spontaneously decided to get Bill Haley's name tattooed on her left arm.*

*Flash forward almost 50 years. Dix (now Porter) is the administrative secretary for JPL's Public Services Office. "Of course the tattoo has faded a little over the years, but it's still there, and I'm still proud of it," Porter said. "It was wonderful to hear The Comets again, and to see them in person after all these years, and I feel especially honored having my picture taken with the group."*

*Maggie Porter of JPL's Public Services Office with members of the Comets. From left: Marshall Lytle, Johnny Grande, Dick Richards, Joey Ambrose, Franny Beecher.*

# News Briefs

**Table Mountain asteroids named**

Two asteroids discovered by JPL astronomer JIM YOUNG at the Table Mountain Observatory have received official designation and naming.

Young has worked for 43 years at the San Bernardino Mountains facility. An asteroid he discovered in 2002 was given the name "JPL," while the other, discovered in 2003, was named "Table Mountain."

Asteroid names are overseen by the Minor Planet Center, which operates at the Smithsonian Astrophysical Observatory, under the auspices of the International Astronomical Union.

The Minor Planet Center is responsible for the designation of the solar system's minor planets, comets and natural satellites. The center is also responsible for the efficient collection, checking and dissemination of astrometric observations and orbits for minor planets and comets.

**Employees receive Service Awards**

For the period of April through June 2005 the following JPL recipients celebrated 25 or more years of service and were invited to attend a luncheon and ceremony in their honor on July 14.

45 years: Frank Estabrook.

40 years: John Duxbury, Edward Kopf Jr.

35 years: Jack Barengoltz, Charles Elachi, Robert Menzies, Srinivas Mohan, Kathy O'Hara, Edward Rhodes Jr., Robert Toth.

30 years: Alaudin Bhanji, Shirley Chung, Roger Hickok, Robert Ibaven, Thomas Kuiper, Saturnino Lopez, Georgene Peralta, Karen Phillips, Karen Piggee, Virendra Sarohia, John Simmonds, Aurelio Tolivar, John West.

25 years: Richard Benesh, Steven Benson, Scott Bolton, Chuck Derksen, Diane Evans, Kay Ferrari, Dennis Ferren, William Fiechter, Henry Garrett, Philip Garrison, Virginia Guzman, Albert Johnson, Cynthia Kahn, Michael Kleine, Diane Mann, James Margitan, Tam Nguyen, Ben Parvin, Susan Pateracki, Jonathan Perret.

For more information on the awards, visit *http://hr/esr.*

# Sea-level changes noted for first time

For the first time, NASA has the tools and expertise to understand the rate at which sea level is changing, some of the mechanisms that drive those changes and the effects that sea-level change may have worldwide.

"It's estimated that more than 100 million lives are potentially impacted by a one-meter increase in sea level," said Dr. Waleed Abdalati, head of the Cryospheric Sciences Branch at NASA's Goddard Space Flight Center. "When you consider this information, the importance of learning how and why these changes are occurring becomes clear," he added.

Although scientists have directly measured sea level since the early part of the 20th century, it was not known how many of the observed changes in sea level were real and how many were related to upward or downward movement of the land. Now satellites have changed that by providing a reference by which changes in ocean height can be determined regardless of what the nearby land is doing. With new satellite measurements, scientists are able to better predict the rate at which sea level is rising and the cause of that rise.

"We've found the largest likely factor for sea-level rise is changes in the amount of ice that covers the Earth. Three-fourths of the planet's fresh water is stored in glaciers and ice sheets or the equivalent of about 220 feet of sea level," said JPL's Dr. Eric Rignot, principal scientist for the Radar Science and Engineering Section. "Ice cover is shrinking much faster than we thought, with over half of recent sea-level rise due to the melting of ice from Greenland, West Antarctica's Amundsen Sea and mountain glaciers," he said.

"In the last 50 years sea level has risen at an estimated rate of 0.07 of an inch per year, but in the last 12 years that rate appears to be 0.12 of an inch per year," said Dr. Steve Nerem, Associate Professor, Colorado Center for Astrodynamics Research, University of Colorado. "Roughly half of that is attributed to the expansion of ocean water as it has increased in temperature, with the rest coming from other sources."

Another source of sea-level rise is the increase in ice melting. Evidence shows that sea levels rise and fall as ice on land grows and shrinks. With the new measurements now available, it's possible to determine the rate at which ice is growing and shrinking.

Also, NASA and its partner researchers now are able to measure and monitor the world's waters globally in a sustained and comprehensive way using a combination of satellite observations and sensors in the ocean. By integrating the newly available satellite and surface data, scientists are better able to determine the causes and significance of current sea-level changes.

"Now the challenge is to develop an even deeper understanding of what is responsible for sea-level rise and to monitor for possible future changes," said Dr. Laury Miller, Chief of the National Oceanic and Atmospheric Administration (NOAA) Laboratory for Satellite Altimetry. "That's where NASA's satellites come in, with global coverage and ability to examine the many factors involved."

NASA works with agency partners such as NOAA and the National Science Foundation to explore and understand sea-level change. Critical NASA resources on this issue include such satellites as the JPL-managed Topex/Poseidon, Jason and Gravity Recovery And Climate Experiment (Grace) missions as well as the Ice, Cloud and Land Elevation Satellite (ICESat).

# 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.

**Saturday, July 16**

Cassini Talk, Star Gazing Party—Dr. Kevin Grazier, Cassini investigation scientist, and Steve Edberg, JPL astronomer, will present a Cassini lecture followed by telescope viewing. 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. Reservations are requested for groups of 10 or more. Call (626) 398-5420 or visit *www.ecnca.org.*

Solar Car Race—Catch the end of a 1,600-mile race featuring hand-built, solar-powered cars. High school student competitors in the Dell-Winston School Solar Car Challenge are scheduled to reach the visitors' parking lot between 2:30 and 3:30 p.m. The race began July 8 in Round Rock, Texas. For more information, visit *www.winstonsolar.org/race.*

**Mon.–Thurs., July 18–21**

Student Career Week—All events will take place in von Kármán Auditorium. On Monday, leadership and organizational consultant Mary Ellen Derro will give a briefing on resume tips and techniques at noon. Tuesday's and Wednesday's noon briefings will feature career opportunities in various JPL organizations. Thursday's career fair from 10 a.m. to 1 p.m. will be an opportunity for students to bring their resumes and meet representatives from JPL's technical and business organizations.

**Tuesday, July 19**

"Achieving NASA's Vision for Space Exploration"—George Whitesides, executive director of the National Space Society, will speak from 4:45 to 6 p.m. in von Kármán Auditorium.

JPL Hiking Club—A slide show titled "Up the Mekong and into the Jungle" will be presented by James Dorsey at noon in Building 171-218.

**Wednesday, July 20**

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.

**Wed.–Thurs., July 20–21**

Investment Advice—TIAA/CREF will offer one-on-one counseling in T1720. For an appointment, call (626) 432-6363 or visit *www.tiaa-cref.org.*

**Thu.–Fri., July 21–22**

Von Kármán Lecture Series—Deep Impact Project Manager Rick Grammier will present "Comets: Time Capsules of Our Solar System's Past" 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/jul05.cfm.* For more information, call Public Services at ext. 4-0112.

**Tuesday, July 26**

Women's Career Panel—The Advisory Council for Women will sponsor a presentation on JPL career opportunities in engineering at 11:30 a.m. in von Kármán Auditorium. John Beckman will moderate; panelists include Jeanne Holm, Cynthia Kahn, Marie Levine, Chi Lin and Amy Ryan. A discussion of administrative career opportunities is planned by ACW for September.

**Wednesday, July 27**

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.

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

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

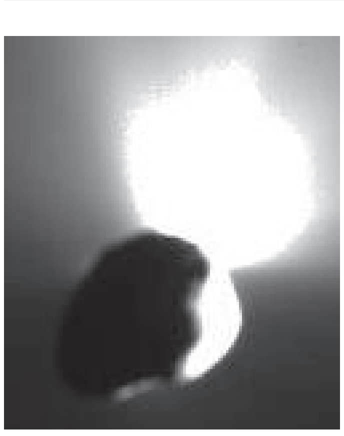
**Thursday, July 28**

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.

**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.



*The view from Deep Impact's flyby spacecraft as it turned back to look at comet Tempel 1. Fifty minutes earlier, the spacecraft's probe was run over by the comet.*

*Continued from page 1*

# Deep Impact

vital components during its closest passage through the comet's inner coma. Shield mode ended when mission control re-established the link with the flyby spacecraft.

The hyperspeed demise of Deep Impact's probe generated an immense flash of light, which provided an excellent light source for the two cameras on the mothership.

The flash created by the impact was just one of the visual surprises that confronted the Deep Impact team. Preliminary assessment of the images and data downlinked from the flyby spacecraft have provided an amazing glimpse into the life of a comet.

"They say a picture can speak a thousand words," Grammier said. "But when you take a look at some of the ones we captured in the early morning hours of July 4, 2005, I think you can write a whole encyclopedia."

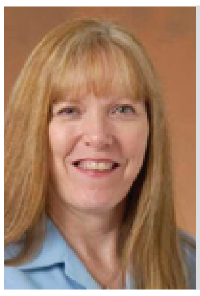
At a news conference held later on July 4, Deep Impact team members displayed a movie depicting the final moments of the impactor's life. The final image from the impactor was transmitted from the short-lived probe three seconds before it met its fiery end.

Expectations for Deep Impact's flyby spacecraft were exceeded during its close brush with the comet. The craft is more than 2.2 million miles from Tempel 1 and opening the distance at approximately 23,000 mph. The flyby spacecraft is undergoing a thorough checkout, and all systems appear to be in excellent operating condition.

The encounter also represented another milestone for NASA, as Internet users downloaded almost 80 million Web pages in the 24 hours starting at 5 p.m. Pacific time July 3, a one-day record for the NASA Web portal. The previous high was 30 million on Jan. 5, 2004, following the landing of the rover Spirit on Mars.

To cap off the wildly successful Independence Day weekend, JPLers had a surprise waiting for them as they returned to work. The five surviving members of the 1950s rock band "The Comets" (of "Bill Haley and His Comets" fame) created an impact of their own as they performed a celebration concert at the Lab. The band approached JPL with the idea of the concert as a way to celebrate the success of the Deep Impact mission.

For movies, multimedia, images and other information on Deep Impact, log on to *www.jpl.nasa.gov/news.*



# Many highlights for Cassini's first year

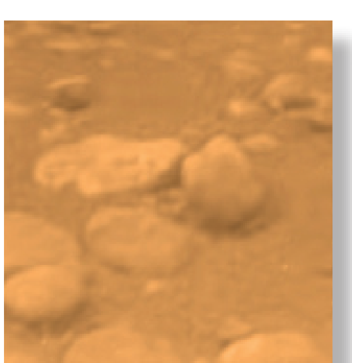
*By Linda Spilker, Cassini deputy project scientist*

A YEAR AFTER CASSINI-HUYGENS ENTERED ORBIT AROUND SATURN, the mission team is looking back at a string of remarkable discoveries. Numerous discoveries have been made about Titan's surface and atmosphere, Saturn's magnificent rings, its amazing icy satellites, dynamic magnetosphere and the planet itself. The highlight of the mission so far is clearly the lifting of the veil on smog-covered Titan. The orbiter's remarkable instruments provided the first glimpses of the surface and the global picture of the hazy world. The Huygens probe descent through the atmosphere to the surface provided a close-up look at a whole new world.

What we expected to see and did not see is equally interesting. Our original ideas for Titan's surface included global oceans and lakes of liquid hydrocarbons. The Huygens probe was even designed to briefly float, because we deemed a liquid landing to be very likely. Small lakes may exist but global oceans are just not there. This lack of large bodies of liquid may cause us to rethink the age and origin of Titan's atmosphere.

Spokes in Saturn's B ring, as seen by NASA's Voyager spacecraft, were also anticipated. To date, we have not seen spokes in geometries where they should have been seen if their associated dust clouds were present. This lack of spokes shows that important electrostatic or electrodynamic effects, like photoelectric charging of the rings, vary seasonally.

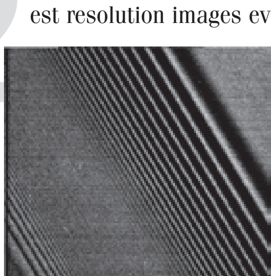
Upcoming events include our closest flyby so far of the icy moon Enceladus as Cassini flies within 175 kilometers (109 miles) of this world on July 14, 2005. We will be looking for clues to the source of Saturn's E ring, which is most likely supplied by material from Enceladus. Other exciting events include six flybys in 80 days, including two flybys of Titan and one each of the moons Tethys, Hyperion, Dione and Rhea. During the October flyby of Titan, we will obtain a radar swath over the Huygens landing site, which will help us put the portion examined by the probe into the broader context of the rest of Titan. Some science discoveries and other highlights from our first year at Saturn include:



1 The Cassini orbiter and Huygens probe reveal a whole new world: Titan's surface is remarkably complex, complete with evidence for methane rain, erosion, stream-like drainage channels, possible volcanoes, lakes, craters and vast dune fields, as well as other puzzling terrain. A soup of complex hydrocarbons, including benzene, has been detected in Titan's atmosphere.

◁ *First color view of Titan's surface*

2 Closest-ever observations of Saturn's rings: The Cassini cameras took the highest resolution images ever of Saturn's rings, and Cassini fields and particles instruments measured the in-situ ring environment as the spacecraft skimmed above Saturn's rings just after Saturn orbit insertion. Discoveries included straw-like clumps several kilometers long in the A ring, an oxygen atmosphere just above the rings, signatures of marble-sized meteoroids impacting the rings and evidence for slowly rotating ring particles.

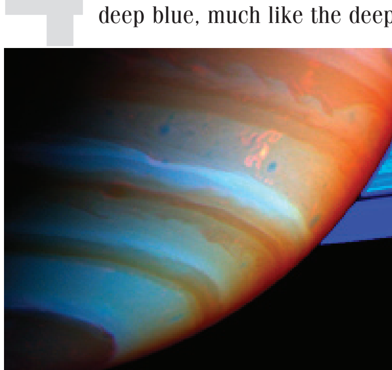


△ *Two waves of rings*

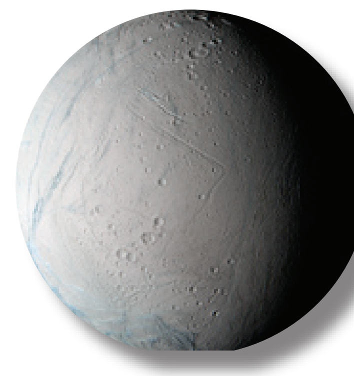
3 Phoebe, a captured world from the outer solar system: Phoebe is a crater-scarred moon, with large landslides revealing bright water ice on crater walls and patchy clustering of silicate and organic material. The volatile ices tell us that Phoebe must have formed in the outer solar system before being captured by Saturn's gravity.

*The face of Phoebe* ▷

4 Saturn's dynamic atmosphere: The entire northern hemisphere of Saturn has a completely new look since the Voyager encounters. It now appears deep blue, much like the deep, clear atmospheres of Uranus and Neptune. The shadow of the rings on the northern hemisphere probably cools it down, so the tan clouds sink to depths where they are no longer visible. Nothing like this had ever been suspected from previous observations. Powerful lightning storms—10,000 times stronger than on Earth—occur in huge, deep thunderstorm columns nearly as large as the entire Earth. The storms occasionally boil up to the visible surface.



△ *The Dragon Storm*



5 Enceladus atmosphere: Icy Enceladus seems to have a tenuous atmosphere, discovered in magnetic field data that may imply internal activity. It may help explain the source and variability of Saturn's E ring.

◁ *Blue clues*

6 New radiation belt: A new and completely unexpected radiation belt was discovered around Saturn between the inner edge of the D ring and the top of Saturn's atmosphere.

7 Ring–moon interactions: Saturn's F ring continues to change. A nearby moon, Prometheus, was imaged stealing particles from the ring's strands. A new moon was discovered lying in, and causing, the Keeler Gap. A number of objects have been found (and lost) in the F ring region, which may be transient clumps of debris. Clumpy ringlets in the Encke Gap also evolve as they interact with Pan, a moonlet, and probably other local objects.

◁ *Prometheus: thieving moon*

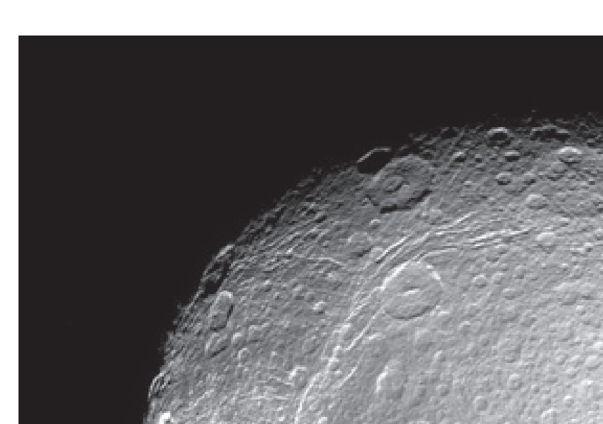
8 Saturn's rotation period puzzle. Cassini took readings of the day-length indicator regarded as most reliable, the rhythm of natural radio signals from the planet. The results give 10 hours, 45 minutes, 45 seconds (plus or minus 36 seconds) as the length of time it takes Saturn to complete each rotation. Here's the puzzle: That is about 6 minutes, or 1 percent, longer than the radio rotational period measured by the Voyager 1 and Voyager 2 spacecraft, which flew by Saturn in 1980 and 1981. Cassini scientists are not questioning Voyager's careful measurements. And they definitely do not think the whole planet of Saturn is actually rotating that much slower than it did two decades ago. Instead, they are looking for an explanation based on some variability in how the rotation deep inside Saturn drives the radio pulse.

9 Iapetus, a moon with a bulging waistline: Iapetus, the two-faced moon, has an equatorial mountain range 20 kilometers (12 miles) high in some places, twice the height of Mt. Everest.

◁ *Giant landslide on Iapetus*

10 Fractured Dione: Dione's mysterious wispy terrain is revealed to be tectonic fractures.

*Dione close up* ▷



For more Cassini images, visit http://photojournal.jpl.nasa.gov/targetFamily/Saturn


# In appreciation

I would like to express my thanks to my friends and co-workers at JPL who send me support and encouragement while I was deployed to Iraq this past year. Your e-mails, letters and care packages did so much to boost my spirits and keep me going during a most difficult time. It was an honor to represent and serve my community and my country.

Erik L. Thiesmeyer

*Section 351 Administrator Erik Thiesmeyer kept a little bit of JPL with him during his tour of duty in Iraq.*

# Passings

**EDWARD KOPROWSKI,** 79, a retired JPL nuclear physicist, died June 8.

Koprowski worked at the Lab from 1977 to 1986. He retired as a member of the Reliability Engineering Section 513. His JPL work included leading the radiation shielding and analysis team for the Galileo spacecraft.

Koprowski is survived by daughters Lauretta, Karen, Lucy, Rosanne and Mary, and son Edward. Services were held June 10 in San Luis Obispo.

**ROGER HOON**, retired from Section 392, died June 14. He was 63.

Hoon joined JPL in 1972 and retired in 1999. He is survived by his wife, Ann; sons Michael, Gregory and Vince; and four grandchildren.

A memorial service was held June 22. Donations in Hoon's name can be made to the L.A. County Arboretum. The family would like to thank his friends in the JPL community for attending and for their support.

**CARLETON SOLLOWAY,** 80, retired from Section 363, died June 19.

Solloway joined JPL in 1960 and retired in 1990. He is survived by his wife, Beatrice, and children Carleton and Michele.

Services will be held the first week of September. For details, e-mail *sollowaytravel@yahoo.com* or call (949) 654-0371.

# Letters

I wish to thank my JPL family for their sympathy and condolences on the recent passing of my mother. Your thoughts and prayers were greatly appreciated and helped our family through a difficult time. The plant from the ERC was bright and colorful and reminded me of my Mom's positive view about everything.

Matt Landano

# 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. 626/821-0224.

CAMERA EQUIPMENT, Mamiya professional outfit: Mamiya 645 super body, AE prism finder, 2-power drives, 120 & 220 film holders, Polaroid film back, Mamiya-Sekor 80 mm-f1.9 & 150 mm-f3.5 lens all in exc. cond., $800/obo. 562/929-4197 (home); 818/468-5354 (cell); j.weisbaum@verizon.net.

DESK, roll top, solid oak, in excellent shape, $450. 661/254-4464, Marian or Fred.

EXERCISE/WEIGHT MACHINE, Weider Pro 4100 weight syst. w/dual stations and max. wt. of 240 pounds, over 38 different exercises, 1 yr. old, like new, all manuals and accessories included, cost over $400, sell $125, pictures avail., gutheinz33@yahoo.com. 626/568-2702.

FURNITURE, sofa, dressers, tables & more, visit www.geocities.com/ladygrey_t/furniture_sale_pictures.html. 626/376-5302, Fred.

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.

FURNITURE: corner desk (L-shaped) w/3 file drawers, contemporary style, like new, for pics/dimensions see http://spider.ipac.caltech.edu/staff/wachter/desk.html, paid $700, sell for $300/obo, buyer must pick up. 618-3546, stefanie_wachter@yahoo.com.

KEYBOARD, Yamaha Electronic Portatone PSR-225 GM; good start for the beginner piano player; 61 keys w/touch response, 6-track song recording, metronome, 100 panel voices, 100 styles of auto accompaniment; optional connection to headphones, footswitch, personal computer; used only for 6 mo., in great condition, like new, in original package w/manual, keyboard stand/power adaptor included; only $125. 626/437-5750, galpp@yahoo.com.

MICROWAVE OVEN, Sharp carousel ESP sensor, model R4H85, 900 W output, black, $30. 323/254-3046, Mark.

MISC: Relax the Back store Sacro-Ease folding seat, $40; 1940s sewing machine table w/stool, $100; Bing & Grondahl luncheon china set, $250. 626/445-2616.

MISC: gas mower w/grass catcher/cover, 1 year old, $90; diamond anniversary ring (1CT) w/gift box, $750; diamond ring (10K YG) w/gift box, $99; Suunto S6 wristop computer, great for hard-core sports, $250; Tony Little's gazelle freestyle elite, $275; his & hers Geneva Classic collection watches (silver tone), $25. 364-1283, Valerie.

MISC: Danish modern cherrywood dining room set w/6 chairs, 3 leafs and matching china cabinet, $300; electric garden weed whacker, only used twice, $20; Canon photo printer, box never opened, $40. 626/359-7666.

MISC: fax cartridge, model PC-102RF for brother fax machines, brand new, $20; Jenny Craig diet tapes, 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.

MISC: 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.

MISC: vacuum cleaner, Dirt Devil, 3 yrs. old, good condition, $25; Hamilton Beach food processor, in-bowl storage, 350 watt motor, wide 8-cup bowl, 2 speeds + pulse, new in package, only $20. 626/437-5750, galpp@yahoo.com.

MISC: carpet shampooer (nds washer replacement on handle), $15; red wig, shoulder length, never used, $20; fishing pole (saltwater), $25; baseball glove (small, left handed) & conditioner, gd 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: Lifestyler auto incline treadmill w/digital display, $150; beige leather sofa, $50; qn. black laquer bdrm. set, bed, end tables, armoire, dresser, mirror, $500; sectional glass desk w/blk. steel frame & 2-drawer filing cab, $200; white gas stove, $200; white microwave, 1,100 W, 1.0 cu. ft., $50; black bookcase, $10; black entertainment stand/cabinet, $25; computer monitor w/internet kybrd. & spkrs., $75; women's suits, sizes 4-10. 248-0258.

MISC: new men's dress shirts, 17 neck, assorted box of 8 for $50 or $7/ea.; slacks, 42-44 waist, $10 & $15; sport coats, $10 & $15; all in exc. cond.; coffee table, 52," $25. 790-6060.

MISC: assortment of Fiskar scissors; rubber stamps and stamp pads (most new, never used); Marvy embossing heat tool, new; beaded baskets filled w/6 beaded Christmas ornaments, red & gold, new, $15; Medtronic elec. muscle stimulator (orig. $600), $65/obo; Jones of NY: pantsuit, olive, size 12, new, (paid $100+), $40. 626/398-4960.

NECKLACE, Turquoise nugget, center nuggets 1.3/4" (sz. of walnuts) to 1" at ends, 15" long (30" in all), incl. Navajo "imperfect" stone marker, shell heishi, old and rare, $250; another, not graduated, all stones 1-1/4" ea., $125, no photos, in La Verne, vivdavies@earthlink.net.

OVEN/MICROWAVE combo, for wall, 27" Kenmore, self-cleaning, 4 years old, exc. cond., buyer pick up in Arcadia, $300. 626/254-0765.

PIANO, Grand, Kawai, 6'1", polished ebony, exc. condition and tone, piano bench and lined piano cover included, located in Altadena. 626/398-6564.

REFRIGERATOR, Kenmore 18, presumably 18 cubic ft., top/bottom fridge, glass shelves, very clean, came w/house but we have our own, new cost approximately $500, sell for $200/obo, can deliver if needed. 248-1557, Martin or mregehr_public@yahoo.com.

REFRIGERATOR, GE 18 cu. ft. top-freezer, white, model TBX18IABKRWW, approx 68"h x 28"w x 33"d, functioning perfectly, $90. 323/254-3046, Mark.

STOVE, vintage 1950s Wedgewood gas, 40," wht. porcelain w/chrome, double oven, working condition, $400/obo. 626/285-5172.

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

WASHER & DRYER, Sears Kenmore 1994, good working cond., both white, 25 1/2 L x 27 W x 36 H, $175/washer, $125/dryer. 626/379-4367.

## Vehicles/ Accessories

'97 AUDI A4 1.8 T, 90K pearl white, auto, clim., stereo, excellent condition, runs great, w/cover, $5,600. 323/356-3940.

'01 BAYLINER boat, exc. cond., 8 passenger seating, 135 HP engine, tandem trailer, trolling engine, just bought new boat cover, $10,200. 562/692-4826, Robert or Norma.

'97 BMW M3 sports pkg., 90K mi., black, 5-spd. automatic, black leather interior, sunroof, anti-lock wheels, a/c, keyless entry, dual airbags, for pics see BMW album: www.pbase.com/onegrl3byz, $14,800/obo. 909/626-5679 or 909/720-7446.

'99 DODGE Intrepid 4 door, original owner, 124K mi., mileage accumulated between Valencia/JPL, $4,500. 661/254-4464, Fred.

'97 DODGE Grand Caravan, V6, 3.8L, leather, roof rack, tow pkg., rear a/c, well maintained, new Michelin tires, 106K mi., $4,900/obo. 500-0330.

'95 HONDA Civic DX coupe, 5-spd. manual, white, a/c, am/fm/cd changer, 104,000 miles, good condition, $3,200. 626/296-1537.

'02 HYUNDAI Elantra GT, silver, gray leather interior, 5-speed, 27,000 mi., a/c, airbags, alarm, 6-speaker CD, c/c, pwr. locks/steering, rear window wiper, keyless entry, moonroof, tinted glass, 1 owner, careful maintenance, immaculate, 5-year/50,000-mile warranty through Hyundai's second-owner program, $8,700/obo. 957-8305.

'96 INFINITI G20, 4-door sedan silver w/gray interior, 5-spd., power steering/windows/locks, a/c, am/fm/CD, 102K miles, airbags, well maintained, 25 mpg city, 30 hwy, $3,200/obo. 626/584-1159, leave message.

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

'85 MERCEDES 380 SL convertible, a classic collector's car, red exterior w/hardtop and new soft top, tan leather interior, only 78,000 mi., maintained in mint condition, $18,000. 626/345-9133, Mike.

'94 MERCURY Sable, dark green sedan, automatic, 61,500 mi., very clean, 3.8L V6, prem. sound, ABS, front airbags, a/c, pw/pdl/pseats, c/c, tilt, $2,980. 323/845-9340.

'87 MITSUBISHI LS van/wagon, 7 passenger, 110K mi., great body & interior, new alternator, belts, new front brakes/rotors, license, newer exhaust/converter, needs intermittent fuel pump repaired, $500. 248-2931.

'91 NISSAN Maxima, white, auto, a/c, all power, 154K mi., good cond., well maintained, recent rebuilt transmission, paid $1,700, $3,000/obo. 970-6980.

TIRES, 2 steel-belted radials, Bridgestone P205/60 R15 with less than 10K miles, $100/obo for both. 661/284-2840, after 6 p.m., Tom.

'02 TOYOTA Tacoma TRD, 19K mi., V6 auto, 4WD, dbl cab, blk. ext., gray int., a/c, pw/pd, am/fm/CD, airbags, ABS, great cond., $21,999/obo. 626/224-4279.

## Wanted

CAR: late model Volvo wagon, silver, w/lg engine. 248-7499.

HOUSING: single man w/cat needs to rent a guest house or small apartment until Dec. 05, house sitting would also be an option, anywhere in the general Los Angeles area, references available. 310/772-8135.

HOUSING: for visiting professor and family for 1-year 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: rent a 1-bd. house w/a small yard, 1 female and dog, near Caltech. 626/960-1051.

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, mrayman@alumni.princeton.edu, Marc Rayman.

STUDIO/GUEST HOUSE, quiet adjunct professor/graduate student, in the JPL, La Canada or adjacent areas. 682-8899.

VOLLEYBALL PLAYERS, coed, no beginners please, Tuesdays 8-10 p.m. at Eagle Rock High School, $4/per nt. 956-1744, Barbara.

## Lost & Found

Found: Pneumatic (air hose) connector, quick disconnect type, male QDC to 3/8" pipe thread; attached tag has UPC code and "BC2468;" found in front of Bldg 241. Ext 4-1636, Kristan.

## Free

WATERBED, king-sized Somma, complete with frame and brass headboard, good condition, you pick up. 626/791-7645.

## For Rent

ALTADENA, for lease, lg. 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, gardener included. gindifrench@yahoo.com. 808/226-6598.

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 with roommate, non-smoker, no pets, close to bus, quiet neighborhood, $850 + sec deposit. 949/689-8103.

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 satellite, wireless DSL, garden, fruit trees, patio, garage, private, immaculate, avail. Aug. 626/798-3235.

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. 626/576-7333 or cpl@caltech.edu.

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.

N.E. PASADENA, cute sabbatical house, desirable area, 2 bd., 1 ba., fully furnished, including dishes, towels, linens, Jacuzzi, washer/dryer, utilities included, weekly $1,000, monthly $2,500. 626/422-8119.

PASADENA, room w/private entrance in beautiful home, beautiful garden setting, above golf course, private bedroom, private beaut. remodeled bathroom & kitchenette, ideal for very quiet/neat person, no pets, month-to-month lease, $725, utilities incld. 626/798-4056, 626/818-8382.

PASADENA, studio condo, fully furn., 1115 E. Cordova Ave., gated facility, 2 blocks from Caltech, pool & BBQ patio, carport, laundry, utilities paid except electric, non-smoker, no pets, $975, security dep. $975 in 3 installments, avail. 8/1. 626/792-9053, Ray or Marilyn.

PASADENA: seeking roommate to share a 2 bd./2.5 ba. townhouse with 2-car garage and lots of storage space; great location 6 mi./JPL, near Caltech, just across from PCC; room has private bath & can be fully or partially furnished; washer/dryer, patio, A/C, fireplace, cable modem, WiFi, HD TIVO, DirecTV, plasma TV, and all utilities included in unit (except long-distance phone); no pets, sorry; $850 + 1-mo. deposit; month-to-month lease must be approved by landlord. 626/844-9286, Dave.

PASADENA guest house, spacious (approx. 900 sq. ft.) 1 bd., partially furnished, includes washer, dryer, refrigerator, cable, a/c, off-street parking plus much more in a great part of Pasadena (approximately 12 minutes from JPL), prefer one person, $1,100 + cleaning deposit and partial utilities. 626/793-7937.

SIERRA MADRE, 2/1.5 townhouse-style apt. to share, 1,000 sq. ft., large patio, a/c, quiet street, garage parking, w/d in unit, n/s, $635 + 1/2 util. 626/355-5667.

SYLMAR, rent to own, newer, spacious, gated, 4 bd., 2.5 ba., near pool and golf, $10,000 credit toward purchase after 1 year, $2,395. 626/584-6526, Fred.

## Vacation Rentals

BIG BEAR LAKEFRONT, luxury townhome, 2 decks, tennis, pool/s pa, beautiful master bd., suite, sleeps 6. 949/786-6548.

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

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

FLORIDA condominium, 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 comforts of home in a quiet, relaxing setting overlooking the beach and 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, w/stunning Teton view, sleeps 6, cable, microwave, etc., borders Grand Teton. 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., rate $145/nite/2, $20/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.

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

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

TIMESHARE: 1 week, 1 bedroom (sleeps 4), worldwide locations, $100/night. 364-1283, Valerie.

JPL'S ONLINE NEWS SOURCE

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Universe

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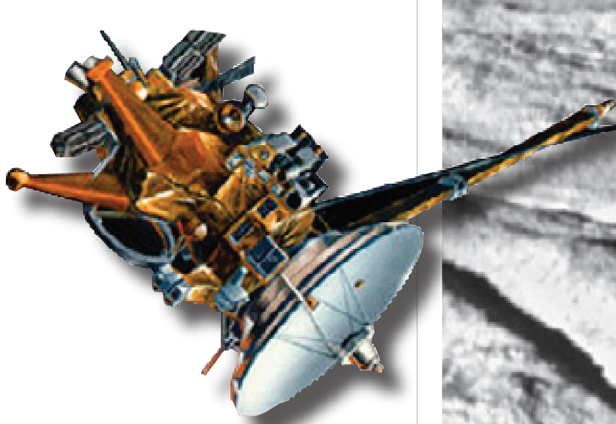
Inside

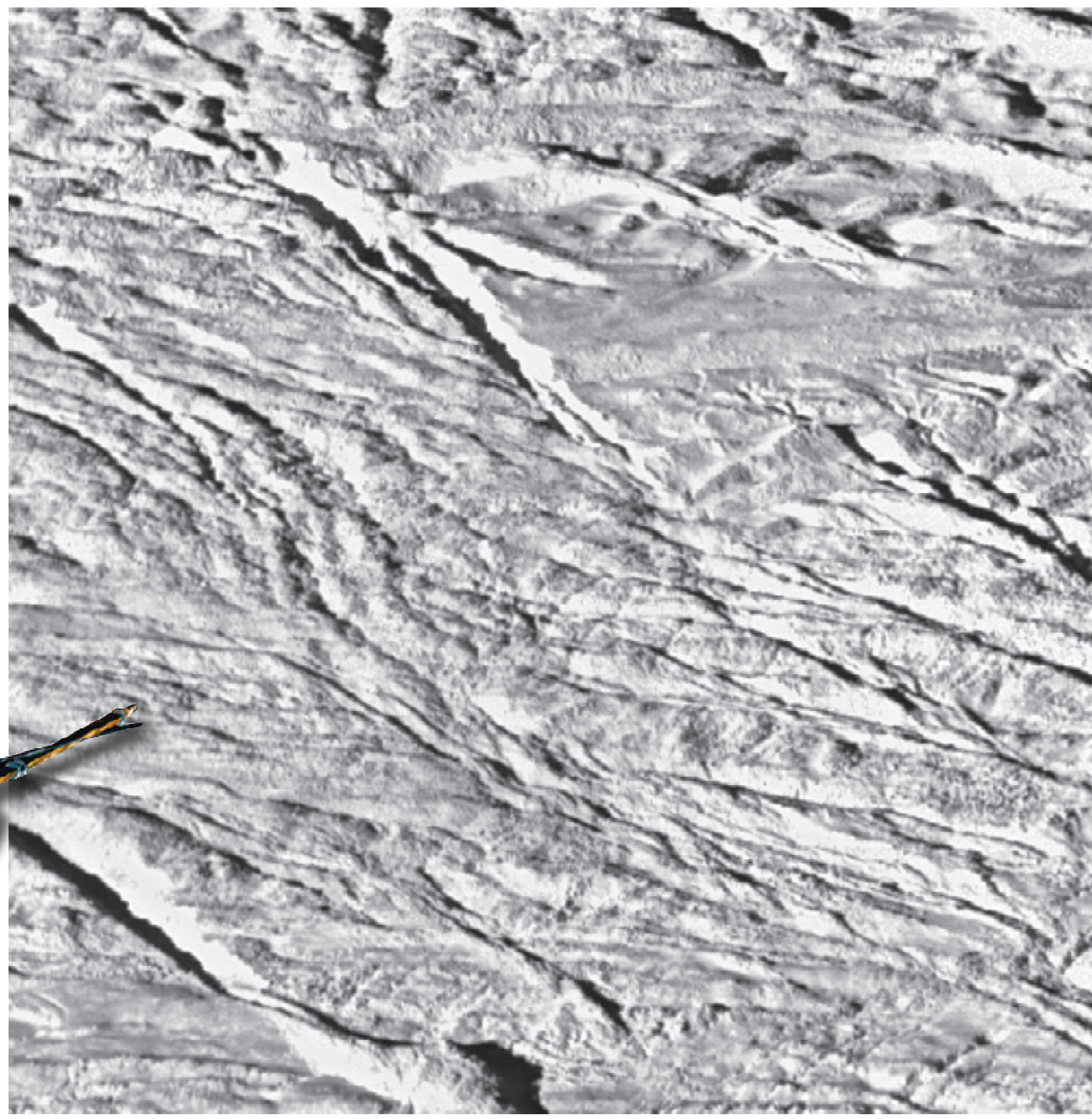


# Striking images of Enceladus revealed by Cassini

*By Carolina Martinez*



**As white as fresh snow, Enceladus has the most reflective surface in the solar system. Previous Cassini flybys revealed Enceladus, in contrast to Saturn's other icy moons, has lightly cratered regions, fractured plains and wrinkled terrain.**



*This wide-angle view is one of the highest resolution images yet acquired by Cassini and shows what appears to be a geologically youthful, tectonically fractured terrain. The image was taken during Cassini's very close flyby of Enceladus on July 14 from a distance of approximately 208 kilometers (129 miles) above Enceladus.*

JPL'S CASSINI SPACECRAFT HAS OBTAINED NEW DETAILED images of the south polar region of Saturn's moon Enceladus. The data reveal distinctive geological features and the most youthful terrain seen on the moon. These findings point to a very complex evolutionary history for Saturn's brightest, whitest satellite.

Cassini's July 14 flyby brought it within 175 kilometers (109 miles) of the surface of the icy moon. The close encounter revealed a landscape near the south pole almost entirely free of impact craters. The area is also littered with house-sized ice boulders carved by tectonic patterns unique to Enceladus. These features set the region apart from the rest of the moon.

As white as fresh snow, Enceladus has the most reflective surface in the solar system. Previous Cassini flybys revealed Enceladus, in contrast to Saturn's other icy moons, has lightly cratered regions, fractured plains and wrinkled terrain.

The new findings add to the story of a body that has undergone multiple episodes of geologic activity spanning a considerable portion of its lifetime. The moon's southernmost latitudes have likely seen the most recent activity.

These same latitudes may also bear the scars of a shift in the moon's spin rate. If true, this speculation may help scientists understand why Enceladus has a tortured-looking surface, with pervasive crisscrossing faults, folds and ridges. The most remarkable images show ice blocks, about 10 to 100 meters (33 to 328 feet) across, in a region that is unusual in its lack of the very fine-grained frost that seems to cover the rest of Enceladus.

"A landscape littered with building-sized blocks was not expected," said Dr. Peter Thomas, an imaging-team member from Cornell University. "The minimal cover of finer material and the preservation of small, crossing fracture patterns in the surrounding areas indicate that this region is young compared to the rest of Enceladus."

False-color composites of this region, created from the most recent images, show the largest exposures of coarse-grained ice fractures seen anywhere on the satellite, which also supports the notion of a young surface at southern latitudes. Some of the latest images may hint at the answer. The images revealed additional examples of a distinctive "Y-shaped" tectonic feature on Enceladus. In this unusual element, parallel ridges and valleys appear to systematically fold and deform around the south polar terrains.

"These tectonic features define a boundary that isolates the young, south polar terrains from older terrains on Enceladus," noted Dr. Paul Helfenstein, an associate of the imaging team also at Cornell University. "Their placement and orientation may tell us a very interesting story about the way the rotation of Enceladus has evolved over time and what might have provided the energy to power the geologic activity that has wracked this moon."

The apparent absence of sizable impact craters also suggests the south pole is younger than other terrain on Enceladus. These indications of youth are of great interest to scientists who have long suspected Enceladus as one possible source of material for Saturn's extensive and diffuse E ring, which coincides with the moon's orbit. Young terrain requires a means to generate the heat needed to modify the surface. Other Cassini instrument teams are working to understand data about temperature, composition, particles and magnetic field. Together with image interpretation, these data can create a more complete picture.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. JPL manages the mission for NASA's Science Mission Directorate. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. The imaging operations center is based at the Space Science Institute in Boulder, Colo.

**These Cassini images are available at *www.nasa.gov/cassini, saturn.jpl.nasa.gov, http://ciclops.org and http://www.nasa.gov/mission_pages/cassini/multimedia/pia06253.html***

# News Briefs

## Chao honored by optical society

For his exceptional achievements in the areas of optical pattern recognition and holography, DR. TIEN-HSIN CHAO, technical leader of the Bio-Inspired Technologies and Systems Group, has been named a Fellow of the International Society for Optical Engineering.

The society bestowed 41 new Fellowships this year. Fellows are members of distinction who have made significant scientific and technical contributions in the fields of optics, photonics and imaging, the organization said.

"Chao is one of the most prominent scientists in the optical information processing area," the society said. "He is known for his work on real-time landmark tracking, high-speed data optical memory, and neural net processors and optical correlators."

Chao is a prolific researcher with a score of distinguished publications in international optical journals, the society said. "His work on compact holographic memory and underwater mobile surveillance systems is very significant to the optical signal processing community in the U.S. He has guided several graduate students and is well respected as both an educator and researcher."

Chao, who joined JPL in 1986, holds six United States patents. His interests include optical and digital pattern recognition, data mining, neuron networks, holographic data storage, and multi-sensor data processing and fusion.

Dr. Tien-Hsin Chao

## Kudos for group's evolutionary ideas

JPL's Evolvable Computation Group, which works to demonstrate the utility of computational engineering and computer-optimized design for complex space systems, won the silver medal in the recent Human Competitive Competition at the Genetic and Evolutionary Computation Conference in Washington, D.C.

The group's paper, "Evolutionary Computational Technologies of the Automated Design of Space Systems," earned a $1,000 prize. Co-authors are RICHARD TERRILE, HRAND AGHAZARIAN, MICHAEL FERGUSON, WOLFGANG FINK, TERRY HUNTSBERGER, DIDIER KEYMEULEN, GERHARD KLIMECK, MARK KORDON, SEUNGWON LEE, BORIS OKS, CHRIS PEAY, ANASTASSIOS PETROPOULOS, PAUL VON ALLMEN and KARL YEE.

More than 700 participated in the conference and 23 groups submitted entries in the competition.

The Evolvable Computation Group uses evolution to create innovative designs on computers using models that already exist and are in use all over JPL. The team won the award for its demonstration that it can adapt these computer models into a framework that uses evolution to automatically optimize designs faster and better than humans. This was done for four different tasks:

- Automatic design of spacecraft power systems,
- Finding paths for robotic arm deployments (a task soon to be demonstrated on a Mars Exploration Rover arm),
- Finding optimum trajectories using low-thrust propulsion, and
- Automatic tuning of microelectromechanical systems microgyros.

The group's researchers cover a broad range of disciplines including biology, genetics, robotics, physics, computer science and system design. They employ biologically inspired evolutionary computational techniques to design and optimize complex systems. Over the past two years the group has developed tools using genetic algorithms and other optimizers to improve on human design of space systems.

## Lab lauded for rideshare program

JPL was recently honored by the Los Angeles County Metropolitan Transit Authority among employers that have demonstrated outstanding achievement in the development and implementation of innovative and successful rideshare programs for their employees.

JPL was cited in the Innovative Rideshare Program or Strategy category. Among the criteria for which the Lab was honored include helping save JPL money by not having to build additional parking structures or purchase off-Lab properties for parking; registering more than 2,300 riders in 30 vanpools, almost 900 carpools and more than 100 members in the JPL Bike Club; and installing two electric vehicle charging stations at no cost to the Laboratory.

Metro and the Ventura County Transportation Commission concurrently recognized employers. A panel of judges representing the five-county transportation commission in Los Angeles, Orange, Riverside, San Bernardino and Ventura reviewed the nominations and selected the winners.

"The awards showcase the best in rideshare programs and ideas in Southern California," said Metro chief executive ROGER SNOBLE. "These employers we're recognizing have demonstrated their commitment to helping improve air quality and alleviate our region's traffic congestion through carpool, vanpool, public transportation and other alternatives to solo driving. They are proving to all employers how easy it is to 'share the ride.'"

*Employee transportation coordinators Robert Kennedy, left, and John Miranda accept rideshare award.*

## One NASA Award bestowed

KATE WOLF of Section 910 received a One NASA Peer Award on June 16 at NASA Headquarters. Wolf, who is on assignment at Headquarters, was honored for the extra efforts she takes with other NASA centers and Headquarters to ensure that project work at JPL is funded without interruption.

The One NASA Peer Award recognizes individuals and teams who demonstrate the One NASA behaviors of decision-making for the common good, collaborating to leverage existing capabilities and standardizing to achieve efficiencies agency-wide. Candidates must be nominated by their peers, rather than by their supervisors.

To nominate someone or for more information about this award, see *http://hr.jpl.nasa.gov/ers/OneNASA*.

*Kate Wolf, left, receives award from One NASA team member Vicki Laidig.*

## Blood drive set for August

The next JPL/Red Cross blood drive will be held in von Kármán Auditorium on Tuesday, Aug. 16, from 10 a.m. to 4 p.m. and Wednesday, Aug. 17, from 7 a.m. to 1 p.m.

Occupational Health Services says that while recent collections have been adequate to meet area patient needs, the forecast for the month is concerning. Blood supplies are critically low and there is now a severe blood shortage, especially with the high demand for type O blood.

Use the Red Cross' confidential and secure donor signup at *www.givelife.org/index.cfm?hcl=JPL*. Under Step One, "Find a Blood Drive," click "Search" and the JPL blood drive dates will come up. Once you select your appointment, you will receive an automatic e-mail confirmation. Advance signup sheets will also be available in Building 310-202 prior to the blood drive. For last-minute signups, or to change your appointment, call the Red Cross at (213) 400-0140.

Everyone who participates in the August blood drive will receive a special Red Cross T-shirt and certificate for Baskin Robbins ice cream.

To donate blood you must be at least 17 years old, weigh no less than 110 pounds, have lived in the United States for no less than three years, and be in good health. If you have donated recently, please keep in mind there must be 56 days between blood donations.

For more information, visit *www.redcross.org/services/biomed/blood/supply/tse.html*.

# 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.

**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.

**Tuesday, August 2**

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

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

"Imaging Earth with ASTER: Improving the Way We Study Volcanoes, Glaciers and Land Use"—ASTER science team leader Mike Abrams will speak at noon in von Kármán Auditorium.

**Wednesday, August 3**

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, August 4**

Investment Advice—Fidelity will provide one-on-one counseling in T1720-144. For an appointment, call (800) 642-7131.

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

"Understanding the Advantages of Diversification"—This Fidelity investment workshop, to be held at noon in T1720-137, will discuss the advantages of diversifying your investments, assessing your current investment allocation, and the strategies needed to create a diversified portfio. It is designed for participants with a basic understanding of investing.

**Tuesday, August 9**

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

**Wednesday, August 10**

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

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.

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

JPL Web Developers—Meeting at noon in Building 180-101.

**Thursday, August 11**

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

# Ex-JPLer Thomas returns to flight

When the Space Shuttle Discovery rocketed into space Tuesday morning, among its veteran crew was Dr. Andrew Thomas, who began his NASA career right here at JPL.

Thomas is making his fourth shuttle flight, is a native of Australia who began his aerospace career in private industry in the late 1970s. He joined JPL in 1989 and, shortly thereafter, was appointed leader of the JPL program for microgravity materials processing in space. This NASA-sponsored research included scientific investigations, conducted in the laboratory and in low gravity on NASA's KC-135 aircraft, as well as technology studies to support the development of the spaceflight hardware for future shuttle missions.

He was selected to join the astronaut corps in March 1992 and reported to the Johnson Space Center in August of that year. Thomas' previous spaceflight experience includes:

- STS-77, a 10-day mission during which the crew deployed two satellites, tested a large inflatable space structure on orbit and conducted a variety of scientific experiments in a Spacehab laboratory module carried in Endeavour's payload bay. The flight was launched May 19, 1996 and completed 160 orbits 153 nautical miles above the Earth while traveling 4.1 million miles and logging 240 hours and 39 minutes in space.
- STS-89 aboard Endeavour as part of the crew to dock with the Mir Space Station, launched January 22, 1998. He served aboard Mir as Flight Engineer 2 and returned to Earth with the crew of STS-91 aboard Space Shuttle Discovery on June 12, 1998, completing 141 days in space and 2,250 orbits of Earth.
- STS-102 Discovery (March 8–21, 2001), the eighth shuttle mission to visit the International Space Station. Mission accomplishments included the delivery of the Expedition-2 crew and logistics resupply with the Leonardo Multi-Purpose Logistics Module, and the return to Earth of the Expedition-1 crew. During the mission, Thomas performed an EVA of 6.5 hours to install components to the outside of the space station. Mission duration was 307 hours and 49 minutes.

# It's back to Mars we go

By Mark Whalen

The Aug. 10 launch of JPL's newest sojourn to the Red Planet—Mars Reconnaissance Orbiter—is approaching fast. Universe caught up with Project Manager Jim Graf, who provided an update.

**The orbiter has been at the Cape since the beginning of May. What's the latest on launch preparations? Are there any areas of concern? What's left to be done?**

The spacecraft has completed its electrical testing and we have loaded the propellant. We are in the process of integrating the spacecraft with the payload fairing and will be moving shortly to Launch Complex 41 for mating with the launch vehicle. While those activities are going on at the Cape, the operations team is conducting critical launch readiness tests. I have no concerns about the flight vehicle at this time.

Last week a review by JPL's Governing Program Management Council affirmed that MRO is ready for launch. Subsequent to that we provided a mission readiness briefing at NASA Headquarters. The team is ready to go.

**What is unique about this mission?**

MRO is flying the most ambitious payload suite we have ever sent to another planet. The instruments will cover more of the surface and at higher resolution than ever before and produce a data volume five times all other Mars missions combined. The payload will "follow the water" in the atmosphere with the JPL-provided Mars Climate Sounder, on the surface with various imagers, and even under the surface with a radar that penetrates the subsurface. The telecommunications subsystem enables a data rate of up to 5.6 megabits per second from Mars to Earth. The high data rate is needed to return all of the data generated by the instrument suite.

From the MER rovers we have in-depth knowledge of specific, relatively small regions on the surface. With the instruments on MRO and their ability to cover vast portions of the planet, we can now transfer that MER knowledge to other areas on the surface.

**MRO's science orbit will be lower than previous orbiters' have been. Does that produce any special challenges?**

The lower orbit helps to increase our spatial resolution, but since we are closer to the atmosphere, the drag caused by the atmosphere increases and we will have to conduct more drag-makeup maneuvers than we would like. The increased drag also impacted our approach to planetary protection. We are not able to stay in orbit long enough to satisfy the traditional criteria for planetary protection, so the MRO project pioneered the use of the bio-burden approach to satisfy planetary protection requirements. This technique required that we both clean the hardware as well as estimate the spores that may be left on the spacecraft after completion of the mission.

**Do you expect the science return to be a quantum leap over past and current orbiters? For example, should we expect to see the best-yet orbital images of Mars?**

Every time we increase the resolution of images taken of Mars, what we find surprises us. The step forward taken with the Odyssey and Mars Global Surveyor instruments has identified ice and other features that have increased our understanding of the planet. The MRO payload will take the next step; it will us enable us to see surface features the size of a card table from orbit and it will have increased spectral resolution enabling accurate mineral detection. The science community and the public will get to see a new Mars, one unlike anything seen previously. The Mars Climate Sounder will dice up the atmosphere in small volumes and allow us to track the water, particulates and selected gases at a level not previously seen.

**MRO will use a type of launch vehicle (Atlas V) never used on an interplanetary mission before. What's the reason for that?**

There are several reasons for the change in launch vehicle. First, the planets are not as well aligned as we would like and the opportunity is the worst in decades in terms of energy requirements. Second, the payload and the large telecom subsystem to return the data are massive. These facts drove us to a new class of launch vehicle. The launch service was competed by Kennedy Space Center, and Atlas won.

**How will this mission support future Mars missions?**

The data will dramatically increase our basic understanding of the planet. It will also tell us where it is both scientifically interesting and safe to land for missions like Phoenix and Mars Science Laboratory. Lastly, the JPL-produced Electra radio on MRO will provide a critical radio relay between Earth and those landers in much the same way Odyssey and MGS are providing that function for the MER rovers.

**What are your personal challenges? In QuikSCAT, you managed an Earth mission whose development seemed to begin and end in a flash. How are you handling the larger scope of MRO?**

QuikSCAT was a great mission. It was ready to launch one year after go-ahead and after six years in space it is still producing critical ocean-winds data. We took risk in that mission since it was unique and didn't have other missions relying on it. We can't take that same risk posture on MRO since it is a flagship mission with many more missions relying on it. Also, QuikSCAT was simpler—since it had one instrument—while MRO has seven instruments plus three engineering payloads and two more investigations using engineering data.

One instrument, the subsurface radar, was provided by the Italian Space Agency, which led to additional complexity in order to comply with International Traffic in Arms Regulations (ITAR). Let's just say that my hair has grayed a lot more on MRO than on QuikSCAT.

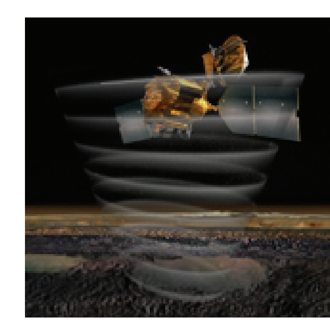
**Describe the team that has gotten you this far, and the one that will carry out the mission once you get to Mars. What work is being done at JPL and what will be done by industry/university partners?**

The technical and administrative staff on MRO is terrific. They are some of the finest professionals I have worked with. The JPL team has worked hand in glove with the Lockheed Martin spacecraft development team to develop an orbiter that is the most capable we have ever sent to another planet. We combined the strengths of both organizations in one team. This arrangement will carry over into operations with prime activities both in Pasadena and Denver.

The instruments were developed by private industry, JPL, universities and the Italian Space Agency, and those principal investigators and team leaders will each be processing the science data when it starts flowing back to Earth in November 2006. The Interplanetary Network Directorate will play a critical role in successfully capturing the flood of data that MRO will transmit back to Earth.

**How do you expect to feel at launch? Excited, nervous, confident?**

The MRO team has done everything possible to make the mission a success; however, we will all breathe a sigh of relief when the first signal comes back from the spacecraft.




*Top: Artist's concept shows the Shallow Subsurface Radar instrument, which will look into the first few hundred feet below the martian surface. Center: The Atlas V rocket, provided by Lockheed Martin, that will launch MRO to Mars. Bottom: The protective fairing that will encapsulate the orbiter atop the Atlas V.*

# Hot sun powers racing cars home

By Susan Braunheim-Kalogerakos

Photo by Cynthia Cano

*Onlookers check out the Saint Thomas Academy car, which won a division of the solar-car race.*

Culminating an eight-day trek across the American southwest, eight teams of high school students competing in the Dell-Winston Solar Car Challenge crossed the finish line at JPL on Saturday, July 16.

The solar vehicles, built entirely by the students, started the race July 8 in Round Rock, Texas, and wound their way 1,600 miles through Texas, New Mexico and Arizona to reach their final destination. The last leg of the race ran from Citrus College in Glendora to JPL.

The Houston Solar Race Team, driving the Sundancer, reached a top speed of 57 mph and averaged 29 mph to win the Open Division. The team is from Houston Vocational Center in Houston, Miss. The Saint Thomas Academy Experimental Vehicle Team won the Classic Division with a top speed of 51 mph and an average speed of 26 mph. The academy is in Mendota Heights, Minn.

The Open Division allows teams to use high-technology hub motors as well as solar cells rated at more than 16 percent efficiency. A hub motor reduces the number of parts required to drive the wheel and is designed to increase the efficiency of the drive train. The Classic Division requires that participants not use hub motors and that they use solar cells rated up to 16 percent efficiency.

Race director and program creator Dr. Lehman Marks felt JPL was an appropriate place to end the race. "One of the main goals of this program is to get kids involved with cutting-edge technology," he said. "There is no better place to do that than at JPL. It just seemed like the perfect place to end the race."

Altogether, 180 students from high schools in Colorado, Texas, Minnesota, Mississippi, Indiana, California, New York and Mexico participated in the race. The California team was represented by students from Walnut High School. The 16 students on Walnut High's "QuikSolar" team prepared for the competition for more than a year, applying the skills learned in the classroom to design and build their solar car. The team ended up placing second in the Classic Division.

## Passings

**DEANNA KRAEMER,** 67, a retired Senior Human Resources Specialist, died July 19. She specialized in helping people with their careers, first in staffing at Caltech in 1982, later at JPL in staffing and outplacement for which she earned a NASA Exceptional Service Medal. She retired in 2000.

She is survived by sons David and Eric, daughter Jennifer La Fontaine and grandchildren Kolby, Sierra, Rachel, Samuel, Benjamin, Michelle, Gabrielle and Aaron.

Services were held July 26 at Assumption of the Blessed Virgin Mary Catholic Church in Pasadena. The family thanks everyone for the outpouring of support.

## Retirees

*The following JPL employees retired in July:*

Leon Keyser, 31 years, Section 3247; Sandra Bedrossian, 29 years, Section 1112; Mardith Wilkins, 25 years, Section 3312; Ronald Alley, 23 years, Section 3242; John Demmitt, 20 years, Section 355G, Jeanie Hascher, 13 years, Section 1110.

## Letters

To our JPL friends: We are truly grateful for the support you have given us during the recent passing of our wife and mother, Nan Sanders. Your kindness has helped lift our spirits during this difficult time, and will never be forgotten. Thanks for all that you have done. Sincerely,

Doug and Jane-Ann Sanders

The Weisbin family wishes to express its deep gratitude to the JPL community for your very thoughtful wishes and lovely plant received in acknowledgment of the passing of our brother-in-law, Irving Levenstein.

Charles R. Weisbin

I'd like to thank everyone in the Quality Assurance Office and the Software Quality Assurance Group for their kind thoughts and sympathy on the recent passing of my father-in-law. We greatly appreciate your kindness. We also appreciate the plant from the ERC; since Marsha's father loved working in the garden, it's a very nice reminder. Regards,

Allen Nikora

## Classifieds

### For Sale

ART CLASSICS, Disney, set of 4, Mickey Through the Years, a ltd. set that has never been open, 4 bases are included, paid $650, sell for $400; Dumbo, Mickey Birthday Party and Tinker Bell with stand, make offer. 653-3061, Jennifer.

BABY CRIB, Jenny Lind, exc. cond., with a premier Kolcraft infant/toddler mattress, $150. 661/259-8211, Ronda Fisher.

BABY ITEMS: booster seat, exc. cond., $30; Medela Pump-In-Style, exc. cond., $175. 909/598-0065.

CAMERA, Minolta 5 megapixel, like new, all software available, $450/obo. 626/281-8195.

COMPUTER, brand new Compaq Presario V4135US laptop (Intel Pentium M processor, 512 MB DDR SDRAM, 15.4" WXGA high-def. BrightView widescreen display, 60 GB HD, 802.11g wireless), Canon iP1500 Photo Printer & carrying case, $960. 626/241-7084, Steve.

COMPUTER MONITOR, Dell UltraSharp 2405FPW 24" wide Aspect Flat Panel LCD w/ height-adjustable stand, http://tinyurl.com/6y69t, brand new, in box, unopened, $800, pick up in Redondo Beach or add $50 for ground shipping. 310/543-8878, luu@verizon.net.

COMPUTER PRINTER, brand new Dell 720 inkjet, whole package never opened, $25/obo. 362-2003, Derek.

CONCERT TICKETS (2), Oasis/Jet, Hollywood Bowl, Sept. 12, 7:30 p.m, Sec. M2, row 2, seats 106-105 (see hollywoodbowl.com/tix/seating_chart.cfm), great place to see a concert, selling at face value + Ticketmaster fees, $120/both tickets/obo. pauline.hwang@gmail.com.

DIGITAL CAMERA, HP Photosmart 315, used twice, comes w/USB connections, wrist-strap; is 2.1 Megapixels, 2.5x digital zoom, 1.8" LCD, HP JetSend infrared, auto flash, auto focus and exposure & self timer; software incl. HP Photo Imaging, ArcSoft PhotoImpression and ArcSoft PhotoMontage; best offer. 653-3061, Jennifer.

EXERCISE EQUIPMENT, gym-like "Bowflex" (complete), except uses calibrated bungee cord sets for tension instead of rods, exc. cond., rarely used, $580. 626/794-1050, eves., Harry.

FOOTBALL HALL OF FAME TICKETS (2), see indoctrination of Dan Marino and Steve Young in Canton, OH on Aug. 7 at 1 p.m.; $50 each ticket. 626/305-6283, 9 a.m.-3 p.m. Mon-Fri.

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

HAM RADIOS: his and hers, (his and hers, mobile and base?), a clean pair of ICOM IC-211's 2-meter deluxe transceivers, manuals, cables, mikes; classic Hammarlund Super Pro receiver and PS, circa 1938, slight repairable damage but considering age, clean; a boat anchor's Boat Anchor, dbathker@att.net. 246-3777.

HI-FI, Surround Sound system, ADS speakers: 1 pr. M12 towers, 2 pr. CM-5 desktop, one 250 watt self-powered subwoofer; NAD T753 6.1 A/V amplifier; speaker cable included; new $5,100, sell $1,600. 957-2718, Larry.

JEWELRY, ladies 18K YG Diamond Cross pendant (.75 tcw of baguettes & round diamonds) w/16" YG chain, paid $310, sell for $140. 323/697-7261.

MISC: electric garden weed whacker, used twice, $20; Canon Photo Printer, new, box never opened, $40. 626/359-7666.

MISC: fishing pole (saltwater), $25; baseball glove (small, left handed) & conditioner, good cond., $15; landscape oil painting, autumn tones, $100; antique cedar chest, 1800s, lid needs repair, $75; trash can w/wheels, $5, '50s Motorola tv "shell," $20; antique pot w/handle, $10; red wig, shoulder length, never used, $20; home gym, $75. 626/357-8210.

MUSIC PLAYER, iPod Mini (blue), brand new, unopened in original package, 4 GB, windows and Mac compatible, great item for music lovers at fantastic price, $110/obo. 626/799-5031, pliu08@amherst.edu.

PIANO, 1995 Petrof 53" upright, excellent condition, modern case design, natural wood lacquer finish, sweet sound, $3,000. 790-8691.

REFRIGERATOR, Haier, 14.3 cubic ft., 3 years old, good cond., clean, $200/obo. 916/320-2365 or e-mail cyndibyndi@gmail.com.

ROWING MACHINE, Concept 2 Indoor w/sliding seat, excellent condition, retail at $850, sell for $650. 634-6212.

SAXOPHONE, Amati alto, great cond., various accessories, ideal for beginners/students, $600/obo. 626/799-5031, pliu08@ amherst.edu.

SCOOTER, 3-whl heavy duty Senior Citizen Amigo Baja w/batteries, charger & basket, mint cond., have all documents, $1,200/obo. 248-3912.

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

STOVE, vintage Wedgewood, gas, white porcelain enamel w/chrome top including ctr. grill, left-side storage with oven + broiler on the right, still in good working order, came with house and was used daily until very recently, $350/obo. 626/357-8547.

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

WASHER & DRYER (gas), full size, white, good working condition, $125/obo for both, available early/mid August. 406-9312, Keith.

WASTEBASKET, for installation inside kitchen cabinets to hide trash, metal guide rail & white plastic, ~1 x 2 x 3 ft (tall), brand new, in orig. box w/installation screws, $30/obo. 626/ 840-0955, lv. msg or e-mail mlei@ligo.caltech.edu.

### Vehicles / Accessories

'98 BMW 528I, 4 dr., automatic transmission, 87K mi., black exterior, tan leather interior, a/c, dual heated & power seats, cruise control, telescoping wheel, premium sound, dual front & side airbags, power sunroof, premium wheels, brand new low-profile wide tires, new brakes and rotors, runs & looks immaculate, $17,990/obo. 445-3287.

'97 DODGE Grand Caravan, V6 3.8L, leather, roof rack, tow pkg, rear a/c, new transmission/Michelin tires, well maintained, 106K miles, $4,900/obo. 500-0330.

'96 FLEETWOOD Sedona tent trailer, 17', slps. 6, includes new cover/awning/new lg.-capacity battery/porta potty, $3,000 obo. 415-0341.

'00 HONDA Accord EX, V6, 4-dr sedan, dark green, power windows, leather, alloy wheels, excellent condition, $11,000. 909/539-7405.

'98 HONDA Civic LX, 75,000 miles, green, automatic, pwr. locks/windows, cruise control, am/fm/cd, a/c, some body work needed, pics at http://pg.photos.yahoo.com/ph/crobles21/my_photos, $5,500. 626/825-9965, leave msg.

'93 JEEP Grand Cherokee, 1 owner, no accidents, 4 x 4, 6 cyl., 4.0 L, red, pwr windows/locks, a/c, cruise, antilock brakes, Michelin tires, good condition, 178K mi., $3,800. 626/794-1133, John.

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

'03 LEXUS GS300 SportDesign, gray exterior, black leather interior, 36K mi., clean and well kept, $30,000. 626/688-7082, Larry.

STREET TIRES (2), Federal Super Steel 595, 245/35 ZR19 93W, have only 500 miles wear, $275 for the pair. 626/327-5670.

'05 TOYOTA Prius 4-dr. sedan, silver, new with < 200 miles, 50-60 miles/gallon, $24,500. 909/539-7405.

'00 TOYOTA Camry LE V6, 79K, black, good condition, CD, spoiler, premium wheels, $9,500. 626/797-4226, Shaun.

'93 TOYOTA Land Cruiser, medium red pearl, 6 cyl., auto, a/c, pwr. windows/doors/brakes (w/ABS), remote entry, factory security system, LoJack, 3rd seat, sliding moonroof, cruise, running board, roof rack, garaged, paint like new, well maintained, 104,300 miles, $9,000. 626/798-9027, after 6 p.m.

### Lost & Found

LOST: half carat pear shape amethyst earring on Wed., 20 July. Sherry, ext. 3-3096.

### Wanted

CARPOOLERS, meet at Towne Ave & 210 (Pomona-Claremont area) at 6:15, arrive back 4:30-5:00; defensive drivers & nice people; current members are at main Lab and Woodbury. Ext. 4-5325, Anita.

HIPPIE-GIRL SINGER for blues/rock/folk/jam band, practice in Pasadena/Glendale. reverb2020@yahoo.com.

HOUSING: quiet engineer seeks small detached house/guest house to rent in nice neighborhood. 310/647-7983, please leave message.

HOUSING for visiting professor and family for 1-year sabbatical, apt./condo/house, 2-3 bd., 2 ba., unfurn./furnished, 1-year lease, around $1,500/mo., start Aug. 5-15. 626/794-2431.

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, mrayman@alumni.princeton.edu, Marc Rayman.

TURNTABLE from '70s or '80s that plays LPs. 661/297-2988 or whartford@sbcglobal.net.

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

### Free

CAT, neutered, gray with pink nose, needs a good home, talkative, follows like a dog, likes people, hates cats, outdoors now but loves to be indoors. 626/840-0955, lv. msg or e-mail mlei@ligo.caltech.edu.

COMPUTER, Power Mac 8600/150, 150 MHz PowerPC, 4 GB HD, 256 MB RAM, CD drive, Zip drive, diskette, Geoport modem, keyboard, mouse, 17" Zenith flat screen CRT, Mac OS 9.1, runs well for an older Mac. 626/440-0609.

FUTON SOFA/BED, white pine solid wood slat frame/base, green color fabric, good cond. 951-9570, Don.

WATERBED, king-sized (72" x 84") Somma, complete with frame and brass headboard, good condition, you pick up. 626/791-7645.

### For Rent

ALTADENA, lovely mtn. cottage near Lake St., 5 mi to JPL, living/bedroom, bathrm., kitchen, a/c, $750 including utilities. 626/794-5096.

ALTADENA, furn. rm. in house, bedr'm/bathr'm, very pleasant, quiet neighb'rh'd, use of kitchen/washer/dryer, $630 incl. util. 626/ 791-8375.

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

ALTADENA: comprehensively furn. 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 includ'd; just bring toothbrush & clothes; TV/DVD/VHS, Dish satellite, wireless DSL; garden, fruit trees, patio, garage; private, immaculate; available September. 626/798-3235.

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. 626/576-7333 or cpl@caltech.edu.

PASADENA, roommate wanted, very large master bd. available in 2 bd./2 ba. condo; new carpet, paint; absentee roommate/owner is never there; pool, gym, Gold Line, security parking, patio, partially furnished; condo is approx. 1,150 sq. ft.; near Colorado and Allen; $1,200 + sec. dep. 323/547-2323, Denise.

PASADENA, beautiful home in Upper Hastings Ranch, 3 bd., 2 ba., fam. room, den, breakfast bar in kitchen, remodeled baths and kitchen, very private backyard, avail. mid-Aug., $2,950 & util. 626/351-9641 or bettyrs@earthlink.net.

PASADENA: seeking roommate to share 2 bd./2.5 ba. townhouse w/2-car garage and lots of storage space; great loc. 6 mi./JPL, nr. Caltech, across from PCC; rm. has priv. bath & can be fully or partially furnished; washer/dryer, patio, a/c, fireplace, cable modem, WiFi, HD TIVO, DirecTV, plasma TV, and all util. included in unit (except long-dist. phone); no pets, sorry; $850 + 1-mo. deposit; month-to-month lease must be approved by landlord. 626/844-9286, Dave.

SIERRA MADRE, 2/1.5 townhouse-style apt. to share, 1,000 sq ft, large patio, a/c, quiet street, garage parking, W/D in unit, n/s, $635 + 1/2 util. 626/355-5667.

TUJUNGA, large duplex with 2 bd., 1 ba. on cul de sac, small yard, stove, w/d hookup, 10 miles to JPL, close to shopping/library/park, $1,250. 353-4669.

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

### Vacation Rentals

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

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

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

GRAND TETON/YELLOWSTONE Nat'l Parks, visit in style, 2 bd. + loft townhome, totally outfitted, w/stunning Teton view, sleeps 6, cable, microwave, etc., borders Grand Teton. 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 right on the beach; 1 bd. w/king heavenly bed, living rm. w/queen sofa bed, fully furn. kitchen, 2 TVs, DVD player, whirlpool tub, plush bath-robes, private balcony, washer/dryer, free high-speed internet, lg. pool w/water slide, fitness center; sleeps 4, 900 sq. ft.; $199/nt.; view resort at www.westinkaanapali.com. 626/794-9579 or fivestarresorts@earthlink.net.

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

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

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

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

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