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Happy new year, indeed!

Spirit's Jan. 3 landing hits the 'sweet spot'

By Guy Webster and Mark Whalen

Spirit, the first of twin Mars Exploration Rovers launched by JPL last summer, became the first spacecraft to land on the Red Planet in six and a half years with an airbag-assisted landing on Saturday evening, Jan. 3.

Ecstatic team members celebrated following the confirmation of Spirit's initial impact at 8:35 p.m. Pacific time. The cheering resumed about three hours later when the rover transmitted its first images to Earth—stunning images of the area around its landing site in Gusev Crater—relaying them through the JPL-managed Mars Odyssey orbiter.

"This is a big night for NASA," said NASA Administrator Sean O'Keefe. "We're back. I am very, very proud of this team, and we're on Mars."

"We've got many steps to go before this mission is over, but we've retired a lot of risk with this landing," said Project Manager Pete Theisinger.



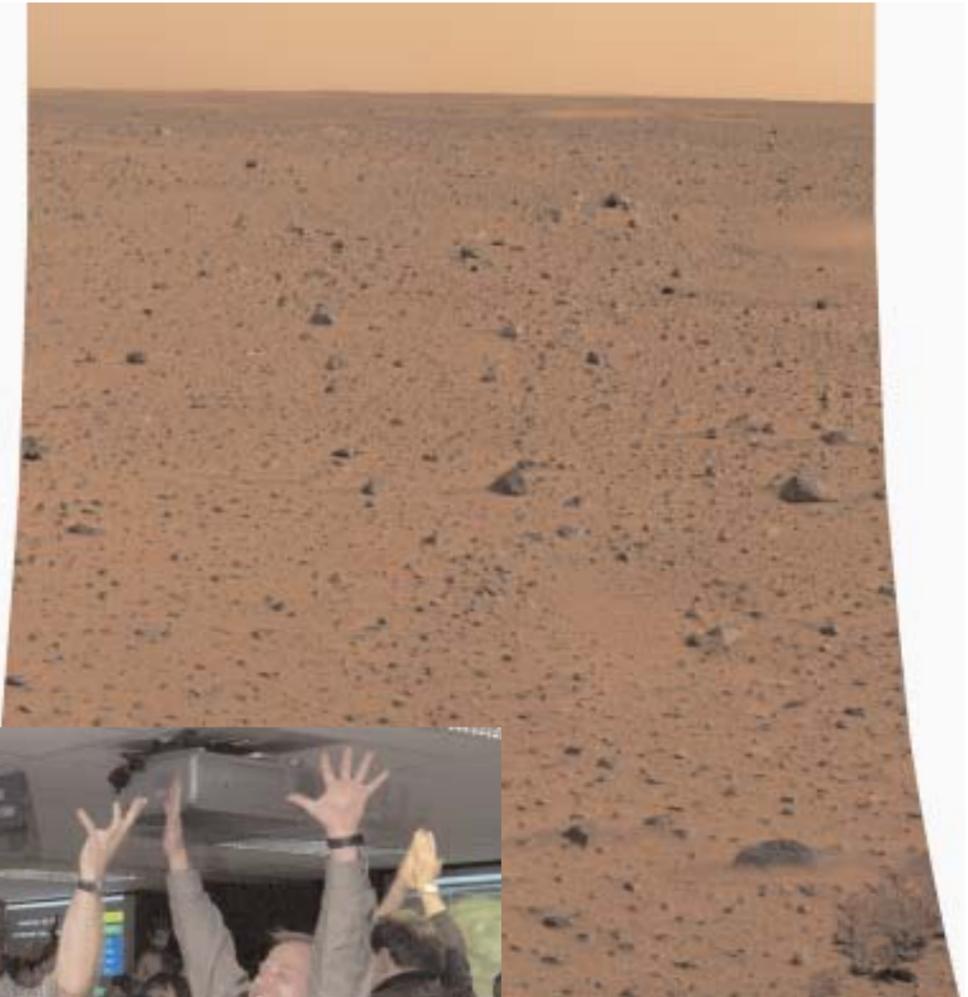
Tom Wynne / JPL Photolab

"You have no idea how it feels," he added. "This is a tremendous day. We're alive on the surface and this gives us hope for things to come."

By correlating images taken by Spirit with earlier images from spacecraft orbiting Mars, the mission team determined that the rover appears to be in a region marked with numerous swaths where dust devils have removed brighter dust and left darker gravel behind.

On Jan. 5, a clean bill of health from a checkout of all three science instruments on Spirit's robotic arm fortified scientists' anticipation of beginning to use those tools after the rover gets its six wheels onto the ground.

Continued on page 4



This color image, released Jan. 6 and created from a mosaic of 12 frames from Spirit's panoramic camera, is the highest-resolution picture ever sent from Mars, more than three times as detailed as images from Mars Pathfinder in 1997. At left, Entry, Descent and



White House Photo

Landing team members celebrate the landing. From left are Adam Steltzner, Robert Mitcheltree and Robin Bruno. Inset: President Bush calls the Spirit team to offer his congratulations.

Stardust makes great catch, heads for touchdown

By D.C. Agle

Project Manager Tom Duxbury, standing, leads the Stardust team in celebrating the spacecraft's successful encounter with comet Wild 2. Next to him is principal investigator Dr. Don Brownlee.

Team Stardust, NASA's first dedicated sample return mission to a comet, passed a huge milestone Jan. 2 by successfully navigating through the particle and gas-laden coma around comet Wild 2. During the hazardous traverse, the spacecraft flew within about 143 miles of the comet, catching samples of comet particles and scoring detailed pictures of Wild 2's pockmarked surface.

Closest approach was at about 11:22 a.m. Pacific time. The spacecraft's radio signal was received at 11:44 a.m.

"Things couldn't have worked better in a fairy tale," said Stardust Project Manager Tom Duxbury.

"These images are better than we had hoped for in our wildest

dreams," said JPL's Ray Newburn, Stardust's imaging team lead. "They will help us better understand the mechanisms that drive conditions on comets."

"These are the best pictures ever taken of a comet," said Principal Investigator Dr. Don Brownlee of the University of Washington. "Although Stardust was designed to be a comet sample return mission, the fantastic details shown in these images greatly exceed our expectations."

The collected particles, stowed in a sample return capsule onboard Stardust, will be returned to Earth for in-depth analysis. That dramatic event will occur on Jan. 15, 2006, when the capsule makes a soft landing at the U.S. Air Force Utah Test and Training Range. The microscopic particle samples of comet and interstellar dust collected by Stardust will be taken to the planetary material curatorial facility at NASA's Johnson Space Center for analysis.

Continued on page 3



Bob Brown / JPL Photolab

News Briefs



Dr. John McNamee

Earth missions get go-ahead

They're carbonated, salty, and alternately wet and dry. Exotic champagnes? No, they're NASA's three Earth System Science Pathfinder small-satellite program missions: Orbiting Carbon Observatory, Aquarius and Hydros.

NASA has awarded all three of these fine "wines" gold medals of sorts by authorizing them to proceed with mission formulation. JPL manages all three mission, each of which performs a first-of-a-kind exploratory measurement that will help answer fundamental questions about how our planet works and how it may change in the future.

The Orbiting Carbon Observatory will enhance our understanding of Earth's carbon cycle and climate. The two-year mission is targeted for launch in August 2007. It will provide the first global, space-based measurements of atmospheric carbon dioxide.

Aquarius will examine the way oceans affect and respond to climate change. Its three-year mission, targeted for launch in September 2008, is the first satellite mission specifically designed to provide monthly global maps of how salt concentration varies on the ocean surface.

Hydros, proposed for launch in 2006 or 2007, will study how water, energy and carbon are exchanged between land and Earth's atmosphere. It will make unprecedented measurements of Earth's changing soil moisture and the freeze/thaw status of land surface that, together, define the state of Earth's hydrosphere.

McNamee to head new office

JPL Director DR. CHARLES ELACHI has announced the appointment of DR. JOHN MCNAMEE as manager of the new Discovery and New Frontiers Program Office. The appointment is effective Jan. 12.

The new Organization 170 is responsible for the planning and end-to-end implementation of the Discovery and New Frontiers Programs consistent with top-level policies, strategies, requirements, and funding established by NASA Headquarters.

Inside NASA portal now available

Would you like a quick way to find information on NASA's Web sites? Inside NASA can help you find and manage information from across the agency by enabling you to organize, on one Web page, links to the NASA information and resources you use most often.

Inside NASA is similar to Inside JPL (<http://insidejpl.jpl.nasa.gov>), the Lab's internal portal (and prototype for Inside NASA), but with a NASA-wide

scope. Inside NASA is now available for JPL use. You can link to it from the Quick Links channel on Inside JPL or bookmark it at <http://insidenasa.nasa.gov>.

Inside NASA provides applications that complement those on Inside JPL. Secure instant messaging is one popular example. You can also find Webex, Process-Based Mission Assurance and an e-mail channel. Inside NASA content choices include links to each Center's internal home pages, Site for On-line Learning and Resources (SOLAR) training, Lessons Learned, Engineering Standards, an employee locator, news from each center, the Multimedia Search, and a Google search.

Using Inside NASA is similar to using Inside JPL. You can customize it to suit your own content and layout needs. Online help and the Welcome channel provide set-up information. If you would like to see an Inside NASA demonstration, mark your calendars for Tuesday, Jan. 13, at 2 p.m. in Building 180-101. See how you can set up Inside NASA to help you manage your information resources.

Inside NASA is now in its pilot phase. JPLers' feedback is requested, and you can submit it via the Contact Webmaster links.

New Weight Watchers specials

JPL and contractor employees are invited to join either the successful Weight Watchers at Work series or On-line program. Both programs have limited special offers. Those considering joining may attend a free orientation meeting on Tuesday, Jan. 13, at 11:30 a.m. in Building 79-16.

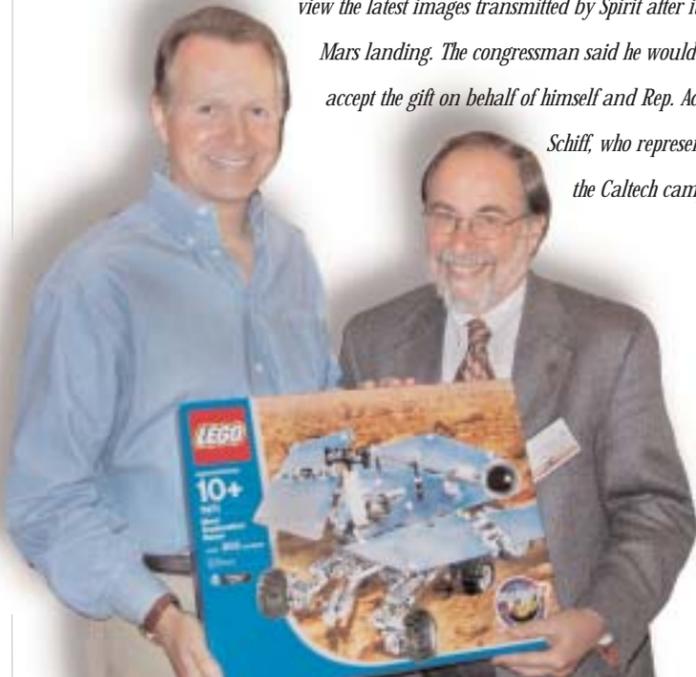
The 17-week Weight Watchers at Work Series costs \$186.15 (based on a \$10.95 charge for each meeting). A three-check payment plan is available for those who sign up on or by Jan. 20. Three checks payable to Weight Watchers for \$62.05 each are collected (must all be dated Jan. 20) at the first meeting. Those who pay for 17 weeks will get an 18th week free.

JPL and contractor employees are welcome to join the series at any time. Those who join after the first week are required to pay \$11 per each remaining meeting at enrollment.

All meetings are held Tuesdays from 11:30 a.m. to 12:30 p.m. in Building 79-16, except for the Jan. 20 meeting, which will be in 238-543. This series runs through May 18. A minimum of 20 paid members is required for this on-Lab program.

For information about the Weight Watchers Online Program, visit JPL's special customized gateway/site at www.weightwatchers.com/cs/jpl and the JPL Weight Watchers website at <http://eis.jpl.nasa.gov/hr/esr/wellness/wwatchers.htm> or call Laurie Lincoln at ext. 4-1612.

Rep. David Dreier, left, chairman of the House Rules Committee and the congressman who represents JPL, receives a Lego model of the Mars Exploration Rover by Caltech President David Baltimore, who thanked him for his longstanding support of Caltech-JPL and NASA. Dreier was at JPL for the landing Saturday night and on Sunday night hosted a group of local municipal and civic leaders at JPL to view the latest images transmitted by Spirit after its Mars landing. The congressman said he would accept the gift on behalf of himself and Rep. Adam Schiff, who represents the Caltech campus.



Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (the Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Group—Meets the first Friday and third Thursday of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at 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).

Working Parents Support Group—Meets the third Thursday of the month at noon in Building 167-111. For more information, call the Employee Assistance Program at ext. 4-3680.

Monday, January 12

Software Product Engineering Class—This one-day course, offered from 8 a.m. to 4:45 p.m. in T1705, provides software cognizant engineers and developers with detailed instruction about various aspects of the software lifecycle, as well as the methodologies and tools that facilitate the development process, the basics of peer reviews, and how to manage and coordinate interfaces with other disciplines and teams. Call Brian Vickers at ext. 3-0877 to register.

Tuesday, January 13

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

Wednesday, January 14

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

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Debbi Llata at ext. 3-3690 for information.

"Nanosystems Biology"—Caltech chemistry professor Dr. James Heath will give this free lecture at 8 p.m. in Beckman Auditorium. For more information, call (626) 395-4652.

Thursday, January 15

"Africa, Genomic Science, and Some Notes On The Evolution Of Human Diversity"—Dr. Wilmot James, visiting professor of history and sociology at Caltech and executive director of the Human Sciences Research Council in Cape Town, South Africa, will speak at 4 p.m. in Caltech's Ramo Auditorium. Free admission. The talk is part of the Caltech Presidential Lecture Series On Achieving Diversity In Science, Math, And Engineering.

Friday, January 16

Folk Music—Guitarist and singer Harvey Reid will perform at 8 p.m. in Caltech's Beckman Institutes Auditorium. Tickets are \$15 for adults and \$5 for Caltech students and children under 12. For more information, call (626) 395-4652 or visit <http://www.folkmusic.caltech.edu>.

"Got Software? How the SQI Project Can Help You"—Trisha Jansma of the Earth Science Data Systems Section (381), project element manager for the deployment element of JPL's Software Quality Improvement Project, will speak at noon in the 167 conference room. She will discuss SQI, created to establish an ongoing operational program that would result in the continuous, measurable improvement of software quality at JPL. For more information, see the software website at <http://software.jpl.nasa.gov>.

Von Kármán Lecture Series—Patrick Abbot, professor of geological sciences at San Diego State University, and Ron Blom, a JPL geologist and remote sensing specialist, will present "The Northridge Earthquake: Ten Years After" at 7 p.m. in Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. For more information, visit <http://www.jpl.nasa.gov/events/lectures/jan04.html>.

Wednesday, January 21

"Personal Responsibility in a Diverse World: Share in the Experience of Pride & Equality"—A celebration of the life of Dr. Martin Luther King Jr. will be held from 11 a.m. to 12:30 p.m. in the 167 conference room. The event is sponsored by the Advisory Committee for Minority Affairs and the African American Resource Team.



Thursday, January 22

Caltech Architectural Tour—The Caltech Women's Club offers this free tour, which is open to the public. Meet at the Athenaeum front hall, 551 S. Hill Ave., Pasadena. Tour begins at 11 a.m. and lasts 1 1/2 hours. For reservations, call Susan Lee at (626) 395-6327.

Friday, January 23

Caltech Women's Club—A Welcoming Coffee will be held from 5 to 6:30 p.m. at the Athenaeum Rathskeller. For more information, contact Carol Andersen at (818) 790-8175 or carol@vis.caltech.edu.

The Kingston Trio—The folk music veterans will perform at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$29, \$25 and \$21. For more information, call (626) 395-4652.

Sunday, January 25

Chamber Music—The Tokyo String Quartet will perform at 3:30 p.m. in Caltech's Beckman Auditorium. Tickets are \$29, \$25, \$21 and \$17. For more information, call (626) 395-4652.

"LSD, Spirituality and the Creative Process"—Cal State Fullerton medical anthropologist Dr. Marlene Dobkin de Rios will give this Skeptics Society-sponsored lecture at 2 p.m. in Caltech's Baxter Lecture Hall. Donations: \$5 for members, \$8 nonmembers; free for Caltech/JPL community. For more information, call (626) 794-3119.

Tuesday, January 27

Marc Abrahams—The founder of the Ig Nobel Prizes will discuss wonderfully strange research in science, medicine and technology at 8 p.m. in Caltech's Beckman Auditorium. Free admission. For more information, call (626) 395-4652.

Wednesday, January 28

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Debbi Llata at ext. 3-3690 for information.

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

Thursday, January 29

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

JPL Stories—Paul Weissman of the Earth and Space Sciences Division will present "All Good Spacecraft Don't Go to Heaven" at 4 p.m. in the Library, Building 111-104. This talk will recount some past efforts to start comet missions, only to see them canceled for a wide variety of reasons. If you have questions about the JPL Story series or wish to participate, call Teresa Bailey at ext. 4-9233.

Toy story

Newly named Spitzer Space Telescope releases first images



A new window to the universe has been opened with the Dec. 18 release of the first dazzling images from NASA's newly named Spitzer Space Telescope, formerly known as the Space Infrared Telescope Facility.

The first observations, of a glowing stellar nursery; a swirling, dusty galaxy; a disc of planet-forming debris; and organic material in the distant universe, demonstrate the power of the telescope's infrared detectors to capture cosmic features never seen before.

The Spitzer Space Telescope was officially named after the late Dr. Lyman Spitzer Jr. He was one of the 20th century's most influential scientists, and in the mid-1940s, he first proposed placing telescopes in space.

"NASA's newest Great Observatory is open for business, and it is beginning to take its place at the forefront of science," said Dr. Ed Weiler, NASA's Associate Administrator for Space Science. "Like Hubble, Compton and Chandra, the new Spitzer Space Telescope will soon be making major discoveries, and, as these first images show, should excite the public with views of the cosmos like we've never had before."

"The Spitzer Space Telescope is working extremely well," said Dr. Michael Werner, project scientist for the Spitzer Space Telescope at JPL. "The scientists who are starting to use it deeply appreciate the ingenuity and dedication of the thousands of people devoted to development and operations of the mission."

Launched Aug. 25, 2003 from Cape Canaveral, Fla., the Spitzer Space Telescope is the fourth of NASA's Great Observatories, a program designed to paint a more comprehensive picture of the cosmos using different wavelengths of light.

While the other Great Observatories have probed the universe with visible light (Hubble Space Telescope), gamma rays (Compton Gamma Ray Observatory) and X-rays (Chandra X-ray Observatory), the Spitzer Space Telescope observes the cosmos in the infrared. Spitzer's unprecedented sensitivity allows it to sense infrared radiation, or heat, from the most distant, cold and dust-obscured celestial objects. Today's initial images revealed the versatility of the telescope and its three science instruments.

The images, clockwise from top left:

- The dusty, star-studded arms of a nearby spiral galaxy, Messier 81, are illuminated. Red regions in the spiral arms represent infrared emissions from the dustier parts of the galaxy where new stars are forming. The image shows the power of Spitzer to explore regions invisible in optical light, and to study star formation on a galactic scale.

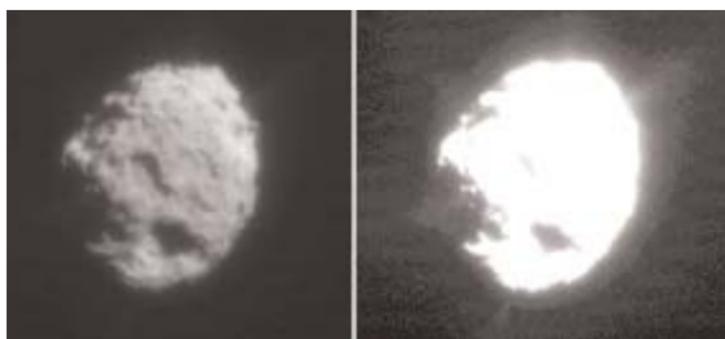
- Spitzer revealed, in its entirety, a massive disc of dusty debris encircling the nearby star Fomalhaut. Such debris discs are the leftover material from the building of a planetary system. While other telescopes have imaged the outer Fomalhaut disc, none was able to provide a full picture of the inner region. Spitzer's ability to detect dust at various temperatures allows it to fill in this missing gap, providing astronomers with insight into the evolution of planetary systems.

- Resembling a creature on the run with flames streaming behind it, the Spitzer image of a dark globule in the emission nebula IC 1396 is in spectacular contrast to the view seen in visible light. Spitzer's infrared detectors unveiled the brilliant hidden interior of this opaque cloud of gas and dust for the first time, exposing never-before-seen young stars.

- Data from Spitzer of the young star HH 46-IR, and from a distant galaxy 3.25 billion light-years away, show the presence of water and small organic molecules not only in the here and now, but, for the first time, far back in time when life on Earth first emerged.

JPL manages the Spitzer Space Telescope mission for NASA's Office of Space Science. Science operations are conducted at the Spitzer Science Center at Caltech. Major partners are Lockheed Martin Corp., Sunnyvale, Calif.; Ball Aerospace & Technologies Corporation, Boulder, Colo.; NASA's Goddard Space Flight Center; Boeing North America (now DRS Technologies, Inc.) Anaheim; the University of Arizona; and Raytheon Vision Systems, Goleta, Calif. The instrument principal investigators are Dr. Giovanni Fazio, Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.; Dr. James Houck, Cornell University, Ithaca, N.Y.; and Dr. George Rieke, University of Arizona.

Stardust *Continued from page 1*



Comet Wild 2 as imaged by Stardust.

The right image shows protruding jets.

Stardust has traveled about 2 billion miles since its launch on Feb. 7, 1999. As it closed the final gap with its cometary quarry, it endured a bombardment of particles surrounding the nucleus of comet Wild 2. To protect Stardust against the blast of expected cometary particles and rocks, the spacecraft rotated so it was flying in the shadow of its "Whipple Shields." The shields are named for American astronomer Dr. Fred Whipple, who, in the 1950s, came up with the idea of shielding spacecraft from high-speed collisions with the bits and pieces ejected from comets. The system includes two bumpers at the front of the spacecraft—which protect Stardust's solar panels—and another shield protecting the main spacecraft body. Each shield is built around composite panels designed to disperse particles as they impact, augmented by blankets of a

ceramic cloth called Nextel that further dissipate and spread particle debris.

"On Jan. 2, comet Wild 2 gave up its particles but it did not do so without a fight," Duxbury said. "Our data indicates we flew through sheets of cometary particles that jostled the spacecraft and that on at least 10 occasions the first layer of our shielding was breached. Glad we had a couple more layers of the stuff."

Stardust entered the comet's coma—the vast cloud of dust and gas that surrounds a comet's nucleus—on Dec. 31. From that point on it kept its defensive shielding between it and what scientists hoped would be the caustic stream of particles it would fly through. And fly through cometary particles Stardust did, but not in the fashion the team envisioned while designing the mission.

"We thought we would see a uniform increase in the number of particles the closer we came to the comet's nucleus and then a reduction," said Brownlee. "Instead, our data indicate we flew through a veritable swarm of particles and then there would be almost nothing and then we would fly through another swarm."

Stardust scooped up these cometary particles, impacting at 3.8 miles per second, for almost instantaneous analysis from onboard instruments and stored other particles for later, in-depth analysis, here on Earth.

"Our navigation camera was designed to assist in navigation, not science," Newburn said. "But these are

the best images ever taken of a comet and there is a remarkable amount of information in those 72 pictures. Not only did we image the jets of material spewing out from the comet, but for the first time in history we can actually see the location of their origin on the surface of the comet."

At about 11:25 am Pacific Time on Jan. 2, only minutes after its closest approach with the comet, Stardust pointed its high gain antenna at Earth and began transmitting a data stream that took more than 30 hours to send but will keep cometary scientists busy for years to come. About six hours later another event took place that goes a long way to literally increasing the scientists task load exponentially.

"Six hours after encounter we retracted the collector grid, with what we are all confident is an abundance of cometary particles, into the spacecraft's sample return capsule," added Duxbury. "The next time the sample return capsule is going to be opened is in a clean room at the Johnson Space Center in the days following Earth return in January 2006."

Scientists expect in-depth terrestrial analysis of the samples will reveal much about comets and the earliest history of the solar system. Chemical and physical information locked within the particles could be the record of the formation of the planets and the materials from which they were made. More information on the Stardust mission is available at <http://stardust.jpl.nasa.gov>.

Landing site honors Columbia



Left: Spirit's camera returned this image of the Columbia memorial. Below: Martian surface at an angle, Sol 5.

NASA has named the landing site of the Mars Spirit Rover in honor of the astronauts who died in the tragic accident of the Space Shuttle Columbia in February. The area in the vast flatland of the Gusev Crater where Spirit landed Jan. 3 will be called the Columbia Memorial Station.

Among the images Spirit has returned from the Red Planet is a memorial plaque placed on the spacecraft to Columbia's astronauts and the STS-107 mission.

The plaque is mounted on the back of Spirit's high-gain antenna, a disc-shaped tool used for communicating directly with Earth. The plaque is aluminum and approximately six inches in diameter. The memorial plaque was attached March 28, 2003, at the Payload Hazardous Servicing Facility at NASA's Kennedy Space Center. Chris Voorhees and Peter Illsley, Mars Exploration Rover engineers at JPL, designed the plaque.

"During this time of great joy for NASA, the Mars Exploration Rover team and the entire NASA family paused to remember our lost colleagues from the Columbia mission. To venture into space, into the unknown, is a calling heard by the bravest, most dedicated individuals," said NASA Administrator Sean O'Keefe. "As team members gazed at Mars through Spirit's eyes, the Columbia memorial appeared in images returned to Earth, a fitting tribute to their own spirit and dedication. Spirit carries the dream of exploration the brave astronauts of Columbia held in their hearts."



Spirit *Continued from page 1*

Also, Spirit succeeded Jan. 4 in finding the Sun with its panoramic camera and calculating how to point its main antenna toward Earth by knowing the Sun's position.

Each day following the landing, Spirit's camera snapped numerous images that were more impressive than the day before. On Monday, the team said that "Sleepy Hollow," a shallow depression near Spirit, may become an early destination when the rover drives off its lander platform. That possible crater and other features delighted engineers and scientists examining pictures from the Mars Exploration Rover Spirit's first look around.

Roll-off is now planned no sooner than Wednesday, Jan. 14.

Color images in a mosaic released Tuesday, Jan. 6—showing countless thousands of rocks of all sizes and shapes—are the highest-resolution pictures ever sent from Mars, more than three times as detailed as images from Mars Pathfinder in 1997. Spirit's panoramic camera took 12 contiguous frames that the camera team combined into the mosaic.

"This is the day we've been waiting for," said Dr. Jim Bell of Cornell University, leader of the panoramic camera team.

The scene rises from near the edge of Spirit's lander platform to the sky. Scientists are examining every detail to learn about the landing area within Gusev Crater. In one section of particular interest, retraction of the spacecraft's deflated airbags has disturbed the surface.

this beast is out, taking incredible pictures in the native habitat it was designed to work in," he said. He praised "the talented and heroic teamwork of people at Cornell and around the country who helped develop this camera—its optics, filters, electronics."

The first stereo image mosaic from Spirit's panoramic camera provided new details of the landscape's shapes, including hills about 1.2 miles away that scientists are discussing as a possible drive target for the rover. The rover's infrared sensing instrument, called the miniature thermal emission spectrometer, has begun returning data about the surroundings, too, indicating that it is in good health. Now, positive health reports are in for all of Spirit's science instruments.

Though engineers and scientists for Spirit are eager to get



NASA / Bill Ingalls

the rover off its lander and out exploring the terrain pictures are revealing, caution comes first.

Art Thompson, rover tactical uplink lead, noted on Jan. 7 that an added "lift and tuck" was required to get deflated airbag material out of the way before it can get its wheels onto Martian ground. "We'll lift up the left petal of the lander, retract the airbag, then let the petal back down," he said.

"That airbag is still a little too high, and we're concerned that we might hit it with our solar panel on the way down," added JPL's Arthur Amador, mission manager.

The rover could also turn to roll off in a different direction, but the maneuver to lift a petal and pull airbags further under it is designed to improve conditions for exiting to the front.

"We have experienced a couple of hiccups, so we're being very cautious about how we deal with them," Thompson said. One concern from Jan. 4 and 5 was resolved late Tuesday, Jan. 6, when results of testing a motor that moves the high-gain antenna showed no sign of a problem.

"We're chomping at the bit to get this puppy off the lander," Thompson said.

Besides looking forward to exploring away from the lander, the rover teams are looking forward to getting Spirit's twin Mars Exploration Rover, Opportunity, safely landed on Mars on Jan. 24. Atmospheric conditions in the region of Opportunity's landing site are being monitored from orbit, said Dr. Joy Crisp, project scientist for both rovers.



Above, from left: Dr. Ed Weiler, Dr. Charles Elachi, Pete Theisinger, Richard Cook and Rob Manning revel in the triumph. Above right, Sean O'Keefe and Dr. Charles Elachi enjoy the moment.

"There are places where rocks were dragged through the soil and the soil was stripped off and folded into bizarre textures," Bell said. "Other areas show tails of debris to one side of rocks, possibly shaped by Martian winds. "There's a wonderful mix of both smooth and angular rocks near the landing site, and this is something we'll be trying to puzzle out in the next few weeks," he said.

Scientists and the public may soon have even more to look at. The panoramic camera mosaic released Jan. 6 shows about one-eighth of a full-circle panorama of the landing region. The camera team planned to have the camera finish taking a full panorama this week. The pictures will share priority with other data during communication sessions either directly from the rover to Earth or relayed via the Mars Global Surveyor and Mars Odyssey orbiters.

Seeing real panoramic camera pictures from Mars, instead of just from tests of the camera inside laboratories or spacecraft assembly areas, put the camera into new perspective for Bell. "Until now, it's been like having an animal in a cage, but now



Everyone on the Mars team deserves our undying thanks. And their families deserve our gratitude for their great support and great patience.
—Pete Theisinger, MER project manager

The neat thing about this is you get to work with really cool people; smart, awesome people. I'm so proud of them. I'm humbled by them.
—Rob Manning, entry, decent and landing development manager



This team has spent the last 3 1/2 years together. It's been an incredible challenge. I encourage you all to let them know how important their contribution has been.
—Jennifer Trosper, Spirit mission manager for surface operations

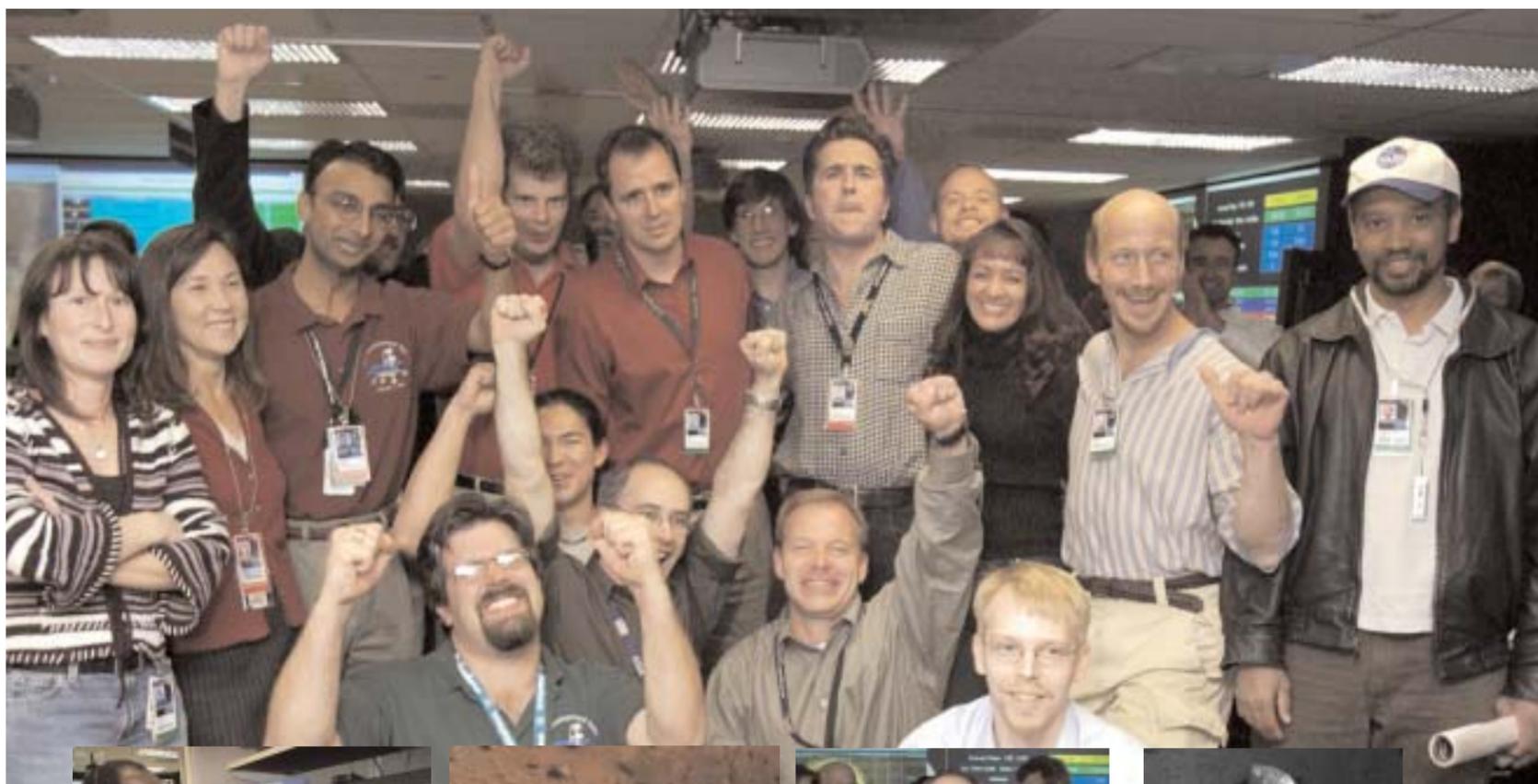


Reality has surpassed fantasy. We're like kids in a candy store. We can hardly wait until we get off the lander and start doing fun stuff on the surface.
—Art Thompson, rover tactical activity lead.



We have assembled the finest team of women and men this country has ever put together. Tonight, you see why we come to work here.
—Dr. Charles Elachi, JPL director

This is surreal. We're in the business of exploration for moments like this.
—Richard Cook, MER deputy project manager



The Entry, Descent and Landing Engineering Team celebrates.

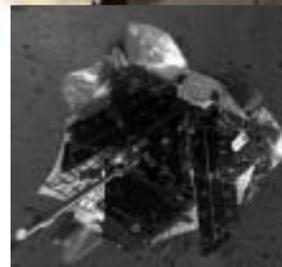
Tom Wynne / JPL Photolab



NASA / Bill Ingalls



Tom Wynne / JPL Photolab



Left to right: Viewing one of Spirit's first images. Spirit's airbags leave a trail. Tom Rivellini gives the thumbs-up. View from above Spirit.

First look behind Spirit, far left. Checking out Spirit's first 3-D image.



NASA / Bill Ingalls



NASA / Bill Ingalls



Bob Brown / JPL Photolab



NASA / Bill Ingalls

Clockwise, from top left: Caltech President Dr. David Baltimore; NASA Administrator Sean O'Keefe, right, and MER team view the first pictures sent back to Earth by Spirit; from left: Dr. Ed Weiler, Dr. Charles Elachi, Congressman David Dreier, Dr. Firouz Naderi.



Bob Brown / JPL Photolab

2003 the busiest year in JPL's history,

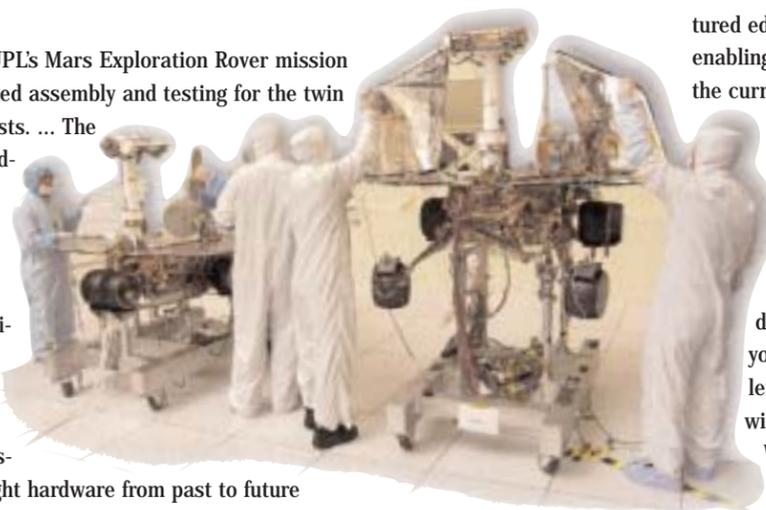
January

An international research team using data from JPL's SeaWinds instrument aboard the Quick Scatterometer spacecraft detected the earliest yet recorded pre-summer melting event in a section of Antarctica's Larsen Ice Shelf. This huge, 656-foot thick plate of glacier-fed floating ice, which in the late 1980s was about as large as Indiana, experienced dramatic disintegration events beginning in 1995 that have reduced its area by nearly 10 percent, or more than 2 trillion tons of ice. ... Four JPL-led investigations were among nine awarded funding by NASA for technology development of innovative Earth science remote-sensing instruments, under the Instrument Incubator Program, to support the mission to understand and protect our home planet. The program focuses on creating mature technologies leading to smaller, less resource-intensive and less expensive flight instruments that can be built quickly and efficiently. ... The Advanced Projects Design Team (Team X), which enables a mission's principal investigators and their design teams to effectively plan new mission proposals, marked its 500th study in support of pre-phase A mission development. ... Australian antennas of NASA's Deep Space Network (left) were spared damage from wildfires that destroyed hundreds of homes and took four lives in the Canberra area.



February

Engineers for JPL's Mars Exploration Rover mission (right) completed assembly and testing for the twin robotic geologists. ... The new Flight Hardware Logistics Program Bonded Stores in Building 325 opened for business, providing a centralized facility to more efficiently transfer residual flight hardware from past to future projects. ... The SeaWinds scatterometer aboard Japan's Advanced Earth Observing Satellite 2—now renamed Midori 2—successfully transmitted its first radar data to our home planet, generating its first high-quality images. ... Images (left) from the visible light camera on JPL's Mars Odyssey spacecraft, combined with images from Mars Global Surveyor, suggested melting snow is the likely cause of the numerous eroded gullies first documented on Mars in 2000 by Global Surveyor. ... Dr. Bonnie Buratti, lead scientist for asteroids, comets and satellites, along with a colleague, conducted a study that confirmed a 50-year-old theory that an asteroid had struck Earth's moon. ... New information about what is inside Mars showed the Red Planet has a molten liquid iron core, confirming the interior of the planet has some similarity to Earth and Venus. JPL researchers, analyzing three years of radio tracking data from the Mars Global Surveyor spacecraft, concluded that Mars has not cooled to a completely solid iron core; rather, its interior is made up of either a completely liquid iron core or a liquid outer core with a solid inner core. ... Using a sensitive new imaging instrument on the Cassini spacecraft, researchers discovered a large and surprisingly dense gas cloud sharing an orbit with Jupiter's icy moon Europa.



March

The Shuttle Radar Topography Mission provided the most telling visible evidence to date of the 112-mile-wide, 3,000-foot-deep Chicxulub impact crater in Mexico's Yucatan Peninsula, the result of a collision with a giant comet or asteroid. ... Former JPL Director Dr. William Pickering returned to his New Zealand homeland to unveil a memorial that honors him and Ernest Rutherford, who earned the Nobel Prize in chemistry in 1908. The memorial is located in the town of Havelock, where both men attended primary school. Pickering also received an honorary doctorate of engineering from the University of Canterbury in Christchurch.

April

The JPL-managed Mars Exploration Program was named as the highest-rated federal program out of 234 evaluated government-wide by the Office of Management and Budget. ... NASA chose two scientifically compelling landing sites—Gusev Crater, which appears to have once held a lake, and Meridiani Planum, a broad outcropping of a mineral that usually forms in the presence of

became more hectic yet with the successful launch of the Galaxy Evolution Explorer in April, Space Infrared Telescope Facility in August, and Mars rovers Spirit and Opportunity in June and July, respectively. Now there are 18 JPL-managed spacecraft flying and other major instruments operating throughout the solar system. The final days of the year led up to

Stardust's flyby of comet liquid water—for the twin Mars Exploration Rovers to explore on the surface of Mars in 2004. ... Aboard a specially-instrumented NASA DC-8 jet, scientists from JPL and the Naval Research Laboratory used the JPL-designed and built Airborne Synthetic Aperture Radar instrument to study the Southern California Bight, between Point Conception and San Diego. AirSar captured eddy image sequences in rapid succession, enabling researchers to measure motions caused by the currents. Coastal eddies can be an important source of transporting nutrients from deep to surface waters, where they stimulate ocean plant growth. They can also transport pollutants from land and recirculate them for days, with both positive and negative consequences for marine life. ... The JPL-managed Galaxy Evolution Explorer spacecraft was launched April 28 from a Pegasus XL rocket released by an L-1011 aircraft off the coast of Florida's Cape Canaveral Air Station. Using state-of-the-art ultraviolet detectors, Galex's 28-month mission will single out galaxies dominated by young, hot, short-lived stars that give off a great deal of energy at that wavelength. These galaxies are actively creating stars, and therefore provide a window into the history and causes of star formation in galaxies. ... Dr. Adena Williams Loston (above), NASA's Associate Administrator for Education, visited JPL for the first time. She discussed current initiatives and also spelled out the efforts to organize and enhance agency education programs.



May

New data released from two microwave sounding instruments that are part of the JPL-managed Atmospheric Infrared Sounder experiment—the most accurate, highest-resolution measurements ever taken from space of the infrared brightness (radiance) of Earth's atmosphere—can be used to make more accurate predictions of weather and climate. ... The Laboratory welcomed about 24,000 people to its annual Open House celebration May 17-18. ... NASA launched a campaign to send hundreds of thousands of names to comet Tempel 1, via a compact disc onboard the Deep Impact spacecraft. ... The Galex mission obtained two "first light" images May 21 and 22. Comprising only four minutes of observing time, more than 400 stars and star-forming galaxies appeared in the far ultraviolet image and more than 1,500 in the near ultraviolet image. The images were dedicated to the memory of the crew of Space Shuttle Columbia. ... Mars Global Surveyor snapped a unique image (above) showing Earth and other planets. The image of Earth actually shows our home as a planetary disc, in a "half-Earth" phase.



June

JPL observed the 25th anniversary of the launch of SeaSat, an experimental satellite that tested a variety of oceanographic sensors including imaging radar, altimeters, radiometers and scatterometers. ... The Mars Exploration Rovers were named Spirit and Opportunity. Nine-year-old Sofi Collis (below) wrote the winning essay in a naming contest, and NASA unveiled the names June 8, two days prior to the launch of the first rover, Spirit ... The first overview analysis of a year's worth of high-resolution infrared data gathered by the Thermal Emission Imaging System (THEMIS) on Mars Odyssey opened Mars to a new kind of detailed geological analysis and revealed a dynamic planet that has experienced dramatic environmental change. "THEMIS is creating a set of data that is going to revolutionize our mapping of the planet and our idea of the planet's geology," said THEMIS Principal Investigator Philip Christensen of Arizona State University. "It will keep Mars scientists busy for the next 20 years trying to understand the processes that have produced this landscape."

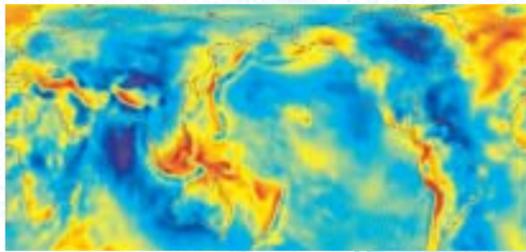




July

The second Mars Exploration Rover, Opportunity, followed its twin with a successful launch the evening of Monday, July 7. ... Astronomers in pursuit of near-Earth asteroids made a discovery with the newly installed Quasar Equatorial Survey, or 'Quest,' camera mounted in mid-April on Palomar Mountain's 1.2-meter (48-inch) Oschin telescope. The detection of the near-Earth object, estimated to be about 820 feet in size, was made July 8. While 2003 NL7 has been labeled a near-Earth asteroid, it is considered non-hazardous, with a 2.97-year orbit of the Sun in which its closest approach to Earth's orbit is about 15.6 million miles. ...

Galex beamed back revealing images (above) of hundreds of galaxies to expectant astronomers, providing the first batch of data on star formation that they had hoped for. The images showed active star formation in nearby galaxies, and large numbers of distant ultraviolet galaxies undergoing starbursts. ... The JPL-managed Gravity Recovery and Climate Experiment (Grace) mission released its first science product, the most accurate map yet of Earth's gravity field (above). The data are expected to significantly improve our ability to understand ocean circulation, which strongly influences weather and climate. ...



Four JPL-led proposals were selected for funding for NASA's In-Space Propulsion Technology Program. Three studies were selected in advanced chemical propulsion technology, while a fourth was selected in the solar sails area.

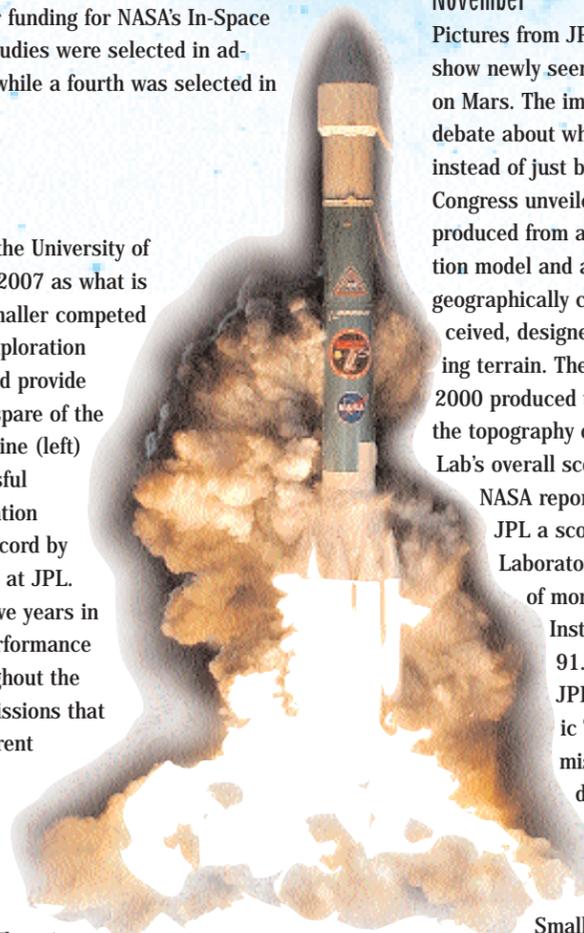
August

NASA announced Aug. 4 that it selected the University of Arizona "Phoenix" mission for launch in 2007 as what is hoped will be the first in a new line of smaller competed "Scout" missions in the agency's Mars Exploration Program. JPL will manage the project and provide mission design. ... A spare of the Deep Space 1 ion engine (left) used during a successful technology demonstration mission achieved a record by running 30,352 hours at JPL.



Researchers kept it running for almost five years in a rare opportunity to fully observe its performance and wear at different power levels throughout the test. This information is vital to future missions that will use ion propulsion, as well as to current research efforts to develop improved ion thrusters. ... The JPL-managed Space Infrared Telescope Facility (SIRTF) successfully launched from Florida's Cape Canaveral Air Force Station Aug. 25 aboard a Delta II launch vehicle (right). The mission will use infrared detectors to pierce the dusty darkness enshrouding many of the universe's most fascinating objects, including brown dwarfs, planet-forming debris discs around stars and distant galaxies billions of light years away. ... JPL, in collaboration with the Goddard Space Flight Center, developed new software that helps link NASA's Earth science satellites together to form a virtual web of sensors with the ability to monitor the globe far better than individual satellites. The effort may help firefighters learn about fires faster through new, high-tech eyes in the sky.

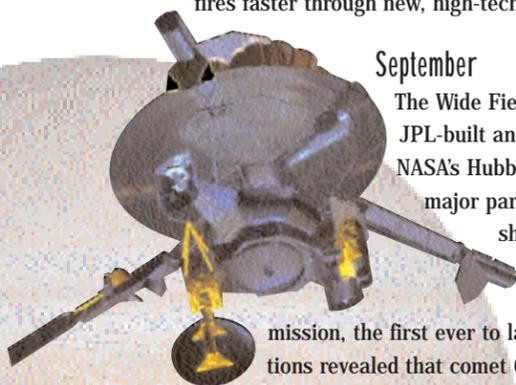
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September

The Wide Field and of Depth Camera 2, the JPL-built and developed camera onboard NASA's Hubble Space Telescope, played a major part in identifying a football-shaped comet as the new target for the European Space Agency's Rosetta mission, the first ever to land on a comet. The observations revealed that comet 67P/C-G is approximately a three-by-two mile object on which it is possible to land. ...

The Galileo mission's 14-year odyssey came to an end on Sept. 21, when the spacecraft passed into Jupiter's shadow then disintegrated in the planet's dense atmosphere. Hundreds of former Galileo project members and their families were present at JPL for a celebration to bid the spacecraft goodbye. It was a celebration of awesome science, ingenious engineering and perseverance in the face of numerous obstacles. Having traveled approximately 2.8 billion miles, the hardy spacecraft (above) endured more than four times the cumulative dose of harmful Jovian radiation it was designed to withstand. ... The CloudSat spacecraft's Cloud Profiling Radar was shipped from JPL's Spacecraft Assembly Facility to Ball Aerospace in Boulder, Colo. CloudSat, an Earth System Science Pathfinder mission that will launch in 2005, will study



October

An Oct. 6 ceremony marked the completion of a new 34-meter antenna at the Deep Space Communication Complex in Madrid, Spain (right). JPL Director Dr. Charles Elachi and other guests from JPL and Ingenieria y Servicios Aeroespaciales, which manages the facility, participated in the event. ... JPL welcomed guests from throughout NASA Oct. 17 for a discussion of the One NASA initiative, a series of collaborative activities across the agency that will support all members of the NASA family. ... Four JPL scientists, along with 11 other researchers, were awarded NASA grants totaling more than \$6.4 million over four years to conduct space fundamental physics research. ... Three JPL researchers were among those from 23 states who were awarded approximately \$47.4 million in grants from NASA to conduct interdisciplinary scientific investigations. The research is expected to expand understanding of a variety of aspects of Earth system science. ... The Patagonia Icefields of Chile and Argentina, the largest non-Antarctic ice masses in the Southern Hemisphere, are thinning at an accelerating pace and now account for nearly 10 percent of global sea-level change from mountain glaciers, according to a new study by JPL researcher Dr. Eric Rignot and two Chilean colleagues. Comparing conventional topographic data from the 1970s and 1990s with data from JPL's Shuttle Radar Topography Mission, flown in February 2000, their objective was to measure changes over time in the volumes of the 63 largest glaciers in the region.



November

Pictures from JPL's Mars Global Surveyor orbiter (right) show newly seen details in a fan-shaped apron of debris on Mars. The images may help settle a decades-long debate about whether the planet had long-lasting rivers instead of just brief, intense floods. ... The Library of Congress unveiled an 8-by-4-foot terrain model (right) produced from a Shuttle Radar Topography Mission elevation model and a Landsat satellite image. The model is geographically centered near JPL—where SRTM was conceived, designed and built—and also shows the surrounding terrain. The 11-day space shuttle mission in February 2000 produced the most complete high-resolution map of the topography of Earth's continents and islands. ... The Lab's overall scores in its fiscal year 2003 Final Performance Evaluation (the NASA report card) represented the first time in 10 years that NASA has given JPL a score of excellent in all categories. This is also the first time the Laboratory has achieved an excellent "overall" rating. JPL received scores of more than 90 out of a possible 100 in each category—Programmatic, Institutional Management and Outreach—for a total weighted score of 91.85, more than three points higher than in fiscal year 2002. ... A JPL-managed mission to study black holes, the Nuclear Spectroscopic Telescope Array, was one of five selected by NASA as candidate mission proposals to study the universe. The proposals are candidates for missions in NASA's Explorer Program of lower cost, highly focused, rapid-development scientific spacecraft. Following detailed mission concept studies, NASA intends to select two of the five mission proposals by fall 2004 for full development as Small Explorer missions. The two missions developed for flight will be launched in 2007 and 2008.

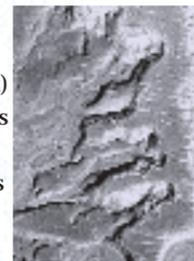
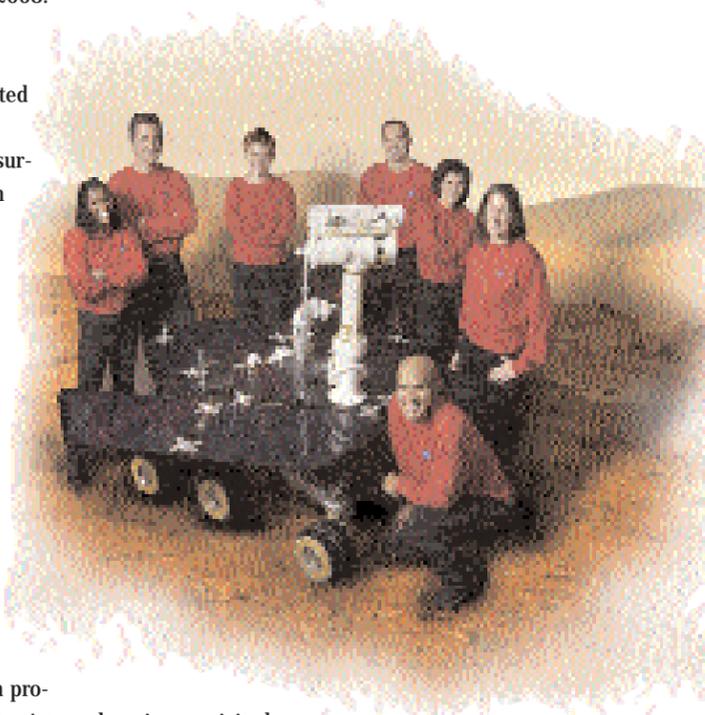


Photo courtesy of Bob Crippen

December

Scientists for the first time detected a tiny but theoretically important force acting on asteroids by measuring an extremely subtle change in a near-Earth asteroid's orbital path. This force, called the Yarkovsky Effect, is produced by the way an asteroid absorbs energy from the sun and re-radiates it into space as heat. The research will impact how scientists understand and track asteroids in the future. ... Several JPL engineers (right) participated in "Marsapalooza," an innovative, educational national tour designed to inform students, teachers and parents about Mars exploration and agency education programs. A total of five youthful scientists and engineers visited New York City; Washington, DC; Chicago; Denver and Los Angeles. The tour was the product of a unique partnership involving NASA, the National Science Foundation, Passport to Knowledge, and several museums, planetariums, and science centers across the country. ... A JPL team successfully tested a new ion propulsion engine design, one of several candidate propulsion technologies under study by NASA's Project Prometheus. The event marked the first performance test of the Nuclear Electric Xenon Ion System (NEXIS) engine at the high-efficiency, high-power, and high-thrust operating conditions needed for use in large-scale nuclear electric propulsion applications.



Next Universe

January 30

Ad deadline:
Tuesday, Jan. 20.

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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

Heartfelt thanks to all of you from my family and me for your thoughts, prayers, and hugs after the death of my mother. The cards and beautiful plants were genuinely appreciated and will always be a reminder of what very special people you all are.

Karen Phillips

My husband and I would like to thank ERC for the plant and Section 2690 for words of encouragement during the passing of my mother-in-law.

Laura White

Passings

ADEUSZ MACIEJOWSKI (aka Tad Macie), 90, a retired electrical engineer, died Nov. 28.

Maciejowski joined JPL in 1968 and retired in 1983. He is survived by his wife, Vera, three daughters, a son and three grandchildren.

Classifieds

For Sale

BABY ITEMS: Graco swing, 3 speed, open top, with removable tray, reclining seat, and plaid cloth pad, \$25; Fisher Price bouncy chair, vibrating, \$10. 661/259-8211, Ronda.

BABY ITEMS: crib, wood, made in Italy, incl. mattress, height adjustable, exc. cond., \$150/ obo; car seat, front-facing, up to 40 lbs., made by Century, gd cond., \$25/obo. 626/791-6101.

BED, Murphy, queen size, folds into white Formica cabinet, exc. cond., \$300/obo. 500-0488.

BED, antique, called "Trailing Vine," brass and iron, ca. 1885, made by Indiana Iron Foundry, recently repainted and brass repolished, would make a terrific child's bed, \$900/obo. 249-0453 betw. 5-9 or jkbonner@gte.net.

BEDROOM FURNITURE, full to queen size headboard, 6-drawer dresser with tall mirror, 2-drawer nightstand, walnut colored oak, exc. cond., \$200/obo. 626/798-4821.

BEDROOM SET, 5 pc., dark oak color, large drawers, good cond., \$300; **RECLINER,** Lazy Boy, mauve, like new, \$200. 626/446-6227, after 5 p.m.

CAMCORDER, Panasonic digital mini DV, PVDV 203, 700x zoom, built-in digital camera, less than 1 lb., ultra compact, brand new in box, never used, full warranty, \$349. 909/592-2279.

CARD SHUFFLER, Johnson, collectible item, all-metal construction with the exception of the friction wheels which drive the cards and the carved-wood dowel handles, stands 6" handle-high and 9" by 6" flanges and handle inclusive, \$35; **DIET TAPES,** Jenny Craig, set of 14, \$50. 790-3899.

CELL PHONE with photo, T-mobile, still in box, \$125; **XMAS TREE,** 7.5 ft., with lights installed, \$120; **ENTERTAINMENT CENTER,** cherry wood, exc. cond., \$75. 701-0061.

COMPUTER, brand new AMD Athlon XP, 22000 MHz, blazing fast, Windows XP Professional, Microsoft Office/Norton Antivirus, 512 MB RAM DDR, Maxtor 120 GB Ultra DMA/133 7200 RPM, CD-RW 52x32x5, on board LAN 10/100, sounds, USB 2.0, ATI video 64 MB, keyboard mouse, monitor not incl., black case w/glass cover. 626/584-7668.

COMPUTER, Toshiba laptop, 2.3 GHz, Pentium Celeron, 30 GB HD, DVD drive, 256 MB RAM, brand new, still in box, \$750/obo. 626/616-1723.

DIGITAL CAMERA, 5-megapixel Olympus Camera C-5050, top rated by PC Magazine, lots of features + great auto modes, brand new in box with all accessories and USA warranty, retails for \$700 + tax, yours for \$571. 310/659-4388, David.

DOG STUFF: drop pin crate, Petmate, blk. 5 gauge black wire mesh, 24" x 18" x 21;" cab. Petmate Kennel, tan, 23" x 12" x 12"; food container, clear w/ black paw prints, 120 oz.; food/water bowls, 4; canned food sealer cap; novelty dog food spork, \$60. 307-6602.

DRUM SET w/double peddle base, \$250/obo. 626/447-4734.

EXERCISE MACHINE, with weights, exc. cond., \$100. 626/794-0081, Bonnie.

FURNITURE: desk, hand carved, oak, + 2 matching bookcases, \$570; library desk, mission, \$375; office furn.: Techline, white, 6 pc., \$350; hall table, drop leaf, \$200; mirror, tall, wood-framed, \$25; rug, Spanish, hand-made, exc. cond., 7 x 9, \$250; Nordic Track, orig., \$30. 626/584-0860 or 626/794-3144, Donna.

GARAGE DOOR OPENER, Stanley, 8 ft. rail, chain drive, exc. cond., 2 transmitters, \$85. 909/596-8117.

GUITAR CASE, Ovation, new, \$25. 367-1063. **HDTV/DECODER,** 57", ext. warranty, 2 yr. left, \$1,800. 714/552-3370, Craig.

HOCKEY TICKETS, 2, Kings' season-ticket holder selling individual games, \$100 for 2 tickets in lower bowl. 626/852-0821.

INFANT CARRIER/CAR SEAT, Peg Perego Primo Viaggio, "Chesapeake," with 2 matching car seat bases, blue/white check fabric, used for 5 mo., clean, vg cond., \$90. 626/446-4969, Jennifer.

KITCHEN TABLE SET, 3' x 3', 4 chairs, sturdy, painted maple, exc. cond., \$90. 626/798-5855.

MISC: tuner/amplifier, Onkyo TX-840, 60 watts/channel. w/remote. \$200; answering

machine/cordless phone, Sony, digital, 900 MHz, \$50; speakers, acoustic research, pair, \$60; lomega Zip drive, w/3 disks, \$50; golf bag, Calloway, pro tour, black, \$60; putter, Ping, J-blade, \$40. 213/810-8801.

MISC: box spring/mattress sets, 2 Serta singles, "Perfect Sleeper," w/heavy support frames, guest room use, exc. cond., \$350/set; grandfather clock, Howard Miller, floor style, man & moon time, Westminster wgt-drivn chimes on qtr. hr., exc. cond., \$550; 2 Coach City Bag purses, \$100/ea. 626/793-3232.

MISC: mixing bowls, 4, nesting, porcelain, like new, rare, \$50 value, \$30/obo; compote tray, silver-plated, 11 x 4 x 1", perfect cond., \$10; pod, hardwood, 17 x 5.5" for hors d'oeuvres, fruits/nuts, \$8; veg. dish with handles, 8," covered, flowered, porcelain, \$8; many other items. 626/793-1895, Albert.

MISC: car creeper, Huffly, \$10; wig, red, shoulder length, \$20; table cloths, 2, slate blue, oval with 18 matching napkins and rings, \$10; shovels \$2 ea; hoe, \$5; punch bowl set, 18 piece, \$10; mailbox, oversized, green, \$20; sytch, cuts tall grass, paid \$54 in 1970, sell \$10. 626/357-8210.

PCI ADAPTER CARD, Maxtor Ultra ATA/133, adds up to 4 ATA devices, suitable for Windows 98/Me/NT/2000/XP, but not Mac, \$15, unopened. 323/254-2562, Mike.

PIANO, lg., upright, gd cond., perf. for beginning student, \$300. 626/794-0081, Bonnie, eves.

PIANO, Yamaha C3 Grand, 6 ft., polished ebony, exc. cond., MSRP \$32,495, sacrifice, \$11,000; **PORT REPLICATOR,** for IBM Thinkpad, works with T20, T21, A20, A21, or X, R series, like new, \$85.790-3899.

POWER WHEELS, 4 x 4 Jeep, battery powered, rides-holds 2 small children, they drive it, safe fun for kids, like new, hardly used, originally cost \$225, bargain at \$125, will bring to Lab. 909/596-9202, eves.

PRINTERS, Epson Stylus, both new and unused, prints 1440 x 720 dpi, color 1160, prints 13 to 44" paper, 4 picoliter ink droplets, \$100; color photo 875DCS w/6 color printing and memory stick adapter card, \$75, accessories and cartridges for each. 626/905-1929, Adam.

SNOWBOARDS, w/bindings for riders approx. 4'10" to 5'3", used little one season, \$75 each; snowboard boots, men's size 9 & 10, \$15; kids' gear, assorted available; gloves, pants, long underwear, etc. 626/797-6824.

TABLE, glass, 72"x 42," 6 upholst'r'd chairs, exc. cond., \$199/obo; **SOFA/LOVESEAT,** vg cond., fabric, \$199/obo. 909/592-2279.

TELESCOPE, 8" Konus, brand new; 2-axis motor finder scope; polar scope; 2 eye pcs.; moon filter, boxed, \$620/obo; collimator, \$40. 661/296-4332.

TIMESHARE MEMBERSHIP, lifetime, Park City, UT, 1 bd., 1 week each year at Park City or trade (RCI), '03 week not used yet, \$595/obo. 790-7934.

TREADMILL, Sears Lifestyler, 8 mph, auto incline, 1.25 HP DC, gd cond., \$125. 248-2480.

TREES: red banana plant 5' tall, \$60/obo; ficus, 10' tall, braided, in 30" plastic pot, \$250/obo; **CERAMIC BOWL,** gray, 2' diam. w/ planted geraniums, \$40/obo. 626/791-6101.

TYPEWRITER, antique Underwood, exc. working order, w/cover, \$150/obo. 626/284-9664.

WASHING MACHINE, Kenmore, 2 1/2 yrs. old, with owner's manual and installation instructions, \$200. 952-7940.

WATERBED BASE with 4 drawers, heater, queen, \$50. 790-6185, Tim Scheck.

WATER SOFTENER, Ecowater, whole house system, good cond., \$300. 500-0488.

Vehicles/Accessories

'96 ACURA Integra GSR, 4 dr., 4 cyl., 5 spd., ABS, a/c, p/s, p/b, p/w, pdl., full pwr., tilt steering wheel, am/fm stereo/cassette/CD, premium sound, loaded, sunroof, alloy wheels, new tires, one owner, extra clean, exc. cond., looks and runs great, must see, \$8,200. 626/285-5722.

'88 BAYLINER powerboat, 24' Trophy Offshore, hard top, fully equipped, low hrs., in slip, with trailer, \$13,000. 626/355-2473.

'94 BUICK Regal, only 69K miles, very clean, excellent mechanical condition, \$3,600. 244-5489, anytime.

'03 CAR CARRIER, with electric brakes, current plates, tandem wheels, on-board ramps, new spare tire, \$1,600. 626/963-2772.

'98 FORD Explorer, power everything, V8, black, 71,000 mi., great cond., leather interior, Blue Book \$10,300, sell for \$9,000. 352-9418.

'95 FORD Thunderbird, 2X, V6, 104K mi., \$3,200. 951-8067.

'94 FORD T-Bird, red, no paint or body damage, auto, power steering/brakes/doors/ windows/seat, tilt wheel, cruise control, am/fm radio/cassette, new tires and brakes, alarm w/keyless entry, one owner, maint. records, exc. cond., Blue Book \$2,600, must sell, \$1,900/obo. 909/596-8117.

'00 HONDA Insight, 22K mi., 5 spd., 55 to 60 mi. per gallon, 6 disk CD changer, extra speakers; with the money I saved on gas in the last few years I can now afford a sports car. you too can do the same, \$10,500. 653-8204, Buck.

'89 ISUZU pickup truck, fair cond., 141K mi., \$1,700. 957-3675 or 317-1070.

'99 MAZDA Miata MX-5, convertible, 2 dr., 4 cyl., 1.8 L, automatic, loaded with a/c, power steering, tilt wheel, cruise, am/fm, CD player, dual front airbags, in pristine cond., black exterior, tan leather interior, only 29K mi., but must sacrifice at \$12K/obo. 249-9437, eves.

'94 MAZDA MX-6 LS, V6, 30K mi. on new engine block, 115K on chassis, 5-spd. w/less than 10K mi. on new clutch, leather upholstery, white paint, beige/black interior, sunroof, antilock brakes, airbags, a/c, alarm, have all maint. records. 626/794-0886, Ted.

'00 MERCEDES BENZ E320, Bordeaux red, gray int., 4 dr., auto, 46K mi., sunroof, keyless entry, garage kept, new tires, exc. cond., very clean, like new, orig. owner, non-smoker, \$29,900/obo. 626/403-0024.

'91 OLDSMOBILE Silhouette minivan, 154K mi., good cond., new transmission, near-new tires, \$2,600. 957-3675 or 317-1070.

'02 TOYOTA Highlander Limited Edition, loaded, V6 auto, ABS, 4WD, leather, full

ing sunroof, heated seats, tow package, fog lights, 6-disc CD changer, 29.8K mi., exc. cond., \$25K/obo. 562/421-3439.

'99 TOYOTA Camry LE, V6, 3.0 L, automatic, a/c, p/s, power front seat/windows/door locks, CD player, new tinted windows, interi- or perfect, alloy wheels, 60K, still under Toyota certified pre-owned warranty, dealer serviced only, have all service records, exc. cond., \$10K. 562/421-3439.

'97 TOYOTA Corolla CE, 5 spd. manual transmission, a/c, power windows/door locks, am/fm stereo cassette, dual front air bags, remote alarm system, dark green, good cond., approx. 98K mi., \$4,345. 468-4678.

'93 TOYOTA 4-Runner, 4WD, auto trans., stereo/CD, air, sunroof, leather interior, pwr. steering/windows, tow bar, alloy wheels, gray, exc. cond., \$7,000. 952-2584.

'92 TOYOTA Corolla LE, 4 dr., burgundy, auto, a/c, power windows/locks/steering, cruise, new tires, very clean, looks great, runs exc., \$2,800. 626/351-8608, opariser@yahoo.com.

'91 TOYOTA MR2, exc. cond., auto, a/c, cruise control, orig. owner, 83K mi., \$4,650/obo. 249-0469, Marty.

'82 TOYOTA Celica GT Liftback, 2.4L engine, clean title, auto, white w/blue side stripes, blue interior, power steering/brakes/side mirrors, tint, cassette/radio, alloy wheels, good tires & battery, alarm, recently serviced trans., DMV tags till 5/04, good cond., 167.5K original mi., great 2nd or student car, \$1,395/obo. 626/358-7705.

'94 TREK 2120, touring bike, 54 cm. frame, ice violet, Trek carbon/Easton Al stays frame, w/Shimano SPD pedals, Shimano RX100T (triple-21 gear), crank set, Shimano Deore LX derailleurs w/SIS bar end shifters, 22.8 lbs., in exc. cond., 300 mi., originally \$1,000, now \$450. 790-2123.

TOW DOLLY for vehicle, exc. cond., new tires and lights, \$550. 248-0491.

'95 VALCO Westcoaster fishing boat, 14.5 ft., welded alum, 15 HP Mercury outboard, Lowrance 3-D fish finder, foot-controlled bow-mounted trolling motor, below deck mounted battery, carpeted floor boards, 2 folding seats, fitted boat cover, galv. Pacific trailer with spare tire, 3 anchors, 2 paddles, rod holders; complete rig, ready to get the big ones; \$3,000. 248-2480.

'99 VOLKSWAGEN GTI VR6, 5 spd., vg cond., \$11,000/obo. 952-6181.

WIND DEFLECTOR, Wind Wedge, set up for Ford pickup towing 5th wheel trailer, deflects air around trailer frontal area, exc. cond., \$40/obo. 626/963-5727.

Free

FILL DIRT, clean, 13 cu. yds. avail., you haul as little or as much as you like, near Los Robles/Jackson, Pasadena. 626/791-3103, dtrask6@its.caltech.edu.

GUINEA PIGS to good home, can be separated, 1 male, 2 females. 626/798-6618.

SPACECRAFT LITERATURE, Voyager flights, Jupiter and Saturn, Space Shuttle by astronaut Collins. 626/793-1895.

Wanted

APARTMENT, 1 bd., close to JPL, can pay up to \$800. 307-3833.

DRIVER, part-time; need after-school help picking up kids, limited babysitting. 626/441-4400.

FICUS: will remove or haul away any unwanted trees (e.g. weeping Chinese banyan) of reasonable size, for LA Zoo. seal_68@yahoo.com or 248-2855.

DOG HOUSE, Igloo Dogloo style for large 80 lbs. + dog, good cond. 626/791-7645, Bob.

MATH TUTOR, Jr. & Sr. high school level classes; geometry, algebra, SAT math, etc. 888/784-1639, eves and or weekends, please leave msg.

ROOM TO RENT, long-distance commuter, male, non-smoker, for 2 to 3 days max per week, starting in mid-to-late January, prefer close to JPL. 626/339-5511.

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

VAN in good running condition that will accommodate at least 7 children; grandmother of 16 seeks donated vehicle to transport children to church. 626/797-3768.

VANPOOL RIDERS for Lancaster/Palmdale/Littlerock/Acton area; leaves Angeles Forest Park & Ride at 5:45 a.m., leaves JPL 4:10 p.m.; \$155 or \$8/day. Ext. 3-0505, Frank Shanklin.

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

Lost & Found

Found: PEARL EARRING, black, in parking lot behind Bldg. 302. Ext. 3-3579, Larry.

Found: WRISTWATCH, Bldg. 183. Ext. 4-4607, Ken.

For Rent

ALTADENA, 2 bd., 1 ba., dining room, den, 1,200 sq. ft., detached garage, \$1,550. 957-3675.

ARCADIA house, 3 bd., 2 ba., hardwood floors, recently remodeled kitchen, formal living room/din. room, fireplace, fenced backyard w/fruit trees, great location, Arcadia schools, \$1,900 + security dep. 626/445-3975, Rula.

BURBANK home, charming 2 bd., 1 ba., hardwood floors, central heat and air, fire-place, laundry hookups, 20 mins. to JPL, gardener included, \$1,750 lease Jan. 249-9364.

GLENDALE guest house, 1 bd. 1 ba., 13 miles to JPL, washer/dryer, wall-unit air, shared patio, water/gas paid, \$895 + el/trash. 204-0131, Marcos.

LA CANADA apt., 1 bd., very close to JPL, LA Canada schools address, next to Caltech Credit Union, across from shopping and Starbucks, \$850. 952-4444, ext. 201.

LAKE VIEW TERRACE, private room in a spacious 2-bd. townhouse, 15-20 min./JPL, kitchen and laundry privileges, parking in attached garage, private ba., close to most fr-

wys, \$625. 323/857-6533 or 818/899-2720. MONROVIA townhouse, large, 3 bd., 2.5 ba., patio, fireplace, 2 garages, \$1,800. 909/239-1501.

MONROVIA apt., 30 min. to JPL during rush hour, 2 story, 3 bd., 1.5 ba., share with 1 person, spacious, private, furn. bd., large closet, own ba., share shower, living room, kitchen, carport, laundry room, pool, good neighbors, safe location, credit check, \$525 + 1/2 util., non-smoker pref'd. 626/358-7705, Mahmood.

MONTEREY HILLS condo, 2 bd., 1 ba., 3rd fl./private end unit with view, fireplace, hrd-wood flrs. & carpet, central air/heat, dishwasher, stove, laundry rm. (w/washer, dryer hookups), secure ground-level parking, close to 110 fwy., >15 min. from JPL, \$1,200, cable, trash, gas and water included, avail. late January. 626/296-9073.

PASADENA, master room, own ba. + office in a large 2.5 bd., 2.5 ba., 2-story townhouse, only 2 mi. from Caltech and Old Town, \$750. 653-9214.

PASADENA apt., 2 bd., 1 ba., fireplace, stove, refrigerator, priv. patio, garage, exc. location in 4-unit complex, near Sierra Madre Blvd. & California streets, laundry facilities, water, trash and gardner paid, avail. Feb.1, \$1,225. 805/967-7725.

PASADENA, unfurnished and furnished 2 bd., 1.5 ba., 2-story apts. with dishwasher, central a/c, new carpet & floors, refig. & stove, laundry room, large patio, parking, close to Caltech & JPL, \$1,150-\$1,175 plus util. 626/577-3060, ext. 14, Dennis.

PASADENA, furnished apartment to share; 3 bd., 3 ba., townhome-style with patio, central a/c, laundry, close to Caltech & JPL, \$625 plus 1/3 utilities, great for Co-ops. 626/429-3677 or betttyrs@earthlink.net.

PASADENA apartment, 2 master bds., 2 1/2 ba., den, 2-car garage, in-unit washer/dryer, newly remodeled, walk-in closets, high ceiling, wet bar, pool/spa/sauna, exercise room & fireplace, \$2,095. 626/233-9496, Kevin or <http://rental.k-von.com>.

PASADENA, 2 bd. 1 ba. house near Caltech & PCC, large living room, dining room and bonus room, new carpet, dishwasher, laundry hook-ups, gated yard, 15 min. to JPL, \$1,700 + deposit. 626/676-1482.

PASADENA tri-level townhouse, 2 master bd. each with own ba. on upper level, kitchen, dining room, living room, fireplace, 1/2 ba. and patio-deck on main level, attached two car garage with washer/dryer hookups, central heat and a/c, near PCC and Caltech, \$1,400 + \$1,500 security deposit, no smoking, no pets, location: 110 N. Meridith Ave. #5. 626/462-1497, Mark or Tenny.

SUNLAND home, 2 bd., 1 ba., one bd. for rent, 300 sq. ft. of storage in garage, roomie shares driveway, laundry, kitchen, bathroom, linen closet, pets OK, quarter-acre lot, utilities included, phone separate, non-smoker, house completely remodeled, \$600. 951

universe

Jet Propulsion Laboratory

I n s i d e

January 30, 2004
Volume 34 Number 2

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Two for two!!

Opportunity matches twin rover's perfect landing on Mars

By Guy Webster and Mark Whalen



The interior of a crater surrounding Opportunity at Meridiani Planum on Mars as seen from the rover's panoramic camera. Above: Entry, Descent and Landing Manager Rob Manning (facing camera) is embraced by Deputy Project Manager Richard Cook, as EDL Guidance and Control Chief Miguel San Martin applauds.

They did it again!

The excitement and sheer euphoria that took over JPL earlier in the month following the Spirit rover's landing repeated itself in the late evening of Jan. 24, as the second Mars Exploration Rover, Opportunity, hit paydirt with a successful landing in Meridiani Planum, one of the smoothest, flattest places on Mars.

Opportunity returned the first pictures of its landing site early Sunday, Jan. 25, about four hours after reaching Mars. The pictures indicate that the spacecraft sits in a shallow crater about 20 meters (66 feet) across that lies near a much larger crater. Scientists value such crater locations as a way to see what's beneath the surface without needing to dig.

The post-landing news conference in von Kármán Auditorium turned into a raucous celebration when the Entry, Descent and Landing team entered and whooped the crowd of onlookers into a frenzy.

"For the last three weeks, we have been observing exploration exactly as it has happened—with joy, glory and sometimes frustration," noted JPL Director Dr. Charles Elachi. "The success of the Mars team was earned the old-fashioned way—they were excellent, determined and worked very hard."

MER Project Manager Pete Theisinger called the occasion "historic and monumental. This has been a stupendous adventure for all of us."

On Jan. 26, Opportunity's second day on Mars, key science instruments passed health tests and the rover made important steps in communicating directly with Earth. Scientists marveled at a high-resolution color "postcard" of Opportunity's surroundings. The mosaic of 24 frames

from the panoramic camera shows details from the edge of the lander to the distant horizon beyond the rim of the rover's small home crater.

"We're looking out across a pretty spectacular landscape," said Dr. Jim Bell of Cornell University, Ithaca, N.Y., lead scientist for the panoramic cameras on Spirit and Opportunity. "It's going to be a wonderful area for geologists to explore with the rover."

New pictures from Opportunity revealed Jan. 27 showed thin layers in rocks just a stone's throw from the lander platform where the rover temporarily sits.

Geologists said that the layers—some no thicker than a finger—indicate the rocks likely originated either from sediments carried by water or wind, or from falling volcanic ash. "We should be able to distinguish between those two hypotheses," said Dr. Andrew Knoll of Harvard University, a member of the science team for both rovers. If the rocks are sedimentary, water is a more likely source than wind, he said.

The prime goal for both rovers is to explore their landing areas for clues in the rocks and soil about whether those areas ever had watery environments that could possibly have sustained life.

Controllers at JPL planned to tell Opportunity on Jan. 27 to start standing up from the crouched and folded posture in which it traveled to Mars.

"We're going to lift the entire rover, then the front wheels will be turned out," said Mission Manager Jim Erickson of JPL. Several more days of activities are still ahead before the rover will be ready to drive off the lander.

Cheney salutes Mars team

By Mark Whalen

Vice President Dick Cheney shows off a Mars Exploration Rover T-shirt he received as a gift from JPL.



Photo by Steve Banskín / JPL Photolab

On the same day President Bush outlined a new vision for space exploration for the nation, Vice President Dick Cheney stopped by JPL to congratulate the Lab on its success with the Mars Exploration Rover mission.

Cheney's Jan. 21 visit included a briefing in Building 264's mission operations area by Jennifer Trosper, mission manager for surface operations. He then addressed a crowd in the mall, backed by about 100 members of the MER team.

"You're capturing the nation's imagination with the Mars Exploration Rovers," Cheney said. "The Spirit mission is showing your ingenuity in its absolute highest form. Each of the hundreds of people here who worked on this project can be enormously proud of the mission's success, and you can know that people all across the country, indeed around the

world, are thrilled and inspired by your work."

Cheney noted Bush's vision for "a second great age" of space exploration. "Our goals are aggressive: to complete the International Space Station by 2010; to send manned flight beyond Earth's orbit in 2014; to return to the moon by 2020, and to use our presence on the moon as a platform for missions to Mars and beyond.

"These aims are ambitious, they're difficult and they're very demanding. The effort will be repaid many times over in scientific advancement, useful new technologies, the discovery of resources on Earth and beyond, and the discovery of more about ourselves."

Cheney told the gathering that the nation's journeys into space will pose countless challenges, "yet we will embark on these missions with confidence, be-

cause we've chosen exactly the right people to do the job. The president and I appreciate the outstanding work performed by everyone at JPL; you're using your talent and your dedication for the benefit of your country and all mankind. America is proud to lead the world into space and the American people are proud of all of you."

The vice president received several gifts from JPL: a Mars Exploration Rover T-shirt, a rover model, and a "Mars watch," which keeps time in Martian days of 24 hours, 39 1/2 minutes.

JPL Director Dr. Charles Elachi thanked Cheney for the visit. "I want to tell you how privileged we feel that this country has entrusted us in exploring the solar system over the last 40 years, how honored we are by your presence here and by the encouragement you are giving us, and how uplifted we are by the president's exploration initiative."

News Briefs

SRTM data create new maps

A new topographic data set from NASA and the National Geospatial Intelligence Agency will allow exploration of the vast reaches of most of Europe, Asia and numerous islands in the Indian and Pacific Oceans, from the comfort of home.

Gathered in just 10 days by the JPL-managed Shuttle Radar Topography Mission in February 2000, the new digital elevation data set showcases some of Earth's most diverse, mysterious and extreme topography. Much of it previously had been very poorly mapped due to persistent cloud cover or inaccessible terrain. The new data being released comprise about 40 percent of the entire mission data set.

The new images are available on the JPL Planetary Photojournal at <http://photojournal.jpl.nasa.gov>. Search for catalog numbers PIA03398, PIA03399, PIA04950 and PIA04951.

"People around the world will benefit from the release of the mission's Europe and Asia topographic data sets because they greatly extend our knowledge of this immense region that also is home to most of Earth's citizens," said DR. JOHN LABRECQUE, manager of NASA's Solid Earth and Natural Hazards Program.

Thompson wins international honor

SUZANNE THOMPSON, a staff engineer in JPL's Reliability Engineering Section (513), received a Gold Medal Award for her combined presentation and research paper at the 10th International Space Conference of Pacific-Basin Societies in Tokyo in December.

The conference was organized by the Japanese Rocket Society in collaboration with the American Astronautical Society and the Chinese Society of Astronautics, and provided a forum for space decision-makers, experts, engineers and technicians to exchange ideas and experiences in

space technology and discuss prospects for the future of space development and its applications in the Pacific Basin.

Thompson's entry in the conference's Masters Level competition, "Kansas Universities' Technology Evaluation Satellite (KUTESat) Sensing of Radiation Energies, Fluxes, and Exposure Geometry in the Space Environment Using a radiation sensing field effect transistor (RadFET) Array," received the conference's top award. She was the only American at the conference to receive top honors in the Master's competition. Her outstanding work was jointly recognized by the presidents of the JRS, AAS and CSA, from whom she received a certificate and plaque.

Blood drive in February

The next JPL/Red Cross blood drive will be held in von Kármán Auditorium Feb. 17, from 10 a.m. to 4 p.m., and Feb. 18, from 7 a.m. to 1 p.m.

The Red Cross has developed a new automated message system for confidential donor sign ups at <http://www.givelife.org/index.cfm?hcl=JPL>. Enter your e-mail address, birth date and sponsor code "JPL," then click on login. If you experience problems accessing the site, sign up at Occupational Health Services home page at http://eis/medical/blood_form.html.

Advance signup sheets are also available at Occupational Health Services, Building 310-202, prior to the blood drive. For last-minute signups, or to change your appointment, please call the Red Cross at (626) 960-6956, ext. 225.

For more information, visit <http://www.redcross.org/services/biomed/blood/supply/tse.html>.

Occupational Health Services notes that during the two-day drive in November, the Red Cross collected 168 pints of blood, from which 504 lives will benefit.

New NASA official visits Lab



Bob Brown / JPL Photolab

Craig Steidle, right, is shown around the ion propulsion lab by Ira Katz, supervisor of the Advanced Propulsion Technology Group.

Craig Steidle, NASA's newly appointed Associate Administrator, Office of Exploration Systems, paid a visit to JPL on Jan. 23. He met with JPL's Executive Council, toured a number of Lab facilities and received briefings on the Lab's current and future missions and technology development. JPL Director Dr. Charles Elachi also discussed with Steidle the support the Lab can provide to the new enterprise.

The Office of Exploration Systems was established to set priorities and direct the identification, development and validation of exploration systems and related technologies. The creation of the new enterprise was part of the recently announced restructuring of the offices within NASA Headquarters.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (the Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Group—Meets the first Friday and third Thursday of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at 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).

Working Parents Support Group—Meets the third Thursday of the month at noon in Building 167-111. For more information, call the Employee Assistance Program at ext. 4-3680.

Saturday, January 31

Preservation Hall Jazz Band—This ensemble will perform New Orleans-style jazz at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$25, \$21 and \$17; high school age and younger, \$10. For more information, call (626) 395-4652.

Chamber Music—Linda Wang will perform violin at 2:30 p.m. in Caltech's Beckman Auditorium. For more information, call (626) 395-4652.

Tuesday, February 3

"A Random Walk Through My Literary Life"—Author Herman Wouk will deliver a free lecture at 8 p.m. in Caltech's Beckman Auditorium. For more information, call (626) 395-4652.

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

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

Wednesday, February 4

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Dr. Ed Stone Lecture—Dr. Gene Serabyn of the Astrophysics Research Element will present "Setting the Stage for the Terrestrial Planet Finder Mission: Recent Progress in Nulling Interferometry" at 11:30 a.m. in Building 180-101.

Thursday, February 5

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

Friday, February 6

Celtic Music and Dance—Leahy, an ensemble of nine Canadian siblings, will perform at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$29, \$25 and \$21; high school age and younger, \$10. For more information, call (626) 395-4652.

Saturday, February 7

Gross Me Out!—At 2 p.m. in Caltech's Beckman Auditorium, Della Lisi, aka Sally Snoot, explains bodily functions in a game show format. Tickets are \$12 for adults, \$7 for youth. This event is part of the Saturdays at 2:00 series of family events. For more information, call (626) 395-4652.

Tuesday, February 10

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

Wednesday, February 11

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

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Debbi Llata at ext. 3-3690 for information.

"String Theory: Past, Present and Future"—Caltech physics professor Dr. John Schwarz will lecture at 8 p.m. in Caltech's Beckman Auditorium. Free admission. For more information, call (626) 395-4652.

Lab ceremony honors King



Carol Lachata / JPL Photolab

MLK Steering Committee chair Laura White addresses the gathering honoring King.

By Rima Bedevian

JPL hosted its 9th annual celebration to commemorate the life and achievements of Dr. Martin Luther King, Jr., on Jan. 21.

This year's event was sponsored by the Advisory Committee on Minority Affairs and the African American Resource Team and coordinated by the MLK 2004 Steering Committee. "Dr. Martin Luther King Jr.'s legacy and dream will continue to live on as the JPL community continues the commitment in helping, encouraging, returning and overcoming," said Steering Committee chair Laura White of Section 2690. "I want to thank the steering committee for all its help and commitment."

The room was filled to capacity, as JPLers and visitors assembled to hear keynote speaker Rev. Kerwin Manning, pastor of the Pasadena Church of God. His address was titled "The Making of a Hero."

"Dr. Martin Luther King Jr. was an ordinary man with an extraordinary calling," Manning said. "He was a social activist who walked the walk. We need to see what our calling is and fulfill it to be extraordinary." Manning also emphasized the significance of acknowledging one's own capabilities and working towards making a difference. "All it takes for injustice to prevail is for good men to do nothing," he said.

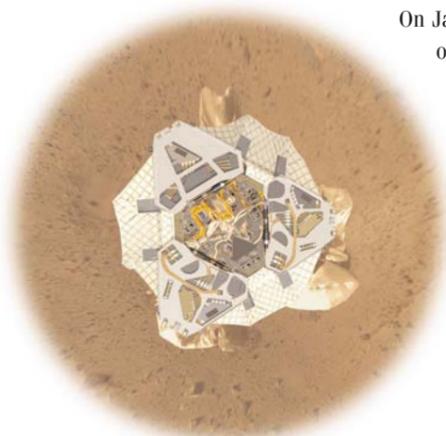
Other highlights of the festivities included a display of artifacts representing the diversity of cultures at JPL, a video presentation of comments from JPLers on Dr. King's dream, recital of a poem written by ACMA chair Tom May called "Hope to See the Day," and the exceptional voice of 11-year-old Teira Church. Church, who won the National Gospel Showcase, sang the Black National Anthem and one of the popular songs from her gospel CD. "I think Martin Luther King, Jr. is a great person and to be a great person you have to be chosen by God," she said. "The new generation of kids should strive to keep the 'dream' alive."

Spirit rover's condition improves

Engineers working on Spirit have determined that the high-gain antenna on that rover is likely in working order despite earlier indications of a possible problem. They are continuing to take information out of Spirit's flash memory. Results from a testbed simulator of the rover's electronics supported the diagnosis of a problem with management of the flash memory, reported Mission Manager Jennifer Trosper. Flash memory is a type common in many electronic products, such as digital cameras, for storing information even when the power is off.

On Jan. 26, during its 22nd day on Mars, the Spirit rover obeyed commands for transmitting information that helped engineers set a strategy for fixing problems with the rover's computer memory. "We have a patient in rehab, and we're nursing her back to health," Trosper said. She added that a high-gain antenna session was scheduled for Wednesday, Jan. 28, which represents "a significant step forward for Spirit."

"I think we've got a patient that's well on the way to recovery," said Project Manager Pete Theisinger.



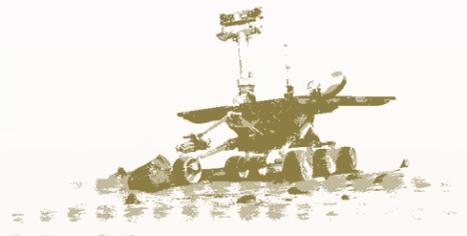
LIVE

A selection of pictures taken last Saturday evening

from mars!

and into Sunday morning, as Mars team members,

officials and guests react to the rover's landing.



Bill Ingalls/NASA

◀ **Two for Two!** Celebrating Opportunity's landing are JPL Director Dr. Charles Elachi, NASA Administrator Sean O'Keefe, MER Project Manager Pete Theisinger, NASA Associate Administrator Dr. Ed Weiler, Dr. Orlando Figueroa, director of NASA's Mars Exploration Program Office, and JPL's Mars Exploration Program Office Director Dr. Firouz Naderi (upper right).



Bob Brown/JPL, Photolab



Tom Wynne/JPL, Photolab

◀ **Entry, Descent and Landing** Manager Rob Manning, left, explains operations to California Congressman Adam Schiff, Governor Arnold Schwarzenegger and Texas Congressman John Culbertson. Looking on at left is Wayne Lee, chief engineer for entry, descent and landing.

▲ **California Congressman** Adam Schiff, left, chats with Sean O'Keefe, Dr. Ed Weiler, Dr. Charles Elachi and Dr. Firouz Naderi.



Tom Wynne/JPL, Photolab



Tom Wynne/JPL, Photolab

◀ **Applauding the successful landing,** former Vice President Al Gore joins Dr. Alice Huang and Dr. David Baltimore.



Dutch Slagter/JPL, Photolab

◀ **Checking for the rover's first images** are Chris Voorhees, left, Joe Melko and Lori Shiraishi. Standing behind them is Jessica Collisson.



Bob Brown/JPL, Photolab

◀ **Celebrating Opportunity's landing,** John Callas and Claudia DeLuna join MER team members in Building 264.

◀ **Last weekend JPL dedicated** a plaque and American flag in Building 230 in memory of U.S. Army Lt. Todd Bryant, killed in action in Iraq in October. With JPL Director Dr. Charles Elachi are Bryant's parents, Linda and Larry. Todd's parents have both worked for JPL, and Larry is currently employed as an operations engineer.

Universe

is back to its normal schedule. The next issue will come out on Friday, Feb. 13. Ad deadline is Monday, Feb. 2.

JPL'S ONLINE NEWS SOURCE



Classified ads will be available the day before Universe is published at <http://dailyplanet>

View this and previous issues of Universe at

<http://universe.jpl.nasa.gov>

E-mail us at

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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 family and I would like to thank all my friends and co-workers for their kind and caring thoughts after the recent passing of my father. The plant you sent will be a living memorial for me. Thank you for your support.

Yvonne James-Bivins, Section 980

I wish to thank all my co-workers and friends at JPL and NASA for the best wishes extended to me on my retirement. I am especially grateful for the excellent support provided by past and present employees of Section 662/282 and the other Sections of the Facilities Division including contractor employees.

Vaji Nasoordeen

Retirees

The following JPL employees retired in January:

David Fulton, 38 years, Section 274; Gaylord Hammerwold, 24 years, Section 319; Shirley Whittington, 14 years, Section 315; Araham Nasoordeen, 13 years, Section 282.

Classifieds

For Sale

ACCESS ROUTER. Linksys OINT wireless, practically new, in box, w/4-port switch, model no. BEFW11S4, ver. 2, \$50. 626/791-5376.

BABY ITEMS: crib, wood, made in Italy, incl. matt., height adjustable, exc. cond., \$150/obo; car seat, front-facing, up to 40 lbs., made by Century, good cond., \$25/obo. 626/791-6101.

BABY ITEMS: breast pump, Medela, pump-in-style, new, used twice, paid \$300, sell for \$175; swing, Graco, paid \$60, sell \$30. 626/574-7431.

BED, Cometa, queen, cherry wood, Italian design, new, paid \$1,300, will sell for \$900, see at <http://www.lofgrens.com/Bedrooms/JESBed.html>. 244-8822.

BED, Ikea, queen size, black steel frame w/large head and footboard, like new, pics. avail., \$75/obo. 352-9856.

BED FRAME, antique craftsman, twin, walnut head & footboard, \$125; desks, 2, small, 1940s, hardwood, with 5 drawers incl. file drawer, \$45 each; chair, papasan, with green cushion, \$25. 626/398-6824.

CARD SHUFFLER, Johnson, collectible item, stands 6" handle high, and 9" by 6," flanges and handle inclusive, \$35; DIET TAPES, Jenny Craig, set of 14, \$40, 790-3899.

COMPUTER, Graphite iMac, 600 MHz G3, 15" CRT, 512 MB SDRAM, 30 GB HD, and slot-loading CD-RW, includes Mac OS X 10.3 Panther, OS 9, + extra software, like-new cond., includes all orig. software disks, manuals + packaging, \$495. 626/398-1855.

COMPUTER, Dell Inspiron 2500 notebook, 14.1 XGA TFT display, 700 MHz Pentium III, 20 GB hard drive, 128 MB RAM, 4MB video card, 24X CD-ROM, 8X DVD combo drive, 3.5 floppy drive, modem/Ethernet, 59 WHR lithium ion 8-cell battery, AC adapter, Windows XP Profes'n'l OS, Microsoft Office XP, access, Excel, PowerPoint & Word, Quicken 2002, Microsoft Works Suite 2001, Norton antivirus, exc. cond., \$400, 249-6786.

CRIB/CHANGING TABLE SET, like new, light brown finish, made by Basset, \$175/obo. 626/446-1140.

DRUM SET with double pedal base, \$250/obo. 626/447-4734.

DRYER, Kenmore, 90 series, electric, 2 yrs. old, great cond., \$200/obo. 661/816-4188.

FIREWOOD, dry 22" to 12" logs, splits & kindling, drive-to, \$1/cu. ft. 248-8030, 24/7.

FOOD WARMERS, electric, 1 serving cart Hotable incl. 1 hotspot & lower shelf, 32 L x 17 W x 31 H, 1 party server 9 x 15, both w/adjustable thermostats, 2 warmers ea. 6 x 6, Salton Hotrays 1975, perfect, all work fine, \$35/obo. 909/593-4046 or vivdaves@earthlink.net, in La Verne.

GOLF CLUB SET, Ram TX2, 4 woods, 2-PW Irons, \$30, 957-4770.

HOCKEY TICKETS, Kings, season ticket holder selling individual games, \$100 for 2 tickets in the Lower Bowl. 626/852-0821.

KITCHEN TABLE SET, country style, painted birch, 3' x 3', 4 chairs, sturdy, exc. cond., \$70. 626/798-5855.

LIFT TICKETS, 2, Brian Head, Utah, non-holiday, \$50/obo. 897-1203.

MISC: cell phone, Samsung VR205, photo phone w/accessories, in orig. mfg. packaging, never used, \$100/obo; ent. center, cherry wood, beveled glass doors, lots of storage, like-new cond., \$100/obo. 701-0061.

MISC: snowboard, "Lift Assist," \$10; diamond ring, 10KYG, \$90; tires, 4, P285-60 R16, \$100; gas grill, Char-Broil Master Flame, w/cover, \$75; cell phone, Nokia 5190, \$30; CD stands, \$10/ea.; ski boots, ladies, Rossingol, sz. 8-8.5, \$40. 897-1203.

MISC: stereo console, am/fm, phonograph, Magnavox, mid '70s, honey colored, make of-fer; floor lamp, white; table lamps, 2; electric blanket, queen; headboard, full to queen size; dresser, 6 drawer, with tall mirror; nightstand, 2 drawer, walnut color, oak, exc. cond., \$200/obo. 626/798-4821, Nancy.

MISC: dining table, smoked glass top, 72" x 42," with 6 upholstered fabric chairs, exc. cond., \$149/obo; sofa/love seat, vg cond., cloth fabric, light color, \$199/obo; bike, 26", men's, 15 sp., helmet, gd cond., \$20;

camcorder, Panasonic digital, PVDV203, 6 mini DV tapes; camera, digital, still, SD card, 700x zoom, 1 lb., new in box, never used, full warranty, \$379. 909/592-2279.

MISC: audio tape recorder, Sony digital, model PCM-M1, exc. cond., orig. box, portable unit, very light, smaller than adult hand, pd. \$800, sell \$550; dresser, solid, pine, 8 drawer, off-white, \$250. 323/344-7163.

MISC: TV, Mitsubishi, 27," color, thin tube with oak console, modern-looking, comes w/Hi-Fi surround sound & remote control, paid \$1,200, sell for \$350; TV, Panasonic, 27," color, digital surround sound w/built-in DVD player and Hi-Fi, VHS and remote control, paid \$600, sacrifice \$450. 323/344-7163.

MISC: laptop computer, Mac Powerbook G3, OS 9.2, 333MHz, 576 MB, \$400; Sony discman, w/ am/fm, recharge, battery, \$50; tuner/amplifier, Onkyo TX-840, 60W/channel, \$150; answering machine/ cordless phone, digital, Sony, 900 MHz, \$40; speakers, Acoustic Research, pair, \$50; golf bag, Calloway pro-tour, black, \$40; putter, Ping J-blade, \$40. 213/810-8801.

MISC: tricycle, girl's, exc. cond., hardly used, \$25; dog house, med., gd cond., \$30; dog pillows, sm. \$10, lg. \$15; bird cages, assorted, used, \$15; cottage, girl's, Little Tykes, hardly used, kept indoors, orig. cond., with all accessories, orig. \$300, sell for \$200; air cond., HEPA, + filters, \$75. 626/798-6248.

MISC: equipment box, Marine's steel, locking, 12 x 6 x 7," \$6; military service machete in scabbard, 23," \$6; meat tongs, lg. restaurant type, 15" long, \$4; audio oscillator, electronic, \$10. 626/793-1895.

MISC: turkey roasting pan, self-basting, with cover, 15 x 11 x 7.5," \$8; cooking kettle, covered aluminum, 5 qt., like new, \$9; vegetable dish with handles; 8," covered, pale yellow, \$9. 626/793-1895, Albert. MOVING SALE: microwave, Panasonic, 1,100W, \$50; TV, 20," Panasonic, VHS and antenna, \$70; vacuum cleaner, 12 amps, Kenmore, attachments, power-mate, \$70; color printer, Epson, 740 Stylus, \$60; cell phone, Sprint PCS, Samsung SCH-3500, dual-band + charger, \$15; all items bought new less than 5 years ago. 626/564-8483, Chris.

MOVING SALE: sofa w/ottomans; 2 upholstered chairs; dining table, teak, w/custom pad; sideboard & 6 chairs; coffee table, lg., dark oak, w/leaded glass; end/lamp tables; organ, Lowrey chord; oak tables, oiled, w/o-fa table & bookcases; pedestal table, round, oak, w/5 armchairs; washer & elec. dryer; bedroom armoire/chest, tall, oak; brass headboard. 248-2480.

PIANO, Yamaha C3 Grand, 6 ft., polished ebony, exc. cond., MSRP \$32,495, sacrifice, \$11,000; PORT REPLICATOR for IBM Thinkpad, works with T20, T21, A20, A21, or X, R series, like new, \$85; CONTROLLER CARD, Ultra ATA, w/ cable, fits into 32-bit PCI 2.1 or 2.2 expansion slot on motherboard, brand new, \$20; INCOME TAX SOFTWARE, J.K. Lasser's 2004, brand new, \$10. 790-3899.

PLAY TICKETS: 2, Puccini's and Baz Luhrman's "La Boheme," Sun, Feb. 15, 2 p.m., row D in balcony at Ahmanson Theater, \$55/seat. 626/791-2519.

PROJECTOR, 35mm slides, uses straight trays. 248-9544.

REFRIGERATOR, GE Profile, 24 cu. ft., white, side-by-side, built-in style, water & ice in door, 6 yrs. old, exc. cond., very quiet, 70.25" h x 36" w x 24" d, \$500. 549-1330.

SKI BOOTS, sizes 6, 7, and 8, used once or twice, \$25. 626/794-0081, Bonnie.

SOFA BED, queen size, very comfortable to sit and sleep, bed hardly used, \$200. 626/577-6638, Suzanne.

TREES: red banana plant, 5' tall, \$60/obo; Ficus, 10' tall, braided, in 30" plastic pot, \$250/obo; CERAMIC BOWL, gray, 2" diameter w/planted geraniums, \$40/obo. 626/791-6101.

WASHER/DRYER, Maytag, older model, works great, \$100 for pair, must be able to pick up from Laguna Beach. 626/646-1937.

Vehicles/Accessories

'96 ACURA Integra GSR, 4 door, 4 cyl., 5 spd., ABS, a/c, p/s, p/b, p/w, pdl., full pwr., tilt steering wheel, am/fm/stereo/cassette/CD, premium sound, loaded, sunroof, alloy wheels, new tires, 1 owner, extra clean, exc. cond., looks and runs great, must see, \$8,200. 626/285-5722.

AUTO TEST SET, electronic, includes an analog ignition oscilloscope that displays both primary/secondary parade and raster waveforms + a full function analyzer with timing light all on a chrome roll-away cart, \$500; full set of proto crescent wrenches, new, sizes 4", 6", 8", 10" and 12," \$38. 249-6071.

BOSTON WHALER boat, 11 ft., 8 hp, Honda outboard, included is a Trail-Rite boat trailer, an Eagle fish finder, new, still in box, and misc. items such as anchor, life vests etc., not used more than 50 hrs., \$4,500. 661/273-0564.

BRAKE BLEEDER KIT, services most brake systems, built in heavy duty safety valve & pressure regulator gage, unit has a 1.5 gal. capacity, includes adapters for Ford and GM + VW and Honda, exc. cond., sells new for over \$400, will sell for \$100. 249-6071.

'94 BUICK Regal, only 69K mi., very clean, exc. mechanical cond., \$4,100. 244-5489, anytime.

'93 CHEVROLET Suburban 2500, 2x4, 350, V8, exc. cond., red, street scene front grill, well-maintained and low mileage, a/c, power doors & windows, wood trim dash, custom front seat sheepskin covers, running boards, new tires with Weld wheels and Flowmaster exhaust, \$13,500/obo. 626/359-7666.

'80 CHEVY El Camino, 350cc, automatic, air conditioning, new paint, tires, transmission, brakes, power steering pump, rebuilt carb., runs great, \$4,500. 310/795-7670, Patrick.

'97 DODGE Caravan, sport model, 110K mi., well-maintained, good cond., \$5,500/obo. 249-3115, Armiik.

'00 FORD Focus LX, 2.0 L, 5 spd., 5 door, red, low mileage (25K mi.), new tires, still under warranty, 3 years/40K, like new, \$7,500/obo. 626/564-8483, Chris.

'98 FORD Explorer Sport, automatic, 49K mi., light blue, 2WD, power windows, keyless entry, alarm, 2 door, very clean, extended warranty, all records, exc. maint., \$8,500/obo. 626/943-9779.

'92 FORD Explorer SUV, Eddie Bauer, 4.0L,

V6, auto, 5 door, red, 2WD, 120K mi., new tires, new transmission, new brakes, new radiator, loaded, very well maintained, \$3,000/obo. 626/564-8483, Chris.

'96 GMC Z71 Sierra 1500 SLE, 5.7 Vortec motor, 4 x 4, silver, tow pkg., a/c, pwr. windows/locks/brakes/steering/driver side seat, cruise control, am/fm/ cassette/CD, gray cloth interior, bedliner, sliding rear window, front seats are separate w/ ctr console, alloy wheels, tinted side windows, orig. owner, 92K mi., clean, regularly serviced, \$13,800/obo. 626/797-1189 or 626/841-9030.

'70 HARLEY DAVIDSON Shovelhead/Chopper, all S&S motor parts, rebuilt motor, extra parts, very fast, must see, \$10,800. 244-8822.

'01 HONDA Civic, 2 door, only 1,010 mi., silver, always garaged, like new, in Burbank, \$13,000/obo. 848-2922, days only please.

'97 HONDA Civic LX, 4 door sedan, great cond., only 63,500 mi., automatic, a/c, dual front airbags, am/fm, Pioneer CD player, cruise control, pwr. locks/windows/steering, alarm, tinted windows, blue w/gray interior, \$7,500/obo. 626/287-7869.

'88 HONDA Accord sedan DX, 110K mi., orig. owner, XM satellite radio/cass., a/c, automatic, exc. cond., \$2,000. 776-9578, Len.

'94 JAGUAR XJ 6, exc. cond., 95K mi., maroon, 4 dr., with beige leather interior, must sell, make offer. 310/451-5919.

'92 LEXUS ES300, 88K mi., gd cond., \$7,000; reason for selling: purchased van to accommodate growing family. 790-1279, eves.

'88 NISSAN Sentra GXE, 4 dr., only 95K mi., 5-speed, manual, good cond., new brakes, original owner, \$1,600/obo. 626/485-3900.

'96 OLDSMOBILE Cutlass Supreme, metallic green, beige interior, exc. cond., loaded, 114K mi., \$4,100. 634-4772, Carl.

'99 SUBARU Outback Wagon AWD, immaculate, 10,700 mi., 2.5 L, 4 cyl., auto, a/c, PS, PW, power locks, cruise, am/fm/CD/cassette, tilt, abs, roof rack, alloy wheels, red, \$13,200, Lancaster area. 661/723-0356 or 661/297-0219.

'99 TOYOTA Avalon XL, 4 dr., automatic, gray/sage w/tan cloth interior, a/c, alarm, CD/cass., power locks/seats/windows, very clean, 51,500 mi., \$12,800/obo. 248-4003.

'98 TOYOTA Sienna minivan, V6 LE, 194 HP, 63K mi., light blue, exc. cond., dual a/c, 12-disc CD changer, dual sliding doors, 1 owner, under extended warranty, \$14,600. 909/592-2279.

'92 TOYOTA Camry LE, light blue, 4 cyl., great cond. inside and out, alloy wheels, moonroof, good tires, original owner, 123K mi., \$3,850/obo. 249-6786.

'99 VOLKSWAGEN GTI, VR6, 5 speed, vg cond., \$10,000/obo. 952-6181.

'96 VOLKSWAGEN Jetta GL, manual, 5 speed, with moonroof, champagne, 90K mi., good cond., \$5,000. 626/222-4979.

'71 VOLKSWAGEN Beetle, smog test no longer req., new bat., brakes & seat covers, 100K mi. 248-8030, 24/7.

WIND DEFLECTOR, Wind Wedge, set up for Ford pickup towing 5th wheel trailer, deflects air around trailer frontal area, exc. cond., \$40/obo. 626/963-5727.

'92 YAMAHA Virano, 750 cc MC, exc. cond., \$3,450. 951-3566.

Free

CATS: Two friendly adults need a warm home ASAP; abandoned by previous homeowners, but super affectionate, healthy, good with kids. 626/644-1973 or <http://www.ugcs.caltech.edu/~gonzo/cats.html>.

DOG named Coaly, blk., lab mix, 6 yrs. old, very smart & loyal, needs love & gd. home ASAP. 661/210-5590, Tina VanVeen, cell.

FILL DIRT, clean, 10 cu. yds. avail., you haul as little or as much as you like, near Los Robles/Jackson, Pas. 626/791-3103, dtrask6@its.caltech.edu.

JARS for baby food, glass, great for crafts. 714/903-8888.

KITTEN, tiger-striped, 4 mo., good w/other animals, really cute, rescued, dropper + bottle fed, sweet and playful. 249-4561.

Wanted

GREETING CARDS/CALENDARS for art projects, Christmas, used. 661/775-9070 or balleysteresa20@hotmail.com.

COMPUTER, laptop with Pentium 4 processor. 310/475-2346, after 7:30 p.m.

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

TUTOR for Business Calculus, 3 to 5 days per week, mid-January to mid-June, 3.5 miles from JPL. 790-7916, Avo.

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

Lost and Found

Found: HAIR CLIP, silver metal, in parking lot behind building 125. Ext. 4-0949.

For Rent

ALTADENA house, nicely appointed Spanish in one of nicest areas, hardwd floors, 3 bd., 2 ba., beamed ceilings, big yard, brick patio, stove, washer/dryer incl., beautiful wooded setting, quiet, \$2,250. 626/483-7700.

ALTADENA furnished garage apt., newly remodeled w/new appliances, 1 bd., 600 sq. ft., util. paid, quiet neighborhood, short-term lease preferred, non-smoker, no pets, \$875. 626/791-0317.

ALTADENA, rm. in house, nice neighborhood, avail. late March/early April, min. from JPL, 3 mi., furn., including linen, laundry, parking, kitchen, patio, \$500 + sec. dep. 626/798-4821.

ALTADENA house to share with a prof. JPLer, 1 bd. in a 2-bd. house, 1/2 mi. from JPL, quiet neighborhood, cul-de-sac, \$600 + 1/2 utilities, avail. March 1. 626/222-6943.

ARCADIA condo, 2 bd., 2 ba., partially furn., a/c, secured complex, pool and washing facility, \$1,700 + util. + \$1,500 security deposit, 1200 E. Huntington Drive at Michillinda. 626/794-6606, Sandy Harlan.

BURBANK home, charming 2 bd., 1 ba., hardwood floors, central heat and air, fireplace, laundry hookups, 20 min. to JPL,

gardener included, \$1,750. 249-9364, Jan. LA CANADA house, 4 bd., 4 ba., FR, DR, LR, very large yard, pool. 248-6064, Mike.

LA CRESCENTA house, 3 bd., 2 ba., above Foothill, priv. backyard, mature trees, no pets/smoking, avail. mid-Feb., \$2,375. 626/351-6032.

MONTEREY HILLS condo, 2 bd., 1 ba., 3rd flr./private end unit w/view, fireplace, hardwood flrs. & carpet, cent. air/heat, dishwasher, stove, laundry rm. w/washer & dryer hookups, secure ground-level parking, close to 110 fwy., 15 min./JPL, \$1,200, cable/trash/gas/water included. 626/296-9073.

MONTROSE apt., 1 bd., 1 ba., new paint & carpet, outdoor fire pit, very private & secure, \$725/no pets. 248-9110.

MONTROSE apartment, large, 1 bd., 10 minutes from JPL, \$775. 626/445-0884, John.

PASADENA apt., furn. 2 bd., 1.5 ba., 2-story townhome-style, dishwasher, central a/c, re-frig. & stove, laundry room, patio, parking, close to Caltech & JPL, \$1,150-\$1,175 + util. 626/577-3060, ext. 14, Dennis.

PASADENA apt. to share, furn., 3 bd., 3 ba., townhome style, patio, cent. a/c, laundry, close to Caltech & JPL, \$625 + 1/3 utilities, great for co-ops. 626/429-3677 or bettyrs@earthlink.net.

PASADENA condo, good area, within 1 mi. of Old Town, Paseo, Caltech, close to mass transit, 1 bd., 1.5 ba., 2 car parking, \$1,300, sec. dep. 909/598-9734.

PASADENA apt., 2 bd., 1 ba., fireplace, stove, re-frig, r. priv. patio, garage, exc. location in 4-unit complex, nr. Sierra Madre Blvd. & Calif. streets, laundry facil., gd closet & cabinet space, outdoor lighting, water/trash/gardener pd, avail. Feb. 1, \$1,225. 805/967-7725.

PASADENA house, in nice neighborhood, 3 bd., 2 ba., living room, dining room, \$2,400. 626/833-3757.

PASADENA, downtown condo off Lake Ave., 2 bd., 2 ba., new construction, never been lived in, hardwood floors, new appliances, granite counter tops, 4th floor, mountain view, elevator, underground parking w/ remote, \$1,650, 12-mo. lease preferred, but month to month OK. 909/599-9506, Scott.

PASADENA condo, lg., immac., in centrally located complex, 2 bd. + office, 2 ba., absolutely fully furn., ideal for visiting staff, 2 parking spaces, 1 mi. from Caltech, JPL owner, flexible lease, \$2,500/mo. 626/685-1138.

SUNLAND home, 2 bd., 1 ba., one bd. for rent, 300 sq. ft. of storage in garage, roomie shares driveway, laundry, kitchen, bathroom, linen closet, pets OK, qtr.-acre lot, utilities incl., phone separate, non-smoker, house completely remodeled, \$600. 951-9744