

Odyssey reveals its first Mars images

By Guy Webster



Initial science data from JPL's Mars Odyssey spacecraft, which began its mapping mission last week, portend some tantalizing findings by the newest Martian visitor.

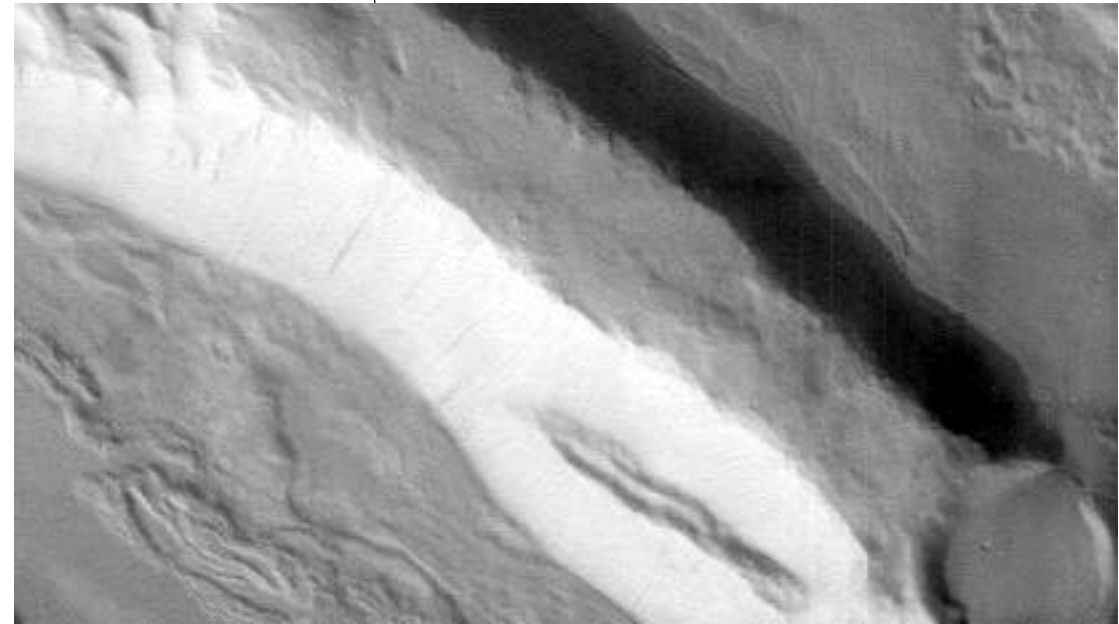
"We are delighted with the quality of data we're seeing," said Odyssey Project Scientist Dr. Steve Saunders. "We'll use it build on what we've learned from Mars Global Surveyor and other missions. Now we may actually see water rather than guessing where it is or was. And with the thermal images we are able to examine surface geology from a new perspective."

New images taken by the thermal emission imaging system show the temperature of the surface at a remarkable level of clarity and detail during both the Martian day and night. The images can be seen at <http://mars.jpl.nasa.gov/odyssey> and <http://themis.asu.edu/latest>. Odyssey's camera system is studying Mars' surface mineralogy geologic history. The thermal infrared images are 30 times sharper than previously available, and the camera's visible-light images will fill a gap in reso-

lution between Viking Orbiter and Mars Global Surveyor pictures. Initial measurements by the gamma ray spectrometer instrument suite show the presence of significant amounts of hydrogen in the south polar region of Mars. Further analysis will be conducted to determine whether the hydrogen indicates a significant amount of water ice near the surface. The detection of hydrogen is based both on the intensity of gamma rays emitted by hydrogen, and by the intensity of neutrons that are moderated by hydrogen. The neutron intensity was observed by the high energy neutron detector and the neutron spectrometer. Additional information is available online at <http://grs.jpl.arizona.edu/results/presscon1>. Measurements made by the Martian radiation environment experiment during Odyssey's cruise phase suggest that the daily dose of radiation experienced by astronauts on their way from Earth to Mars would be more than twice the dose endured by astronauts on the International Space Station. Investigators are in the process of troubleshooting the radiation experiment to determine why the instrument stopped communicating and was turned off in August 2001.

Above The thermal emission imaging system on JPL's 2001 Mars Odyssey took this nighttime infrared image of a massively disrupted region on Mars called Hydaspis Chaos, located near the equator. North is toward the right. The steep slopes leading down into the canyons of Hydaspis Chaos are strewn with rocks, while the plateaus and mesas are covered with dust. This pattern indicates that processes are at work to prevent the dust from completely covering the surface on these slopes, even over the very long times since these canyons were formed.

Left This visible-light image, taken by the thermal emission imaging system's camera, shows Mars' highly fractured, faulted and deformed Acheron Fossae region. North is to the top in this image, which was acquired on Feb. 19. The scarps visible in this image are about 1 kilometer (3,300 feet) high, based on topography derived from the Mars Orbiter Laser Altimeter instrument. Dark streaks only 50 meters (160 feet) across can be seen on some of the cliff faces. These streaks may have been formed when the pervasive dust mantle covering this region gives way on steep slopes to create dust avalanches. The image also shows impact craters as small as 500 meters (1,600 feet) in diameter and smooth and textured plains.



Combination of spacecraft observe Jupiter's magnetosphere

Scientists simultaneously using a combination of NASA spacecraft have seen into the workings of an invisible whirling bubble of charged particles surrounding Jupiter. That bubble, Jupiter's magnetosphere, is the biggest object with distinct boundaries within our solar system, more than 100 times wider than Jupiter itself. It contracts in response to shock waves from the Sun, according to one report appearing Feb. 28 in the journal Nature. In all, seven reports appearing together will detail various results from a concerted research campaign that took advantage of the Saturn-bound Cassini spacecraft's flyby of Jupiter 14 months ago. The campaign found extremely energetic

electrons traveling near the speed of light close to Jupiter, as well as a vast nebula of neutral atoms, and triggers for glowing auroras near Jupiter's north and south poles. "We're seeing results from a remarkable opportunity," said JPL physicist Dr. Scott Bolton, a co-author of three of the reports. "We had one spacecraft, Galileo, inside the magnetosphere monitoring what was happening there at the same time another spacecraft, Cassini, was outside the magnetosphere monitoring the solar wind just upstream," Bolton said. On Jan. 10, 2001, when Cassini and Galileo were more than 20 times farther from each other than Earth is from the Moon, each spacecraft encountered the boundary

of Jupiter's magnetosphere while the bubble was contracting in response to an increase in solar-wind pressure. "This is the first two-point measurement of the Jovian system actually responding to the solar wind," said University of Iowa physicist Dr. William Kurth, lead author of the Nature report on these results. "The combined observations of Galileo and Cassini help show us the relative importance of the influence of the solar wind and the factors affecting the magnetosphere from within—primarily the energy from Jupiter's rotation and the supply of material from volcanoes on the moon Io." The Jupiter observations strengthen confidence in our understanding about Earth's protective magnetosphere.

News Briefs



Dr. Charles Elachi

Elachi named AIAA fellow

JPL Director DR. CHARLES ELACHI has been elected as a fellow in the American Institute of Aeronautics and Astronautics, the world's leading professional society in the field.

Elachi is being honored for his international technical leadership and pivotal contributions in the field of spaceborne synthetic aperture radar for observing Earth and exploring other planets. To become a fellow, a candidate must be distinguished in the field of aerospace and show strong leadership potential.

"I'm honored to be elected as a fellow in this most distinguished organization," said Elachi. "This reflects not only on me personally but on all my colleagues at JPL who helped me throughout my career."

U.S., Europe incorporate Quikscat data

In a move to improve global weather forecasts and ultimately save lives and property, the United States and Europe have incorporated wind speed and direction data from the JPL-developed Quick Scatterometer (Quikscat) spacecraft into their operational global weather analysis and forecast systems.

Using Quikscat data, forecasters can now predict hazardous weather events over the oceans as much as six to 12 hours earlier. Launched in 1999, Quikscat takes approximately 400,000 measurements over 93 percent of Earth's surface every day.

In recent years, Quikscat data have proven useful in improving forecasts of extreme wind events, such as hurricanes, and in monitoring longer-term climatic effects such as El Niño. Quikscat's SeaWinds scatterometer instrument is a specialized microwave radar that continuously measures both the speed and direction of winds near the ocean surface in all weather conditions. Participants in the Quikscat program

include the National Centers for Environmental Prediction, a branch of the National Weather Service, Washington, D.C., and the European Centre for Medium-Range Weather Forecasts in England.

"Realizing the full potential of Quikscat data is possible only because of a series of unique collaborations," said Dr. Michael Freilich, Quikscat principal investigator. "NASA researchers and engineers worked together to develop and calibrate the instrument and algorithms. NOAA personnel, in partnership with NASA, enable rapid delivery of near-real-time spacecraft data to forecast centers. There also are the teams of meteorologists who are developing and refining computer programs that incorporate the data into models and display measurements for forecasters."

SIRTf telescope delivered to Lockheed

The telescope system for NASA's Space Infrared Telescope Facility arrived Feb. 20 at Lockheed Martin Space Systems Co., Sunnyvale, Calif., where it will be integrated with the spacecraft. The system, called the cryogenic telescope assembly, contains the telescope, liquid helium cooling tank and three science instruments. It was shipped on Feb. 19 from Ball Aerospace & Technologies Corp., Boulder, Colo., where it was built.

The JPL-managed Space Infrared Telescope Facility, scheduled to launch Jan. 9, 2003, will study the early universe and hunt for planet-forming regions in dust disks around nearby stars. It will also detect objects by looking for the heat they emit in the infrared portion of the electromagnetic spectrum.

The Space Infrared Telescope Facility is the fourth and final mission under NASA's Great Observatories Program, which includes the Hubble Space Telescope, the Compton Gamma Ray Observatory and the Chandra Advanced X-ray Astrophysics Facility.

Lab event helps introduce girls to engineering

By Cynthia Cuno

Less than 20 percent of all college engineering students in the United States are female and only 10 percent of engineers in the workforce are women. Studies show girls lose interest in science and mathematics well before they enter college, and young women often lack the necessary exposure to role models in science and engineering professions.

In an effort to bring young women a greater awareness of engineering careers, JPL's Education and Public Outreach Office observed National Engineers Week by hosting "Introduce a Girl to Engineering Day" Feb. 21.

Forty high school juniors from 17 schools spent the day at the Laboratory with women scientists and engineers from a variety of disciplines. Students toured the Lab and learned about the "life-cycle" of a planetary mission.

develop is the kind of exposure that is important for women," added Valerie Duval, manager of the Space Experiments Systems and Technology Section. "Students really need to make sure that they truly have an interest in engineering—they need to like building things and should find out if they have that passion."

The young women visited several JPL research facilities, including the Project Design Center, Microdevices Laboratory, Observational Instruments Laboratory, and the Multi-Mission Imaging Processing Laboratory.

Students responded positively to the experience. "Tours like this get you more interested in this field than just hearing about it from a counselor or teacher," said Lupe Talavera of Gabrielino High School in San Gabriel.

Dawn Mission Manager Sarah Gavit, who spoke to the girls during their tour, felt the students were genuinely interested. "Everyone seemed so enthusiastic and I think they got a positive view of what we do," she said.

Organizers hope to expand the event next year and reach students in junior high. "Often sociocultural influences contribute to girls not taking adequate math and science courses," said Kneissl-Milanian.

"Although many girls may be interested in becoming an engineer, they may not have the encouragement to take the three years of high school math and science needed to major in such subjects in college."

Participating schools were invited from local directorates of California's Mathematics Engineering Science Achievement (MESA) Program, which assists students from groups with low eligibility rates for colleges. Students from MESA Program schools were selected according to coursework taken and interest in mathematics and science. Students were required to make a presentation about their JPL experience to their peers in their local student chapters.

"For this pilot program we wanted to take a focused approach by reaching girls with a certain interest in math or science," said Petra Kneissl-Milanian of the Education and Public Outreach Office. "The objective was to show them different disciplines engineering has to offer, elicit questions, and provide them with an opportunity to informally meet the engineers."

"Girls need all the encouragement they can get," said Mary Bothwell, manager of the Observational Systems Division, who welcomed the girls to the Lab. "Often they don't get the encouragement they need from parents and teachers, so it's important to provide them with role models in real life."

"The understanding of how systems

Special Events Calendar

Ongoing Support Groups

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

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

Gay, Lesbian and Bisexual Group—Meets the first and third Fridays 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.

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.

Working Parents Support Group—Meets the third 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.

Friday, March 1

Songs from Eastern Europe—The Kitka Women's Vocal Ensemble will perform at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$22, \$18 and \$14. Call (626) 395-4652.

Fri., March 1–Sun., March 3

Love's Labour's Lost—The Shakespeare comedy will be presented in Caltech's Ramo Auditorium Friday and Saturday at 8 p.m., Sunday at 2 p.m. Tickets are \$15. Call (626) 395-4652.

Saturday, March 2

Planning for Your Child's Educational Future—Caltech director of financial aid David Levy and USC associate dean of admissions and financial aid Catherine Thomas will discuss simple, effective ways for parents to develop a financial plan for their children's college education. Hosted by the JPL Child Educational Center and the Verdugo Hills Hospital Foundation, the free program is open to all parents, grandparents and expectant parents. Location: Verdugo Hills Hospital, 182 Verdugo Blvd., Glendale, 4th floor. A complimentary continental breakfast will be served at 9:45 a.m., with the talk scheduled from 10 a.m. to noon. For reservations, contact Helen Ruppel at ext. 4-3418 or hruppel@caltech.edu.

Sunday, March 3

"American Extremists"—The Skeptics Society will present Dr. John George, professor of political science and sociology at the University of Central Oklahoma, who will provide a historical overview of extremism and the conspiracy theories and religious views that attract recruits. To be held at 2 p.m. in Caltech's Baxter Lecture Hall. Donations: \$5 for members, \$8 for nonmembers.

Chamber Music—The California Classical Ensemble will perform a free concert at 3:30 p.m. in Caltech's Dabney Lounge. Call (626) 395-4652.

Tuesday, March 5

Airborne Visible/Infrared Imaging Spectrometer Workshop—To be held at Pasadena's Doubletree Hotel from 8 a.m. to 5 p.m., continuing through March 8. JPLers considering attending are asked to register; registration and agenda are available online at <http://aviris.jpl.nasa.gov/html/workshop2002.html>. Call Valentina Grigoryan at ext. 4-5615.

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

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

Wednesday, March 6

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at the Caltech Credit

Union, 528 Foothill Blvd., La Cañada.

"Celebrating the Voice of Women"—JPL's Advisory Council for Women will host a luncheon honoring guest speaker Gail McGovern, the president of Fidelity Personal Investments, who has been named as one of the top 50 most powerful women in the U.S. by Fortune magazine. To be held from noon to 1 p.m. at the La Canada Flintridge Country Club, 5500 Godbey Dr. Tickets are \$17 and seats are limited. Log on to http://ood-lib.jpl.nasa.gov/ood-lib/dscgi/ds.py/Get/File-1033/Ticket_Request.doc.

"New Materials for Perfect Vision"—Caltech chemical engineering professor Dr. Julia Kornfield will lecture at 8 p.m. in Beckman Auditorium. Free admission. Call (626) 395-4652.

"Women Shaping the World: Voices from Afghanistan, East Timor and Guatemala"—In celebration of International Women's Day, women educators and activists will share their personal histories, expertise on issues ranging from reproductive health to domestic violence, and vision for the future. To be held at 8 p.m. in Caltech's Baxter Lecture Theater. Free admission. Call the Caltech Women's Center at (626) 395-3221.

Thursday, March 7

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

Thurs., March 7–Sat., March 9

Love's Labour's Lost—The Shakespeare comedy will be presented in Caltech's Ramo Auditorium Thursday and Friday at 8 p.m. and Saturday at 2 p.m. Tickets are \$15. Call (626) 395-4652.

Friday, March 8

Travel Film—*China: the 21st Century* will be presented at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$9 and \$7. Call (626) 395-4652.

Fri., March 8–Sat., March 9

Winter Concert—The Caltech Men's and Women's Glee Clubs will perform a free concert at 8 p.m. in Dabney Lounge. Call (626) 395-4652.

Saturday, March 9

Lazer Vaudeville—This family show that combines the high-tech effects of lasers and black lights with the traditional vaudeville arts of juggling, comedy and acrobatics will be held at 2 p.m. in Caltech's Beckman Auditorium. Tickets are \$10 for adults, \$5 for children. Call (626) 395-4652.

Sunday, March 10

Caltech-Occidental Symphony Orchestra—The program for this free concert is to be announced. It will be held at 8 p.m. in Caltech's Ramo Auditorium. For more information, call (626) 395-4652.

Tuesday, March 12

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

Wednesday, March 13

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

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Guests welcome. Call Joy Hodges at ext. 4-7041.

Friday, March 15

Dr. Stephen Hawking—The renowned physicist will speak at 8 p.m. in Caltech's Beckman Auditorium. Admission is free, but guaranteed-admission tickets will be distributed, on the day of the event only, beginning at 9 a.m. at Beckman. Limit is two tickets per person; ticket holders are asked to return in time to be in line no later than 7:30 p.m. Call (626) 395-4652.



Jennifer Trosper, Mars Exploration Rover Project system engineer, gives visiting high school girls a tour of the In-Situ Instruments Laboratory during Introduce a Girl to Engineering Day.

are we even talking about this? Doesn't every JPL employee know all they need to know about timekeeping?
A Well, no, based on questions we have received from employees and other input.

Q Why is this an important issue?
A Although funding for JPL projects comes from or through NASA, we are not government employees. We are Caltech employees and we are paid by Caltech. However, Caltech uses the JPL Timekeeping system to charge NASA for the time spent working on projects and tasks by both our exempt and non-exempt employees. The JPL Timekeeping system is also used to keep track of employees' paid and unpaid leave.
Using the JPL timekeeping system properly will get you paid accurately. Accurate labor-charging to the projects and tasks that you are working on will get the costs to your program or project appropriately and get Caltech accurately reimbursed by NASA and/or our other sponsors. Inaccurate time reporting or labor charging can cause all sorts of problems.

Q Does anyone ever come by and check up on timekeeping and labor charging practices?
A Yes. Periodically, auditors from the Defense Contract Audit Agency perform what are called floor checks. When they do, they may stop by and ask you what you are working on; ask you to show them your Work Authorization Memo (WAM), which is evidence that you are authorized to work on the program or project; or ask you about errors and how you would correct one. If an auditor approaches you, answer their questions as completely and honestly as you can. However, if they have questions you cannot answer or you need assistance, please ask them to wait while you get help from your supervisor or call for assistance from the JPL Audit Relations Office, ext. 4-0967.

Q How did we fare in the latest audit?
A JPL employees are subject to random audits to see how well we understand our timekeeping responsibilities, and how well we do it. A recent audit has shown that employees need to improve their under-standing of our timekeeping requirements and their timekeeping responsibilities.

Q Timekeeping and labor charging? These terms sound like the same thing; are they?
A Timekeeping is a term normally used when someone keeps track of their hours worked. Labor charging or labor distribution refers to spreading or charging those hours to programs or projects, referred to in the JPL system as projects and tasks that an individual works on.

Q What are the employees' responsibilities?
A Your responsibilities as an employee in-clude working only on projects and tasks that are authorized by your supervisor and as evidenced by a WAM, charging accu-rately to what you are working on, and fol-lowing JPL timekeep-ing policies and procedures.

Additionally, exempt employees are respon-sible for submitting time on a weekly basis, no later than 10 a.m. Monday. Non-exempt employees are responsible for submitting time on a daily basis.

Q Do I have additional responsibilities if I am a manager or supervisor?
A Yes. As a manager and supervisor you have responsibilities that in-clude authorizing work performed by your staff and reviewing the labor charges they submit into the timekeeping system. Normally, you should discuss with the employee any task you would like them to perform and set up their WAM prior to the employee beginning work. Once a week you are required to review the time and labor charges submitted by your non-exempt employees. And at least once a quarter you are required to review the labor charges submitted by your exempt employees. Many managers and supervisors do this review more frequently.

Q How does filling out my timecard become an ethics issue?
A If someone erroneously charged their time to a project and task that they were not working on, then this would be inappropriate. There are

serious ramifications that could impact the entire Lab. If JPLers have questions about ethics pertaining to their timekeeping or other issues, they should call Roy Harris at ext. 4-6338.

Q What are the consequences of making a mistake here and there?
A Mistakes can happen, and there are a couple of ways of correcting errors. If the error is identified prior to when the timekeeping system finalizes its weekly close at approximately 10 a.m. on Monday, the employee can fix the error electronically through the timekeeping Web. When done this way, the process is simple and only requires the employee's efforts. If the mistake is discovered after the Monday morning timekeeping system close, then a Labor Adjustment needs to be initiated by the employee using a paper form. You can get a Labor Adjustment form off the NBS website at <http://nbs-web>, in the "Library" subdirectory. In either case, an audit trail is maintained by the system.

Q Are JPL subcontractors affected by these policies?
A Yes. Subcontractors are covered by their individual subcontracting company's timekeeping policies, but they are also responsible for knowing JPL's labor charging and ethics policies. Each subcontractor should take some time to be thoroughly familiar with those policies. In most cases, the subcontracting companies who work at JPL have timekeeping and labor charging policies that are very similar to JPL's. Subcontractors are also subject to floor checks by the Accounting and Finance Division's Subcontract Audit and Compliance Group, as well as the DCAA.

Q Where is all of this information available?
A A quick source of this information plus detailed guidance and "How to" steps can be found in the timekeeping website at

Who do you work for? Keeping track of it is critical

IT'S ABOUT TIME!

Universe recently sat down with Cathy Kiburtz, controller and manager, Accounting and Finance Division, to discuss some burning issues on the subject of timekeeping.



Photos by Bob Brown / JPL Photolab

<http://techinfo.jpl.nasa.gov/jpl/timekeeping>, or you can select the Help icon on your Time Entry Screen. For personal help you can call the timekeeping Help Desk at 4-4357 or visit them in Building 241.
For more details about JPL's timekeeping, labor charging, supervisory review and ethics requirements, JPLers can search DMIE, soon to be known as "JPL Rules!," using any of the keywords.

Q How do you plan to keep this issue in the spotlight?
A This will be an ongoing information and education campaign. The Accounting and Finance Division has partnered with the Daily Planet to have articles and electronic information available to JPL employees periodically. Over the next few months we will continue to remind our employees of these topics so that it does not become out of sight and out of mind. The main thing we want to get across to the folks here at the Lab is that it's easy, and it's very important to do it right. Fill out your time card correctly, and everyone benefits.

Celebrating 40 years

DailyPlanet

newspaper for the JPL community

Classified ads will be available the day before Universe is published, at

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JPL's online news source

View this and previous issues of Universe online

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



Former JPL directors (from left) Drs. William Pickering, Bruce Murray and Ed Stone and current director Dr. Charles Elachi share a laugh during the Feb. 15 dedication of the new visitors center museum in von Kármán Auditorium. The four took part in a panel discussion during the event, which hosted local dignitaries and JPL history makers, and was part of the year-long celebration of the 40th anniversary of planetary exploration. Former director Dr. Lew Allen was unable to attend.

Passings

WILLIAM THOGMARTIN, 65, a re-tired assistant engineer and member of the technical staff in Section 353, died of stroke Feb. 3.

Thogmartin joined JPL in 1962 and retired in 1999. He is survived by his wife, Linda; three children and two grandchildren. Services were private.

Letters

I would like to thank the “un-named” individual who found my cell phone in the blue parking lot on Feb. 11 and turned it in to the guard station. It was very nice of you. Thanks again.

Bill Mogensen

I would like to thank my JPL colleagues and friends for their sympathy and support following the recent death of my wife's mother. We also deeply appreciated the lovely plant sent to our home. Sincerely,

Herb Siegel

My family and I would like to express our sincere thanks and appreciation to my friends and co-workers for their prayers, cards, expressions of sympathy and the Armstrong's gift certificate upon the death of my father. Also, a special thank you to JPL for the lovely plant.

Vickie Wang

I would like to express my deepest gratitude to my friends and co-workers for their support following the recent passing of my mother-in-law. Keith and I also want to send a special thanks to the Mechanical Engineering Section for the thoughtful card and to ERC for the beautiful plant, which helped provide comfort during this sad time for us.

Keith and Jan Magee

Classifieds

For Sale

BABY ITEMS: clothes, 3 to 18 months, \$50 - \$1; super saucer, \$30; 3-in-1 play crib, \$50; battery swing, new, \$50; front carrier, \$5; asst. stuff. 951-3929, after 7 p.m.
BABY ITEMS: Graco swing, like new, 3-spd, \$45; baby monitor, new, \$10; crib mattress, like new, \$30; Aprica stroller, \$30; plus numerous infant toys. 626/850-4378.
BED, twin mattress & ash wood frame with 2 drawers, \$200; DESK, child's 44" x 18" x 30", and chair, ash wood, \$100; heating stove, antique, \$150; all in exc. cond. 790-6136.
BICYCLES, children's, four, \$15/ea. 626/357-8210.
BED FRAME, metal, for queen size bed, never used, \$15, BATTERY CELL, metal hydride, for Nokia 5000 and 6000 series phones, \$15; CASE, new case for Nokia 8000 series cell phone, never used, \$5. 366-6134.
CHEST, black, 6 drawer, 15 x16 x 50, \$30; CABINET, black, low, 2 door, 1 interior shelf, 27 x 21 x 32, \$30; BOOKSHELVES, white, beechwood trim, 4 shelves, 3 adjustable, 27 x 10 x 69, \$30; all Ikea type. 790-0335.
CHINA CABINET, 1950s Drexel mahogany, e-mail lelson@altavista.com for photo, \$500 cash and carry. 353-9367
COMPUTER, Macintosh Quadra 850, includes monitor, keyboard, mouse, modem; \$100. 248-9418.
COMPUTER, 450 MHz, Pentium II, 256 MB RAM, AGP video, 4.36 GB hard drive, CD, \$250 obo. 626/797-3310, eves. & weekends.
COMPUTER DESK, simulated slate top, wrap around corner unit, non-hutch, 1 year old, \$350 new, sell for \$150. 909/398-1854.
COMPUTER HUTCH, wood grain appearance, pull-out keyboard tray, shelves for printer &

CPU, other cubby-like shelves, on wheels, 61" H x 32.5" W x 19.5" D, \$50/obo. 626/798-0329.
CRIB/DAYBED, Bellini "Milano", natural wood, great cond., adjusts to 3 heights, sides remove for daybed use, mattress included, \$200/obo. 709-0208, Deborah.
CROCK POTS, two, 1.5 qt., \$5/each. 364-9726.
DINING TABLE, smoked-glass top, 72 x 42, 6 upholstered fabric chairs, exc. cond., \$399;
HANDHELD COMPUTER, Cassiopeia EM500, color, windows CE, MS Word/Excel/Money, maps, voice recorder, 16 MB RAM, adv. calculator, IE, MP3 player, case, exc. cond., \$179;
CHANNEL SPEAKER, Cerwin Vega Center, 100W, exc. cond., \$39;
COMPUTER SPEAKERS, Sony, brand new, \$20;
VIOLIN, hard case, exc. cond. \$250/obo. 909/592-2279.
DRYER, Fridgidaire, good cond., \$50. 562/693-2986.
DVD/CD PLAYER, Panasonic A110, good cond., \$65. 626/395-4567.
GARDEN HOSE HOLDERS, new, black ironwork, holds up to 100-ft hose, \$60/obo; new, aluminum, holds up to 75-ft hose, \$50/obo. 626/791-6101.
IN-LINE SKATES, K2 Extreme Flight; almost new: all receipts, paperwork, and tool; size 10.5; Rollerblade knee, elbow, and wrist guards included; \$150. 640-7479, Greg.
LOVESEAT, like new, overstuffed, hunter green/brown/tan abstract pattern, \$185/obo. 626/254-1550.
MOVING SALE: bedroom set, double bed, dresser, chest, night stand, \$275; desk, student, \$25; desk, office, \$45; day bed, \$20; curtain rods, \$3; hi-fi system, \$100; washer/dryer, \$275; range/oven, elec., \$100. 248-9418.
PALM PILOT CRADLE, original, with serial connection, \$25. 626/794-2196.
PLATES: 6 dinner, 10 inch, porcelain, nice patterns, \$9/all; 4 dinner, mocha brown, glazed, \$2/ea; other household items. 626/793-1895, Albert.
RECEIVER, a/v, Denon AVR-3200, Dolby digital, 85 watt x 5 chl., 6 chl. ext. input; 5 chl. stereo, \$400. 661/255-5645.
REFRIGERATOR, Amana, 25 cu. ft., side-by-side, 2 years old, white, almost-new cond., ice and water maker, \$950/obo. 626/285-5683.
REFRIGERATORS, G.E., one is beige, 17 yrs. old, side by side, \$100, other is white, 15 yrs. old, freezer on top, \$100; TABLE, dining room, with leaf, cherry wood tops, black legs, 4 chairs, good cond., \$150; SOFA/SLEEPER, makes into queen size bed, abstract black, blue and mauve design, good cond., \$300. 626/357-8210.
REFRIGERATOR/FREEZER, full-size, Hotpoint, used only 2 years, \$150. 626/398-3649, Jen.
SATELLITE DISH, complete TV system, antenna with dual LNBF for operating 2 TVs separately, 2 receivers with smart cards, model ISD2200 with UHF remote, model 1000 with infrared remote, installation kit with user and installation guide, \$100/obo. 626/797-7320.
SCOOTER, Pace Saver, 4 wheel, 2 batteries, for handicapped, only 3 yrs. old, exc. cond., \$650. 790-6060.
SECTIONAL, great frame, cushions, and pillows, perfect for customizing to match your décor, \$100. 626/850-4378.
SWEATERS, girls, new, sizes 6, 8 and 10, white, blue, \$3. 790-6060.
TELEPHONE, Nokia 6185, with slim battery, \$50. 626/794-2196.
TENT, heavy duty with integral floor, rainproof, 9 x 9, sleeps 3, vg cond., clean, \$45. 626/793-1895.
TOY COLLECTION, Star Trek, huge collection; all in mint, unopened condition; pricing for individual items, but prefer to sell collection as a whole, will deal on pricing for complete collection; unpriced items are open for offers; http://briefcase.yahoo.com/john_de_pablos/then stlist.xls for details and prices. 777-9671 or john_de_pablos@hotmail.com.
VACUUM CLEANER, Eureka World Vac Mega Boss upright w/attachments, \$45; HAND VAC, Dirt Devil, \$15. 626/357-8257.
VIDEO, Disney's Little Mermaid VHS, new, sealed, Special Edition, fully restored with THX sound, \$25; other brand new Disney videos also available. 562/420-2313.
WALKERS: 4 wheeler w/hand brakes, seat & carrying basket, like new, \$75, aluminum, \$25; SECURITY BARS, 2, for edge of bathtub, \$15/ea; VACUUMS, Hoover steam w/upholstery attachment, used twice, \$100, Hoover w/attach-ments, exc. cond., \$25. 352-3112.
WOOD, garage full of misc. types, make offer. 626/797-6472.
WORD PROCESSOR, office system, Smith Corona, 4400 plus, \$50. 352-3112.
ZIP DRIVE, 100 MB with USB, \$50. 626/794-2196.

Vehicles/Accessories

CAR COVER, from California Car Cover Co., deluxe, weather proof, custom, for 1984-96 Corvettes, orig. \$400, now \$89. 366-6134.
'96 DODGE Neon, blue, 2 dr., 5 spd., AM/FM

radio, cassette, CD w/multi changer and remote, 132K mi., \$1,600/obo. 909/596-8117.
'84 DODGE D-50 pickup truck, vg cond., 2.6L eng., auto trans, bedliner, shell, very clean, new tires, radiator, carburetor, and battery, 141K mi., orig. owner, \$2,200. 626/332-2682.
'97 FORD Taurus GL sedan, 83,000 mi., V6, automatic, 4 dr., a/c, pwr. steering/ABS brakes/window/door locks/drivers seat, cruise control, AM/FM stereo cass., tilt wheel, metallic silver exterior, gray interior, 4 new Michelin tires, current registration, \$5,495. 626/798-1765.
'95 FORD Explorer XLT, 4 x 2, 109K mi., red, auto, good cond., Michelin tires, AM/FM cass., cruise cntrl., pwr. steering/windows/door, a/c, running board, \$6K/obo. 952-1928.
'66 FORD Mustang, 4 spd., V6, original engine overhauled, new upholstery, brakes need work, tow away only, \$2,500/obo. 790-6136.
'92 HONDA Accord EX sedan, 4 dr., 106K mi., gd. cond., white w/blue int., auto., 4 cyl. 2.2L, front-whl. dr., a/c, p/s, p/w, p/dl, cruise cont., ABS, tilt whl., sun/moon roof, am/fm stereo/ cassette, anti-theft, gd. tires, \$6,000. 626/296-9073, Patli.
'91 HONDA Accord EX, manual, 2 dr., sedan, orig. owner, well cared for, 137K miles, green with beige interior, a/c, power windows/locks/ moonroof, \$3,000/obo. 626/797-7021, Greg.
'99 JEEP Wrangler SE, exc., black, soft-top, under 23K mi., 4-wheel drive, extras, like new, \$11,000/firm. 957-7742.
'90 JEEP Cherokee Pioneer, 4 dr., brown, a/c, auto, 4 x 4, 6 cyl., tinted wdws., new tires, 126,800 mi., \$4,000. 909/861-7121, Ted.
'87 NISSAN Sentra, 2 dr., h/b, only 64K mi., runs great, auto transmission, exc. air cond., new tires, stereo cassette, radio, anti-theft device, red, very clean, only \$2,300/obo. 626/449-8224.
'87 PLYMOUTH, Voyager LE, minivan, elect. window, seats, etc. rebuilt eng., 10K, new radiator, tires, \$2,200. 626/345-0528.
'95 SAAB 9000 CS, 5 dr., 101K mi., 1 owner, exc. cond., auto, ABS braking, front airbags, alarm, keyless entry, sun/moon roof, heated seats, climate control, AM/FM/tape player, power windows, cruise control, \$10K/obo. 626/683-3544.
'99 TOYOTA 4 Runner Ltd., 4 x 4, black leather, moonroof, running board, tow pkg., cd, V6, loaded, wooded panels, 27,000 mi., \$23,999. 909/599-3230.
'94 TOYOTA Camry LE, V6, vg cond., only 32,000 mi., \$8,200. 626/797-6472.
'89 TOYOTA Camry sedan, 4 dr., automatic, 1 owner, a/c, front-wheel dr., 4 cyl., 2.0L, good cond., clean. \$3,550/obo. 626/282-1821.
'87 TOYOTA Supra, turbo, liftback, 2 dr., straight body, new 16" tires, blown head gasket, all other parts nearly new, \$950/obo. 626/488-8616.
'83 VOLVO DL wagon, 150K mi., auto, a/c, p/s, cruise cont., am/fm/cass., roof rack, maroon, gd. cond., \$1,500. 626/794-2431.

Wanted

HISTORIC COMPUTER/ACCESSORIES: IBM-1401 manuals, drawings, card decks or software tapes, especially Autocoder or Fortran; JPL veterans and a pack rats: did you use IBM-1401 circa 1962-65? Contact me about historic preservation. 957-3675, Van Snyder.
PLAYPEN, with mesh sides for puppy. 352-3112.
SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.
SPORTS ILLUSTRATED MAGAZINES, used, for school projects. 626/850-4378.
VOLLYBALL PLAYERS, coed, no beginners please, Tuesday nights 8-10:00 at Eagle Rock High School, \$3/nt. 956-1744, Barbara.

Lost & Found

Lost: Gold necklace with silver and gold coin pendant, sentimental value, reward. Ext. 3-4050 or 957-3296.

Free

ARMCHAIR, circa 1950s, nice classic style, needs reupholstering. 364-9726.
BOXES, U-haul, great for moving, about 20 medium and 10 small. 248-6263.
CACTUS, several cereus plants, arms to 7 ft tall, Pasadena. 626/398-4262, Martin, 10 a.m.-7 p.m.
FILL DIRT, clean, haul as much or as little as you want of the 2 cu. yds., located near Los Robles/Jackson, Pasadena. 626/791-3103.

For Rent

ALTADENA, room in Rubio Canyon area, private residence, kitchen & laundry OK, no smoking, no pets, \$400. 626/797-8082.
BURBANK, 1 bd., 1 ba., garage, patio, washer/dryer, \$800. 972-2993.
LA CANADA apt., 1 bd., 1 ba., 10 min./JPL, 2nd floor unit in 4-plex, air cond., en-closed

garage, avail. March 9, \$790. 790-7445.
MONROVIA HILLS, 2 bd., 2 full ba. in a private family home; share kitchen and laundry; electricity, water, gas and cable included; 12 miles from JPL; no smoking/pets; \$500/ea. bd. w/ba. 626/358-7728.
PASADENA, spacious 2 story condo, 3 bd., 2.5 ba., prestigious community, beaut. inter., bright kitch., prof. landscape, ctrl. air & heat, close to shop., cozy l/r with f/p, end unit, frml d/r, hdwd. flrs., immac. cond., close to schls. \$1,750. 626/396-9024.
PASADENA, 1 bd., 1 ba., in a partially furn. 2 bd., 2 ba. apt., near Caltech & PCC, subterranean parking, fireplace, balcony, recently remodeled, C/A, washer/dryer in unit, \$675. 626/564-9511.
PASADENA, townhome-style apt., furnished, 2 bd., 1.5 ba., a/c, parking, patio, laundry facilities, no pets, \$1,195 plus utilities. 626/351-9641.
PASADENA apt., furnished 2 bd., 1.5 ba., to share with Caltech Post Doc, a/c, parking, patio, laundry facilities, no pets, \$595 + utilities. 626/351-9641.
PASADENA, room, quiet neighborhood around Rose Bowl, pool privilege in summer, \$350. 626/304-0340.
PASADENA townhome, spacious 2-story, 1,513 sq., ft.; across from Caltech, Catalina & San Pasqual; 3 bd., 2.5 ba., liv. rm w/fireplace, lg. formal step-up din. rm., 2 patios & 2 balconies; newer kitchen appliances, washer/dryer in unit, dishwasher, brand new central air/heat; secure underground parking; in-complex pool, spa, and sauna; all operational all year long; rent or lease; \$2,100. 626/585-9048.
PASADENA, new view home, 5 minutes fr. JPL, 4 bd., 2.5 ba., all appliances, some furniture, private gated road, utilities negotiable, \$2,600. 626/744-9892.
SIERRA MADRE apt., 2 bd., 1 ba., 6 unit bldg, walk to village, new carpet, paint, carport, \$850. 626/355-7318.
SOUTH PASADENA, studio apt, fully furn., 1718 Huntington Dr. betw. Marengo and Milan Sts., utilities paid, car space, laundry, non-smoker, no pets, \$750. 626/792-9053, Marilyn or Ray.
SYLMAR house, 4 bd. and office, 3 ba., 3-car garage, contemporary, newer, modern style, air/heat, high ceilings/large yard/cul de sac, w/d hookups, cable, phone jacks, 20 min. drive to JPL, \$2,250 + \$1,500 deposit. 790-2489 or 213/840-8421, cell.
TUJUNGA, unfurnished room in 3 bd., 1 ba. home with pool, washer/dryer, all utilities paid, kitchen privileges, no pets, \$500. 353-1734.

Vacation Rentals

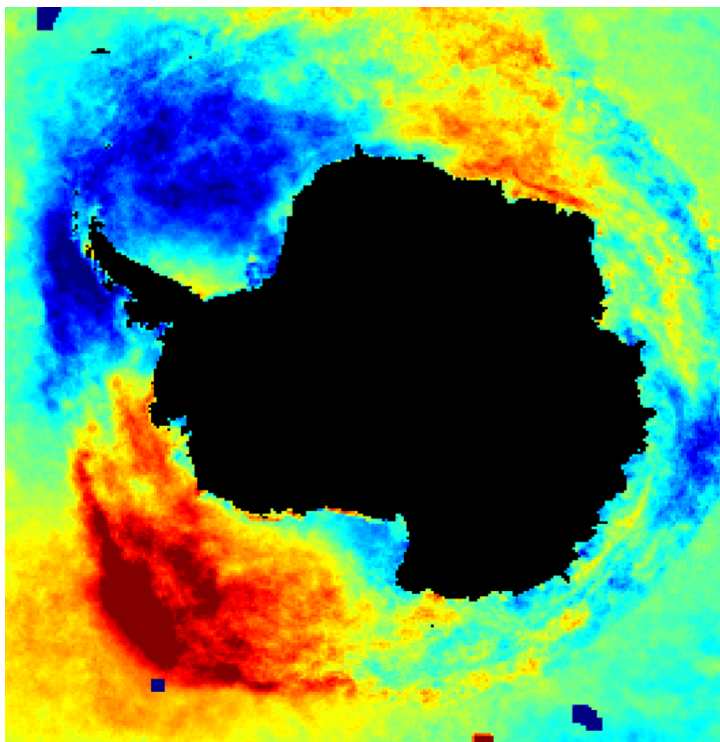
BIG BEAR LAKEFRONT, luxury town home, 2 decks, tennis, pool/spa, beautiful master bd. suite, sleeps 6. 949/786-6548.
CAMBRIA, ocean front house, sleeps up to 4, excellent view. 248-8853.
HAWAII, Kona, ocean front on Keauhou Bay, house and guest house comfortably sleep 6, 3 bd., 2 ba., rustic, relaxing and beautiful, swimming, snorkeling, fishing, spectacular view, near restaurants, golf and other attractions. 626/584-9632.
HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps 4, laundry fac., 4/15-12/14 \$105/nite/2, 12/15-4-14 \$120/nite/2, \$15/nite/ add'l person. 949/348-8047 or jackandrandy@cox.net.
MAMMOTH Courchevel, fully equipped unit, 2 bd., 2 ba., sleeps 6, a short walk to Canyon Lodge and ski lifts. 661/255-7958.
MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equipped kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/view to mtns., Jacuzzi, sauna, streams, fishponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455.
OCEANSIDE condo, fully furn., 2 bd., 2 ba., fireplace, full kitchen; quiet, relaxing, beautiful beachside setting w/BBQ, pool, spa, game rm.; great ocean view, easy walk to pier and restaurants; sleeps 6, weekly or monthly. 909/981-7492 or dfhauge@yahoo.com, Darlene.
OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier & harbor, pool/spa, game rm., sleeps 4. 949/786-6548.
PACIFIC GROVE hse, 3 bd., 2 ba., f/p, cable tv/vcr, stereo/CD, well eqpd. kitch. w/microwv, beaut. furn, close to golf, bches, 17 Mile Dr., Aquarium, Cannery Row, JPL discnt. 626/441-3265.
PARIS, duplex apt. in elegant new building in central Paris, available by the month, elegantly furnished, beautifully equipped kitchen, sleeps 2, walking distance to everything yet completely quiet. 626/792-5942.
ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.
SAN FRANCISCO, Nob Hill honeymoon suite, sleeps 2 max, full kitchen, maid, concierge, reserve early, \$125/nite, 750/week. 626/254-1550.

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El Niño tied to Antarctic climate change

By Alan Buis

This surface temperature map shows the average pattern of warming and cooling of the southern ocean around Antarctica associated with El Niño episodes. Warming is represented by red and cooling by blue. The intensity of the warming is strongest in the Amundsen and Ross Seas, located in the Pacific sector of the southern ocean. In contrast, the cooling is strongest in the Bellingshausen and Weddell Seas in the Atlantic Sector.



NASA researchers have found strong relationships between El Niño episodes and changes in climate and sea ice cover around Antarctica.

Identifying these relationships is important because it provides new insights into the changing characteristics of the Antarctic region and their role in Earth's climate system. The findings, published in the March 1 issue of the American Meteorological Society's Journal of Climate, show that although the total ice coverage of the southern ocean has not changed significantly over the last 20 years, the El Niño and its related Southern Oscillation appear to affect regional ice distributions. The oscillation is a recurring warming and cooling of the surface ocean in the central and eastern Pacific. El Niño refers to the

warm phase of the oscillation. "Understanding the connection between the Southern Oscillation and southern ocean climate and the sea ice cover will substantially improve our understanding of global climate," said Dr. Ron Kwok, a senior research scientist at JPL. "Our study concludes that the southern ocean's climate and ice cover is somehow connected to climate in the tropical latitudes. While we don't know yet the cause-and-effect relationship between the two, we do know the changes in sea ice cover cannot be explained by local climate variations alone and are instead linked to larger scale climate phenomena. The study was conducted by scientists at JPL and NASA's Goddard Space Flight Center, Greenbelt, Md. It is based on data from 1982 to 1999. The NASA scientists also noted changes in sea ice cover in regions not normally associated with El Niño, such as the Weddell Sea east of the Antarctic peninsula. The strongest links were observed in the Amundsen, Bellingshausen and Weddell seas of the west Antarctic, where the connections are localized and well defined. Within these sectors, higher sea level pressure, warmer air temperature and warmer sea surface temperature are generally associated with the El Niño phase.

Off-the-shelf camera device to hunt for distant planets

By Jane Platt

It could fit on your desk, and it's made mostly from parts bought at a camera shop, but two scientists believe their new instrument will help them find a slew of large planets orbiting stars in our Milky Way galaxy. "An amateur astronomer could do this, except maybe for the debugging of the software, which requires several people working 10 hours a day," said Dr. David Charbonneau of Caltech. "But it's easy to understand what's going on and cheap to build the equipment. That's why everyone thinks it's an ideal project, if it works." The assembly of the new instrument is a cooperative effort between Charbonneau and Dr. John Trauger of JPL. "David's approach promises to locate new planets orbiting distant stars," Trauger said. "The instrument is simple and straightforward, taking advantage of spare parts and computer code we already have on hand at JPL, and we hope to have it up and running in a few months." Charbonneau and his colleagues will soon use their gizmo to begin a three-year survey for extra-solar planets at Palomar Observatory in San Diego County. The instrument is based on a standard telephoto lens for a 35-millimeter camera. It will sweep the skies, looking for "hot Jupiters," or large, gaseous planets, as their fast orbits take them in front of other stars, into the line of sight between a star and Earth. Astronomers will watch for the "wink" from the star as an orbiting planet partially blocks its light. The new instrument uses a standard 300-millimeter Leica camera lens, with a charge-coupled device, or CCD. The CCD, which costs \$22,000, will be mounted in a specially constructed camera housing to fit at the back of the lens. The entire device will be fitted onto an inexpensive equatorial mount, available at many stores carrying amateur astronomical equipment. "Basically, the philosophy of this project is that, if we can buy the stuff we need off the shelf, we'll buy it," Charbonneau said. The project costs \$100,000, a fraction of the cost of most large Earth- and space-based telescopes. The Palomar staff will provide a small dome for the instrument, and the system will be automated so it can be operated remotely.

40 years ago at JPL...

With JPL's year-long celebration of 40 years of planetary exploration now underway, Universe will each month provide a look back at what was happening at the Laboratory four decades ago. At right is an advertisement in Universe's predecessor, "Laboratory," offering JPLers a summer 1962 Hawaii getaway. Seems like an impossible bargain today, but the publication noted that the tour—which included airfare, hotels, meals and other extras—could be financed through the credit union. Also from winter 1962: Ranger 3 was launched Jan. 26. The Ranger project of the 1960s was the first U.S. effort to launch probes directly toward the moon. An inaccuracy put Ranger 3 off course and it missed the moon. The mission included the maiden voyage of the gamma ray spectrometer, which was to survey the moon's crust. Ranger 3 was one of nine Ranger missions launched between 1961 and 1965. The spacecraft were designed to relay pictures and other data as they approached the moon and finally crash-land onto its surface. A variety of difficulties plagued the first several attempted missions in this series, but the later Rangers were finally a complete success.



News Briefs



Dr. James Bock

Bock receives presidential award

JPL astrophysicist DR. JAMES BOCK has received the Presidential Early Career Award for Scientists and Engineers.

The award is the highest honor bestowed by the U.S. government on outstanding scientists and engineers who are beginning their independent careers. The program is sponsored by the National Science and Technology Council, which implements the President's science and technology policy across the federal government.

DR. MICHAEL WERNER, JPL senior research scientist and principal scientist for the Space Infrared Telescope Facility, nominated Bock for the award.

"It is important that the world know that JPL has world-class scientists," said Werner. "Bock provided the key detector elements for two experiments that have put our understanding of the early universe on solid footing and have set the stage for further exploration."

Bock builds detectors and instruments for far infrared millimeter wave astrophysics. Bolometer instruments developed by Bock were used in a recent balloon-borne experiment called Boomerang to detect minute fluctuations in the cosmic microwave background, showing the geometry of the universe is essentially flat. Bolometers sense thermal radiation in the same way humans can feel the warmth from sunlight with their hands, but are many times more sensitive.

A ceremony in Washington, D.C. will honor Bock and other awardees. They will each receive \$500,000 over a five-year period for research. Bock plans to use the funding to develop a new experiment to study the polarization, or the specific light properties, of the cosmic microwave background. A relic of the Big Bang, the cosmic microwave background arose when the universe was 1,000 times hotter and denser than it is today. It gives us a snapshot of the universe when it was just 300,000 years old, a tiny fraction of its current age of 15 billion years. The physical properties of the universe at that time imprinted signatures in the structure and polarization of the cosmic microwave background that we detect today.

Bock received his bachelor's degree in physics and math from Duke University and his doctorate in physics from UC Berkeley. He has been at JPL since 1994.

Halpern honored by scientific society

DR. DAVID HALPERN, a JPL senior research scientist, has been named a fellow of the American Association for the Advancement of Science.

He was presented with a certificate and rosette pin at the society's annual meeting in Boston on Feb. 16. Halpern was inducted in recognition of his "basic research in air-sea interactions in tropical oceans and for coordinating international efforts in measuring ocean surface quantities from satellites."

The American Association for the Advancement of Science is the world's largest federation of scientists. The organization began honoring individuals with the fellow designation in 1874 to recognize contributions in all fields of science.

Halpern joined JPL in 1986 and is currently manager of the climate variability program. His research focuses on using satellite measurements to understand how the wind creates ocean currents and redistributes temperatures. His recent studies include El Niño, the intertropical convergence zone in the South Pacific and monsoons in the Arabian Sea. He is also chairman of the Committee on Space Research Scientific Commission on Space Studies of the Earth's Climate, an international organization that reports to the United Nations.

Halpern received his bachelor's degree, with honors, in geology and physics from McGill University, Montreal, and his doctorate in oceanography from the Massachusetts Institute of Technology. He has served as visiting

professor at Caltech and is an adjunct professor at UCLA. He is a fellow of the American Geophysical Union, a fellow of the American Meteorological Society and an honorary fellow of the California Academy of Sciences. His awards include the NASA Special Service Award and the NASA Outstanding Leadership Medal.

Hubble sees bow shock in Orion

Astronomers using NASA's Hubble Space Telescope have found a bow shock around a very young star in the nearby Orion nebula, an intense star-forming region of gas and dust.

A picture from the Hubble Heritage team is available at <http://www.jpl.nasa.gov/images/wfpc>. It was taken in February 1995 as part of the Hubble Orion Nebula mosaic by Hubble's Wide Field and Planetary Camera 2, designed and built by JPL.

Named for the crescent-shaped wave a ship makes as it moves through water, a bow shock can form in space when two gas streams collide. In this case, the young star, LL Ori, emits a vigorous wind, a stream of charged particles moving rapidly outward from the star. Our own sun has a less energetic version of this wind that is responsible for auroral displays on the Earth.

Unlike a water wave from a ship, this interstellar bow shock is three-dimensional. The filamentary emission has a distinct boundary on the side facing away from LL Ori, but is diffuse on the side closest to the star, a trait common to many bow shocks.

A second, fainter bow shock can be seen around a star near the upper right-hand corner of the image. Astronomers have identified numerous shock fronts in this complex star-forming region and are using this data to understand the complex phenomena associated with star birth.

The Orion nebula is a close neighbor in our Milky Way galaxy, at only 1,500 light-years from Earth. The filters used in the color composite represent oxygen, nitrogen, and hydrogen emissions.

CEC summer camp signups March 23

Registration is now underway for the JPL/Caltech Child Educational Center's summer camp, "Exploring Our Natural World." Signup day is set for Saturday, March 23 from 10 a.m. to 2:00 p.m. at the school's main campus at 140 Foothill Blvd., La Cañada.

The summer program, for children completing kindergarten through 6th grade, is held from June 24 through Aug. 28 at three locations: the Oak Grove site in La Cañada, next to La Canada High School; Palm Crest Elementary School in La Canada; and the CEC site in Pasadena, near Caltech.

The camp will feature arts and crafts, drama, music, creative writing, swimming, fun field trips, outdoor sports and games, gardening, water play and science exploration.

Families may apply for the full summer or for weekly sessions; however, enrollment is limited at each location. For information, call the CEC at ext. 4-3418. Brochures are also available in the ERC office.

Science festival for girls coming up

Caltech will host a March 23 science festival for members of former astronaut DR. SALLY RIDE's science club for girls in grades 6 through 8.

The Los Angeles Science Festival on campus will include workshops for both girls and adults. Registration will be from 8 to 9 a.m. Workshops will run through 1:30 p.m., followed by a street fair.

Twenty workshops on a variety of science topics will be offered, from which girls will choose two to attend. Presenters from JPL include Earth Science and Technology Director DR. DIANE EVANS; DR. ANN TAVORMINA, manager, Exploration Systems Autonomy Section 367; and DR. ANDREA DONNELLAN, deputy manager, Earth and Space Sciences Division.

For registration information, log on to <http://www.sallyridefestivals.com> or call (800) 561-5161.

Special Events Calendar

Ongoing Support Groups

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

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

Gay, Lesbian and Bisexual Group—Meets the first and third Fridays 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.

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.

Working Parents Support Group—Meets the third 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.

Friday, March 15

Dr. Stephen Hawking—The renowned physicist will speak at 8 p.m. in Caltech's Beckman Auditorium. Admission is free, but guaranteed-admission tickets will be distributed, on the day of the event only, beginning at 9 a.m. at Beckman. Limit is two tickets per person; it is suggested that ticket holders return in time to be in line no later than 7:30 p.m. For more information, call (626) 395-4652.

Von Kármán Lecture Series—Robert Hogg of the Machine Vision Group, Autonomy and Control Section 345, will present "Autonomous Navigation for Urban Robots" at 7 p.m. in the Vosloh Forum at Pasadena City College, 1570 East Colorado Blvd. Open to the public.

Sunday, March 17

Chamber Music—The Arditti String Quartet will appear at 3:30 p.m. in Caltech's Dabney Lounge. Tickets are \$27, \$23, \$19 and \$15. For more information, call (626) 395-4652.

Tuesday, March 19

JPL Hiking+ Club—Meeting at noon in Building 238-543.

Tues.-Wed., March 19-20

Investment Advice—One-on-one counseling is available with TIAA-CREF in T-1720. For an appointment, call (877) 209-3140, ext. 2614.

Thursday, March 21

"Taking A Realistic Look At Equity Returns"—This seminar, to be held from 10 a.m. to noon in Building 180-101, will help participants gain a better perspective on equity performance by tuning out the fund choice "noise" and discussing how to best meet your financial goals. The focus will be on: how a wide selection of equity funds and short-term high returns can be counterproductive to efficient equity investing; investing in a wide range of asset classes as a wise approach; using TIAA-CREF's indexing and/or active management strategies as powerful investment alternatives; and the importance of costs relative to investment returns and Morningstar's star rating system.

TIAA/CREF Enrollment Meeting—To be held at noon in Building 180-101 to assist employees newly eligible for Caltech/JPL retirement plan participation in selecting investment options and completing enrollment forms.

"Asset Allocation"—This seminar will discuss the importance of a diversified portfolio to a sound investment plan and will be held from 1 to 3 p.m. in Building 180-101.

Investment Advice—One-on-one counseling is available with Fidelity Investments in T-1720. For an appointment, call (800) 642-7131.

Social Security—A representative will be available from 9:15 to 11:30 a.m. in T-1720. For an appointment, call the Benefits office at 4-3760.

JPL Stories—Dr. Moustafa Chahine, JPL senior research scientist and



former chief scientist, will present "The Way the EC Thinks," from 4 to 5 p.m. in the the Library,

Building 111-104. From downsizing to outsourcing, and from TQM to PBM, come hear personal accounts based on Chahine's 15 years on the JPL Executive Council. If you have questions about the JPL Story series or wish to participate, call Teresa Bailey at ext. 4-9233.

Saturday, March 23

Folk Music—Steve Gillette and Cindy Mangsen will perform at 8 p.m. in Caltech's Dabney Lounge. Tickets are \$12 for adults, \$4 for children under 12. For information, call (626) 395-4652.

Wofa!Percussion and Dance From Guinea, West Africa—Ten performers present a blend of ancient rituals and contemporary vision with drumming, dancing and chanting at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$22, \$18 and \$14; youth high school age and under, \$10. For information, call (626) 395-4652.

Tuesday, March 26

"Distributed Autonomy: Successfully Coordinating Multiple Spacecraft or Rovers"—Drs. Tony Barrett and Tara Estlin of JPL's Artificial Intelligence Group will speak at noon in the 167 conference room. This lecture is sponsored by the Exploration Systems Autonomy Section.

Wednesday, March 27

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Guests welcome. Call Joy Hodges at ext. 4-7041 for information.

Thursday, March 28

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

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



Dr. David Halpern

NASA

and the German
Space Agency have
prepared for the

Saturday, March 16 launch of the Gravity Recovery and Climate Experiment (Grace), a scientific pathfinder mission that will test a novel approach to tracking how water is transported and stored within the Earth's environment.

The JPL-managed mission will precisely measure the planet's shifting water masses and map their effects on Earth's gravity field, yielding new information on effects of global climate change.

The twin Grace satellites were set to launch at 1:23 a.m. Pacific time from Russia on a five-year mission that will revolutionize understanding of changes in the Earth's gravity field over time and space. The mission will provide measurements of the gravity field that are far more accurate and sensitive than any that can be obtained by ground-based observations or single remote-sensing spacecraft.

Grace marks the first launch in NASA's Earth System Science Pathfinder Program, designed to develop new measurement technologies for studying our Earth system, said Dr. Ghassem Asrar, associate administrator for NASA's Earth Science Enterprise. "Through NASA's continuing investment in technology development, we've been able to create an innovative mission at a fraction of the cost of missions formulated just a decade ago," Asrar said. "Grace will provide us with a new view of our home planet and help us to better understand climate change and its global impacts such as changes in sea level and the availability of water resources."

A more precise gravity map of Earth is expected

to increase the accuracy of many techniques used by scientists who study Earth with space-based instruments. These techniques—ranging from satellite altimetry and radar interferometry to digital terrain models covering large land and ice areas—provide critical input to many scientific models used in oceanography, hydrology, glaciology, geology and related disciplines.

The gravity variations that GRACE will study include changes due to surface and deep ocean currents; runoff and ground water storage on land masses; exchanges between ice sheets or glaciers and the oceans; and densities of mass within the Earth.

As they race around the globe 16 times a day, the satellites will sense tiny variations in the Earth's surface mass below ground and corresponding variations in the Earth's gravitational pull. Regions of slightly stronger gravity will affect the lead satellite first, pulling it slightly away from the trailing satellite. By measuring the constantly changing distance between the two satellites and combining that data with precise positioning measurements from Global Positioning System instruments, scientists will be able to construct a precise Earth gravity map.

Grace is the first Earth-monitoring mission in the history of space flight whose key measurement is not derived from electromagnetic waves bounced off the Earth's surface. Instead, the mission will use a microwave ranging system to accurately measure changes in the speed and distance between two identical spacecraft flying in a

polar orbit about 220 kilometers (137 miles) apart, 500 kilometers (311 miles) above Earth.

Grace Project Scientist Dr. Michael Watkins of JPL noted that the twin satellites "chase each other from pole to pole, 16 times a day. The real key to the mission is that we map that separating distance between them extremely accurately."

Watkins compared the sensitivity of the ranging system to detecting gravity separation changes between one item in Los Angeles and another in San Diego to the precision of one-millionth of a meter—about one-tenth the width of a human hair.

A unique aspect of the mission, Watkins pointed out, is that "the two satellites are the instrument," he noted. "A lot of us are used to a satellite 'bus,' with particular devices on the spacecraft that make measurements, like a camera or altimeter. In the case of Grace, it's the separation between the two spacecraft that we're measuring, and that combined system forms our Grace instrument."

JPL has contributed to the GRACE mission with a broad range of project management and systems engineering activities. JPL also provides instruments and computer expertise, including:

- K-band ranging instrument system, which



Photo courtesy of Kim Leschly and Margaret Srinivasan

TWIN SATELLITES, LAUNCHING MARCH 16, WILL MEASURE OUR PLANET'S GRAVITY FIELD AND WATER MOVEMENT

TRACKING EARTH WITH GRACE

By Alan Buis and Mark Whalen

determines the distance between the satellites;

- Star cameras, which are used to orient the satellite in space;
 - Blackjack Global Positioning System receiver integration, to determine exact satellite locations;
 - Instrument processing unit, which combines information from the GPS receiver, K-band ranging system and star cameras, for transmission to Earth;
 - Science data system, the computer system on the ground that extracts the relevant science information from the combination of data sent by the instrument processing unit.
- "These concepts for gravity mapping—using one or two satellites—date back about 30 years," Watkins said. "The Grace concept dates back a decade ago when engineers at JPL realized that advances in the Global Positioning System, as well as Deep Space Network advances in K-band tracking that were used to track very distant spacecraft, could make the Earth gravity mapping mission much more accurately and more economically than in earlier mission concepts.

"That small group at JPL has evolved into a national and international project involving a number of countries around the world," he said.

Grace is a joint partnership between NASA and the German Center for Air and Space Flight. The U.S. portion of the project is managed by JPL for NASA's Office of Earth Science. Science data processing, distribution, archiving and product verification are managed under a cooperative arrangement between JPL and the University of Texas' Austin-based Center for Space Research in the United States and Germany's Earth Research Center.

More information about the Grace program is available online at <http://www.jpl.nasa.gov/grace>. Information on NASA's Earth System Science Pathfinder Program is available at <http://essp.gsfc.nasa.gov>.

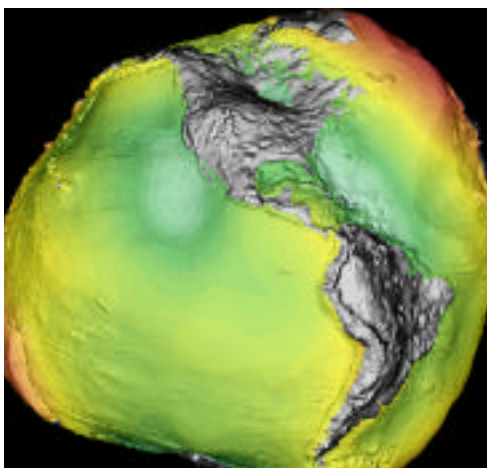


Image courtesy of German Geospatial Research Center

Above: Crew members at the Plesetsk Cosmodrome in northern Russia prepare the twin Grace satellites for their March 16 launch.

Left: This image shows the Earth's geoid—a surface of equal gravitational potential that, over the ocean, closely follows the sea surface. The geoid was determined from data collected from previous satellite missions, including the Challenging Minisatellite Payload (CHAMP), the forerunner to Grace.

Retired physician receives asteroid honor



Retired JPL physician Dr. Donal Sweeney earlier this month had an asteroid named in his honor (8378 Sweeney) and was also presented with a plaque to commemorate the naming. Sweeney (second from right) retired from JPL in October 2000 after 10 years at the Lab. He is joined by Senior Research Scientist Dr. Moustafa Chahine (left), astronomer Eleanor Helin and JPL Director Dr. Charles Elachi.

Passings

FRANK BOUQUET, 76, a retired JPL scientist in Section 354, died of diabetes Feb.7 in a nursing home. Bouquet worked at the Lab from 1978–88. He is survived by three children. Services were private.

WILLIAM SWANSON, 85, a retired millwright from Section 662, died of Parkinson's disease Feb. 20. Swanson joined JPL in 1957 and retired in 1981. He is survived by his wife, Helen, daughter Judy and three grandchildren. Services were private.

ROBERT HILL, 73, a retired contract analyst in Section 652, died of pneumonia Feb. 10. Hill worked at JPL from 1965–92. He is survived by his wife, Marilynne, one son, three daughters and five grandchil-dren. Services were held at Live Oak Memorial Park in Monrovia.

Letters

I would like to thank my many friends and co-workers for their kind support and expression of sympathy following the recent passing of my mother in Egypt. Special thanks to the NMP team for their moral support that was a comfort to me and a reminder of what a wonderful team the NMP is. Also, thanks to 336 for the beautiful flower and sympathy card. Best regards,

Dr. Faiza Lansing

My wife and I, and our granddaughter, would like to thank our many friends in Division 31 and particularly in Section 312 for the sympathy cards and the two beautiful floral arrangements given to us following the death of our daughter, Kathy. We would also like to express our thanks to the ERC for the lovely plant that was send to our home. The many expressions of sympathy and friendship will always remain in our memories.

Carl Sauer

On behalf of my family and myself, thanks to JPL for the beautiful plant. Our thanks to the Cassini MSSO for their generous donation to Dad's favorite charity, Heal The Bay Santa Monica. Words are inadequate in expressing our gratitude to the wonderful management of Cassini's MSSO for their tremendous support in providing me the honor of taking care of my Dad during his last days on this earth. It was the greatest gift of all and will never be forgotten.

Patti Smith and family

My heartfelt appreciation goes to each and every one of you who made my retirement milestone a resounding success. It was a pre-ship review that issued only one action item: enjoy your life. As always, each one of you is very special to me and your individual personalities are indelibly inscribed forever in my heart. I bequeath to you my heritage, and rest assured that your capability and knowledge will sustain both JPL and your mission into the future.

Dennis Ross
Systems Safety Office

Retirees

The following JPL employees retired in March: Donald Starkey, 44 years, Section 313; Kenneth Atkins, 32 years, Section 160; James Conel, 31 years, Section 327; Alexander Borshevsky, 15 years, Section 346.

Classifieds

For Sale

BICYCLES (4), children's, \$15. 626/357-8210. CAMPING MEMBERSHIP, Western Horizon Resorts and Adventure Outdoor Resort, \$5,000 to enter and \$425 year, will sell with trailer. 661/248-0111. CHINA CABINET, 1950s Drexel mahogany, e-mail lelson@altavista.com for photo, \$500 cash and carry. 353-9367. COMPUTER, notebook, Sony VAIO PCG-505FX, light on weight, heavy on features and performance, < 1" thin, < 3 lbs. 266 MHz, 4.3GB, 64MB, 10.4" SVGA, Win98 CD-ROM Drive, V.90 modem, port replicator, external floppy, Sony slip case, lithium-ion battery \$750/obo. 687-8627, cell. COMPUTER, Macintosh Quadra 850, monitor, keyboard, mouse, modem, \$100. 248-9418. COMPUTER, notebook, Compaq Presario 1247, AMD kg-2, 400 MHz, 6 GB HD, 96 MB RAM, 56K modem, 10/100 PCMCIA card, CD-ROM, original documentation and recovery CDs, \$550/obo. 626/356-0320. COAT, women's, black leather, belted trench, size 10/12, zip-out insulated lining, worn very few times, \$50/obo. 780-0470. CRIB, Childcraft, with mattress, oak, 3-drawer dresser, makes into bed, exc. cond., \$200. 957-3130. DESK, executive size, walnut finish, \$100; FILE CABINET, four-drawer, steel, \$75; CHAIR, \$25. 626/351-8198. DISHWASHER, portable, with butcher block, wood grain top, almond color, exc. cond., \$150/obo. 626/287-2295. DRESSES, evening/prom, 2 new designer, one by ABS, size 12, price tag \$329, sell \$200; one by Satche, size 10, price tag \$268, sell for \$165. 241-8208, eve, Irena. FISH TANK, 40-50 gallon, w/stand and supplies, some plants, no fish, needs cleaning, \$200/obo. 626/405-9701. GARDEN HOSE HOLDERS, new, black ironwork, holds up to 100-ft. hose, \$60/obo; new, aluminum holds up to 75-ft. hose, \$50/obo. 626/791-6101. HAM RADIO, standard C228A dual band (144/220 MHz) xcvr., gd. cond., extra batrr., AC charger, add'l accys, \$140. 957-2773. MATTRESS, Cal. king, fair condition, \$40/obo; SHEETS, Cal. king, \$10, must be able to pick up in Burbank. 504-6624. MOVING SALE: weight bench, Golds Gym, plus weights. \$100; refrigerator, almond, Frigidaire, 20.6 cu ft., \$150; washer/dryer, Maytag, \$300; fireplace screen, \$10; CB 40-Channel, Cobra, \$40. 362-3358. MOVING SALE: bedrm. set, 8-piece, incl. dbl. bed, dresser, chest, night stand, \$250; student desk, \$25; office desk, \$45; corner bed, \$20; curtain rods, \$3; hi-fi system, \$100; washer/dryer, \$250; elec range/oven \$75. 248-9418. MOVING SALE: dining table w/4 chairs, \$200; couch, olive colored, 1 yr. old, \$400; armoire, \$600; coffee table w/storage space, \$175; range/oven, gas, \$300; other items also available, must sell, moving out of country. 509-1862, Karen. OVEN, Kitchenaid, electric, self-cleaning, black, \$50; COOKTOP, Dacor gas, 5 burners, 36" wide, \$50. 790-2915. PIANO, Clavinova digital, Yamaha CLP 411, exc. cond., black, with bench, \$1,500/obo. 626/475-5790. RAINCOAT, women's, powder blue, cotton/poly-ester, belted, size 10/12, zip-out insulated lining, seldom worn, \$35/obo. 780-0470. REFRIGERATORS, one is beige, 17 yrs. old, side by side, \$100; other is white, top mount, 15 yrs. old, fair cond., \$100; TABLE, din. rm., w/leaf, cherry wood tops, black legs, 4 chairs, gd cond., \$150; SOFA/SLEEPER, makes into qn.-sz. bed, abstract black, blue and mauve design, good cond., \$300. 626/357-8210. RECEIVER, a/v, Denon AVR-3200, Dolby digital, 85 watt x 5ch/ 6 chl ext. input, 5 chl stereo, \$400. 661/255-5645. SATELLITE DISH, complete TV system, antenna with dual LNBF for operating two TVs separately, 2 receivers with smart cards, model ISD2200 with UHF remote, model 1000 with infrared remote, installation kit with user and

installation guide, \$100/obo. 626/797-7320. TICKETS (2), Pasadena Distinguished Speaker Series: April 30, Maya Angelou; May 15, Garrison Keillor; both at 8 p.m.; 3rd row center, \$35/each. 626/836-8561, Sam. TRIP TO MALAYSIA, round trip economy airfare, 4 nts. hotel in Kuala Lumpur, all transfers to/from hotel, tour of city, gd. thru Oct. 29, '02, approx. 6 wks. notice needed for booking; retail value ~\$1,000, seeking \$500, I won this but can't use it. 323/935-3432. VIDEO, Disney's Little Mermaid VHS, new, sealed, Special Edition, fully restored with THX sound, \$25; other brand new Disney videos also available. 562/420-2313. WEDDING GOWN, designer Mori Lee, beautiful with capped sleeves, scalloped neckline, satin bodice, overlaid with lace, re-embroidered appliques, sequins, pearls, illusion pyramid pick-up on front of skirt flows in a wide lace edge to back of dress, deep V-back meets satin bow at waist, no train, size 12, fits 5' 8", can be altered, \$150/obo. 241-3779.

Vehicles/Accessories

'98 DODGE Grand Caravan, V6, 3.3L, auto, 60K mi., must sell, moving, \$12K. 714/839-5750 or patsward@yahoo.com. '97 FORD Taurus GL sedan, 84K freeway mi., V6, automatic, 4 dr., a/c, pwr. steering, ABS pwr. brakes, dual air bags, cruise control, pwr. window/door locks, AM/FM stereo cassette deck, tilt wheel, pwr. drivers seat, metallic silver, extra clean, no smoke, 4 near-new Michelin tires, current registration, \$4,995. 626/798-1765. '95 FORD Windstar XL van, rear air, captain's chairs, many other extras, 83,000 mi., well maintained, all records, runs great, \$7,000. 626/447-6423. '94 FORD Mustang GT convertible, leather int., new brakes/clutch, 10-disc CD changer, 5-speed manual trans, \$9,000. 701-9260. Steve. '92 HONDA Accord EX sedan, 4 dr., 106K mi., gd. cond., white w/blue int., auto., 4 cyl. 2.2 ltr., front whl dr., a/c, p/s, p/w, p/dl, cruise cont., ABS, tilt whl., sun/moon roof, am/fm stereo/cassette, anti-theft, gd. tires, \$5,900. 626/296-9073, Patti. '90 HONDA Accord LX sedan, blue, 85K mi., gd. cond., auto trans., stereo/cassette, cruise, power locks/windows, \$3,000/firm. 626/796-0023. '99 JEEP Wrangler SE, exc., black, soft top, under 23K mi., 4 wheel drive, extras, like new, \$11,000/firm. 957-7742. '97 JEEP Cherokee Sport, 85K mi., 4.0 ltr., automatic, outstanding cond., red, full service history, ABS, CD, cruise control, pwr. mirrors, windows, doors, a/c, alloy wheels, tint glass, keyless entry, dual airbags, loaded, new tires, \$8,900. 626/683-8087, Felipe. '97 MITSUBISHI 3000 GT, black with tan leather interior, 5 spd., cruise control, 44K mi., extended warranty, 10 CD changer, LoJack, rear spoiler, rear spoiler, exc. cond., like new, \$13,500. 990-0134, Zvi. '92 LEXUS LS400, silver, original owner, low miles, exc. cond., leather, sunroof, everything except CD, \$12,950. 626/355-7318. '96 SAAB 900S, 3 dr., 5 sp., 80K mi., orig owner, all service records, exc. cond., grn/tan, ABS, alarm, factory AM/FM/cass., new brakes, starter, belts, \$8,700/obo. 310/306-7319. '00 SEABREEZE 5th wheel trailer, 33 ft., 3 pull-outs, blue, 27" TV, 5 CD, am/fm, microwave, side-by-side fridge with ice maker, see for more, \$36,000/obo. 661/248-0111. '99 TOYOTA 4Runner Ltd., 4x4, black, leather, moonroof, running board, tow package, CD, V6, loaded, wooded panels, 27,000 miles, \$23,999. 909/599-3230. '93 TOYOTA Tercel, 2 dr., 37,000 mi., air cond., 4 speed manual trans., exc. cond., w/airbags, \$3,000/obo. 626/794-4921 or 323/393-2831, Bert.

Wanted

COMPUTER, bargain laptop, any brand, better if HD> 2GB; RAM>64MB, should be working good and cheap, PCMCIA type II slot for modem/Ethernet cards required. albertobig@libero.it. SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman. VOLLYBALL PLAYERS, coed, no beginners please, Tues. nights 8 to 10:00 at Eagle Rock High School, \$3/nt. 956-1744, Barbara.

Free

FILL DIRT, clean, haul as much or as little as you want of the 2 cu. yds., located near Los Robles/Jackson, Pasadena. 626/791-3103.

For Rent

ALTADENA, charming 2 bd., 1 ba., house near Christmas Tree Lane: hardwood floors, fireplace, appliances; fenced back yard, fruit trees, roses; includes water, gardener, trash; see www.alumni.caltech.edu/~chrisc;

\$1,650/negotiable. 626/794-9579. ALTADENA, furn. rm., share bathroom, full house privs incl. washer/dryer, pets negotiable, female preferred, \$400. 626/798-2112. ALTADENA, near LaViña Estates area, room in home w/access to kitchen/bath/living rm., less than 5 min. from JPL's East lot, near Chaney Trail, walking distance from park w/tennis courts, no smoking/pets, avail. April 1, \$600 + \$1,200 security deposit. 626/296-2779. GLENDALE / L.A. border, 2 bd., 1 ba. apt., garage available, Verdugo Rd., 10 min. to JPL. 353-7103. MONROVIA house, 1 bd., 1 ba., off-st. parking, incl. water/trash, no smoking/pets, carpet, blinds, stove, large kitchen, month-month, gardener takes care of lawn, avail. 4/8, \$750 + \$500 sec. dep. 714/839-5705. MONROVIA HILLS, 2 spacious bd., 2 full ba. in a private home, share kitchen and laundry, electricity, water gas and cable included, 12 miles from JPL, no smoking, no pets, \$500 each bd. with ba. 626/358-7728. PASADENA house for lease, near Caltech, available May 1, 3 bd., 2 ba., living room, nice kitchen, fenced yard, 2-car garage, no pets, no smoking, gardener included, \$1,300 + \$1,300 security deposit. 626/794-0455. PASADENA, spacious 2-story condo, 3 bd., 2.5 ba., prestigious community, beaut. inter., bright ktch., prof. landscape, ctrl. air & heat, close to shop., cozy l/r with f/p, end unit, frml dr, hdwd. flrs., immac. cond., close to schls. \$1,750. 626/396-9024. SIERRA MADRE apt., 2 bd., 1 ba., 6 unit bldg, walk to village, view, new paint, carport, \$850. 626/355-7318. SUNLAND, fully furn. room in condo; share kitchen, bath, laundry; gar. parking, a/c, pool, Jacc., tennis court; 10 miles to JPL; prefer upper classman student, male, non-smoking; \$500 + 1/2 util., first, last & security deposit. 352-3112.

Real Estate

ALTADENA, walk to JPL, 3 bd., 2 ba. cul-de-sac home on huge 9,700 sq. ft. lot, C/H/A, 2-car attached garage, 9-ft ceilings, large remodeled family kitchen, newer carpet, new lighting in all rooms, cathedral ceiling entrance, built in 1980, \$268,000. 626/318-9374, cell. LA CANADA, 4 bd., 2.75 ba., 2,410 sq. ft., 100 x 148 lot, pool, private backyard, completely remodeled, new kitchen with Corian counters/sinks, high gloss white cabinets, breakfast area, indoor laundry, high ceilings in living areas, new windows/doors/floors, 3 bd. w/own closets, master bedroom with walk-in closet, very bright, \$799K. 790-4553, after 6 p.m., weekdays, Sima, or weekends 687-9812.

Vacation Rentals

BIG BEAR LAKEFRONT, luxury townhome, 2 decks, tennis, pool/spa, beautiful master bd. suite, sleeps 6. 949/786-6548. CAMBRIA, ocean front house, sleeps up to 4, exc. view. 248-8853. HAWAII, Kona, ocean front on Keauhou Bay, house and guest house comfortably sleep 6, 3 bd., 2 ba., rustic, relaxing and beautiful, swimming, snorkeling, fishing, spectacular view, near restaurants, golf and other attractions. 626/584-9632. HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slips 4, laundry fac., 4/15-12/14 \$105/nite/2, 12/15-4-14 \$120/nite/2, \$15/nite/ add'l person. 949/348-8047 or jackandrandy@cox.net. LAS VEGAS, timeshare avail. w/45 days adv. notice, sleeps 4-6, w/full kitch. & bath, TV, VCR, 1 block to the Strip, adjacent to Harrah's and Caesar's Palace. 909/896-2721. MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equipped kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/view to mtns., Jacuzzi, sauna, streams, fish-ponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455. OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier & harbor, pool/spa, game rm., sleeps 4. 949/786-6548. OCEANSIDE condo, fully furn., 2 bd., 2 ba., fireplace, full kitch., quiet, relaxing, beautiful beachside setting, BBQ, pool, spa, game room, great ocean view, easy walk to pier and restaurants, sleeps 6, avail. weekly or monthly. 909/981-7492 or dfhauge@yahoo.com, Darlene. ORLANDO, Fla. timeshare, avail. March 30-April 3, sleeps 4-6, full kitch. & bath, TV, VCR, minutes to DisneyWorld, \$440. 909/896-2721. PACIFIC GROVE house, 3 bd., 2 ba., f/p, cable tv/vcr, stereo/CD, well eqpd. kitchen w/microwv, beaut. furn, close to golf, bches, 17 Mile Dr., Aquar., Cannery Row, JPL discont. 626/441-3265. ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906. SILVERLAKES, Calif., resort, golfer's dream, 4 weeks free golf anytime each year, vacation club membership, 2 bd. condo for up to 6 people, two lakes, many amenities, private PGA

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Grace blasts into orbit

By Alan Buis



The Gravity Recovery and Climate Experiment (Grace) launches from the Cosmodrome at Plesetsk, Russia on Sunday, March 17.



Following a delay of 24 hours due to high winds, the JPL-managed Gravity Recovery and Climate Experiment (Grace) was successfully launched from the Cosmodrome at Plesetsk, Russia on Sunday, March 17 at 1:21:27 a.m. Pacific time.

Under partly cloudy, cold skies, the twin Grace satellites lifted off on a Russian Rockot launch vehicle. Riding nearly 160,000 kilograms (approximately 350,000 pounds) of thrust, the rocket headed northward over the Arctic Ocean and Alaska, then south across the Pacific Ocean and Antarctica before heading north again over Africa and Europe. At 85 minutes, 38 seconds into the mission—or 2:47 a.m. Pacific time—the satellites separated from the launch vehicle's third stage above Africa into a polar orbit 500 kilometers (311 miles) above Earth. Ground controllers successfully acquired the spacecraft's signal from the German Space Operations Center's ground tracking station in Weilheim, Germany at 2:49 a.m. Pacific time. Initial telemetry reports received by the Grace team showed both satellites to be in excellent health. Following separation, the leading GRACE satellite began pulling away from the trailing satellite at a relative speed of about 0.5 meters (1.6 feet) per second. Over the course of the next few days, the satellites will be spaced 220 kilometers (137 miles) apart—a little more than the distance between Los Angeles and San Diego. Grace will precisely measure Earth's shifting water masses and map their effects on Earth's gravity field. The five-year mission is the first launch of NASA's Earth System Science Pathfinder program. As they race around the globe 16 times a day, the satellites will sense tiny variations in Earth's surface mass below and corresponding variations in Earth's gravitational pull. Regions of slightly stronger

gravity will affect the lead satellite first, pulling it slightly away from the trailing satellite. By measuring the constantly changing distance between the two satellites using an extremely sensitive microwave ranging system and combining that data with precise positioning measurements from Global Positioning System instruments, scientists will be able to construct a precise Earth gravity map. Through the first week of April, basic satellite operations will be established. During a subsequent three-week commissioning phase, Grace's science instruments and supporting systems will be powered up, evaluated and calibrated. The performance of the Grace system for measuring Earth gravity will then be validated over the following six months. The mission then enters its observational phase, during which routine operational data products will be made available to scientists. Grace will be a scientific boon to researchers who study Earth with space-based instruments. The monthly gravity maps generated by Grace will be up to 1,000 times more accurate than those currently in use, substantially improving the accuracy of many techniques used by oceanographers, hydrologists, glaciologists, geologists and other scientists to study phenomena that influence climate. These phenomena range from shallow and deep ocean currents, water movement on and beneath Earth's surface, and the movement and changing mass of ice sheets, to sea-level heights, sea-level rise and changes in the structure of the solid Earth. Additional information about the Grace program is available on the Internet at <http://www.csr.utexas.edu/grace>. Grace is a joint partnership between NASA and the German Center for Air and Space Flight. JPL manages the U.S. portion of the project for NASA's Office of Earth Science. Science data processing, distribution, archiving and product verification are managed under a cooperative arrangement between JPL and the University of Texas' Austin-based Center for Space Research in the United States and Germany's Earth Research Center.

Lab event helps the blind touch the stars

By Mark Whalen



Students from Annalee School enjoyed feeling tactile maps and meteorites during their visit to von Kármán Auditorium. At right, JPL astronomer Steve Edberg helps a student feel the Voyager model.

Blind adults, blind school children and teachers of blind students touched the stars and toured the planets in a recent JPL event designed to share the wonders of astronomy. Students and teachers from Annalee Elementary School in Carson, along with some parents, visited the Lab March 18, a day after the event was canceled at Mount Wilson Observatory due to snowy conditions. One of the highlights of the visit was a scale-model solar system stretching across von Kármán Auditorium, which allowed participants to learn the relative distances of the planets from the sun. JPL astronomer and Cassini investigation scientist Steve Edberg moved slowly from one planet in the display to the next as the students followed the sound of his voice. Edberg also helped the kids feel the Voyager spacecraft model in von Kármán, explaining the infrared camera and telescope, and talked about meteorites as the kids held samples from California and Arizona desert. Edberg, who teaches an astronomy class at La Cañada High School, appreciated the students' interest in science. "This group of kids was just like those in all the classrooms I've visited," he said. "They are interested in space and the universe and all the gee-whiz stuff they hear about, like black holes. This group also asked questions about robotic space exploration, including some tough what-if questions. When they were asking questions their im-

paired sight made no difference at all. "Helping people expand their knowledge and understanding, especially of something that already interests them, is always enjoyable," Edberg said. "I learned a lot too, and got to create new ways to share information and experiences with a group that doesn't usually receive attention in our field. Figuring out ways to share knowledge learned with a sense that the audience doesn't get to use challenges my creativity." Dr. David Hurd, planetarium director and astronomy professor at Edinboro University in Pennsylvania, provided Braille tactile maps for participants to feel the stars, planets and constellations, showing the familiar shapes from the night sky. "It's fun," said Norma, 8. "I liked feeling the moon." Hurd taught visitors a jingle to help them remember the initials of the planets from the sun out: "My very educated mother just served us nine



Photos by Dutch Slager / JPL Photolab

News Briefs



The new history of the Deep Space Network.

Next ISO audit set for April 1–3

It has been three years since JPL was awarded ISO certification from Det Norske Veritas (DNV), an external auditing company. Last year, NASA re-competed the ISO registrar contract and awarded it to National Quality Assurance, USA, who will replace DNV as JPL's external auditor for the next three years.

From April 1-3, two National Quality Assurance auditors will conduct their first ISO audit at JPL. This audit will be similar to previous surveillance audits that were held every six months. The audit will look at various aspects of configuration management, mission operations and task order review, as well as closure of the corrective actions issued from the last ISO audit conducted by DNV.

The audit schedule (which is subject to change) is available on the ISO website at <http://iso.jpl.nasa.gov>. See your ISO organization representative (listed at <http://iso/help/list-orgreps.html>) for details about how the audit will affect your organization.

New book profiles history of DSN

"Uplink-Downlink: A History of the Deep Space Network 1957-1997" has just been published by the NASA History Office. Authored by DOUGLAS MUDGWAY, a retired JPL engineer involved in the development and operation of the DSN for 30 years, the book is dedicated to the memory of DSN pioneer DR. NICHOLAS RENZETTI, with a foreword by former JPL Director DR. WILLIAM PICKERING.

The book is available to view in the JPL Library, or copies may be purchased online from the Government Printing Office at <http://bookstore.gpo.gov> or order by phone at (866) 512-

1800 or (213) 239-9844. The reference number for the book is SP-2001-4227.

Contracts class starts April 4

The third in a series of eight UCLA Extension classes on government contract and proposal management at JPL will be held in the 190 cafeteria from 5 to 8 p.m. on Thursdays beginning April 4 and continuing through June 20. To enroll, attend on the first night and pay the \$380 fee with a check or credit card. Tuition reimbursement is available for almost the full cost of the class through JPL Education and Training Providers (<http://hr/et/>), and special education loans are available to Caltech Credit Union members.

Students come from many different directorates at JPL and find the class a useful opportunity to learn from each other as well as improve their career mobility and visibility. Repetition of the first two classes will depend on interest at JPL after completion of the eight scheduled classes. Students who successfully complete all eight classes will receive a certificate of completion for the UCLA Extension/JPL Government Contract and Proposal Management Program.

JPL at Cherry Blossom Festival

JPL's Asian American Council will staff three booths at the April 5-7 Cherry Blossom Festival, to be held at the Pasadena Convention Center. The council is seeking volunteers to help staff a booth featuring a Mars display and rover, and two booths for the festival's "Kids' Corner."

For information on volunteering, call REGGIE SAKURAI, ext. 4-4883. For information about the festival, visit <http://www.jpdizon.com/sites/cherry>.

Special Events Calendar

Ongoing Support Groups

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

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

Gay, Lesbian and Bisexual Group—Meets the first and third Fridays 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.

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.

Working Parents Support Group—Meets the third 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.

Monday, April 1

Cesar Chavez Celebration—Eric Reyes Chavez, eldest grandson of labor leader Cesar Chavez, will speak at an event hosted by JPL's Amigos Unidos. The event will be held in von Karman Auditorium from 11:30 a.m. to 1 p.m. For more information, visit the Amigos Unidos website at <http://eis/au>.

Tuesday, April 2

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

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

Wednesday, April 3

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

"Planets Orbiting Nearby Suns"—Caltech postdoctoral astronomy fellow Dr. David Charbonneau will speak at 8 p.m. in Caltech's Beckman Auditorium. Admission is free. For information, call (626) 395-4652.

Thursday, April 4

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

Saturday, April 6

Second Hand—The post-modern performance dance ensemble will perform at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$22,

\$18 and \$14; youth high school age and under \$10. For information, call (626) 395-4652.

Sat., April 6–Sun., April 7

All-Mozart Concert—The Caltech Chamber Singers will give a free concert at 8 p.m. Saturday and 3:30 p.m. Sunday in Beckman Auditorium. Call (626) 395-4652.

Sunday, April 7

Chamber Music—Works by Minimum Security Composers Collective, kellogg, Kernis Rzewski and Coleman will be presented in a 3:30 p.m. concert in Caltech's Beckman Auditorium. Tickets are \$27, \$23, \$19 and \$15. Call (626) 395-4652.

Tuesday, April 9

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

Wednesday, April 10

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

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Guests welcome. Call Joy Hodges at ext. 4-7041 for information.

Thursday, April 11

CMA Excellence in Management Award—The Caltech Management Association will honor Caltech trustee and Northrop Grumman Chairman and Chief Executive Officer Kent Kresa. The award recognizes an executive for demonstrating extraordinary vision and leadership. The event will be held at the Athenaeum, with reception at 6 p.m., dinner at 7 and program at 8:15. Cost: \$45 for CMA members, \$50 for members' guests and \$55 for non-members, which includes CMA membership. Reservation deadline is April 8. For more information, call Alice Tangney at ext. 4-7702.

Friday, April 12

"Royal England"—This travel film will be presented at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$9 and \$7. For information, call (626) 395-4652.

Saturday, April 13

Ethos Percussion Group—Featured on this 8 p.m. program in Caltech's Beckman Auditorium will be the Missa Luba Congolese mass, performed with the Kirk Choir of the Pasadena Presbyterian Church and tenor Leslie Thomas. Tickets are \$22, \$18 and \$14; youth high school age and under \$10. For information, call (626) 395-4652.

Six JPLers win SFA honors



Above, left to right: Mits Iwanaga, Genny Lopez, Amy Ryan, Leslie Lamb, Kirk Barrow, Joanne Shimada, guest Jim Erickson.

Six JPL employees earlier this month received NASA's Space Flight Awareness award. The sextet traveled to Kennedy Space Center to see the March 1 launch of Space Shuttle Columbia, the Hubble Space Telescope repair mission that marked Columbia's first flight in more than two years following its refurbishment.

Honorees Kirk Barrow (Section 531), Mitoji Iwanaga (204), Leslie Lamb (344), Genny Lopez (256) Amy Ryan (346) and Joanne Shimada (334) also received a VIP tour of Kennedy Space Center as part of the award.

At JPL, the Space Flight Awareness Program is administered by the Employee Services and Recognition Group. For more information, visit <http://eis/sec614/reward/#sfa>.

Four receive Lew Allen Award

From left: Senior Research Scientist Dr. Moustafa Chahine, Dr. Ayanna Howard, Dr. Juergen Mueller, Dr. Ian Joughin, Dr. Victoria S. Meadows, JPL Director Dr. Charles Elachi.

Four JPL Scientists have received the 2001 Lew Allen Award for Excellence.

The annual awards recognize and encourage significant individual accomplishments or leadership in scientific research or technological innovation by JPL employees during the early years of their professional careers.

The recipients are Dr. Ayanna Howard of the Autonomy and Control Section 3454, Dr. Ian Joughin of the Radar Science and Engineering Section 3340, Dr. Victoria S. Meadows of the Earth and Planetary Atmospheres Section 3233 and Dr. Juergen Mueller of the Thermal and Propulsion Engineering Section 3534.

Howard received her award for contributions to autonomous systems development, including innovative real time software tools for spacecraft precise and safe entry descending and landing applications.

Joughin was recognized for pioneering research in use of interferometric synthetic aperture radar for polar ice sheet topography and motion; development of remote sensing techniques for vector measurement of ice flow and contributions to Earth



Science missions.

Meadows was recognized for initiative and leadership in bringing to JPL an important new research endeavor in the now-evolving area of detection of biosignatures from extrasolar planets by spectroscopic observations with space-based astronomical instruments.

Mueller received his award for groundbreaking work in development of miniaturized thrusters and feed system components, a new area of propulsion engineering, which is critical

to the development of highly capable micro-spacecraft.

Each winner received a wall plaque and a grant of \$25,000 from the Director's Research and Development Fund, which is used at JPL to enhance the professional efforts of the awardees.

The award was established in 1990 in honor of Dr. Lew Allen, who served as JPL's director from 1982–90.

Former ERC store undergoes transformation for its reopening next week

A couple of months ago, Caltech Auxiliary and Business Services took over the operation of JPL's store (formerly a part of the Employee Recreation Club or ERC). [JPL's Human Resources Office is responsible for subclubs as well as employee events and activities.] Tom Mannion, director of Caltech Auxiliary and Business Services, discusses the state of the store's remodeling, plans for next week's grand opening, and prospects for future services.

By Mark Whalen

How did your group at campus get involved with managing the JPL Store?

Over the past several years we've worked to make our bookstore uniquely Caltech: to meet the specific needs of the faculty, students and staff, and to have a high-quality store. We're looking to implement a similar model for the Lab: a store that provides the services to support JPL's mission, the staff and visitors as well—a store that is uniquely JPL.

Our group also provides dining and vending services at JPL, and now we're getting a better picture of the needs of everyone on Lab. The opportunity to include JPL as a part of our larger community was a natural.

Having the JPL Store as part of our operation should benefit us with the ability to get better prices from distributors on apparel and other merchandise as we buy larger quantities.

Will the new store offer all new services and merchandise?

We looked at what the previous store offered, and we plan to offer even more merchandise.

The sale of tickets to sports and entertainment events will certainly be continued, and we'll see what we can do to expand it and make it better. Photo developing and associated products such as film will continue to be sold. And we will have a large number of scientific exploration-based toys.

We hope to put in some basic convenience items; for example, people can buy a small quantity of Tylenol without getting in their car and losing their parking space.

We're also trying to build a better environment near the store. We have a new food and coffee cart right outside the door, which offers hot and cold drinks, pastries, salads and sandwiches.

In general, we're playing it by ear and will be responsive to what our customers need.

How have you gone about the process of reorganizing the store?

We heard some good suggestions from people here. And some things were obvious to me when I walked in—it was somewhat dark, there was no room for people if there's a long line, you can't see things up close before you buy them. Eventually we'd like to break out the front counter to create a store where people can really interact with the merchandise.

People have been used to going to the old store thinking, "I have to know what I want, tell them and they'll get

it for me." We'd really like to make it a store in which, for example, you can go in and watch part of a DVD or video, browse through the pages of a book, or feel the elasticity of a sweatshirt or the durability of a toy. Thus far, we've only been able to take out the front wall, which JPL went out of their way to do. Customers won't be able to browse through the store yet, but that is our long-term goal.

For the opening week, we will place more merchandise in front of the counter in display racks. The new mail service will be available, and there'll be some new books there. We will also be on line on April 1. The site will be hosted at campus.

What activities are planned for the grand opening during the week of April 1?

The store will be open its normal hours, 9 a.m. to 4 p.m., Monday through Friday. The festivities will include live music on Monday and Friday, noon to 1 p.m. Refreshments will be served Monday and Friday, 11 a.m. to 2 p.m.

A barbeque lunch will be made available for \$4.95 per plate, Tuesday through Thursday, 11 a.m. to 2 p.m. There will be raffles every day. The raffle giveaway will include pens, movie tickets, coffee rover mugs, postal collectibles, complimentary FedEx mailings or JPL insignia clothing.

One thing that will be available on April 1 will be tickets for JPL/Caltech day at Dodger Stadium, for the June 1 Arizona Diamondbacks game. More than 3,000 right-field pavilion tickets will be set aside for JPL and campus employees. There will be carnival-like activities for kids before the game, and tickets will be \$10. Bus transportation will be available as well.

We'll also start marketing a private party at Magic Mountain May 10, where JPL, campus and perhaps another company will have exclusive use of the park in the evening. Tickets will be \$20, including parking.

How will the new mail service work?

This area will be to the left as you enter the store. There will be a package-supply stand with boxes, labels, etc., and a scale to weigh packages. We'll offer the U.S. Postal Service as well as Federal Express. Packages will be collected at the Lab, then taken to the campus for processing. All FedEx services—including Saturday morning, two-day delivery, etc.—will be available.

We'll also sell stamps over the counter. The stamp machine in the vending area next door will remain, though, as that service is helpful to those who are here after hours.



Photos by Bob Brown / JPL Photolab

We will eventually expand the service to offer gift wrapping, particularly during holiday season.

The green mailboxes around the Lab will remain for Postal Service letters and small packages.

What challenges do you face?

Being where we are, accessibility to the community and visitors is sometimes a bit difficult. Long term, we are looking at the possibility of moving part of the operation closer to the visitors' center at the main gate. There's some interest in doing this and some good discussions have taken place. We'll benchmark some other NASA facilities for ideas.

How can people at JPL contact you with comments or questions?

My phone number on campus is (626) 395-6174 (from on Lab, dial 161 and 6174). My e-mail address is Mannion@its.caltech.edu.

Tom Mannion, director of
Caltech Auxiliary and
Business Services

Service awards

The following JPL 2002 first quarter service award recipients celebrating 20 or more years of service attended a luncheon in their honor March 14:

40 years: Edward Greenberg, Stephen Gunter, Donald Lord, Arvydas Vaisnys, Ray Wall, Albert Whittlesey, C.A. Yamarone Jr.

35 years: Elsa Abbott, Robert Chandler, Julie Corpe, John Houseman, Charles Leising, Gary Milam, Edward Ng, Ronald Ploszaj, Phil Salomon, Gael Squibb, Shirley Stroup, Richard Williamson.

30 years: Sandra Dewegeli, Earl Higa, Robert Jacobson, Bonnie Kun-
kle, John Martonchik, James Weiss.

25 years: John Armstrong, Henry Awaya, Gary Bruner, Stuart Dejesus,



Robert Ferber, Greg Goodson, Yvonne James-Bivins, Joseph Kahr, R. Lloyd Keith, Charles Lahmeyer, Yolanda Oliver, Mary Reaves, Ronald Salazar, Jeffrey L. Smith, Linda Spilker, Glenn Veeder Jr.

20 years: Rose Ackerley, Ronald Alley, Clark

Burgess, Lisa Campbell, Jennifer Cruz, Sherrill Eastman, Larry Edmonds, Daniel Finnerty, Larry Fowler, Page Garcia, Ann Hall, Faiza Lansing, Steve Monacos, Michael O'Connell, Benjamin Saldua, Cesar Sepulveda, Choon-Foo Shih, Thomas Thompson, John Tullius.

For information on JPL's Employee Services & Recognition Program, log on to <http://eis/sec614/reward>.

Passings

ODELL RAPER, 72, retired manager of the Offices of Science Administration, Elements 3211 and 3214, died of cancer Nov. 19 at his home in Tujunga.

Raper joined the Lab in 1959 and retired in August 2001. He is survived by his wife, Nancy, three sons, two daughters and five grandchildren. Services were private.

WILLIAM LINNENKOHL, 94, a retired technical manager from Section 647, died of cardiac arrest March 1.

Linnenkohl worked at JPL from 1965–76. He is survived by his wife, Esther, daughter Betty True, two grandsons and four great granddaughters.

Burial was at Eternal Valley in Newhall.

DENNIS MACIEJ, 61, a senior engineer in Section 357, died of cancer March 2 at his home in Lancaster.

Maciej had worked at JPL since 1976.

He is survived by his wife, Kathleen Tharp-Maciej, three children and four grandchildren.

Services were private.

DR. THOMAS WYNNE, 83, retired JPL staff physician, died of pneumonia March 13.

Wynne served as staff physician at the Lab from 1954 to 1979. He is survived by his wife, Arline, sons Thomas Jr. and James, daughters Catherine and Margaret, and five grandchildren.

Services were held March 19 at Mater Dolorosa Retreat Center in Sierra Madre. In lieu of flowers, the family requests donations be made to Flying Samaritans International, 3444 Parkside Dr., San Bernardino, CA 92404.



Dr. Thomas Wynne

Letters

Thank you to my Contract Management Office co-workers for the comforting words and beautiful plants in the passing of my mother in Hawaii. Your support then and now has meant more than words can express. Thank you also to the ERC for the thoughtful plant.

Joyce N. Grunwald

I would like to thank my many friends at JPL for their kind thoughts and words following the recent death of my mother in Vermont. Her illness came on very suddenly and unexpectedly. I also wish to thank ERC for the lovely plant we received at home.

Phil Moynihan

I would like to express my appreciation for the beautiful plant sent in honor of my husband, retiree William Swanson.

Helen Swanson

Classifieds

For Sale

BED, twin matr. & ash wood frame w/2 drawers, \$150; DESK, child's (44" x 18" x 30"), & chair, ash wood, \$75, all in exc. cond. 790-6136.

BED, hardly-used queen-size from hardly-used guest bedroom; purchased new in Sept. 2001; Sealy Posturpedic Premier mattress and box spring set; \$250. 695-0811, Bob.

BICYCLES, kid's: 24" Raleigh Mountain Scout, \$100; 20" Novara Dirt Rider, \$100; quality bikes in exc. cond., not toy store junk; pictures at <http://home1.gte.net/res000mx/bikes.html>. 626/358-0778, steven.jenkins@ieee.org.

CAMERA: Digital Olympus D600L. 1.4 Megapixels; through-the-lens viewfinder, extra memory card; bonus accys: Olympus battery charger w/ NIMH batts; camera case; exc. cond., great for Web pictures. \$140. 957-2773.

COMPUTER, Macintosh Quadra 850, monitor, keyboard, mouse, modem, \$100. 248-9418.

COMPUTER HUTCH: wood grain appearance, pull-out keyboard tray, shelves for printer & CPU & other cubby-like shelves, on wheels, 61" H x 32.5" W x 19.5" D, \$50/obo. 626/798-0329.

DARKROOM EQUIPMENT, Durst M300 enlarger for 35 mm, polycontrast filters, enlarger timer, developing tanks, safelights, trays, print dryer and other incidentals, \$100. 626/584-6518.

DRESSES: evening/prom, 2 new designer, one by ABS, size 12, price tag \$329, sell \$200; one by Sache, size 10, price tag \$268, sell \$165. 241-8208, eve, Irena.

DRYER, 8 years old, Fridgidaire, gas, minimally used, \$50. 562/693-2986.

ENTERTAINMENT CENTER, holds 27" TV, shelf for VCR, 3 additional shelves, 3 drawers + cabinet w/2 shelves, vg cond., \$50. 362-7750.

EXERCISE EQUIPMENT from PowerTrainer, bench arrangement, comes w/how-to-use VHS video, rarely used, \$50. 362-7750.

FLY ROD, four section, 7.5 ft., with case, made by Southbend, vg cond., \$40. 626/793-1895.

FOLDING CHAIRS, 4, card-table type, vg cond., \$32; BEACH CHAIRS, 2, exc. cond., \$12 value, \$6/ea. 626/793-1895.

GOLF CLUBS, Nicklaus Golden Bear, graphite, \$175. 626/339-6498.

LOVESEAT, like new, overstuffed, hunter green/brown/tan abstract pattern, \$185 obo. 626/254-1550.

MOUNTAIN BIKE, Trek 18" frame, black, exc. cond., only ridden a few times, sacrifice at \$200/obo; BIKE RACK for car \$25, never used. 323/255-8635.

MOVING SALE, Danish hide-a-desk cabinet, \$250; twin motorized adjustable sick bed, \$350; double mattress, springs and frame, \$50. 952-8468.

PLAYER PIANO: Schafer & Sons, cherry wood, model # PS48, retail \$7,695, exc. cond., w/bench & rolls, \$2,000/obo. 805/987-5766.

REFRIGERATORS, G.E., 1 is beige, 17 yrs. old, side by side, \$100, other white, 15 yrs. old, top freezer, \$100; TABLE, din. rm, w/leaf, cherry-wood tops, black legs, 4 chairs, gd cond, \$150; SOFA/SLEEPER, makes into queen-sz. bed, abstract black, blue & mauve, gd cond., \$300; BIKES (4), children's, \$15/ea. 626/357-8210.

REFRIGERATOR, full size, Hotpoint, used only 2 years. \$150. 626/398-3649, Jennifer.

ROLLER SKATES, in-line K2 Extreme Flight, almost new; all receipts, paperwork and tool; size 10.5; knee, elbow, and wrist guards included; \$150. 640-7479, Greg.

SKI BOOTS, Nordica, men's size 12, exc. cond., \$50. 626/793-7879.

SOFA BED, 70", like new, charcoal brown, \$125; WAGON, Radio Flyer, \$15; PUSH LAWN MOWER, \$40; BUFFET TABLE, folding, on wheels, removable glass tray on top, like new, \$30. 248-4647.

TOASTER OVEN, extra-lg. capacity (bakes 10" cakes/5 lb. chicken/2.5 qt. casserole); DeLonghi Alfredo DeLux; 10 yrs old, but brand new (box never opened); \$70. 892-2674, Bridget, kriketbml@juno.com (note: character before the @ is a lower case L, not a numeral 1).

TOY COLLECTION, Star Trek, huge; all in mint, unopened cond.; pricing for indiv. items but prefer to sell collection as a whole, will deal on pricing for complete collection; un-priced items open for offers; http://briefcase.yahoo.com/john_de_pablos_then_slist.xls for details and prices. 777-9671 or john_de_pablos@hotmail.com.

TRADING CARDS, basketball, 179 assorted, from early to mid 1990s, \$6. 626/332-2682.

VACUUM CLEANER, Shop Vac, rigid, 12 gallon, orig. \$69, never used, \$50. 626/793-7879.

VIDEOTAPE, Disney's "Aladdin & the King of Thieves," VHS, new, sealed, \$17; other brand-new Disney videos also avail. 562/420-2313.

WASHER (like new) & DRYER (gas), \$250;

STUDENT DESK, \$25; OFFICE DESK, \$45. 248-9418.

Vehicles/Accessories

'94 CHEVROLET Camaro, V6, Bose spkrs, CD, T-top, teal, pwr. windows/driver's seat, 115K mi., \$7,000. 362-1159.

'96 DODGE Neon, blue, 2 dr, 5 speed, AM/FM cass., CD w/multi changer and remote, 133K mi., \$1,200 obo. 909/596-8117.

'84 DODGE D-50 pickup truck, vg cond, 2.6L eng., auto trans, bedliner, shell, very clean; new tires, radiator, carburetor, and battery; all receipts on request, 141K, orig. owner, \$2,200. 626/332-2682.

'97 FORD Taurus GL sedan, 84K fwy. mi., V6 automatic, 4-door, a/c, pwr. steering/ABS brakes/window/doorlocks, dual air bags, cruise control, metallic silver, immaculate, Michelin tires, \$4,995. 626/798-1765.

'89 FORD Aerostar XL van, red w/gray interior, well maintained, exc. cond., 122K mi., located in Ontario, \$2,000. 909/988-8199.

'94 HONDA Civic, 102K mi., 1 owner, 2 dr., ABS, moonroof, elect. windows, am/fm/cass., cruise cont., a/c, white exterior with gray interior, Blue book \$5,000, sell \$4,000. 893-3108.

'93 HONDA Accord LX, 5 speed, 4 dr., 89K miles, orig. owner, a/c, am/fm/cassette, vg cond., \$6,000/obo. 249-4602.

'81 HONDA Interstate SilverWing, shaft drive, water cooled, Prolink suspension, just over 6,000 miles, garage kept, near mint, includes second seat for passenger; see <http://home.attbi.com/~macmaven/sw/index.htm> for pictures; \$2,250. 353-2103.

'84 NISSAN 300Z, 2-dr. coupe, blue, 150K mi., 1 owner, fair cond., \$900. 626/355-9723, Neil.

'00 TOYOTA Corolla VE, automatic, 4 door, a/c, am/fm cass. stereo, tinted glass 37K, exc. cond. \$9,950. 626/798-6488.

'97 TOYOTA Camry LE, 57,600 mi., white w/ gold trim, alloy wheels, moon roof, pwr. locks/ windows, great cond., \$11,500. 626/290-1970.

'95 TOYOTA Corolla DX sedan, 4 dr., pearl green ext., gray int., gd. cond., 85K mi., a/c, am/fm/cass., dependable, \$5,300/obo. 909/949-2133.

'94 TOYOTA Tercel DX sedan, 4 dr., 110K mi., a/c, auto, am/fm radio, good cond., \$3,400, serious buyers only. 626/445-3808 or euihyeok@netzero.net.

'93 TOYOTA Tercel, 2 dr, with 37,000 only, a/c, 4-speed manual, exc. cond., w/airbags, \$3,000/ obo. 626/794-4921 or 323/393-2831, Bert.

'98 VW Jetta GLS, 40K mi., moon roof, new tires, full service records, exc. cond., \$10,999/obo. 626/695-2075, John.

'74 VW Super Beetle, yellow, gd. cond, fully operable and presentable, \$3,400/obo. 626/395-6418.

Free

DOG DOOR PANEL, fits into sliding door, silver color, flap measures 7" x 11" (medium size), bought at Home Depot for \$100 three years ago, our mutt grew too big. 249-4683.

SPA/HOT TUB: Freestanding unit, working order, we're upgrading: inside fiberglass, outside natural wood siding: includes cover, 120V electr. incl. heat; receiver must provide transport (pickup truck OK). 626/794-7343.

Wanted

APARTMENT in Glendale area, 2 bd., starting ASAP; 2 adults (sisters), 2 children (boys), no pets; prefer quiet, safe neighborhood. 805/443-7264, Charlie or Chad.

CAMPER SHELL, black, for 1997 Ford Ranger short-bed truck. 626/488-8616.

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

THAI TEACHER, spoken language, for future vacation to Thailand, poss. 2 students. 626/584-4415.

VOLLYBALL PLAYERS, coed, no beginners please, Tues. nights 8 to 10:00 at Eagle Rock High School, \$3/nt. 956-1744, Barbara.

Lost & Found

Found: READING GLASSES in Bldg. 180-101 on March 12. Ext. 4-3406, Donna.

Found: SUNGLASSES, Esprit, in East lot on March 25. Ext. 3-5323, Don Eagles

For Rent

ALTADENA, charming house, 2 bd., 2 ba., near Christmas Tree Lane; hardwood floors, fireplace, appliances, fenced back yard, fruit trees, roses; includes water, gardener, trash; see www.alumni.caltech.edu/~chrisc, \$1,650. 626/794-9579.

ALTADENA, furn. rm. in priv. residence, 5-10 min. bike ride to JPL, tennis & basketball nearby, laundry, kitchen, shared bath, \$400. 626/798-2523.

BURBANK HILLS, 4 bd., 1 3/4 ba., above Glenoaks, gardener, complete new int., close to schools, huge yd, 15 min./JPL, \$2,600. 843-7180.

CLAREMONT-area townhouse, 3 bd., 2 1/2 ba., patio, pool, spa, beautiful neighborhood, \$1,400. 909/593-1239, Joann.

COVINA, two rooms, \$350/ea. 626/339-6498.

GLENDAL, furn. rm, cent. courtyard with running fountain, deck w/gazebo, bathroom w/garden view, complete house privileges, util./cable paid, no smoking/drinking, \$625. 246-4750.

TUJUNGA, furnished room in 3-bd., 1-ba. home w/pool, washer/dryer, all utilities paid, kitchen privileges, no pets, \$500. 353-1734.

PASADENA house for lease, near Caltech, avail. May 1, 3 bd., 2 ba., living room, nice kitchen, fenced yard, 2-car garage, no pets, no smoking, gardener included, \$1,300 + \$1,300 security deposit. 626/794-0455.

PASADENA, spacious 2-story condo, 3 bd., 2.5 ba., prestigious community, beaut. inter., bright ktch., prof. landscape, ctrl. air & heat, close to shop., cozy l/r with f/p, end unit, frml d/r, hdwd. flrs., immac. cond., close to schls. \$1,750. 626/396-9024.

PASADENA, townhouse-style apt., near PCC, 2 bd., den, 2.5 ba., 2 fireplaces, a/c, built-in range/oven, refrig., drapes, disposal, laundry, water, gardener, trash pd., \$1,100. 790-7062.

PASADENA, studio condo, fully furnished, 1115 E. Cordova Ave., gated facility, 2 blocks from Caltech; pool & BBQ, patio, carport, laundry; utilities paid except electric: non-smoker, no pets; \$875. 626/792-9053, Ray or Marilyn.

PASADENA townhome-style apt., furn., 2 bd., 1.5 ba., a/c, parking, patio, laundry facilities, no pets, \$1,195 + utilities. 626/351-9641.

PASADENA, spacious 1 bd. guesthouse, quiet Chapman Woods area, stove, refrigerator, w/d, utilities, \$850 + \$500 cleaning deposit. 626/793-7937.

PASADENA, furnished 2 bd., 1.5 ba., apt. to share w/Caltech Post Doc, a/c, parking, patio, laundry facilities, no pets, \$595 incl. utilities. 626/351-9641.

Real Estate

LA CANADA, 4 bd., 2.75 bath, 2,410 sq. ft., 100 x 148 lot; pool, priv. backyard, completely remodeled, new ktch. w/Corian counters/sinks, high gloss white cabinets, breakfast area, indoor laundry, high ceilings in living areas, new windows/doors/floors, 3 bd. w/own closets; master bedroom w/walk-in closet, very bright; \$799K. 790-4553, after 6 p.m. weekdays, or 687-9812.

SHOW LOW, Ariz., 3 bd. house, .43 acres w/ ponderosa pines, nat'l gas, sewer, in-town subdivision, close to skiing and fishing, great investment property, house needs help, \$30K/obo. Randall.Mielke@fijivillage.com.

WILLIAMS, Ariz. area, (10 mi. away), 43 acres w/2-rm. house on top of cliff w/great views, seasonal pond, wildlife everywhere, 4-mi. dirt road access year round, great investment, \$42K cash/obo. Randall.Mielke@fijivillage.com.

SILVERLAKES, Calif., vacation club membership, 2-bd. condo, 4 wks in resort community, 2 lakes, many amenities, free golf at priv. PGA-rated course w/driving range & putting greens, less than 2 hrs. fr. Pasadena, exchange rights with 3,000+ affiliate domestic/int'l resorts, illness forces sale, \$17,500. 805/967-7725.

Vacation Rentals

ANYWHERE, timeshare week, 1 bd., location based on availability, expires 8/30/02, \$400. 362-3358.

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

CAMBRIA, ocean front house, sleeps up to 4, exc. view. 661-8853.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd w/loft, compl. furn. phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slips 4, laundry fac., 4/15-12/14 \$105/nite/2, 12/15-4-14 \$120/nite/2, \$15/nite/ add'l person. 949/348-8047, jackandrandy@cox.net.

MAAMMOTH, Courchevel, fully equipped unit, 2 bd., 2 ba., sleeps 6, short walk to Canyon Lodge and ski lifts. 661/255-7958.

MAAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equipped kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/view to mtns., Jacuzzi, sauna, streams, fishponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455.

OCEANSIDE condo, fully furn., 2 bd., 2 ba., fireplace, full ktch., quiet, relaxing, beautiful beachside setting, BBQ, pool, spa, game room, great ocean view, easy walk to pier and restaurants, sleeps 8, avail. weekly/monthly. 909/981-7492 or dfhaug@yahoo.com, Darlene.

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

PARIS: Duplex apt. in elegant new building in central area of town, available by the month; elegantly furnished, beautifully equipped, gourmet kitchen, sleeps 2; walking distance to everything, yet completely quiet; \$2,700. 626/792-5942.

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

SAN FRANCISCO, Nob Hill honeymoon suite; slips 2 max., full ktch., maid, concierge; re-serv early; \$125/nite; \$750/wk. 626/254-1550.