

universe

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Radar pushes limit of asteroid prediction

By Guy Webster



Above: Jon Giorgini, leader of a team reporting about the asteroid, and positions of the Earth, Sun and Asteroid 1950 DA on April 5.

SO L A R S Y S T E M

Applying unprecedented refinements to the analysis of celestial hazards, JPL astronomers have identified a potential close encounter with Earth more than eight centuries in the future by an asteroid two-thirds of a mile (one kilometer) wide.

What will most likely be a miss, even without preventive measures, will come on March 16, 2880, said JPL senior engineer Jon Giorgini. Odds for a collision are at most one in 300, and probably even more remote, based on what is known about the asteroid so far. Still, that makes this space rock, named 1950 DA, a greater hazard than any other known asteroid.

"This is not something to worry about," said Giorgini, leader of a team reporting about the asteroid in the April 5 edition of the journal *Science*. "We're showing that searches with optical telescopes and follow-up observations with radar telescopes can provide us centuries of advance notice about potential close encounters of asteroids with Earth. That's plenty of time to consider the options—35 generations, in fact.

"This report is a success story for our efforts to identify potential troublemakers," said JPL's Dr. Don Yeomans, manager of the NASA Near Earth Object Program.

"Radar observations are helping us push predictions five to 10 times further into the future."

This report differs from previous ones about other asteroids' Earth-impact potential. Estimates of impact risks in earlier cases came from a few nights' optical observations of newly found asteroids. Astronomers soon ruled out the possible impacts after a few more observations narrowed uncertainties about the asteroids' orbits. The current orbit of 1950 DA has been mapped with great accuracy using precise radar data and a 51-year span of optical data.

Uncertainty about how close it will come to Earth in 2880 stems from gaps in knowing physical details of the asteroid that could subtly alter its course over the centuries.

"How close 1950 DA will approach Earth turns out to depend on the asteroid's physical attributes—its size, shape and mass—and how it spins, reflects light and radiates heat into space," Giorgini said. These things are unlikely to be known any time soon. The way the asteroid radiates energy absorbed from the Sun back into space has the biggest potential effect, he said. Releasing heat in one direction nudges the

asteroid in the opposite direction. The resulting acceleration is tiny, but over the centuries acts like a weak rocket and could make the difference between a hit and a miss.

Asteroid 1950 DA was discovered from Lick Observatory, Mount Hamilton, Calif., in 1950. It faded from view for five decades then was found from Lowell Observatory in Arizona in 2000. Astronomers used large dish antennas of NASA's Deep Space Network site at Goldstone, Calif., and the Arecibo Observatory in Puerto Rico to examine the asteroid with radar when it passed at a distance 21 times farther away than the Moon in March 2001.

"Once an asteroid is discovered, radar is the most powerful way to find its exact orbit and, apart from sending a spacecraft, the only way to see what it looks like," said JPL's Dr. Steve Ostro, who led the radar observations of 1950 DA.

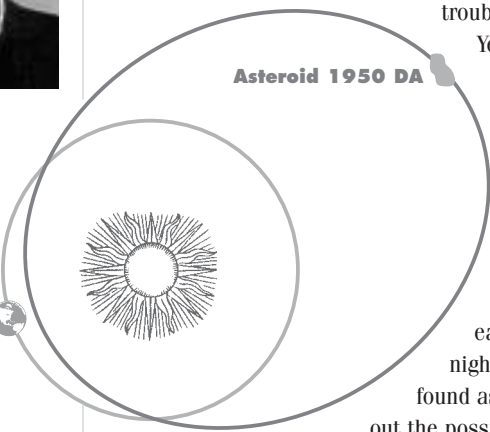
Giorgini refined calculations of future orbits by including factors such as the push from sunshine and the potential gravitational tug from 7,000 other asteroids and nearby stars. Effects of each small influence on the asteroid's movement could be amplified by 15 gravitational tugs during close approaches to Earth and Mars—none of which have any chance of an impact—prior to 2880. "It's like predicting a 15-bank shot in a pool game," Giorgini said. "We know the cue stroke extremely well because it is right now and we can measure it. But at each future bank, small variations accumulate and change the next bounce, which changes the following one and so on. What we've done is find the range of changes possible due to tilt, imperfections and fuzz on the table, the bounce of the cushions, and wind blowing across the room. We need to know more about the 'cue ball' to really be sure of how the last three banks in 2809, 2840 and 2860 will line things up for 2880."

If future generations' studies of 1950 DA indicate it ought to be diverted to prevent a collision, the subtle influences that its physical properties have on its motion might be manipulated to advantage. For example, Giorgini suggested, its surface could be dusted with chalk or charcoal to alter the way it reflects light, or a spacecraft propelled with a solar sail could collapse its reflective sail around the asteroid. In any event, determining asteroids' physical properties will be important for long-term calculations of impact hazards.

In addition to Giorgini, Ostro and Yeomans, authors of the report include Dr. Lance Benner, Dr. Paul Chodas, Dr. Steven Chesley, Dr. Myles Standish, Dr. Ray Jurgens, Randy Rose and Dr. Alan Chamberlin, all of JPL; Dr. Scott Hudson, Washington State University; Dr. Michael Nolan, Arecibo Observatory; Dr. Arnold Klemola, Lick Observatory; and Dr. Jean-Luc Margot, Caltech.

Images are available at <http://neo.jpl.nasa.gov>.

Arecibo Observatory is operated by the National Astronomy and Ionosphere Center at Cornell University, Ithaca, N.Y., under an agreement with the National Science Foundation. The radar observations were supported by NASA's Office of Space Science.



Deep Space 1 finds comet has hot, dry surface

By Martha Heil



Comet Borrelly, as imaged by Deep Space 1.

Comets are sometimes described as "dirty snowballs," but a close flyby of one by JPL's Deep Space 1 spacecraft last fall detected no frozen water on its surface.

Comet Borrelly has plenty of ice beneath its tar-black surface, but any exposed to sunlight has vaporized away, say scientists analyzing data from Deep Space 1.

"The spectrum suggests that the surface is hot and dry. It is surprising that we saw no traces of water ice," said Dr. Laurence Soderblom of the U.S. Geological Survey's Flagstaff, Ariz., station, lead author of a report on the Borrelly flyby results appearing in the online edition of the journal *Science*.

"We know the ice is there," he said. "It's just well hidden. Either the surface has been dried out by solar heating and maturation or perhaps the very dark soot-like material that covers Borrelly's surface masks any trace of surface ice."

The Deep Space 1 science team released pictures and other initial findings days after the spacecraft flew within 2,171 kilometers (1,349 miles) of the comet's solid nucleus on

Sept. 22, 2001. This week's report provides additional details about the nucleus and the surrounding coma of gases and dust coming off of the comet as measured by one of Deep Space 1's scientific instruments.

"Comet Borrelly is in the inner solar system right now, and it's hot, between 26 and 71 degrees Celsius (80 and 161 degrees Fahrenheit), so any water ice on the surface would change quickly to a gas," said Dr. Bonnie Buratti, JPL planetary scientist and co-author of the paper. "As the components evaporate, they leave behind a crust, like the crust left behind by dirty snow."

Borrelly is unusually dark for an object in the inner solar system. The comet's surface is about as dark as a blot of photocopy toner, possibly the darkest surface in the solar system. It is more like objects in the outer solar system such as the dark side of Saturn's moon Iapetus and the rings of Uranus.

"It seems to be covered in this dark material, which has been loosely connected with biological material," Buratti said. "This suggests that comets might be a transport mechanism for bringing the building blocks of life to Earth."

Comets may have played an important role in supplying organic materials that are required for life to originate.

Soderblom points out that Borrelly's old, mottled terrain with dark and very dark spots—different shades of black—are apparently inactive. Ground-based observations estimated that 90 percent of Borrelly's surface might be inactive, and the observations taken by Deep Space 1 show that this is indeed true.

"It's remarkable how much information Deep Space 1 was able to gather at the comet, particularly given that this was a bonus assignment for the probe," said Project Manager Dr. Marc Raymond. Deep Space 1 completed its original goal to test 12 new space technologies and then earned extra credit by achieving additional goals, such as the risky Borrelly flyby. "It's quite exciting now as scientists working with this rich scientific harvest turn data into knowledge."

Images of comet Borrelly from Deep Space 1 are available at http://www.jpl.nasa.gov/images/ds1/ds1_borrelly.html. For more on the mission, visit <http://nmp.jpl.nasa.gov/ds1>.

News Briefs



Galileo at Jupiter.

Space Foundation honors Galileo team

Hundreds of people who have helped make JPL's Galileo mission to Jupiter a long-running success have drawn recognition from the Space Foundation with an award presented earlier this month.

The Space Foundation, a nonprofit group supporting space activities, space professionals and education, selected Galileo's NASA and industry team to receive a Space Achievement Award. "The selection recognizes the design, development, launch and operation of the Galileo space probe, which resulted in a more-than-10-year odyssey of solar system exploration," said STEVE EISENHART, foundation vice president. "We're focusing on the abundance of scientific discoveries that have come from Galileo."

"This award is a tribute to the team of people at all phases of the project who made this mission the successful legacy of discovery that it is," said Galileo Project Manager DR. EILENE THEILIG.

Galileo, launched in 1989, continues to return new scientific information after more than three times its originally scheduled two-year orbital tour. It will examine the high-radiation environment near Jupiter and the density of the small inner moon Amalthea when it flies near Amalthea for the first time seven months from now.

Voyager team fixes distant spacecraft

Astronauts can make service visits to the Earth-orbiting Hubble Space Telescope, but what do you do if the spacecraft needing a replacement part is the farthest human-made object from Earth, more than twice as distant as Pluto?

The answer, as the flight team for the Voyager Interstellar Mission recently demonstrated, is to plan ahead and keep top-notch engineers available.

Last month, the team cautiously activated a backup position-sensing system, including a Sun sensor and star tracker, on Voyager 1. The spacecraft had been carrying those components and other spare parts since it was launched in 1977 on what was then slated as a four-year mission.

"After sitting on the shelf for 25 years, it's like new equipment," said Project Manager ED MASSEY. Voyager 1 and its twin, Voyager 2, completed their history-making tour of outer planets in 1989 and are now headed toward the boundary zone—called the heliopause—where the Sun's influence ceases way to interstellar space. Both spacecraft have adequate power and communication capabilities to explore that frontier for about 20 more years, if other onboard systems hold up.

The original designers' foresight in building backup systems into the Voyagers helps, but making changeovers aboard a spacecraft more than 12.5 billion kilometers (7.8 billion miles) away presents enormous challenges. Anything that could go wrong needs to be foreseen, because reaction time is unforgivingly slow. Communication signals take nearly 12 hours each way traveling to or from Voyager 1 at the speed of light.

And the task now falls to a Voyager flight team of just 14 people, compared with a Voyager team of more than 300 in the 1980s.

The success of the recent modifications gives the team confidence in switching to other backup systems on both spacecraft when concerns arise about original systems, Massey said.

Cassini completes course maneuver

JPL's Cassini spacecraft successfully completed a course adjustment April 3 during its journey toward Saturn.

The maneuver was designed using new procedures the mission will employ for course adjustments while orbiting Saturn. The spacecraft fired its main engine for 9.8 seconds to accomplish the maneuver.

Cassini is in good health. As of April 28, it will have traveled 3 billion kilometers (about 1.9 billion miles) since its launch in October 1997. It will reach Saturn on July 1, 2004.

Last week's engine burn, just the 13th since launch and the first since February 2001, was planned both for tweaking Cassini's trajectory and for routine maintenance of the propulsion system. To keep fuel-lines flowing freely, engineers do not allow Cassini to go much more than one year between engine firings, said EARL MAIZE, Cassini spacecraft operations team manager at JPL.

During its orbital tour at Saturn, Cassini will need to fire its main engine for trajectory correction maneuvers as frequently as once every five days. Until now, the tasks in preparing and executing each maneuver were spread out over as much as three weeks.

"We streamlined the process this time," said JPL systems engineer JOEL SIGNORELLI, leader of the maneuver-design team.

The team used new software that automates some of the preparatory steps. Then, within a nine-hour span of two-way communications between Cassini and NASA's Deep Space Network, safety checks were performed, commands were sent to the spacecraft, the engine ran for the prescribed time, and engineering data confirming the successful burn were sent down.

Scientific instruments monitoring the space environment around the spacecraft continued to gather data during the procedure, which will be a valuable capability during the orbital tour but had not been attempted during previous flight path correction maneuvers.

The engine applies 445 newtons (100 pounds) of force to the 5-ton spacecraft. "It's about like me pushing on a school bus," Maize said. The next burn planned for Cassini will be a flight path correction maneuver in May 2003.

Nearly six months after it begins orbiting Saturn, Cassini will release its piggybacked Huygens probe for descent through the thick atmosphere of the moon Titan on Jan. 14, 2005. Cassini-Huygens is a cooperative mission of NASA, the European Space Agency and the Italian Space Agency.

Lab open house canceled

Following "considerable review" of security, logistics and cost requirements, JPL Deputy Director EUGENE TATTINI announced last week that the Laboratory has decided it would be in JPL's and the public's best interest not to hold an Open House this year.

"As you know, additional security measures have been required at all NASA facilities," Tattini told JPL staff, noting that currently, no NASA center plans to hold a general public Open House activity this year.

"Telling the JPL story to the public remains an important aspect of our work," Tattini said, adding that JPL in recent months has made focused efforts to increase the number of tours offered during the normal work week. "We will be exploring alternate methods to connect the public's enthusiasm for the extraordinary work we undertake at the Lab on behalf of the nation. For instance, the year-long celebration marking the 40th anniversary of Mariner 2 and the 25th anniversary of Voyager offer us such opportunities. Other activities are being explored as well, including prearranged weekend tours.

"So many of you have given so generously of your time, imagination and hard work to make the JPL Open House an event that grows in popularity and value each year," Tattini told JPL staff. "We are determined to reinstate this major event to the Lab's calendar in the near future."

ISO audit a success

JPL successfully completed an ISO audit conducted by NQA April 1-3. The combined three-year certification review, certificate transfer from DNV to NQA, and surveillance audit were satisfactorily completed. NQA recommended ISO 9001 certification extension for three more years. For details, log on to <http://iso.jpl.nasa.gov>.

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—Meets at noon on Wednesdays. Call Occupational Health Services, 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, 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.

Folk Music—Autoharp player/singer Bryan Bowers will appear at 8 p.m. in Caltech's Dabney Lounge. Tickets are \$15 for adults, \$5 for children under 12. Call (626) 395-4652 or visit <http://www.cco.caltech.edu/~folkmusi>.

Sunday, April 14

Chamber Music—The New Hollywood String Quartet will perform works by Beethoven, Barber and Dvorak at 3:30 p.m. in Caltech's Dabney Lounge. Free admission. Call (626) 395-4652.

Tuesday, April 16

Dr. Sheila Widnall—The Massachusetts Institute of Technology professor of aeronautics and astronautics will lecture on diversifying science, math and engineering at 4 p.m. in Caltech's Beckman Institute Auditorium. Free admission. Call (626) 395-4652.

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

Thursday, April 18

JPL Stories—Fred Felberg, who served as JPL's associate director from 1983-87, will present "Floating With Venus" at 4 p.m. in the customer service area of the Library, Building 111-104. Come hear about Mariner 2's encounters with Venus and the Rose Parade. Call Teresa Bailey at ext. 4-9233.

Von Kármán Lecture Series—Dr. Ross Salawitch, research scientist in JPL's Atmospheric Chemistry Group, will present "The Changing Ozone Layer: A Greenhouse Gas Connection?" at 7 p.m. in von Kármán Auditorium. Open to the public. The talk will examine future prospects for Earth's ozone layer, drawing upon research activities at JPL and Caltech in the three "pillars" of atmospheric sciences—laboratory measurements, atmospheric observations, and computer modeling. See <http://www.jpl.nasa.gov/events/lec->

[tures/apr02.html](http://www.jpl.nasa.gov/events/lectures/apr02.html) or call Public Services at ext. 4-0112.

Friday, April 19

"Heart and Soul: Love Songs of the '50s"—The 16-piece Hollywood Hills Orchestra and four singers will perform at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$29, \$25 and \$21; youth high school age and under, \$10. Call (626) 395-4652.

TIAA/CREF Enrollment—This monthly meeting, to be held at noon in T-1720-137, is designed to assist employees newly eligible for Caltech/JPL Retirement Plan participation in selecting investment options and completing enrollment forms.

Von Kármán Lecture Series—Dr. Ross Salawitch, research scientist in JPL's Atmospheric Chemistry Group, will present "The Changing Ozone Layer: A Greenhouse Gas Connection?" at 7 p.m. in the Vosloh Forum at Pasadena City College, 1570 E. Colorado Blvd. See April 18 listing for further details.

Saturday, April 20

Caltech Jazz Festival—The Caltech Jazz Bands will be joined by the Washington Rucker Band and the World Ambience Symphony from 2 to 6 p.m. in Dabney Lounge. Free admission. Call (626) 395-4652.

Tuesday, April 23

Investment Advice—One-on-one counseling appointments are available in T-1720 with Fidelity Investments. For an appointment, call (800) 642-7131. TIAA/CREF has no available appointments for April.

Quantum Technologies—Dr. Ulvi Yurtsever of JPL's Quantum Computing Technologies Group will present "Heisenberg's Toolbox: The Fantastic Promise of Quantum Technologies" at noon in conference room 180-101. The lecture is sponsored by the Exploration Systems Autonomy Section.

Wednesday, April 24

Investment Strategies—Fidelity will hold a workshop from 9 to 11 a.m. in Building 180-101 for employees who are currently participating in JPL's employer-sponsored 403(B) retirement plan and are 10 years or more from retirement. Topics: Current allocation and future savings needs, and the importance of reviewing, reevaluating, and rebalancing your portfolio regularly.

Photography Talk—Michael Cunningham and Craig Marberry will give a free talk on their book of photography and oral history at 8 p.m. in Caltech's Beckman Auditorium. For information, call (626) 395-4652.

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

Thursday, April 25

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. Call Susan Lee at (626) 395-6327.

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

Saturday, April 27

Lily Cai Chinese Dance Company—"Dance Calligraphy" draws inspiration from the intersection of music, dance and the Chinese art of calligraphy. To be held at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$25, \$21 and \$17; youth high school age and under, \$10. Call (626) 395-4652.



Artist's concept of Voyager.

Headquarters' information-protection plans supplement other security disciplines

This article was provided by NASA's Office of Public Affairs for publication in the employee newspaper of each NASA center.

In the article at bottom, JPL Security and Protective Services Manager Joseph Charles discusses the Laboratory's implementation of its Operations Security Program.

By Michael Braukus

One of the first things David Saleeba did after taking the helm as assistant administrator of the Office of Security Management and Safeguards (Code X) was to tour the headquarters building looking for weaknesses in security. A former Secret Service agent, Saleeba's investigative experience immediately led him to have the paper recycling boxes inspected. What he found was in his mind unbelievable. Personnel records, contracting information and other confidential documents were found in almost every receptacle.

This discovery reinforced to Saleeba the need for a comprehensive agency-wide Operations Security Program. The person Saleeba tasked to develop and coordinate this program for NASA is Ike Hendershot, Director of Special Programs.

Hendershot, also a former Secret Service agent, said, "The ultimate goal of the Operations Security Program is to deny an adversary critical organizational information that is not intended for disclosure. This does not mean that the Operations Security Program would prevent the appropriate sharing of data, facts, knowledge, technology, or scientific accomplishment. However, many agencies don't always realize how much critical information they are actually giving away by predictable behavior, casual conversation, routine messaging, internet exchange and refuse disposal. Careful attention must be applied to what is revealed. Failure to do so could provide adversaries with the information they need to compromise the agency for embarrassment on the one hand and to execute terrorist acts on the other."

Hendershot said a viable and complete Operations Security Program will increase operational effectiveness and safeguard efficiency by preventing the inadvertent compromise of classified and/or unclassified but sensitive information concerning the agency's activities, capabilities, intentions and personnel.

According to Hendershot, the Operations Security Program is a training and awareness program, not a faultfinding process. It does not replace other security disciplines, it supplements them. For an agency to operate successfully, employees must be aware of their daily activities, and those of others that may reveal sensitive employee and agency information or classified activities. Ideally, a comprehensive NASA-wide Operations Security Program will help prevent or negate these vulnerabilities. The program also can benefit NASA employees and their families. Employees can take the knowledge learned from the program and use it to protect themselves from identity theft and other forms of theft.

The new NASA-wide Operations Security Program will formulate program policy, establish, coordinate, and administer training and awareness programs, alerts, briefings and workshops. In addition, advice will be provided and assistance will be offered in the following areas:

- Identification of critical NASA organizational information
- Threat analysis
- Vulnerability analysis
- Risk assessment
- Countermeasures

Hendershot suggests that a good start for the program would be for all employees to insure proper disposal of waste in and around their work areas. Classified material should be shredded. In addition, sensitive material should be either shredded or placed in an authorized container (burn bag) for burning.

The Operations Security Program can only add to the outstanding reputation NASA enjoys in the pursuit of excellence as a Federal agency. Remember, the Operations Security Program is a lifestyle!

For additional information or for questions or concerns, feel free to call the Headquarters Security Management Office at (202) 358-2010.

INCREASING SECURITY AGENCY WIDE

LAB IMPLEMENTS SECURITY MEASURES

to protect sensitive documents

By Mark Whalen
Has an Operations Security Program been implemented here at JPL?

Yes, JPL does have an Operations Security Program in place.

We have been involved in the for the past four years, and we have been sensitizing Laboratory personnel to the program and the concept. We anticipate expanding our program, with further guidance from Code X.



Joe Charles, JPL Security and Protective Services Manager.

The Operations Security Program is not the only enhancement we have made to our security program to ensure the security and safety of the Laboratory since Code X and the events of 9-11 came into existence. Among the more obvious changes, of course, were the security checks and the checkpoint at Oak Grove. We are much more cognizant of suspicious packages, briefcases, backpacks, and gym bags than we were seven months ago.

We, like other NASA and business facilities, have increased our security posture and at the same time, we have tried to give the appearance of normal operations.

It's becoming a big priority to deny critical information about our operations to an adversary. Critical information is anything that would give an opponent or the opposition additional information, or "a leg up."

Are employees generally aware of and compliant with the program?
 Yes. A number of Lab organizations have proprietary or sensitive documents—some old, some new—that they have stored in-house and eventually need to

destroy. On the average, we receive several calls a week from various parts on Lab, indicating their need to have documents shredded.

So a couple times a month, a vehicle comes on Lab to shred material almost to mulch. One of our officers will stand by from the time the documents are delivered to the shredder until the time the shredding is completed.

Another area that is really growing is in the area of computer disks. We are considering purchasing a machine that will mulch disks into a powder. This system is already in use in a number of governmental organizations.

We follow a very stringent process to safeguard classified materials. It's implemented on a need-to-know basis. The individual working on a particular document will have access to it. It's not something we open up to the whole group at JPL. When work is completed it goes back to the originating agency or organization.

How are things going for your organization since last September?

How have employees reacted to the changes that have taken place?

Overall, cooperation from the staff here has been tremendous. Initially there was some resentment and concerns, but as time has gone by our activities are paying dividends far more than we had anticipated.

Among the things Security has done is to tighten the scrutiny of access to the Lab; move forward the checkpoint at the "Y" at the south gate prior to the main entrance; increase both foot and vehicle patrols; and establish barricades in certain areas.

There is also a greater sense now of security awareness at the Lab—not just in our area, but throughout the Laboratory. I believe the majority of people on Lab feel safe.

Any time you change something, there will always be resentment and questions about why the changes are made. But after being exposed to the change, people do understand it and see how they will benefit from it.

We always know that our prime responsibility is the safety and security of our employees, the Laboratory and its assets.

Self-service mail station now open at JPL Store

DailyPlanet
Online for the JPL community

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

JPL's online news source

View this and previous issues of Universe online <http://universe.jpl.nasa.gov>

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Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted on ad cards, available at the ERC and the Universe office, Bldg. 186-118, or via e-mail to universe@jpl.nasa.gov.

Ads are due at 2 p.m. on the Monday after publication for the following issue.

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

The JPL Store Easy Mailing Service is open and ready to serve Lab customers. Announced by JPL Director Dr. Charles Elachi in his Feb. 5 all-hands meeting, the service responds to employee requests for a self-service mailing station for personal mail.

The service is simple to use for both United States Postal Service and FedEx envelopes and packages: Simply weigh your item on the scale located in the east entry of the JPL Store, write down the postage required (or weight, for FedEx), and take the package to the JPL Store counter to complete the transaction. JPL Store staff will sell you the correct postage and will determine the rates for FedEx packages. You may also purchase postage at the vending machines located in the

Building 114 vending area. Postal Service mail and FedEx items must be received at the JPL Store counter by 2:30 p.m. each business day for same-day processing.

Employees may also continue to deposit mail in the green mailboxes around the Lab. These boxes are for Postal Service envelopes only and are not intended for small packages or FedEx envelopes.

The self-service mailing station offers a complete range of services and forms, including change of address, certified mail, insurance, delivery confirmation, return receipt, and international mail. The station is stocked with a variety of mailing supplies, including cushioned envelopes, bubble wrap, tape, boxes, Postal Service priority

mailers, and FedEx mailers. JPL Store staff is trained to answer your mail and FedEx questions, and reference materials such as the Postal Service Mailing Handbook, ZIP code directories, and FedEx rate tables are also available.

Please note that the mailing station and FedEx services are for personal mail only. As with any package entering the Laboratory, personal mail packages are subject to inspection. JPL business mail continues to be processed by the JPL Mail Center, and business FedEx packages are handled by the Shipping/Receiving Group (241-104). Any JPL material or equipment that leaves the Laboratory must be handled through the normal JPL shipping process.

Passings

JANE ADAMS, 82, a retired secretary in Section 375, died of heart failure Feb. 13.

Adams worked at the Lab from 1961-86. She is survived by three children, four grandchildren and three great grandchildren.

Services were private.

SALVATORE MANSOLINO, 68, a retired facilities coordinator in Section 662, died of cancer March 7 at his home in San Dimas.

Mansolino worked at JPL from 1972-98. He is survived by his wife, Sayra. Burial services were held at Forest Lawn Memorial Park in Covina Hills.

RAYMOND LAUNER, 84, a retired senior business systems analyst in Section 644, died of heart failure March 13 at his home in Boise, Idaho.

Launer joined the Lab in 1966 and retired in 1987. He is survived by six children and 16 grandchildren.

Services were private.

EDWARD CHRISTENSEN, 61, a senior engineer in Section 312, died of a heart attack March 19 at his home in Stevenson Ranch.

Christensen had worked at JPL since 1977. He is survived by his wife, Janet. Services were held March 26 at Valencia United Methodist Church.

HENRY KLEINE, 73, a retired member of the technical staff in Section 363, died of pneumonia March 22.

Kleine joined JPL in 1974 and retired in 1993. He is survived by his wife, Jean; three children and seven grandchildren.

PAUL MEEKS, 86, a retired technical manager in Section 501, died of Alzheimer's disease March 24 at his home in Altadena.

Meeks worked at the Lab from 1969-83. He is survived by his wife, Florence, three sons, six grandchildren and two great grandchildren.

Services were held at Mountain View Sunrise Chapel in Altadena.

DR. JOHN PIERCE, 92, who served as JPL's first chief technologist, died April 2 in Mountain View, Calif.

Pierce was considered a visionary electrical engineer and acoustics expert who headed the team that invented the transistor and was a major force behind Echo I, the world's first communications satellite, launched by NASA in 1960.

He earned a Ph.D. at Caltech in 1936 and returned to the campus as an engineering professor in 1971, where he would work for more than a decade. He later served on the JPL Advisory Council, and in 1979 was named the Lab's first chief technologist by then-JPL Director Dr. Bruce Murray. That two-year assignment included membership on the JPL Executive Council.

Pierce is survived by his wife, Brenda Woodard Pierce; son John, and daughter Elizabeth Anne Pierce.

Letters

From myself, Barbara, and our family, a special thank you to all the gang that prepared and came to my retirement celebration. The fun and reflections of the full JPL career shared with so many great professionals will be remembered always. It's great to know I'll still be working with many of you in the post-retirement era through my participation in the IEP. See you 'round the campus.

Ken Atkins

I would like to thank everyone, friends and co-workers, for all the cards, plants, flowers and gifts following the recent death of my father. Your kind thoughts and words have meant more to me than words can express. I also wish to thank the ERC for the lovely plant we received at home.

Michelle Medina-Gussie

Classifieds

For Sale

AIR PURIFIER by Living Air, for large area, hardly used, \$100. 626/577-6638, Suzanne.

BABY ITEMS: Evenflo Supersaucer, \$30; Evenflo front carrier, soft, \$7; Gerry rear carrier, hard, \$25; Gerry bathtub, plastic, \$5; Infantino activity gym, overhead, \$7; Century car seat w/base, rear-facing, \$40; Safety1st bathtub carousel, \$7; all in superb cond., prices are obo. 626/791-6101.

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

CART, by Huge Cart, folds flat, brand new, \$35/obo. 626/791-6101.

COMPUTER, Sony notebook VAIO PCG-505FX, 266MHz, 4.3GB, 64MB, 10.4" SVGA, Win98, light on weight, heavy on features and performance, < 1" thin, < 3 lbs., Port replicator, floppy disk, V.90 modem, external CD-ROM drive, \$650. 687-8627.

COMPUTER DESK, pedestal, 65" x 30" x 21", oak finish, place for CPU, keyboard and printer/scanner, end cabinets have shelves with doors, \$60. 243-8255.

DESK, large, executive, solid light cherry, 40 X 70 inches, exc. cond., \$150; BOOK SHELVES, white, three tier, 54 X 10 inch, all mounting hardware, \$15. 626/458-5410.

DODGER TICKETS, various games throughout season, 2 seats on Loge (orange) level nr. 1st base, \$23/ticket, call for list. 626/296-1253.

DODGER TIX, season seats behind 3rd base, Loge, Sect. 141, Row J, 4 seats/game, face value, \$23 seat/game; pick bet. 4 and 20 games in 2002. 790-5902 or nsl1020@yahoo.com.

ENTERTAINMENT CENTER, cherry wood, \$300; BAR STOOLS, 2, wrought iron, black, padded backs and seats, \$100. 701-0061.

MISC: Armoire, natural pine, 5 sm. drawers, 1 long drawer & hanging closet area, \$150; matt. & box spring, full size, w/frame, 8 mo. old, practically never used, \$125; dining set, natural pine, round shape, w/4 chairs, \$125; end table, rod iron, glass top, \$50. 957-8921.

MOVING SALE: sofa & love seat w/oak trim, \$225; exc. desk, \$150; writing desk & swivel office chair, \$175/both; coffee table, \$50; hall tree w/mirror, \$175; library table \$125; day bed with mattress and full comforter set, \$175; all oak and top quality. 626/446-7894.

RECEIVER, a/v, Denon AVR-3200, Dolby digital, 85 watt x 5 ch.; 6 ch. ext. input; 5 ch. stereo, \$400. 661/255-5645.

REFRIGERATOR, Amana, 21 cu. ft., bottom freezer with ice cube maker, almond color, perfect condition. \$500. 790-3717, Gayle or Jason, or gaylenorthrop@earthlink.net.

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

SOFA BED, 70", exc. cond., \$125; MOWER, push, \$40; LAMP, antique, cranberry glass, \$50; BUFFET TABLE, can be folded, glass and wood, exc. cond. 248-4647.

WASHER/DRYER, washer like new, gas dryer, \$225. 248-9418.

Vehicles/Accessories

'88 ACURA Integra RS, white, 4 dr., pwr. locks/windows/brakes/steering, auto trans., a/c,

am/fm/cass, 123K mi., \$2,300/obo. 957-7623.

'89 CHEVROLET C3500 Silverado ext. cab, 454 V8, TBH400, a/c, pwr windows, cruise, am/fm cass, newer trans rebuild, new radiator, brakes, Delco battery, bedliner, 94,000 miles, needs paint but runs great, pics at http://home.earthlink.net/~justright/1989_dually.jpg, \$5,900/obo. 249-4729, James.

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

'96 FORD Aerostar XLT, extended 7 passen-ger, teal/silver, auto, loaded, front/rear stereo and air, roof rack, towing pkg, hitch and brakes, 85K mi., super clean, \$8,500/obo. 949/874-4476.

'93 FORD Escort wagon, white, orig. owner, 5 speed, exc. cond. 1.9L, a/c, pwr. steering/mirrors, roof rack, am/fm/cass, 101K mi., \$3,000. 790-8760.

'87 FORD F150, black, V8, 5.0, power doors/windows/brakes, auto, cruise control, 1/4 cab & bedliner, towball, wiring, HD springs, \$2,900. 951-3653.

'87 FORD F250 pickup, 460cid V8, 4:10-1 diff, auto, A/C, AM/FM, PS/PB, cruise, new tires, 5th wheel hitch/bed cover, 43K mi., good cond., strong tow veh., records available, renewed lic.-Jan., cab top air foil, \$5,500. 626/963-5727.

'42 FORD, Jeep stock except for Buick V6 engine, project car, \$1,200. 248-6213.

'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.

'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.

'99 JEEP Wrangler SE, exc., black, soft top, under 23K miles, 4 wheel drive, extras, like new, \$11,000/firm. 957-7742.

'98 JEEP Grand Cherokee, V8 engine, 60K mi., tow package, tinted windows; new tires, shock and brakes; CD player, exc. cond., orig. owner, \$13,500. 661/297-0671.

'93 KAWASAKI Ninja 600R, exc. cond., 16,000 mi., black with purple/turquoise strip, leather tank cover, \$3,500/obo. 501-8161.

'85 COUNTRY LITE 5th wheel trailer, 30 ft., orig. owner, alum. frame, 13.5K A/C, side bath, microwave, TV/CP avail, new tires & water pump, sleeps 6, exc. cond., renewed lic.-Mar., \$8,500. 626/963-5727.

'96 SAAB 900S, 3 dr., 5 sp., 80K mi., orig. owner, all service records, exc. cond., green/tan, ABS, alarm, factory AM/FM/cass stereo, new brakes, starter, belts, \$8,700/obo. 310/306-7319.

'99 TOYOTA 4 Runner Limited, 4 x 4, two tone black, leather, moon roof, running board, tow package, CD, V6, loaded, wooden panels, 27,000 mi., \$23,999. 909/599-3230.

'87 VOLVO, silver, v. g. cond., 240K mi., \$2,200/obo. 626/791-5376.

Free

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

SCANNER, flatbed, 8.5 x 17", scsi, 2400 dpi. 790-3854.

Wanted

AUDIO D.A.T. RECORDER in good cond., must be stereo for classical music recording. 323/731-7445.

CHILD CARE, student or sitter to transport from school and care for two boys, 11 & 12, at our home, 2 or 3 days a week, 4:30-6 p.m., Pasadena-Altadena. 626/797-6824 or 213/821-2391.

FLAT FILE(S) with 5 or 10 drawers to hold 36 x 48" sheets, steel or wood with good working mechanism, stacking units preferred, will haul. 626/798-3235, Rob Staehle.

TOWN/GUEST HOUSE, in safe, quiet neighborhood for single female, prefer no more than 15 minutes from JPL, one or two bedrooms/den, bath, kitchen w/stove. 541-9210, Fran.

LAPTOP COMPUTER, any brand, better if HD> 2GB; RAM>64MB, should be working good and cheap, PCMCIA type II slot for modem/Ethernet cards, 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.

Lost & Found

FOUND: BRACELET in the second floor ladies room of Building 241. 4-6802, Debe.

FOUND: FOUNTAIN PEN, maroon colored, around March 18 or later, third floor in Building 301, outside swinging doors under sign reading "370 thru 375". 4-0116, Linda.

FOUND: Reading glasses in Bldg. 180-101 on March 12, Ext. 4-3406, Donna.

For Rent

ALTADENA, furn. room, share bathroom, full house privs incl. washer/dryer, pets nego-liable, female works out better but will con-sider male, avail. May 5, \$450. 626/798-2112.

LA CANADA, 4 bd., 2.75 ba., 2,409 sq. ft., 100 x 148 lot, pool, priv. backyard, completely remodeled, new kitch w/Corian counters/sinks, high gloss white cabinets, breakfast area, indoor laundry, high ceilings in living areas, new windows/doors/floors, 3 bedrooms w/own closets, master bd. with walk-in closet, very bright, \$799K. 790-4553, after 6 p.m. weekdays, or 687-9812.

LA CANADA FLINTRIDGE, room, private ba., kitchen privileges, pool, BBQ, parking, avail. May 1. 790-1280.

LONG BEACH condo, 1 bd., 1 ba., on Cedar Ave. near beach, \$700. 317-1070 or 957-3675.

PASADENA, 1 large bd., 1 ba., fully furn. condo. for lease, 1115 E Cordova St., ideally located 2 blocks from Caltech and PCC, very nice area, garage, \$1,150 + \$1,150 security deposit. 626/575-5255.

PASADENA, furn. apt. to share, 2 bd., 1.5 ba., a/c, parking, patio, laundry facilities, no pets, \$595/ ea. + util. 626/351-9641.

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

PASADENA, near Caltech, avail. May 1, 3 bd., 2 ba., living rm., /p, nice kitchen, fenced backyd, 2-car gar., no pets, no smoking, gardener included, \$1,300 + \$1,400 sec. 626/794-0455.

PASADENA, avail. Apr. 15 or May 1, near Caltech, 2 bd., 2 ba., living room, nice kitchen, washer and dryer hook up, enclosed backyard, 2-car garage, no pets, no smoking, \$1,200 + \$1,300 sec. 626/794-0455.

PASADENA, spacious 2-story condo, 3 bd., 2.5 ba., prestigious community, beaut. inter., bright kitch., prof. landscape, ctrl. air & heat, close to shops, cozy lr with fp, end unit, frml dr, hdwd. flrs., immac. cond., close to schls. \$1,750. 626/396-9024.

Real Estate

MONROVIA, 4 bd., 2.25 ba., 1,749 sq. ft., 9,830 sq. ft. lot, 18 x 40 ft. pool, 2-car detached garage, private backyard w/block walls, hillside front yard, great location, view of valley and mountains, built in 1960, \$449K. 626/359-2838, after 4 p.m. weekdays or all day weekends.

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

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

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

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, exc. view. 248-8853.

FLORENCE, Italy; sunny, 2-bd., 1-ba. apt. near the Boboli Gardens and Pitti Palace, includes kitchen and small study/laundry room, 3rd floor, no elevator. mary@jchemother.it.

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.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, slps. 6-8, fully eq'd kitch. incl. microwave, D/W, cable TV, VCR, phone, balcony w/mtn. view, Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455.

PACIFIC GROVE hse, 3 bd., 2 ba., /p, cable tv/vcr, stereo/CD, well eqpd. kit w/microw. beaut. furn. close to golf, bches, 17 Mile Dr., Aquarium, Cannery Row, JPL discent. 626/441-3265.

OCEANSIDE condo, fully furn., 2 bd., 2 ba., fire-place, full kitch., BBQ, pool, spa, game rm, grt. ocean view; quiet, relaxing, beautiful beachside setting; easy walk to pier/restaurants, sleeps 6, 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.

PALM DESERT, exquisite, 2 bd., 2 ba. villa, approx. 1,500 sq. ft.; for vacation or long term; newly remodeled; skylight, patio & 2-car garage; conveniently located across from the Living Desert; great private, secure resort; with tennis courts, pool, spas and club house facilities, for a quick getaway or to outright buy. 909/868-7334.

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.

universe

Jet Propulsion Laboratory

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AIRS prepares for liftoff

By Mark Whalen

“Everybody talks about the weather, but no one does anything about it” is certainly an old cliché, but soon it might not be so true. Set for launch early next month is a JPL-developed and managed Earth-observing instrument that will go a long way in helping to improve weather prediction and climate observation.

The Earth

The Atmospheric Infrared Sounder (AIRS), scheduled for launch from Vandenberg Air Force Base at 2:54 a.m. Pacific time May 2, will fly aboard the Earth Observing System's Aqua spacecraft. AIRS, along with its two partner microwave sounding instruments—the Advanced Microwave Sounding Unit and the Humidity Sounder for Brazil—represents “the most sophisticated sounding system ever flown in space by NASA, at Earth or any other planet,” noted JPL's Dr. Moustafa Chahine, the science team leader.

The suite of instruments is expected to become the pathfinder for the National Oceanic and Atmospheric Administration's (NOAA's) future operational sounding system in support of medium-range weather forecasting.

Circling the globe 14.6 times a day in polar orbit, AIRS will observe and characterize the entire atmospheric column from the surface

of Earth to the top of the atmosphere. It will provide data on surface emissivity and temperature, atmospheric temperature and humidity, cloud cover and height, and spectral outgoing infrared radiation. It will also measure ozone and other greenhouse gases. These data will help researchers increase their understanding of Earth's global water and energy cycles, climate variation and trends, and the response of the climate system to increased greenhouse gases. The results will be improved weather forecasts, better understanding of factors influencing climate prediction and air quality, and better ability to reduce economic and human losses from weather-related hazards.

“Tomorrow's forecast starts with today's description of the weather, worldwide, so more accurate descriptions of today's weather can be expected to lead to better and longer forecasts,” said AIRS Project Manager Dr. Avi Karnik of JPL. “This is where the accuracy of AIRS comes in.” Currently, weather balloon data provides most of the information about Earth's atmosphere, with about 4,000 “radiosonde” balloon launches each day. AIRS, however, will provide 400,000 ra-



The Aqua satellite, carrying JPL's Atmospheric Infrared Sounder (arrow), is scheduled for a May 2 launch from Vandenberg Air Force Base.

diosonde quality soundings daily. In addition, two-thirds of the precipitation on land comes from the 75 percent of the world covered by oceans, which balloons do not observe.

“Data from AIRS will be provided to NOAA within three hours,” said AIRS Project Scientist Dr. George Aumann. “Three NOAA scientists on the AIRS science team will be analyzing data in support of weather-forecasting.” From NOAA, the data are distributed to weather forecasting centers around the world, including those in Europe, Japan, Australia, Great Britain and Canada. “Data for climate research purposes are received, analyzed and archived at Goddard Space Flight Center within 72 hours,” Aumann said. “The AIRS science team provides the algorithms for data analysis. Implementation of the science algorithms is carried out in Division 38 under Steven Friedman and the data validation is carried out in Division 32 by a science team lead by Dr. Mike Gunson.”

Chahine said the concept of a system that would provide reliable, accurate data from space on the Earth's temperature and moisture content was started in the early 1970s, but that the technology became available in the early 1990s and is now ready to fly. The key to the AIRS instrument, he said, was the development of three major technologies: Cryocoolers, detectors and the integrated focal plane, the most complex ever assembled by BAE Systems in Lexington, Mass.

The development of the cryocooler, designed at TRW especially for AIRS, has left something of a “legacy” for JPL, according to Fred O'Callaghan, program manager of the instrument in its early days of development, who noted that with the support of Ron Ross' group at JPL, it turned out to be a factor of three better than anyone had ever built. “What we left for JPL is a cryocooler laboratory that is absolutely the best in the world,” O'Callaghan said.

AIRS “has truly been a Labwide effort,” Karnik said. “At one time there were about 50 people on Lab working on the design, build, monitoring, analysis, and subcontract management. Every division at JPL contributed to this project.”

For more information about the project, log on to <http://www.jpl.nasa.gov/airs>.

Goodbye, DMIE; hello, JPL Rules!

The JPL Rules! team (from left): front: Ann Bernath, David Bernath; center: Margaret Simpson, Lora Mitchell, Rutbie Dios; Standing: Max Hoagland, Sylvia Ascencio, Bill Sarkisian, Dan Gray.

Monday, April 29 will mark the debut of “JPL Rules!,” the Lab's official online resource (<http://rules.jpl.gov>) for institutional and governing documents. The improved and upgraded website, which contains rules and guidelines for getting work done at JPL as well as the documents that describe the Lab's organizational structure, replaces the DMIE Information System.

Universe met with Lora Mitchell, JPL Rules! Information System Manager, to discuss the new system.

Q What are the biggest differences your users will notice? What kind of user support will you offer?

A The new design offers a number of improvements. The documents are grouped in easier-to-find categories, the document display is easier to read and there are three online tutorials to help you use the site.

We offer various levels of help-desk services by phone (4-RULES), e-mail, or via the web site, including a customizable page option and a faster, and a more comprehensive set of keywords to enhance search results. We also offer a separate help line (via the web) for help in searching information. If you can't find what you are searching for you can use a special link and we'll call you back in 30 minutes during normal business hours (Monday through Friday) 7:30 a.m. to 4:30 p.m.

Q How did you determine which changes needed to be made?

A We worked with users, designers and programmers to change what didn't seem to be working on the old system. We demonstrated incremental changes to many different work groups on Lab to get feedback



from a diverse cross-section of employees. We also conducted usability tests and adjusted the site accordingly.

Q How big is the JPL Rules! document repository?

A It is a lot smaller than the old DMIE Information System and is getting smaller by the day. The old system had approximately 1,800 documents—over half of these were considered “rules” and the rest were things such

continued on page 3

News Briefs



Sean O'Keefe

A virtual town hall

JPLers got to participate in a virtual town hall meeting with NASA Administrator SEAN O'KEEFE last Monday. "NASA Update" was the first in a series of agency-wide meetings which, although originating from the main auditorium in Washington, DC, enjoyed participation across the agency by NASA field centers.

The meeting was broadcast on NASA Television and presented an opportunity for the administrator to share recent news and events involving the agency, as well as an opportunity for JPLers and employees at other NASA centers to ask the Administrator questions.

The first NASA Update seems to have been a success, with questions from Goddard, Johnson, JPL and other NASA centers. As this is meant to be an ongoing interaction, JPLers will be notified of the upcoming meetings as soon as a schedule becomes available. Please look for announcements in the Daily Planet, This Week, and other JPL communication methods.

NEAR landing team honored

The team that made history last year by navigating a spacecraft to a remarkably safe landing on asteroid Eros received a laureate prize earlier this month from Aviation Week & Space Technology magazine.

JPL's DR. BOBBY WILLIAMS, the navigation team lead, accepted the laureate's award for the Near Earth Asteroid Rendezvous mission navigation team at the National Air and Space Museum, Washington, D.C.

"Working on the project has been the high point of my career," said Williams. "A maneuver like this had never been done before—our team had to go back to school and rethink the way we do things."

On Feb. 12, 2001, the spacecraft was coaxed into a soft landing on the asteroid's surface. "The feat of landing on a body with only one-thousandth of Earth's gravity was all the more remarkable given that the spacecraft was not designed to land at all," said JAMES ASKER, the magazine's Washington bureau chief.

The JPL navigation team included JAMES MILLER, PETER ANTREASIAN, CLIFF HELFRICH, WILLIAM OWEN JR., ERIC CARRANZA, STEVEN CHESLEY, TSENG-CHAN WANG, JON GIORGINI, and JOHN BORDI. The team also included navigators from the mission's managing center, Johns Hopkins' Applied Physics Laboratory, Laurel, Md. Besides landing the spacecraft, the navigation team recorded other firsts, accomplishments that will be recounted in the April 29 issue of Aviation Week & Space Technology.

Explorer mission study moves forward

A JPL-managed mission to discover the brightest galaxy in the universe is

one of four proposals selected by NASA as candidates for the next missions in the agency's Explorer Program of lower cost, highly focused, rapid-development scientific spacecraft.

Following detailed mission concept studies, NASA intends to select two of the mission proposals by early 2003 for full development as Medium-class Explorer flights. The two missions developed for flight will be launched in 2007 and 2008.

The JPL-managed Next Generation Sky Survey is an infrared telescope designed to survey the entire sky with 1,000 times more sensitivity than previous missions. It would discover the brightest galaxy and the closest star, or failed star, to the Sun. Currently, Alpha Centauri is the closest known star system to the Sun. However, many scientists believe there may be brown dwarfs, or failed stars, that are even closer. The survey would be led by DR. EDWARD WRIGHT of UCLA at a total mission cost to NASA of \$180 million. Science operations and data processing would be handled by the Infrared Processing and Analysis Center at Caltech.

The selected proposals were judged to have the best science value among 42 proposals submitted to NASA in October 2001. Each will receive \$450,000 (\$250,000 for the Mission of Opportunity) to conduct a four-month implementation feasibility study.

Mini-satellite workshop held on Lab

More than 100 people earlier this month attended NASA's National University Satellite Programs Workshop at JPL, which was co-sponsored by the Lab's Center for Integrated Space Microsystems (CISM).

The two-day workshop brought together participants from university, government, national laboratories and industry to explore innovative ways in which the design, development and flight of highly miniaturized satellites can be used effectively for the following purposes:

- Education and development of a future space engineering workforce
- Space exploration education and outreach
- Bringing flight experience to a space technology development community
- Providing frequent opportunities for the test and demonstration of space technologies
- Performing focused space and Earth science exploration missions.

Co-sponsors were the NASA Space Grant Program, the Air Force Research Labs, the Defense Advanced Research Projects Agency and the Arizona Space Grant Consortium.

For more details, log on to <http://cism>, click on "Events, then on "Workshops."

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—Meets at noon on Wednesdays. Call Occupational Health Services, 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.

Saturday, April 27

Lily Cai Chinese Dance Company—"Dance Calligraphy" draws inspiration from the intersection of music, dance and the Chinese art of calligraphy. To be held at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$25, \$21 and \$17; youth high school age and under, \$10. Call (626) 395-4652.

Sunday, April 28

Coleman Chamber Music Ensemble Competition Winners Concert—Winners will perform at 3:30 p.m. in Caltech's Ramo Auditorium. Tickets are \$10. Call (626) 395-4652.

"How the Universe Got Its Spots"—Dr. Jenna Levin, advanced fellow, applied mathematics and theoretical physics. Cambridge University, will describe what we know about the shape and extent of the universe, its beginning and its end. Sponsored by the Skeptics Society, and held at 2 p.m. in Caltech's Baxter Lecture Hall. Donations are \$5 for members, \$8 for nonmembers. Call (626) 395-4652.

Wednesday, May 1

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

Thursday, May 2

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

Fri., May 3-Sat., May 4

Capitol Steps—This troupe of former congressional staffers will perform song parodies poking fun at politicians and other newsmakers at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$32, \$28 and \$24. Call (626) 395-4652.

Fri., May 3, Sun., May 5

Piano Concert—James Boyk, Caltech's pianist-in-residence, will present a free concert Friday at 8 p.m. and Sunday at 2:30 p.m. in Beckman Auditorium. Call (626) 395-4652.

Sunday, May 5

Chamber Music—Works by Haydn, Hartke and Dvorak will be presented at 3:30 p.m. in Caltech's Beckman Auditorium. Tickets are \$27, \$23, \$19 and \$15. Call (626) 395-4652.

Tuesday, May 7

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

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

Wednesday, May 8

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.

"The Wind and Raising the Obelisk"—Caltech professor of aeronautics and bioengineering Dr. Morteza Gharib will give a free lecture at 8 p.m. in Beckman Auditorium. Call (626) 395-4652.

Thursday, May 9

Freeman Dyson—The JPL Distinguished Visiting Scientist, an internationally renowned physicist and author, will give a talk titled "Technology and Social Justice" at 7:30 p.m. at Neighborhood Church, 301 N. Orange Grove Blvd., Pasadena.

Friday, May 10

Brazil: Giant of the South—This travel film will be shown at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$9 and \$7. Call (626) 395-4652.

Saturday, May 11

Bandorama—The Caltech Jazz and Concert Bands will perform a program to be determined at 8 p.m. in Beckman Auditorium. Free admission.

Lab fire department shows off new engine



The newly acquired fire engine, above. At right, Fire Chief Fred Gooden describes features to JPL Director Dr. Charles Elachi.

only happens about every 20 years or so. The current engine has been at the Lab since 1983, and as with any technology, is a bit behind the power curve. With a price tag of approximately \$350,000, the new engine is fully computerized, has a water tank with a 750-gallon capacity (compared to the 500-gallon capacity of the old engine), can dispense two types of firefighting foam, and sports many other state of the art firefighting capabilities.

The folks from Security and Protective Services were kind enough to park it on the mall last week so that curious JPLers could have an

The Lab got a brand new, red, shiny fire engine!

This kind of purchase

opportunity to oooh and ahhh over the new truck. Fire Chief Fred Gooden and the on-duty crew of firefighters were on hand to answer questions.

The new engine, built by Kovatch Mobile Equipment, will be in service in about a month. In the meantime, JPL's firefighting team will be receiving training on the new equipment. Another NASA center has already expressed interest in obtaining the old engine.



JPL Facilities, Human Resources, and Caltech Dining Services will soon collaborate on a major remodeling of the Building 167 cafeteria. Bob Develle, manager for Facilities Engineering and Construction; Nancy Kapell, JPL cafeteria liaison; and Andre Mallie, director of Caltech Dining Services, discuss the project and planned alternatives for food service during construction.

What is the scope of the project?

Develle: We're doing a complete refurbishment of the cafeteria's infrastructure, including re-piping the water systems. Old equipment, such as the walk-in refrigerators, freezer and dishwasher in the kitchen area, will be replaced with new, energy-efficient models. Lighting, flooring and ceilings will also be replaced.

The entrance to the cafe will be squared-off for a larger retail "Grab 'n Go" area. The conveyor dish belt will be enclosed behind a wall by the exit, cutting down the noise from the dish-washing operation.

The cafeteria is more than 35 years old and was designed for smaller population, so one of the things we'll do is enlarge the service area for improved traffic flow.

When will the cafeteria close down, and when will it re-open?

Develle: The cafeteria will be open until at least mid-June, and it's estimated that the remodel will take no more than a year to complete.

Can you re-model/upgrade without closing down the facility?

Develle: No. A partial closure would delay work, is more costly, and does not comply with Health Code standards for safe food service.

Kapell: To minimize disruption for employees who use the 167 cafeteria, Human Resources, in conjunction with Facilities, Safety, Plant Protection, and Caltech Dining Services, has developed alternative dining options during the remodel.

What are these alternative dining options?

Kapell: In our other two cafeterias, we will offer expanded hours from 11 a.m. to 2 p.m., with more "Grab 'n Go" selections. There will also be added service at the Coffee Rovers on the mall (north of Building 186) and the patio of JPL Store (Building 114). Both locations will have additional outside seating.

By the time the cafeteria closes, we also plan to have a 50-by-100-foot tent erected on the lawn north of Building 183, with an adjoining trailer in front of the ATM that will be our kitchen. The tent is like a soft-sided building and is completely enclosed. It is climate controlled (heating and air conditioning), and has carpeting and overhead lighting. We will use the tables and chairs from 167 to seat about 200 people, and additional seating on the mall will be available.

Mallie: In the tent, we will offer a breakfast buffet, a breakfast bar including bagels, donuts and pastries, and regular and specialty coffees. For lunch, there will be a hot buffet, exhibition cooking (daily made-to-order specials), salad bar, deli, a large "Grab 'n Go" area that includes sushi, salads and sandwiches, and microwavable meals. Barbecues will

also be available outside on select days. Snacks, desserts, soda and coffee will be available during break periods.

Will the new cafeteria seat more people? What kinds of new and different amenities will be offered?

Kapell: There won't be more seating, but the space will be utilized better. The current "drink island" will be replaced with a larger salad bar. The grill area will be moved farther into the facility to avoid the lines backing up at the entrance door. Another cashier station (for a total of six) will be added for quicker checkout. And the lighting in the serving and seating areas will be upgraded.

CAFE MAKEOVER

167 cafeteria will soon close for a major remodeling



Photo by Bob Brown / JPL Photolab

Mallie: We'll have a char-boiler grill, a wood-burning pizza oven and an extensive salad bar. There will be a pasta station, rotisserie cooking, and a demo concept called "Just in Time," where you choose fresh meats and fish and they are cooked to order in front of you. We will also offer expanded deli options, sushi and more retail items, such as prepared sandwiches, for "Grab 'n Go" customers. Free refills will continue to be offered on fountain drinks.

How is this project being funded? How much will it cost?

Develle: This is a fiscal year 2002 Construction of Facilities project, budgeted at \$1.5 million. Additional funding from the Business Operations and Human Resources Directorate will be used to replace equipment, tables and chairs in the seating area, as well as new carpeting.

JPL Rules!

continued from page 1

as charters, roles and process descriptions. Dr. Elachi gave us the mandate to reduce the rules and make them more understandable and accessible. JPL Rules! represents the first major step in that direction.

Q *How many documents or rules were you able to eliminate?*

A Our focus has been on the business side of things. The spacecraft development documents were being modified as a result of the Mars '98 losses and we chose not to address streamlining those at this time. About 324 of the original 702 business-related directive documents we started with will remain. Forty documents were retired without replacement, while the rest were consolidated and streamlined. The spacecraft development documents will be addressed next.

Q *Eliminating only 40 documents doesn't sound like much of a reduction. What is significant about these new 324 documents?*

A Most of the 702 documents contained rules we needed to do our work. However, we found a lot of duplication and unnecessary document content that could be eliminated. We also found that our document architecture could be streamlined, allowing several documents to be combined into one. For example, there were separate policy documents for different kinds of leave such as sick leave, jury duty, vacation and bereavement. Putting all these requirements and the complete subject context into one document makes it a lot easier for users to find what they need.

Q *How streamlined is the new document architecture?*

A Before we started the streamlining, we had 47 document types. An outside consulting company confirmed what we knew—we had a system that was complicated and difficult to understand—and recommended how to simplify the architecture as well as the documents. The resulting architecture has 11 document types divided into three classifications: Directives, Guidance and Organizational. Directives contain documents that are mandatory, meaning you must follow them; the types are Policy, Requirement and Procedure. The Guidance class contains documents that add additional guidance but are not necessarily mandatory; the types are Standards, Specifications, Guidelines and Reference Material. The Organizational class describes the structure of our work; the types of documents here are Charters, Roles, Position Descriptions and Process Descriptions.

Q *Can users still type "DMIE" to access the new site? What will happen to DMIE?*

A Users can use as URLs "Rules," <http://rules.jpl.nasa.gov> or "DMIE." The information system and user interface will be replaced by JPL Rules!, but the "process" of defining and maintaining the institutional environment will remain a function of the Enterprise Process and Standards Program Office.

Q *How did the name JPL Rules! come about?*

A We held a contest in the JPL cafeterias last June. Employees voted on a series of names, some we proposed and some they suggested. "JPL Rules!" was the hands-down favorite.

Q *How will you keep the JPL community informed of the changes?*

A We will utilize the major institutional Lab communication vehicles: a Labwide e-mail message, notices in the Daily Planet and This Week, and articles such as this in the Universe.

We will also demonstrate the site the week of April 29 according to the following schedule:

- 167 cafeteria: Daily, 11:30 a.m. to 1 p.m.
- 303 cafeteria: Daily, 11:30 a.m. to 1 p.m.
- 190 cafeteria: April 29, 11:30 a.m. to 1 p.m.
- von Kármán Auditorium: April 29, 2, 2:45 and 3 p.m.
- Building 601 lobby: April 30, 11:30 a.m. to 1 p.m.
- 167 conference room: April 30, 3 and 3:45 p.m.; May 1, 3 and 3:45 p.m.

If your work group is interested in a demo, please call Ester Lawrence at ext. 4-5954.

Q *Is the clean-up effort finished?*

A This is an evolutionary process that is strongly customer-driven and results-oriented. Along with the rest of the document reduction, we will monitor user reactions for any areas that may need immediate repair or fine-tuning. We take user feedback very seriously, and are always looking for ways to help make the system easier to use. We have heard many fine suggestions during our demos over the last several weeks, and will evaluate them as possible areas of improvements. So, when you see us at the cafeterias next week, stop by and give us your input.

40 years ago at JPL...

JPLers in April 1962 were encouraged to vote for the Lab's "Queen of Outer Space" among the contestants shown at right. Flyers with pictures and biographies of the candidates were made available to aid staff in making their selections.

Employees were invited to attend a semi-formal coronation ball to crown the queen, the event marking the 11th annual coronation ceremony, this one a dance held at the Ambassador Hotel in Los Angeles.

The eventual winner? Jean Probst, seated in the front row, second from left, who worked in Research and Development Procurement.



'62 QUEEN CONTESTANTS

DailyPlanet

News for the JPL community

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

<http://dailyplanet>

JPL's online news source

View this and previous issues of Universe online

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

Universe

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Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted on ad cards, available at the ERC and the Universe office, Bldg. 186-118, or via e-mail to universe@jpl.nasa.gov.

Ads are due at 2 p.m. on the Monday after publication for the following issue.

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

Passings

LEONA GREGUS, 64, an accountant in Section 671, died of cancer March 6 at her home in La Cañada.

Gregus joined JPL in 1964. She is survived by her brother, Frank, and mother Ellen. Services were private.

THOMAS STEWART, 88, a retired supervisor in Section 615, died of heart failure March 13 at his home in Hemet.

Stewart worked at the Lab from 1964-80. He is survived by his son, Tom; four grandchildren and six great grandchildren.

Services were private.

Letters

I would like to express my deepest gratitude to my friends and co-workers for their support following the recent death of my younger brother. My family and I would also like to send a special thanks to the Communication Ground Systems Section for their thoughtful card and gift basket and to ERC for the beautiful plant. Your kind and thoughtful expressions of condolences helped provided comfort during this sad and painful time for us.

Joanne Nakayama

Retirees

The following JPL employees retired in April: Dennis Ross, 36 years, Section 531; Luis Alfaro, 33 years, Section 805; Donald Gray, 27 years, Section 312; Joseph Toczylowski, 26 years, Section 346; Joan Feyman, 17 years, Section 323; Alvin Fogel, 15 years, Section 368; Sheila Davis, 13 years, Section 369.

Classifieds

For Sale

BABY FURNITURE: matching crib, 5-drawer chest, 4-drawer chest/changing table; all white w/pastel trim, all in vg cond., \$225/all; Little Tikes table w/2 chairs, \$20. 626/798-4120.

BABY ITEMS: Evenflo Supersaucer, \$30; Evenflo front carrier, soft, \$7; Gerry rear carrier, hard, \$25; Gerry bathtub, plastic, \$5; Infantino activity gym, overhead, \$7; Century car seat w/base, rear-facing, \$40; Safety1st bathtub carousel, \$7; all in superb cond., all prices are obo. 626/791-6101.

BBQ GRILL: Weber Genesis 3000 LP, red, never used, brand new in orig. shipping box, market value \$600+, sell for \$460. 626/963-7227, eve.

BELLY DANCE COSTUMES: 4, Egyptian professional-quality, med. sizes: aqua, pink, purple, black; in nightclub, sparkle style, candelabra headdress incl., \$100-\$500. 323/258-7037.

CABINETS: Ikea free standing, all fully assembled, solid constr., like new: Varde base, 57" w x 25" d x 35" h, \$300; high cabinet, 27" w x 25" d x 70" h, \$300; Visdalen wardrobe, 25" w x 60" h x 21" d, \$150. 626/796-9284.

CAMERA: Mamiya M645, medium format SLR, waist level finder, 55 mm lens, pistol grip, filters, focus screen, like new, \$600. 789-9193.

CARPET: beige/light brown, nylon exc. cond., new, never used, \$300; BAKER'S RACK, w/wine rack/chop block, exc. cond., \$100;

HEADBOARD: queen sz., blue vinyl, exc. cond., \$50. 626/395-8183, Renee.

CART: by Huge Cart, folds flat, brand new, \$35/obo. 626/791-6101.

CHEST: white wicker w/5 drawers, 18" d x 30" w x 45" h, exc. cond., \$60. 626/585-8213.

CHINA CABINET: 1950s Drexel mahogany, for photo: jelson@bigfoot.com, \$500 cash and carry. 353-9367.

COMPUTER TABLE: oak, exc. cond. \$50/obo. 368-7861

DESK: beautiful, solid oak, 39 1/2" wide x 59" long, exc. cond., \$325/obo. 368-7861.

DESK: antique child's, oak, 31" w x 13" d x 26" h, 3 drawers, small chair, \$125. 626/334-2664.

DINETTE SET: rod iron, 42" glass tabletop, 4 chairs, like new, \$250. 909/594-9057.

EXERCISE MACH. Soloflex, w/butterfly attachment, exc. cond., \$150/obo. 661/296-4332, Brenda.

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

MISC.: all in exc. cond.; DINING RM. TABLE, purchased at The Barn, solid oak, 4' round, 6' round w/extension leaf, + 6 cane-back chairs, \$300; ENTERTAINMT CTR., from The Barn, oak, 55" x 50" x 17," \$175; DESK, executive, solid oak, 5' x 33 1/2" (\$150); COFFEE TABLE, solid oak, 27" x 23," \$50; MATTRESS & BOX SPRING, queen sz., w/bed frame, almost new, \$150. 248-2602.

MISC.: STAR WARS Stormtrooper, 6 ft. free-standing cardboard figure, \$15; MOPED, Motobecane model 50, very low mileage, doubles as bicycle when engine is disengaged, needs a little work, \$100; CARTRIDGE DRIVE, Syquest 44MB, \$15; CARTRIDGES, Syquest 44 MB, \$1/ea; 790-3899.

MISC.: DESK, child's, solid maple, 42" x 21," \$60; END TABLE, child's, \$40; TABLE, glass-top, 24" x 24," \$35; STOOLS, 2, natural wood, almost new, removable pads, \$35; EXERCISE MACHINES: NordicTrac "Leg Shaper Plus," cost \$399, sell \$75; NordicTrac "ski," cost \$299, sell \$50; LAWN MOWER, rotary, 4 hp w/grass catcher, nds, some work, but runs, \$25; all in exc. cond. 248-2602.

MOVING SALE: recliner, \$80; oak chest, 3 drawer, 31" high, \$100; oake-framed oval mirror, \$30; bookcase, 3 shelves, \$50; twin beds, extra long, 80", linens and spread inc., \$150; wardrobe, 47" x 23" x 59" tall, \$35. 248-3414.

PANCAKE BREAKFAST: Crescenta-Canada YMCA, May 11, 7-11 a.m., all you can eat IHOP pancakes, prem. Farmer John sausage, fresh brewed Starbucks coffee, freshly squeezed OJ; a great deal for a good cause, \$3 at the door, 930 Foothill Blvd., La Canada.

POOL TABLE SET: 4 x 8 ft., 1" slate table w/recent felt, balls, fluorescent light, cue rack, ball rack w/counters, chalk rack; all walnut, custom made, vg to exc. cond., serviceable cover and misc. extras, \$1,100/obo; HIKING/BACKPACK EQUIP. + X-C skis/poles/boots, large qty., phone for details; BOOKCASE, open, 2.5 ft. x 6 ft., natural finish, \$20/obo; SHELVES, 3, black wood, 4 & 5 ft long, w/3 wall-attached decorative wrought iron stands, \$30/obo. 248-8841.

RADIO STATIONS: 3, Yaesu amateur, 6 m, 2 m, 70 cm, transceivers, amplifiers and antennas; HF, Yaesu FT, amateur, 100 W transceiver, 500 tuner, power supply microphone, good second station or new amateur, \$250. 626/791-9869.

REFRIGERATOR: Frigidaire, side-by-side, \$250; LAWNMOWER, Craftsman, \$95; STROLLER, tandem, \$10; CRIB, \$15; MATTRESS, crib-size, \$10; BED FRAME, toddler, red color, \$25; BACKPACK CARRIER, toddler, \$25; CAR SEAT, Gerry, \$15. 626/836-4767.

REFRIG.: Kenmore, auto defrost, top mount freezer, ice maker, 18.1 cu. ft., energy efficient, quiet, 9 mo. old, perfect cond., \$450. 626/796-9284.

REFRIG.: Kenmore 21 cu. ft., side-by-side, w/water dispenser, used for 1 year, \$495; WASH-ER/ DRYER, stacked, Kenmore, extra-lg. capacity, dryer is gas, used for one year, \$575; FREEZER CHEST, 7 cu. ft., \$50; SKI MACHINE, VitaMaster, w/electronic console, \$95; STROLLER, Graco, gd. cond., \$29; 626/836-4767.

REFRIG.: Maytag, side-by-side, icemaker and water dispenser in door, gd. cond. 626/301-1538.

REFRIGERATORS, G.E.: one is beige, 17 yrs. old, side by side, \$100, other is white, 15 yrs. old, freezer on top, \$100; TABLE, din. rm, w/leaf, cherry wood tops, black legs, 4 chairs, gd cond., \$150; SOFASLEEPER, makes into qn-sz. bed, abstract black, blue & mauve design, gd cond., \$300; BICYCLES, children's, 4, \$15/ea. 626/357-8210.

SHUTTER DOORS: Plantation, 6', solid wood French style, \$350; DOOR, sliding glass, 6', tinted not dual pane w/hardware, \$125. 957-4770.

TICKETS (2): California Speedway, for NASCAR Winston Cup, NAPA Auto Parts 500, Sunday, April 28, Sect. 4, row 5, seats 1 & 2, \$50/ea. 626/357-9708, Lynda.

TICKETS: Dodgers, season seats behind 3rd base, Loge, Sect. 141, Row J, 4 seats/game, face value, \$23 seat/game; many available games, 790-5902, nsl1020@yahoo.com.

TICKETS: Dodgers, various games throughout season, 2 seats on Loge (orange) level nr. 1st base, \$23/ticket, call for list. 626/296-1253.

TRAIN SET: HO gauge, with complex track layout

and plans, mounted on 4' x 8' table, includes buildings, bridges, trains, controllers, switches, etc. \$125/obo. 952-8163.

WASHER/DRYER: washer is like new, dryer is gas, \$200. 248-9418.

Vehicles / Accessories

'90 BMW 325i, exc. cond., brand new clutch, tires, 5 speed, strong engine, A/C, BW, premium sound, \$4,000. 626/791-1245.

'99 DODGE Ram 1500 truck, 5.2L, V8, 8' bed, locking shell, 41K mi., must sell, \$12K. 909/593-6379, eves.

'97 FORD Explorer XLT, only 37K mi., very clean, exc. cond., new tires/brakes, garage parked, am/fm/cass., all dealer servicing, gold color, \$11,000. 626/355-5631, Tim, eve.

'95 FORD Explorer Ltd., V6, light green w/light brown leather interior, 6-disc CD changer & cassette, Lo-Jack, roof rack, tow package, pwr. seats/locks/ABS, dual airbags, rear air, cruise ctrl, gd. cond. 166K mi., orig. owner, \$9,000/obo. 909/469-6131.

'95 FORD Windstar XL minivan, rear air, quad seating, console + many more features, 86K mi., 1 owner, all records, runs great, \$6,300. 626/447-6423.

'94 FORD Thunderbird, red, auto, am/fm, cass., new tires, alarm, keyless entry, 1 owner, all maint. records, 124K mi., exc. cond. inside/out, \$4,500. 909/596-8117.

'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/v, p/dl, cruise cont., ABS, tilt whl., sun/moon roof, am/fm stereo/cassette (anti-theft), gd. tires, \$5,800. 626/296-9073, Patti.

'88 HONDA Accord LX sedan, 4 dr., beige, orig. owner, 2.0 L, a/c, pwr. steering/windows/locks, cruise, am/fm/CD, new speakers, 133,000 mi., gd. cond., \$2,850/obo. 952-2340.

'93 JEEP Laredo, burgundy, all wheel drive, tow pkg., Lo-Jack, 102K mi., \$6,500. 626/441-2150.

'79 PORSCHE 924, red, gd. cond., fully operable, sun roof, fm/CD, 5 speed, less than 80K mi., \$3,000. 805/526-1052.

'96 SATURN SL2, auto, ABS & traction control, cc, power steering/window/locks, prem. sound, 69K, dealer maintained, orig. owner, red w/tan interior, exc. cond., alw. reliable, selling because we need larger car for growing family, \$5,600. 249-4683.

'99 TOYOTA 4Runner Ltd., 4 x 4, auto, moon roof, leather power seats, wood panels, rear air cond., CD, loaded, 27K mi., \$23,995. 909/599-3230.

'97 TOYOTA 4Runner Ltd., 4 x 2, tan, 3.4 L, V6, sunroof, leather interior, am/fm/cass./CD, A/C, roof rack, tow package, privacy glass, running boards, keyless entry, Lo-Jack, exc. cond., 67K mi., \$18,350/obo. 762-4780.

Wanted

FLAT FILE(s) with 5 or 10 drawers to hold 36 x 48" sheets, steel or wood w/gd. working mechanism, stacking units preferred, will haul. 626/798-3235, Rob Staehle.

GUEST HOUSE/DUPEX in safe, quiet neighborhood for single female, prefer no more than 15 min./JPL, 1 or 2 bedrooms/den, bath, kitchen w/stove. 541-9210, Fran.

PIANO & DRUM SET, used. 909/598-0065.

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

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

Free

CAT, short hair, gray female, approx. 1-2 years old, very sweet, no fleas, litter trained, spayed, OK with dogs. 626/287-9433.

DOG, loving blue-eyed husky-shep mix, 1-2 yrs., all shots, neutered male, gd w/cats, needs home w/fenced yard. 626/797-6824.

DOG, Jindo, gorgeous cream/white curl-tail male, 2 yrs. old, neutered, all shots and license, small end of breed range, but true Jindo personality, to loving home w/secure yd., must be approved by current owner. 248-8841.

KITTENS (4), two weeks old, will be avail. to take home in 1 month. 626/287-9433.

Lost and Found

Lost: GOLD EARRING, pearl w/single diamond, in east parking lot or in Bldg. 303. 4-9641, Patricia.

Lost: GOLD CHAIN, medal encrusted with red stones, reward offered, 4-5733.

Lost: GOLD ID BRACELET, lost on 4/23, possibly near Bldg. 238, 180 or 167. 4-9744, Chau.

For Rent

ALTADENA, charming 2 bd., 1 ba. house near Christmas Tree Lane, hardwood floors, fireplace,

appliances, fenced backyd, fruit trees, roses, see www.alumni.caltech.edu/~chris, incl. water, gardener, trash, \$1,650/negotiable. 626/794-9579.

LA CANADA/FLINTRIDGE, room, 2 mi. from JPL, private ba., kitchen privileges, pool, BBQ, parking, avail. May 1. 790-1280.

MONROVIA HILLS, lg. bd., 1 full ba. in private family home, share kitch. & laundry, electricity, water, gas and cable included, 12 miles/JPL, no smoking/pets, \$500. 626/358-7728.

MONROSE, detached bachelor apt., 10 min./JPL, \$525. 626/445-0884.

N. SAN GABRIEL, 3-level townhouse, 15 min./JPL, 3 bd., 2.5 ba., den, living rm., f/p, ctrl, air/heat, storage rm., attached garage, nice quiet end unit, \$1,600. 626/840-4919.

PASADENA, 2,000 sq. foot house, close to JPL; 3 bd., 2 ba., lg. master bd., lg. tiled kitchen, fireplace, formal din. rm., washer/dryer, fridge; asking \$1,850. 626/794-8517, Art.

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

PASADENA, furnished apt. to share, 2 bd., 1.5 ba., a/c, parking, patio, laundry facilities, no pets, \$595/ea. + util. 626/351-9641.

PASADENA house for lease, near Caltech, 3 bd., 2 ba., living room, f/p, nice kitch., fenced backyard, fruit trees, 2-car gar., no pets, no smoking, gardener incl., avail. May 1, \$1,300 + \$1,400 sec. deposit. 626/794-0455.

PASADENA, near PCC and Caltech, 2 bd., 2 ba., living room, nice kitch., fenced backyard, fruit trees, 2-car gar., no pets, no smoking, gardener incl., avail. May 1, \$1,200 + \$1,300 sec. deposit. 626/794-0455.

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 fr with f/p, end unit, frml d/r, hdwd. flrs., immac. cond., close to schls. \$1,750. 626/396-9024.

Real Estate

LA CANADA, 4 bd., 2.75 ba., 2,409 sq. ft., 100 x 148 lot, pool, private backyard, compl. remodeled, new kitch. w/Corian counters/sinks, high gloss white cabinets, brkfst area, indoor laundry, high ceilings in living areas, new windows/doors/floors, 3 bd. w/own closets, master bd. w/walk-in closet, very bright. \$799K. 790-4553, after 6 p.m. or 687-9812.

SILVERLAKES, Calif., resort, golfer's dream, 4 free wks. at priv. PGA-rated course w/driving range/putting greens anytime each year, vac. club membership, 2 bd. condo for up to 6 people, 2 lakes, many amenities, less than 2 hours/Pasadena, exchange rights w/3,000 resorts, reduced to sell due to illness, \$17,500. 805/967-7725.

Vacation Rentals

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

BIG BEAR, Logonita Lodge, deeded timeshare, 1 week 2002, dues and property taxes paid, \$7,500. 626/791-9868.

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/v, 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.

HAWAII, Maui Paradise Island, ocean view, 1 bd., living room, kitchen, sleep up to 6, microwave, stove, refrigerator, washer/dryer, Jacz/spa, championship tennis court, on-site restaurant & store, 1 week every other year, can be traded for other resorts, \$8,000/obo. 909/985-9975.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equipped kitchen incl. microwave, D/V, cable TV, VCR, phone, balcony mtn. view, Jacz., sauna, streams, fishponds, 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.

PARIS, duplex apt. in elegant new building in central city, monthly rental, elegantly furn., designer kitchen, fully equipped, sleeps 2, walking distance to everything yet completely quiet, \$2,700/mo. 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.