Universe

Jet Propulsion Laboratory

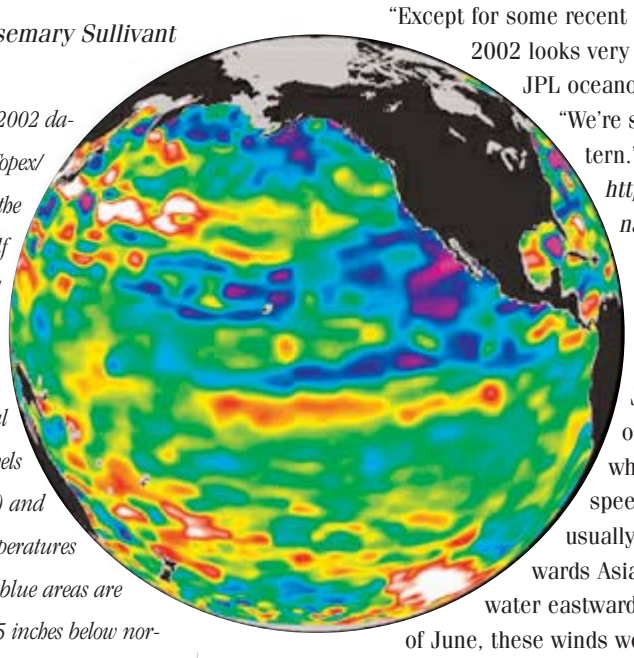
July 5, 2002
Volume 32 Number 14

Inside

theme EARTH

As summer starts, next El Niño is slow to grow

By Rosemary Sullivant



Data June 14, 2002 data taken by Topex/Poseidon show the Bering Sea, Gulf of Alaska and U.S. West Coast, where lower-than normal sea-surface levels (blue areas) and cool ocean temperatures continue. The blue areas are between 2 and 5 inches below normal, and the purple areas range from 6 to 7 inches below normal.

The Pacific Ocean doesn't show signs of anything that looks like the whopper El Niño of 1997-98, according to the latest information from the JPL-managed U.S.-French ocean-observing satellite Topex/Poseidon.

The data do show that the mid-equatorial Pacific Ocean has slowly warmed by about 1 degree Celsius (1.8 degrees Fahrenheit) above normal in the past few months. However, the Pacific continues to be dominated by the larger-than-El Niño/La Niña pattern called the Pacific Decadal Oscillation, which may discourage El Niño development. The image is available online at *http://www.jpl.nasa.gov/images/earth/pacificocean.*

"Except for some recent mid-Pacific warming, June 2002 looks very much like June 2001," said JPL oceanographer Dr. William Patzert. "We're still in an El Niño holding pattern." See the June 2001 image at *http://sealevel.jpl.nasa.gov/elnino/ 20010621.html.*

The ocean warming in the past month can be explained by a relaxation in the equatorial trade winds observed by the JPL-managed Quick Scatterometer (QuikScat) satellite, which measures ocean wind speed and direction. These winds usually blow from the Americas towards Asia, helping push warm water eastward. "For the first two weeks of June, these winds were unusually weak," said QuikScat Project Scientist Dr. Timothy Liu. "But by last week, they had returned to normal. If the weakening continued or intensified, we could have been expecting an El Niño to develop by early fall."

"For the past few winters the weather- and moisture-delivering jet stream has been steered north by the Pacific Decadal Oscillation and other planetary patterns, resulting in a warm winter all across the United States and very dry conditions on the East and West coasts," Patzert added. "A large enough El Niño might provide some relief for the drought-plagued west, southwest and southeast U.S., but it's wishful thinking so far."

The Topex/Poseidon data were taken during a 10-day collection cycle ending June 14, 2002. They show that there hasn't been any fundamental change in the ocean's large-scale patterns for the past three years. The near-equatorial ocean has been very quiet, although sea levels and sea-surface temperatures are near normal or slightly warmer throughout the far western and central tropical Pacific.

The Pacific has settled into a negative phase of the Pacific Decadal Oscillation pattern for the past three years. This long-term ocean feature waxes and wanes approximately every 20 to 30 years. In its present phase, a warm horseshoe pattern of higher-than-normal sea-surface heights connects the north, west and southern Pacific, while a cool wedge of lower-than-normal sea-surface heights is in the eastern equatorial Pacific. More information on the Pacific Decadal Oscillation is available online at *http://topex-www.jpl.nasa.gov/elnino/20000118.html.*

Most recent National Oceanic and Atmospheric Administration sea-surface temperature data also clearly illustrate the warming of the western and central tropical Pacific and the persistence of the basin-wide Pacific Decadal Oscillation pattern. They are available online at *http://psbsgi1.nesdis.noaa.gov:8080/PSB/EPS/SST/climo.html.*

The Topex/Poseidon and follow-on Jason 1 missions are managed by JPL for NASA's Earth Science Enterprise, dedicated to understanding the total Earth system and the effects of natural and human-induced changes on the global environment.

For more information on Topex/Poseidon and Jason 1, visit the Ocean Surface Topography from Space website at *http://sealevel.jpl.nasa.gov/index.html.* More information on QuikScat is available at *http://winds.jpl.nasa.gov/missions/quikscat/ quikindex.html.*

Visit the National Oceanic and Atmospheric Administration site at *http://www.noaanews.noaa.gov/ stories/s794.htm* for seasonal weather forecasts.

theme SOLAR SYSTEM

Contour lifts off; JPL team set to navigate

Contour lifts off July 3.

NASA's Comet Nucleus Tour (Contour) spacecraft—set to provide the closest look yet at the "heart" of a comet—successfully launched Wednesday, July 3 at 2:47 a.m. EDT aboard a Delta II rocket from Cape Canaveral Air Force Station, Fla.

Designed and built by the Johns Hopkins University Applied Physics Laboratory in Laurel, Md., the 2,138-pound (970-kilogram) spacecraft was placed into an elliptical Earth orbit 63 minutes after launch. About 19 minutes later the mission operations team acquired a signal from the spacecraft through the Deep Space Network antenna station in Goldstone, Calif., and by 5:45 a.m. EDT Mission Director Dr. Robert Farquhar of the Applied Physics Lab confirmed the craft was operating normally and ready to carry out its early orbit maneuvers.

Contour will rely on JPL's navigation experts to guide the craft on its tricky journey toward two comets to find out how the icy, rocky bodies evolve as they approach the Sun.

The spacecraft is slated for a 15-month journey to Comet Encke followed by a two-and-a-half-year trip to Comet Schwassmann-Wachmann 3. The mission was conceived so that scientists could compare the older, less active Encke to the younger, dust-clouded Schwassmann-Wachmann 3. The different targets pose a challenge to the navigators, too.

"We'll be flying by quickly and close to Comet Encke. There will be just 10 minutes of time to take the science data, and our job is to protect that time," said Tony Taylor, chief of the navigation team at JPL. "On the other hand, Comet Schwassmann-Wachmann 3 has more dust and gas shooting from its inner body. We will fly past it a bit farther away to avoid being hit by a particularly large particle, and we'll have more time to observe the comet."

The navigation team will guide the spacecraft through its complex orbit. After six weeks, the navigators will steer the spacecraft toward the first of the two comets.

"It's like having two launches," said Dr. Bobby Williams, a member of the navigation team and the leader of the JPL navigation team that landed the Near Earth Asteroid Rendezvous spacecraft on the asteroid Eros in February 2001. "We have to fire a rocket to go into orbit around Earth and then about six weeks later fire another rocket to push the spacecraft out of Earth orbit."

The spacecraft will fly by each comet at the peak of its activity as it approaches the Sun. During each encounter, the target comet will be well situated in the night sky for astronomers worldwide to make concurrent observations from the ground. Protected by its dust shield, the spacecraft will fly by each comet nucleus to within a distance of 100 kilometers (62 miles). The most intensive data-taking will occur within a day or so of each encounter.

The mission's design is flexible so that the spacecraft can be retargeted to intercept an unexpected comet visitor. If a "new" comet passes close enough to Earth's orbit, mission managers at the Applied Physics Laboratory will design a new flight path to take advantage of the opportunity to study the new comet. The JPL navigation team will then calculate the amount of fuel the spacecraft should burn, and for how long, to put it on the right path.

JPL will also provide communications support through the Deep Space Network, the worldwide series of antennas that provide radio communications for all of NASA's interplanetary spacecraft.

"JPL's participation is essential to making the mission happen," said Dr. Joseph Veverka, principal investigator and leader of the mission from Cornell University, Ithaca, N.Y. "We have to get the spacecraft very close to the comets and we have to communicate with the spacecraft—and we couldn't do those things without JPL. And one of the world's experts on comets, Dr. Don Yeomans of JPL, is part of our science team."

Comets may have brought to the forming Earth some of the water in the oceans, some of the gases of our atmosphere and perhaps even the building blocks from which life arose.

News Briefs

United Way of Greater Los Angeles

Left to right: Dlorah Gonzales of Caltech's human resources office; Joe Haggerty, president of United Way of Greater Los Angeles; and Angela McGahan, manager of JPL's Internal Communications Office.

Caltech, JPL honored by United Way

Caltech and JPL have received the United Way's Community Landmark Award for the 2001–02 fundraising campaign conducted last fall.

The United Way of Greater Los Angeles chapter honored the campus and Laboratory at ceremonies last month. The organization said the award celebrates "the contributions of visionary companies that have found United Way of Greater Los Angeles to be a friend and messenger of their optimism and hope for the community." The award is given, United Way said, "to an organization that has demonstrated a true commitment to the United Way fundraising campaign and has championed the belief that United Way is the way America cares ... community by community."

JPL staff contributed approximately $450,000 to the campaign, and Caltech staff added about $150,000.

"We are grateful to be honored in this way by United Way," said TOM SCHMITT, assistant vice president for Human Resources Administration at Caltech. "All members of the Caltech community are pleased that the United Way would single out Caltech, including JPL, for the award and are only hopeful that we can continue to be as supportive or more so in the future as have been in the past."

NASA Internet sites honored

Two NASA Internet sites were honored last month with Webby Awards, sponsored by the International Academy of Digital Arts and Sciences. The awards recognize Web sites that are both aesthetically exceptional and which utilize technology to help build communities.

One of the awards, the People's Voice Award for Science, was given to the Earth Observatory, an interactive site that highlights news and imagery about NASA's Earth science research.

KAREN YUEN, JPL's Earth outreach theme lead, credited JPL staff members with providing significant contributions to the site. MIKE ABRAMS from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) team contributed image acquisition and caption writing; DAVE DINER and CLARE AVERILL from the Multi-angle Imaging SpectroRadiometer (MISR) team for outreach, and TIM LIU from the Quikscat science team, for providing images and words that keep JPL's role in predicting El Niño in the forefront.

The NASA home page, which serves as the agency's entryway into its more than 4 million public World Wide Web pages, won the Webby's People's Voice Award in the Government & Law category.

Voters who register through the Webby Awards site select the People's Voice winners. The academy also has panels of judges who select their choice for the top site in each category based on a variety of functional and esthetic criteria.

"We're very pleased that Internet users voted NASA these awards," said GLENN MAHONE, assistant administrator for public affairs. "Since 1994, when people around the world were staying up late to see images of Comet Shoemaker-Levy colliding with Jupiter, the Internet has been an important means of fulfilling NASA's mission to inspire the next generation of explorers in ways that only NASA can."

The Earth Observatory, at *http://earthobservatory.nasa.gov,* is sponsored by the NASA Goddard Space Flight Center, Greenbelt, Md., and the Office of Earth Science at NASA Headquarters.

The two winning sites are the fourth and fifth NASA sites to be selected for Webby honors during the past six years. Previous winners include JPL's Mars Pathfinder (*http://mars.jpl.nasa.gov/MPF,*) which garnered the 1998 People's Voice for Science.

The full list of winners and nominees can be found on at *http://www.webbyawards.com.*

Atlas will launch Mars '05 orbiter

NASA has chosen the Atlas III expendable vehicle offered in a competitive bid by Lockheed Martin Commercial Launch Services Inc. for the launch of JPL's Mars Reconnaissance Orbiter, scheduled in 2005. Lockheed Martin Commercial Launch Services is a division of International Launch Services of McLean, Va.

This is a firm fixed-price task order awarded under the terms of the current NASA Launch Services contract for intermediate-class launch services, for which Lockheed Martin Commercial Launch Services is one of two selected providers.

The prime contractor for the Mars Reconnaissance Orbiter spacecraft is Lockheed Martin Astronautics in Denver, which is responsible for spacecraft design, integration of the science instruments and the support of mission operations.

The Mars Reconnaissance Orbiter spacecraft will weigh approximately 1,975 kilograms (4,355 pounds) and have a 250 by 320 kilometer-high (200 by 155 mile) polar orbit around Mars. The spacecraft's instruments will provide significant improvements in resolution and data volume over previous missions and are being developed by both U.S. and international investigator teams. The spacecraft will also provide telecommunications and navigation support for future Mars missions.

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.

Tuesday, July 9

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

Thursday, July 11

Contract Management—The first session of a class that is part of the UCLA Extension/JPL Government Contract and Proposal Management Certificate Program begins in Cafeteria 190 from 5:30 to 8 p.m. Class continues through Sept. 12. Enroll tonight, with credit card or check; fee is $380. For more details call Dana Edler at ext. 4-5825.

Monday, July 15

"The Odyssey of Odyssey: Why We Could Not Fail"—Mars Odyssey Project Manager Roger Gibbs, Mission Manager Dave Spencer and Project Scientist Steve Saunders will speak at 4:45 p.m. in von Kármán Auditorium. Gibbs will discuss challenges the project faced during the development phase; Spencer will discuss the preparation for and execution of the operations phase; and Saunders will discuss the significance of the first science data return. The talk is sponsored by the Caltech Management Association. For membership information, contact Priscilla Fraschetti at ext. 4-4964, mail stop 264-255.

Tues., July 16–Wed., July 17

Investment Advice—A TIAA/CREF representative will be available for one-on-one counseling in T1720-131. For an appointment, call (877) 209-3140 or visit *www.tiaa-cref.org.*

Wednesday, July 17

Career Day—Student employees are invited von Kármán Auditorium from 1 to 4 p.m. to learn about the technical and business divisions' vision and mission, work activities and job listings for new graduates, academic part-time and co-op students. Representatives of JPL's student employment programs will be available. Bring copies of your resume.

Thursday, July 18

JPL Stories—Dr. Ed Stone, Voyager project scientist and former JPL director, will present "Voyager—the Journey of a Lifetime" from 4 to 5 p.m. in the customer services area of the Library, Building 111-104. For information about the story series, call Teresa Bailey at ext. 4-9233.

Social Security—A representative will be on Lab for counseling. For an appointment, call the Benefits Office, ext. 4-3760.

TIAA/CREF Enrollment Meeting—Employees newly eligible for Caltech/JPL retirement plan participation are invited to Building 180-101 from noon to 1 p.m. for help in selecting investment options and completing enrollment forms.

TIAA/CREF Workshop—"Estate Planning," to be held from 10 to 11:30 a.m. in Building 180-101, will focus on gaining a better perspective on planning for your financial future and meeting financial goals. Consultant Julie Thomas will discuss wealth transfer in a tax-effective manner, charitable gift giving, and maximizing the transfer of significant retirement plan assets.

Thurs.,–Fri., July 18-19

Von Kármán Lecture Series—Galileo science team member Dr. Rosaly Lopes-Gautier will present "Jupiter's Moon Io: A World of Great Volcanoes" Thursday in von Kármán Auditorium and Friday at Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. Both lectures begin at 7 p.m. For more information, call Public Services at ext. 4-0112 or visit *http://www.jpl.nasa.gov/events/lectures/jul02.html.*

Tuesday, July 23

Investment Advice—A Fidelity representative will be available for one-on-one counseling in T1720-131. For an appointment, call (800) 642-7131.

Ongoing

JPL Tennis Club—A round robin is held Saturdays at 9 a.m. at El Molino School tennis courts, at the corner of Del Mar Boulevard and El Molino Street. Parking is available. For information, call Gordon Blackhall, ext. 4-6981 or Jorge Vazquez, 4-6980.

Celebrating Heritage Week

Hundreds of JPLers enjoyed the final day of American Heritage Week, which was held June 10–13. At left, a Henna artist draws a tattoo; at right, Tony Saddul (l) and Jean Cheng dance to the Chaffey College/Cal Poly Pomona Latin Jazz Band.

Photos by Dutch Slager / JPL Photolab

As the future of space exploration expands to regions more remote and more hostile than ever explored before, spacecraft of the future will have to live longer and be able to withstand the adverse conditions associated with harsher environments.

BY DEREK BLACKWAY

Hardware EVOLUTION

JPL TEAM WORKING ON WAYS TO GIVE SPACECRAFT LONGER LIFE

JPL researcher Adrian Stoica of Section 3445 has dedicated his career to developing technologies for this very goal. He and his six-person team of researchers have been developing and testing evolvable hardware designed to enhance the survivability and versatility of spacecraft in extreme situations.

"Evolvable hardware is a relatively new technology, born at the confluence of automated design, artificial intelligence and reconfigurable hardware," Stoica said. "It addresses hardware that changes/self-configures itself for meeting new requirements or for improving its performance. It is the only proven technique to automatically synthesize (analog) electronic circuits. Moreover, this can be done it on-chip and in-situ."

Evolvable hardware—the first concept of which was proposed in 1994—is based on the same idea as the evolutionary process occurring in the biological world. In a silicon chip about the size of a fingernail, robust search algorithms, called genetic algorithms, seek solutions from a vast search space within seconds. The search spans a variety of candidate solutions or circuits, which are obtained from the genetic code associated to each circuit. The circuit that satisfies the requirement the best is the one chosen as the first solution to fix the problem. The system then builds on itself, reconfiguring stronger solutions.

Genetic algorithms are combined with reconfigurable hardware devices to achieve reconfiguration autonomously, thereby making them self-configurable, which is the next step forward from hardware that is only able to be reconfigured by a human.

"If you are operating in an environment far away," Stoica explained, "you would need the capability of finding electronic solutions to address situations that occur, without the benefit of a human designer. This is a method of getting an on-board way of solving the problem.

"In case of faults or degradation of electronic components, such is often the case with flight hardware, evolvable hardware can find new circuit topologies or chip architectural arrangements that bypass the faults or reuse the components in a different way than the original one, salvaging some part of their capabilities. This leads to a new system that is able to continue and maintain the existing functionality, although the components are not exactly the same or not in the same arrangement."

Photo by Dutch Slager / JPL Photolab

Adrian Stoica shows three generations of evolvable chips built at JPL. The largest one, developed last year, measures about 30 square millimeters.

Before joining JPL in 1996, Stoica earned his doctorate in robot learning from Victoria University in Melbourne Australia and had been working in the field of adaptive and learning hardware since 1986. He started working in evolvable hardware when he was hired at JPL. "I got into this because I was interested in automated design," Stoica said.

Stoica's supervisor, Anil Thakoor, has been a strong supporter, acting as a lobbyist for the new technology as well as appealing to NASA and the Department of Defense. "Anil had the vision to see the opportunity of this technology at a time when there were no chips and no proofs, only some ideas," said Stoica.

"Adrian and his team get the credit for bringing evolvable hardware to JPL and making NASA and the Department of Defense aware of the technology, championing it for space applications," Thakoor said.

Not long after the initial funding (a Director's Discretionary Fund grant from former Chief Scientist Dr. Moustafa Chahine), Stoica started gathering a team and fabricated the world's first evolvable analog chip.

In choosing his team to bring to JPL, Stoica looked for good old-fashioned experience, hand-picking the best researchers bringing from leading research labs around the world. "I brought Didier Keymeulen from Electrotechnical Lab in Japan, and Ricardo Zebulum from the group at University of Sussex (United Kingdom) that first demonstrated evolvable hardware. Michael Ian Ferguson came from the European Organization for Nuclear Research, on the border between France and Switzerland, just outside Geneva," explained Stoica, referring to key team members. "We are now the best team in the world, as measured by technology demonstrations, publications and references to them, and individual recognition of the team members."

The team also initiated and has been organizing the main event in the field: the NASA/Department of Defense Conference on Evolvable Hardware, which this year will be held in Washington, D.C from July 15 to 18.

The team does its experimental work in the Evolvable Systems Lab, part of JPL's Center for Integrated Space Microsystems facilities. Here the chips are put in environmental chambers in which the temperature can be altered to extreme conditions. The chips self-reconfigure to recover from degradations induced by extreme temperatures.

The team has designed and fabricated three generations of evolvable chips.

"One of the accomplished goals for our latest chip was for it to be able to rapidly perform the testing of hundreds of thousands of circuits that were evaluated in a matter of seconds, and result in an evolved/synthesized circuit solution that satisfied the imposed requirements." Stoica said. "It's an excellent result, but we realize there is a long road from laboratory proof-of-concept to insertion of technology in space."

During this long road, Stoica focuses on small goals.

"Part of what makes me happy," he said, "is the emotional reward when you solve a problem, find a solution to a previously unsolved problem, or when you know something that no one else on Earth knows. And for us, that happens on a day-to-day basis. We're exploring totally new ground. Our chips allow us to do unique experiments that no one else in the world can do. We discover many things that wouldn't be possible if we didn't have these chips."

More "material" rewards for Stoica include the JPL Lew Allen Award, as well as other prizes and invitations to deliver keynote addresses and tutorials.

Stoica and his team can often be found working late nights on Lab. "I am fortunate to have a great team," Stoica said. "We are very close. We work hard together, go to conferences together, go to baseball games and ski together. This facilitates intercommunication and keeps our motivation high."

As the workload intensifies, the excitement level of the group remains consistently steady.

"We are excited about our progress, although, as happens all over the world of science, the more you know, the more questions appear, and you realize that there is still a lot of work to be done," Stoica said. "Still, I strongly believe that evolvable hardware concepts will be the very essence of all infrastructures 20 to 30 years from now, and will play an important role in enabling more survivable space hardware."

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

Universe

Editor
Mark Whalen

Design & Layout
Adriane Jach, Audrey Steffan/ Design Services

Chief Photographer
Bob Brown/Photo Lab

Advertising
Susan Braunheim-Kalogerakos

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

Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted 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

AUDREY ADKINS, 75, a retired senior photo lab technician in Section 642, died May 30.

Adkins worked at JPL from 1959–88. Services were private.

HAROLD CONWAY, 81, a retired senior instrumental specialist in Section 375, died June 1.

Conway joined the Lab in 1979 and retired in 1986. He is survived by his wife, Emily, and son Harold.

Services were private.

JOSEPH AUSTIN, 65, a retired maintenance electrician in Section 662, died of lung cancer June 8.

Austin worked at the Lab from 1982–95. Services were private.

JACK DUNN, 70, a retired senior test specialist in Section 357, died of desmin myopathy June 12.

Dunn joined JPL in 1967 and retired in 1995. He is survived by his wife, Margaret, and sons Jack Jr. and Russell.

Private burial was in Dayton, Ohio.

Retirees

The following JPL employees retired in July: Timothy Scheck, 38 years, Section 910; Yi-Chien Wu, 33 years, Section 353; Santosh Srivastava, 27 years, Section 323; Gail Huddleston, 22 years, Section 331; Marilyn Pistoll, 22 years, Section 311; Noel Tibbetts, 16 years, Section 245; Richard Capps, 15 years, Section 700; Robert Van Steenburg, 11 years, Section 813.

Letters

Thanks to the Staffing department and the party committee for the wonderful retirement party held in 167. It was wonderful and the food and gifts were terrific. I will look so good on the golf links. I will miss you all but especially all my co-workers in Human Resources whom I have worked with for over 15 years. I am looking forward to a rewarding retirement, but I will keep in touch and I wish everone much happiness and prosperity.

Noel Tibbetts

Classifieds

For Sale

AIR CONDITIONER, Sharp Comfort Touch energy saver, model AFT 908X, 110V, 8,500 BTW, $200/obo; TABLE FANS, misc., $20/obo. 248-1856, Gordon.

BABY ITEMS: soft front carrier, Evenflo, $7; car seat w/base, Century, rear-facing, $40. bathtub carrousel, Safety1st, $7; all in superb cond., prices are obo. 626/791-6101.

BED, antique oak & rod iron, queen size w/rails, $150/obo; SKI SET, used, women's Head, 170s Gala radial & poles, Salomon boots, size 7 + bindings, see pictures @ERC, $120/obo. 626/744-9064.

BEDS, 1 twin XL, 1 full, both include mattress, box spring, frame, exc. cond., almost new, $60/ea./obo. 247-3439, Sean.

BICYCLE, women's 29", Centurion Comp TA road bike, equipped with Shimano 600 derailleur, etc., terrific cond., $60. 956-3745, Steve.

CAMERA, Mamiya M645 SLR, A & E prism, 220 back, w/120 & 220 roll film holders and inserts, deluxe power motor dr. lenses, 45 mm, 80 mm & 105-210 zoom, Sunpak auto flash, mod. 555, aluminum case, $2,200. 323/257-7668.

CELL PHONE, Ericcson R280LX, Internet browser, tri-mode, five-line display, two-way text messaging, includes battery, fast charger, earbud headset, and all original manuals and paperwork, used with AT&T Wireless but should work with any service, $40/obo. mckenn@earthlink.net.

COFFEE MAKERS: Krups, 10-cups, white/gray, like new, $40/obo; Braun, 10-cups, white/black, like new, $30/obo. 626/791-6101.

COMPUTER, Compaq, 300 MHz, 128 MB RAM, 3.2 GB hard drive, new 56K modem, new mouse/KB, computer only $295; 15" monitor, $65; 17" monitor, $95. 626/486-0999.

DISNEY WORLD TICKETS, 4, good for any Disney World theme park, valid thru end of 2003, regularly $48/ea., sell for $40/ea. 956-1744.

DODGER TICKETS, 2, selected games, Loge (orange) level, aisle 140, row J, seats 1, 2, parking not included, sell at face value, $23/ticket. 626/296-1253.

FOREIGNER TICKETS, 4, fourth row seats at the Grove in Anaheim, next to the Edison Field in Anaheim, 2 or 4 tickets, will not sell single tickets, $96/ea. 219-0965.

KITCHEN TABLE & CHAIRS, butcher block style w/white legs, 60" long 33" wide, 6 Windsor style chairs, sturdy, $175. 952-8455.

MISC ITEMS: receiver, Sony DSS, $40; TV, Toshiba, 20" color, $25; car cover, Falcon mid-size, $10; pictures, framed, dance oriented, 3, 2 x 3ft, $5/ea.; tablecloth, oval 60 x 84, tan, $3; rocking chair cushions, tapestry-tie, $10; pool raft, $3. 626/447-7584.

MOUNTAIN BIKE, specialized Rockhopper, women's model, 15", 2 yrs old, hardly ridden, exc. cond., can e-mail photo, $350. 626/304-0403.

MOVING SALE: glass top table, $45; 2 bar stools, $30, queen mattress + box, $120; Rock Hopper, $80; blender, $10; coffee table, $10; Mac 603e /200/4GB/60MB+ 17" monitor + 28.8 modem, $50; futon, 8", $80; grill, gas w/spare new grate, $70; glasses, plates, and silverware, $5/all; bookcase, $5; sofa, $20, 3 chairs, $15; cookie jar, Sagauro, $5; JGRs, complete set, Viking era, free; toaster, $5; TV stand, $10; answering machine, digital, $20. 352-3777.

MOVING SALE: TV, Sony 27" Trinitron, like new, $200; TV, Sharp 17", vg condition, $30; vacuum, good condition, $20; Grill, Kenmore, $20; microwave, Sharp, $15, swinging chair $5; 2 chairs, very sturdy, leather/wood, $5; dining table, glass/wood, $5. 626/577-9278.

PET DOOR, for sliding glass door, clear glass w/black aluminum frame, for cats up to 15 lbs or dogs up to 7 lbs., w/installation instruc-tions, cost $160, sell for $60. 548-5656.

PIANO, Clavinova digital, Yamaha CLP 411, exc. cond., black, with bench, $1,300/obo. 626-475-5790.

PLAYPEN, can also be used as portable crib, $20. 626/797-3310, eves & weekends.

RANGE, electric, Tappan stove top and bottom oven, $200/obo. 626/963-8288.

REFRIGERATOR, off-white, 18 cu. ft., Kenmore Coldspot, less than 1 year old w/1 year of warranty remaining, avail. August, $400/obo. 626/289-6359.

SLIDE RULES, 2, log/log duplex, Decitrig, and Doric pocket, make offer. 352-3588.

SOFA/LOVESEAT, Broyhill, camel back, green, great condition, $500/obo; COFFEE TABLE, and end tables, cherry, Queen Anne style, $100/obo. 626/319-7234.

SOFA SLEEPER, makes into queen bed, abstract black, blue and mauve design, good cond., $300; BICYCLES, 4, children's, $15/ea.; PICNIC TABLE, 2 benches, $20. 626/357-8210.

STEAM BUGGY, a better way to clean, without harsh chemicals, moved to small apt., no room to store, like new, pd. $150, will sell for $50. 248-3414.

TREADMILL, Perform, bought from Sears for $623, used less than 15 times, moving sale, $190. ahh19_99@yahoo.com or 626/237-1256, eve.

TV CART, solid oak, on casters, 36 w x 23 d x 30 h, pull-out shelves for videos-DVDs behind door, location for VCR-DVD player behind glass panel door; large storage area with double doors, exc. cond., $125. 626/398-8702.

Vehicles/Accessories

'91 ACURA Integra GS, red, 167K mi., new tires, brakes, stereo w/12 CD changer, must sell, $3,700. 805/522-2721.

'00 BMW 323i, silver on black leather interior, premium sport pkg. includes: wood trim, moon roof, xenon headlights, steptronic automatic trans. and Harmon Kardon premium sound, Lo-Jack, 35,000 mi., great cond., Kelly Blue Book $29,810, sell $28,500/obo. 909/452-7594.

'95 CHEVROLET Camaro, silver, T-tops, V6, 5 spd. manual, 80K, exc. cond., $8,000. 352-2380.

'95 EAGLE Summit wagon (twin of Mitsub. Expo), 85K, SUV space w/car-like ride, efficiency; auto, all pwr., a/c, good mileage, clean, new timing belt, tires, seals, all belts, etc.; needs trans. work; $1,950/obo. 661/424-1420.

'01 FORD Escape, 3.0 V6, 4 w/d, 26K mi., loaded, premium sound, 6 CD, towing package, auto trans., mocha int./ext., 2 new tires, exc. cond., $19,950. 626/296-4082, Ted.

'96 FORD Aspire, red, stick shift, new CD player/speakers, new tires, brand new fuel pump, good cond., only 70K mi., $1,000/obo. 626/351-4606.

'96 FORD Escort LX, 2 dr. hatchback, stick shift, a/c, stereo, only 60K mi., great commuter car, exc. cond., $4,350. 909/985-6806.

'95 HONDA Civic, white, 4 dr., automatic, 96K, a/c, cruise control, am/fm cass., pwr. steering/ window/door locks, ABS brakes, dual airbags, exc. cond., 1 owner, $6,000. 626/577-9278.

'90 FORD Taurus L, 4-door sedan, 3 liter V6, automatic, cruise, a/c, power locks, radio/cassette, 101K mi., gd cond., drives well, $1,850. 323/845-9340.

'67 FORD Mustang 390, 4-speed S Code coupe, Ford Blue exterior, new interior, great condition, must see, $6,500/obo. 626/339-9353, Greg.

'91 JEEP Laredo, 4 dr., 2/4 w/d, 4.0 l/6 cyl., air, tlt wtt., crs cont., r/f r/k, AM/FM, power everything, $3,500/obo. 323/256-6634, Mary.

'90 LODESTAR inflatable boat, 10', 20 HP max, 6 person max, oars, bench seats, rmvbl. floor, great for sea, rivers & lakes, $600. 909/237-8808.

'79 MCI MC5C, 39 passenger coach with toilet, 35 foot with automatic trans, V6, air, new generator, starter, tires, great motor home conversion, $12,000. 626/728-2375.

'97 MERCURY Villager GS minivan, 7 passen-ger, CD player, very good cond., $7,900. 661/286-1038.

'91 NISSAN Stanza XE, exc. cond. inside and out, power steering/brakes, automatic, a/c, everything works, very well maintained, one owner, $3,000/obo. 626/577-0778.

'89 NISSAN Maxima GXE, auto, very good cond., orig. owner, all service records, 175K mi., a/c, power sunroof/windows/doors/seats, Bose stereo, $1,950. 248-6263.

'96 SAAB 900S, dark green with beige interior, 80M, orig. owner, exc. cond., all maintenance records, 5 spd., a/c, factory stereo, alloy wheels, $7,900/obo. 310/306-7319, Mike.

'96 SAAB 900SE turbo convertible, 5 spd., red/black, leather interior, CD changer, all options; exc. condition, 43K miles, $15,900/obo. 249-1749

'99 SATURN SCZ coupe, 5 spd., a/c, power steering, windows and door locks, tilt wheel, cruise control, am/fm stereo w/CD, premium sound, dual front air bags, leather interior, rear spoiler, 43K mi., 6 yr./75K extended warranty is transferable, $10,500/obo. 686-8117 or 426-1121.

'93 SATURN SL2 DOHC, 5 speed, green, beige interior, 199K mi. mostly freeway, 4 dr, 30 mpg, clean inside/out, new clutch, new tires, a/c, ps, pb, am/fm cass., orig. owner, spider spikes for snow, split fold down rear seat, new sheepskin driver seat cover, $3,500/obo. 626/395-0455.

'94 SEADOO GTX, 2, both are 3 seaters, new upholstery, pre-mix required, 1 has new '94 engine, other has new top end, lake tuned, vg cond., includes 2000 Ziena trailer, $6,500. 626/359-7666.

'86 SUZUKI GSX-R 750 motorcycle, 21K mi., very clean and in great shape, CVK carbs, KN filters, Kerker K2 pipe, degreed cams, lots of spares and extras, $2,500. 640-7479, Greg.

'96 TOYOTA Corolla DX, 4 dr., all pwr., dual a/b, a/c, am/fm, cass, CD, new tires, exc. cond., 137K mi., $5,900. 248-6440.

'96 TOYOTA Corolla DX, 4 dr., all pwr., dual A/B, a/c, am/fm, cass, CD, new tires, exc. cond., 137K mi., $5,900. 760/246-3825.

'88 TOYOTA Camry LE, automatic, sunroof, am/fm cassette, power windows, extra set of hubcaps, runs well but needs work, 181K mi., $1,350/firm. 626/237-1275.

'84 TOYOTA Corolla, 5-speed, hatchback, black, 135K miles, strong engine, needs some work, but runs, good student car, $500. 352-3777, Scott.

'01 VOLKSWAGEN Beetle GLS, silver/black leatherette, 5 spd., pwr. locks, windows and mirrors, cruise, alloys, am/fm cass., CD changer, fog lights, ABS, remote keyless entry, 8K mi., $16,800. 626/449-0997, after July 24.

'66 VOLKSWAGEN Bug, refurbished inside/out, good engine, must see to appreciate, $2,500. 626/355-7961.

'92 VOLVO 940GL, 4 dr., 117K mi., black, leather int., exc. cond., loaded, must see, $6,500. 626/422-8332.

Wanted

AUTO ENGINE, any kind or condition, will pick up but can't pay anything. 626/357-7770.

GUEST HOUSE close to JPL for a married couple, no kids, no pets, non-smoker. 310/370-6905, Frank.

PLAY STRUCTURE, used, to buy, plastic mini-structure with small slide, steps, doors, etc., for toddler 1-3 yr. old. 626/351-8643.

ROOM, single male teacher seeks rent in Pas., SGV, Pomona for less than $500; clean, quiet, responsible. Scuddy717@yahoo.com.

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

VANPOOL RIDER, Caltech vanpool #2 has open seats for new passenger, permanent or occasional, from Rialto, Fontana, San Bernardino, Cucamonga, Upland, La Verne and San Dimas; vanpool arrives at Caltech at 7:45, departs at 4 p.m. 626/395-6598, Jose.

For Rent

ALTADENA, condo for lease, minutes from JPL, 2 bd., 1.75 ba., nice closets w/organizers, fireplace, central a/c, community pool, storage room, 2-car garage/carport, tile counter top and marble floor in kitchen, large patio with landscape, planters and oriental garden with waterfall and spa; an end unit with windows on three sides, cable on, for rent by owner, $1,200. 626/398-1988.

ALTADENA house, 3 bd, new kitchen, new ba., shaded yard, .5 mi. east of JPL, water & trash paid, non-smokers, $1,500. 382-4751.

ARCADIA apt., spacious 2 bd., + den, 1ba., 2nd floor in 3-unit building, new paint, remodeled kitchen, pkg, washer/dryer in unit, a/c, walking distance to shops, bus stops, nice neighbor-hood, good schools, $1,250. 626/576-7333.

LA CRESENTA, apt. to share, 2 bd., 1 ba, washer/dryer, 15 mins./JPL, no smoking or pets, female preferred, $425 + 1/2 util. 249-9739.

LA CRESCENTA house, 3 bd., 2 ba., 3 yrs. old, large yard, quiet wooded neighborhood, $2,400. 249-2990.

MONROVIA HILLS, charming 2nd level of house w/a view, 2 bd., 1.5 ba., kitchen w/refrigerator & electric stove, dining rm., living rm, master bd. w/walk-in closet, laundry rm. area, $1,200 w/2-car garage or $1,000 w/out garage. 626/256-0015.

MT. WASHINGTON, room in newly remodeled, large home in tranquil, bucolic setting, private bd. with full bath, 15 min. to JPL, includes basic utilities, washer/dryer, satellite TV, off-street parking, $900 + security dep. 323/478-1853, Priscilla.

PASADENA, nice Southeast area, cute 2 bd., 1 ba.. house to share, furnished with hardwood floors, yard, laundry and 2-car garage, no smoking, I have a very friendly dog who stays at doggie day care M-F, only nights and weekends at home, $800 + $600 security deposit. 626/792-1330.

PASADENA guest house, above Eaton Canyon golf course, in a beautiful setting, about 1,000 sq. ft., washer & dryer, ideal for one person with a very quiet lifestyle, $895 + utilities. 626/798-4056.

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 w/FP, end unit, frml. d/r, hdwd. flrs., immac. cond., close to schls, $1,750. 626/396-9024.

PASADENA, cottage house, 1 bd., near JPL/Rose Bowl, washer & dryer, stove and refrigerator, gardener/auto sprinklers, carport, small, private yard, paid utilities, asking $950. 626/794-8517, Art.

PASADENA, near Caltech, very nice, large, 2 bd., 2.5 ba. townhouse, w/hardwood, floors, fireplace, patio, A/C, washer/dryer, refrig., stove, new carpet, 2 car parking, $1,600. 626/441-6955.

PASADENA, 3 bd., unfurn., 107 S. El Molino Ave., utilities paid except for gas and electricity, hardwood floors, stove, and laundry hook-up, parking for two cars, 1st and last month's rent, $200 security dep. to move in, $1,300. 626/793-8001 or jaywatkins@earthlink.net.

PASADENA apt. to share, 2 bd., 1 ba., 5 min./ JPL, on Del Mar, 2 blocks so. of Colorado, fireplace, porch, gym, sauna, pool, Jacuzzi, cent. air, secured parking & building, avail. 8/15, $725. 626/683-8864.

SAN MARINO house, 3 bd., 2 ba., 2-car garage with automatic opener, newly painted, remod-eled kitchen, dishwasher, a/c, laundry hookups, spacious family room overlooking yard, living rm. w/fireplace, gardener included, close to bus, exc. neighborhood & school district, $2,850. 626/576-7333.

Real Estate

ALTADENA, 3 bd., 1 ba., 1,108 sq. ft., 7,668 sq. ft. lot, 2-car detached garage w/laundry facilities, by owner, $285,000 or make offer. 800/836-8750, ext. 10020.

DUARTE, 4 bd., 2 ba., 2,019 sq. ft. home, 3-car garage, living room w/fireplace, vaulted wood ceiling family room w/fireplace and wall-to-wall built-in bookcase and kitchen bar, 7,500 sq. ft. lot, mountain view, $379,000. 626/305-1919.

GLENDALE, 4 bd., 2.75 ba., 2,410 sq. ft. home, in pristine move-in cond., convenient 10 min. from JPL, in wooded Glenoaks Cyn. setting & wonderful neighborhood, bay-windowed living rm w/fpl, formal dining rm, large fam rm w/wet bar, & remod. oak-cab kit, spacious front porch w/cyn view, incl. kitchen & laundry appl., new carpet, paint, lighting, furnace, dbl-pane windows, Cu plumbing, $529K. 323/937-9349.

LA VERNE/CLAREMONT–area townhouse, 2 master bd., 2.5 ba., approx 1,400 sq. ft., attached 2-car garage w/washer and dryer hookups, private yard and streets, $205,000. 909/596-5774.

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, 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, jackandrandy@cox.net.

LAKE TAHOE, North Shore, condo, 2 bd., 2.5 ba., sleeps 6, pool, private beach, all amenities, convenient location, two miles to casinos, available by the week only, special JPL discount, $650/week includes tax and cleaning. 626/355-3886, Rosemary/Ed.

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.

MAMMOTH townhouse, sleeps 8; pool, Jacuzzi, sauna, game room; newly decorated; 3rd night free. 626/794-6860 eves.

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 furnished, 2 bd., 2 ba., fireplace, full kitchen, quiet, relaxing, in beautiful setting, located at beachside, with barbeque, pool, spa, game room, and great ocean view, easy walk to pier and restaurants, sleeps 8, available weekly or monthly. 909/981-7492 or dfhauge@yahoo.com, Darlene.

PARK REGENCY, Park City, Utah, December 17-24, 2002, 1 bd., sleeps 4, all units have cooking facilities and are well furnished, many have gyms, pools, Jacuzzis, a tourist desk and some have daily family activities, $550. 897-1203.

PUERTO VALLARTA, Villa del Mar, lg. studio, sleeps 4 max, rooms have microwave, kitchen, phones, cable TV, private patio, 3 pools, 3 restaurants, spa, private beach, charming town, top rated resort. avail only 12/28/02 - 1/4/03, on-site New Year's Eve Fiesta, see at http://www.myuvc.com/puerto_vallarta.shtm. 541-1340.

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.

TIMESHARE, 1 week, anywhere in the world, for the flexible traveler, based on availability, 1 bd., expires Aug. 25, 2002, sleeps 4, $500. 897-1203.

Universe

Jet Propulsion Laboratory

July 19, 2002
Volume 32 Number 15

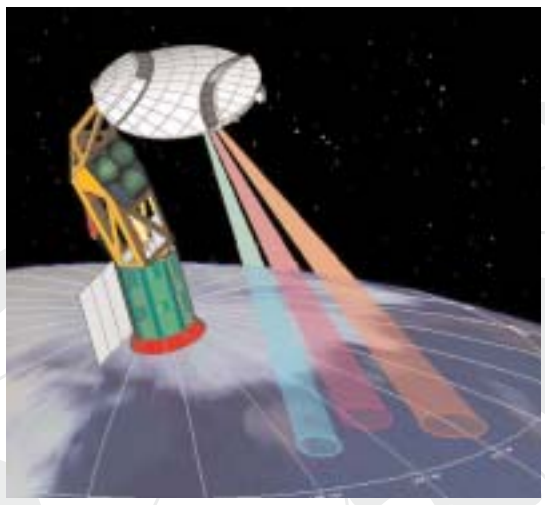
Inside

theme EARTH

Lab will manage new Earth science missions

By Mark Whalen

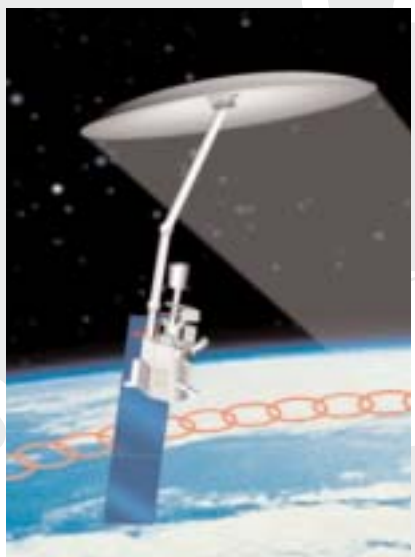
JPL WILL MANAGE *two new missions selected by NASA as part of the Earth System Science Pathfinder small-satellite program that will yield fresh insight into our home planet's carbon cycle and how oceans affect and respond to climate change—knowledge that will help better life here on Earth.*



Partnering with NASA centers, universities, industry and international participants, the Orbiting Carbon Observatory and the Aquarius missions will enhance NASA's mission: to better understand and protect our home planet.

In addition to the two selected new missions, a third proposal from JPL, called Hydros, has been selected to serve as an alternate to the selected missions, should the primary missions encounter difficulties during the initial development phases.

"THE ORBITING CARBON OBSERVATORY will provide global measurements of atmospheric carbon dioxide needed to describe the geographic distribution and variability of carbon dioxide sources and sinks," said Dr. Ghassem Asrar, associate administrator for Earth Science, NASA Headquarters, Washington, D.C. "Aquarius will provide the first-ever global maps of salt concentration on the ocean surface, a key area of scientific uncertainty in the oceans' capacity to store and transport heat, which in turn affects Earth's climate and the water cycle," he added.



Artist's renderings show (clockwise from top) Aquarius, the Orbiting Carbon Observatory and Hydros.

"We are extremely excited about participating in these breakthrough missions," said Dr. Diane Evans, JPL's Earth science and technology director. "Each performs a first-of-a-kind exploratory measurement that will help answer fundamental questions about how our planet is changing and how it will change in the future."

The Orbiting Carbon Observatory will generate knowledge needed to improve projections of future carbon dioxide levels within Earth's atmosphere. Increasing carbon dioxide concentrations have raised concerns about global warming. Even though the biosphere and oceans are currently absorbing about half of the carbon dioxide generated by human activities, the too poorly understood to predict their response to future climate and land-use changes.

Dr. David Crisp of JPL will be the principal investigator for the Orbiting Carbon Observatory, and Bharat Chudasama of Section 380 is the project manager. The mission will include more than 19 universities and corporate and international partners.

Other JPL personnel serving as managers on the project are George Sprague (311), the project system engineering manager and proposal manager, and Barry Weiss (3813), ground data system manager.

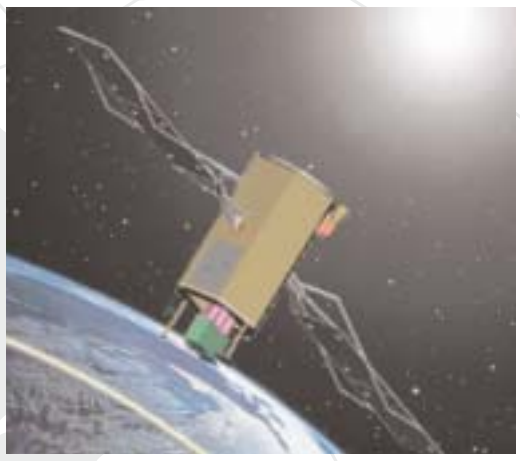
THE SCIENCE TEAM ALSO INCLUDES five JPL scientists from JPL's Atmospheric Chemistry Research Element 3243: Drs. Linda Brown, Ross Salawitch, Stan Sander, Bhaswar Sen and Geoffrey Toon. This represents the largest number of JPL scientists on a JPL-managed principal investigator mission, said Crisp.

The Orbiting Carbon Observatory Education Office is led by Dr. Gil Yanow (1854). Deb Vane (8600), the deputy principal investigator of the Earth System Science Pathfinder CloudSat mission, also contributed to the education plan.

The observatory's instrument will be designed and manufactured by Hamilton Sundstrand Sensor Systems Division in Pomona. The spacecraft will be provided by Orbital Sciences, Dulles, Va.

THE AQUARIUS MISSION IS A COLLABORATION between the Argentine Space Program, JPL and NASA's Goddard Space Flight Center. It will provide global maps of ocean-salt concentration on a monthly basis over its planned three-year mission life so that researchers can better understand the nature of Earth's oceans and their role in storage and distribution of heat and thus their role in global climate change.

Amit Sen of Section 387 is the Aquarius project manager, and Goddard's Dr. Chet Koblinsky will serve as principal investigator. The partnership adds to a successful long-standing relationship between NASA and Argentina. In all, over 17 universities and corporate and international partners will be involved in the Aquarius mission.



Other JPL mission team members are project scientist Dr. Yi Chao, project systems engineer David Durham and instrument manager Dr. Simon Yueh. Science/applications team members are Dr. Tim Liu, who will study surface water fluxes and evaporation, and Dr. Bill Wilson, who is responsible for instrument calibration.

JPL WILL MANAGE THE PROJECT in its formulation and implementation phases through launch, which is scheduled for no earlier than September 2006, from Vandenberg Air Force Base in California.

The Aquarius instrument consists of a JPL-provided scatterometer, and a radiometer provided by Goddard. JPL will test the integrated instrument before it is shipped to Argentina to be integrated with the spacecraft bus. JPL will handle data archiving and distribution, and Goddard will be responsible for data processing.

Following launch, Goddard will manage science operations, and JPL will provide technical support on the instrument.

If selected, the alternate Earth System Science Pathfinder mission, Hydros, would provide the first global view of the Earth's changing soil moisture and surface freeze/thaw conditions, enabling new scientific studies of global change and atmospheric predictability and making new hydrologic applications possible. Launch is now planned for 2007 with at least two years of operation.

THE HYDROS MISSION IS A COLLABORATION between JPL, Goddard, and the Massachusetts Institute of Technology. The project manager is JPL's Dr. Joel Smith, and Hydros is led by Principal Investigator Dara Entekhabi of MIT. Eni Njoku of JPL is one of two project scientists; the other is Paul Houser of Goddard Space Flight Center. Other JPL co-investigators are Jakob van Zyl and Kyle McDonald. The spacecraft bus contractor is Spectrum Astro Inc., and the mission team's contributing partners are the the Italian space agency; Canadian Space Agency; the Integrated Project Office, which is sponsored jointly by the Department of Commerce, Department of Defense and NASA; and the Department of Defense.

Hydros will gather its data in 1,000-kilometer swaths from a sun-synchronous polar orbit with a revisit time of two to three days. The data gathered will consist of brightness temperature measurements by a passive radiometer and backscatter measurements from radar.

NASA will fund up to $175 million for each of the two selected missions. The selected missions will have approximately nine months to refine their proposals to mitigate risk before mission development is fully underway.

NASA issued an Announcement of Opportunity and initially received 18 proposals, six of which were selected for detailed assessment, with two now moving on toward final implementation.

News Briefs

Most of Los Angeles is visible in this north-northeast perspective viewed from above the Pacific Ocean. In the distance the San Gabriel Mountains rise up to separate the basin from the Mojave Desert, which can be seen near the top of the image. The 3-D perspective view was generated using topographic data from SRTM and an enhanced color Landsat 5 satellite image mosaic.

SRTM data made available worldwide

People around the world will soon get to see Earth in an entirely new way, as NASA extends the release of detailed topographical maps collected during the JPL-managed Shuttle Radar Topography Mission beyond U.S. borders to the rest of the globe.

NASA and the National Imagery and Mapping Agency (NIMA), partners in the mission, earlier this month agreed on a policy to provide 90-meter (295-foot) resolution digital-elevation mission data from sites outside the United States to qualified researchers. Selected data will simultaneously become available to the public. The two agencies also made public the mission's research-quality 30-meter (98-foot) resolution topographic data for the entire continental United States.

"Americans take for granted the quality of U.S. topographic maps, but for millions of people around the world, particularly those in the frequently cloud-covered equatorial regions, the elevation maps created with these data will be 10 times more precise than the best available today," said NASA Administrator SEAN O'KEEFE. "That kind of improvement will lead to significant advancements in aviation safety and mitigation of natural hazards, and to smarter and more sustainable urban development, to name but a few applications."

Shuttle Radar Topography Mission data are being processed at JPL into research-quality digital-elevation models one continent at a time. NASA expects to have all mission data processed and delivered to NIMA by the end of this year. All international 90-meter (295-foot) resolution data is expected to be available to the public no later than two years after JPL makes its final data delivery.

The Shuttle Radar Topography Mission (Feb. 11-22, 2000) made 3-D measurements of more than 80 percent of Earth's landmass between 60 degrees north and 56 degrees south of the equator, areas home to nearly 95 percent of the world's population.

Asteroids for Pathfinder team members

As part of the commemoration of the fifth anniversary of JPL's Mars Pathfinder mission, five members of the Pathfinder team have been recognized with asteroids named in their honor.

JPL astronomer ELEANOR HELIN presented certificates to RICHARD COOK, Pathfinder's flight operations manager; KIRK GOODALL, Pathfinder Web engineer; JENNIFER HARRIS TROSPER, who led the Pathfinder surface operations test program; ROB MANNING, flight system chief engineer; and SAM THURMAN, who led a team that helped develop the Pathfinder landing system.

Each of the asteroids were discovered in 1997 at Haleakala, Hawaii by the JPL Near-Earth Asteroid Tracking Program. Pathfinder landed on the surface of Mars on July 4, 1997.

Program recognizes NASA suppliers

JPL has joined with Goddard Space Flight Center in Maryland on a NASA-wide initiative to communicate the importance of process controls to the agency's suppliers.

Sponsored by NASA's Office of Quality Assurance, the Supplier Outreach and Process Control Program develops policies, procedures, software tools, training and other support for suppliers and their workforce to encourage continuous improvement.

BUCK CRENSHAW, JPL procurement quality assurance manager, and KIEN NGUYEN, program coordinator, visited two suppliers last month in recognition of their joining an "approved suppliers" list. Suppliers can gain this status by requesting and passing a quality-assurance audit.

The pair recognized Mott Corp. of Farmington, Conn., a manufacturer of diverse porous materials that has contributed to the Herschel Space Observatory and Planck Project; and Marotta Scientific Controls Inc. of New Jersey, which develops valves and systems for critical performance, environment, weight and power constraints. Marotta has contributed to the New Millennium Program's Space Technology-5 mission.

Currently, two supplier visits are planned for each month, Nguyen said. The NASA-wide goal, she said, is to create a consolidated list of about 200 suppliers by next fiscal year.

Forms have been sent to JPL project and program managers to suggest suppliers for recognition. For information, call Nguyen at ext. 3-7264.

Child care center has fall openings

The Child Educational Center, founded in 1979 under Caltech and JPL sponsorship, is continuing to enroll children, particularly infants and 2-year-olds, for the upcoming 2002-03 year.

JPL and Caltech families not only receive priority enrollment, but also a tuition discount. Tuition assistance is available for qualifying low- and middle-income families.

For information regarding enrollment or to schedule a tour, call ext. 4-3418. Information about the CEC program is also available online at *www.ceconline.org.*

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 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, July 19

Von Kármán Lecture Series—Galileo science team member Dr. Rosaly Lopes will present "Jupiter's Moon Io: A World of Great Volcanoes" at 7 p.m. in Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. For more information, call Public Services at ext. 4-0112 or visit *http://www.jpl.nasa.gov/events/lectures/jul02.html.*

Tuesday, July 23

Investment Advice—A Fidelity representative will be available for one-on-one counseling in T1720-131. For an appointment, call (800) 642-7131.

"Rover Traverse Science: The Opportunities and the Challenges"—Dr. Robert Anderson of Division 32 and Dr. Rebecca Castaño of the Machine Learning Systems Group will discuss rover traverse science and the roles autonomy can play in future rover missions. This talk will explore how scientists and technologists are working together to create the software necessary for the rover to make onboard science decisions. The lecture is sponsored by the Exploration Systems Autonomy Section and will be held at noon in conference room 167.

"Skymobile"—This unique science outreach program housed in a semi-tractor trailer and sponsored by the Natural History Museum of Los Angeles County will be open on the mall from 9 a.m. to 4 p.m. The museum has worked with several JPL scientists in developing Skymobile, and JPL's Mars Program has supported its development with materials and training. Skymobile travels from school to school on a weekly basis, serving 4th and 5th grade children and teachers within the Los Angeles Unified School District.

Wednesday, July 24

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Roger Carlson at ext. 4-2295 for information.

Thursday, July 25

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

Thursday, August 1

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

Ongoing

JPL Tennis Club—A round robin is held Saturdays at 9 a.m. at El Molino School tennis courts, at the corner of Del Mar Boulevard and El Molino Street. Parking is available. For information, call Gordon Blackhall, ext. 4-6981 or Jorge Vazquez, 4-6980.

Italian space chief visits Lab

JPL Director Dr. Charles Elachi, left, chats with Prof. Sergio Vetrella, president of the Italian Space Agency, in the Space Flight Operations Facility during Vetrella's visit to the Lab last month. Vetrella also received briefings on topics of mutual interest to his agency and JPL, including Earth science, the Herschel Space Observatory and Planck Project, Cassini Program and Mars Program. He also toured the Low Frequency Instrument Test Facility, Planck Sorption Cooler Test Facility, In Situ Instrument Lab and Multimission Image Processing Lab.

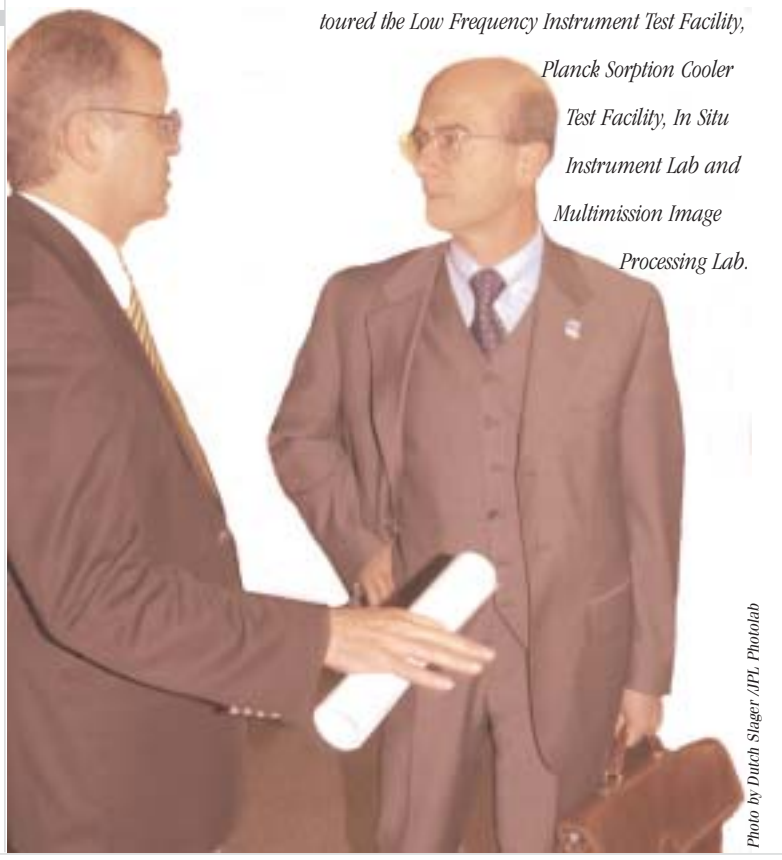
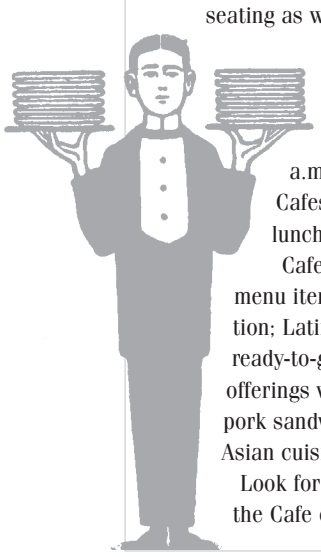


Photo by Dutch Slager /JPL Photolab

Cafe on the Mall to replace 167 cafeteria during renovation

The cafeteria in Building 167 is finally about to undergo its long-awaited remodel. Beginning Friday, July 26, the cafe will be closed for a 9- to 12-month renovation period. On Monday, July 29, Cafe on the Mall, a tent located between Building 183 and the automated teller machine, will open.

Nancy Kapell of the Employee Services and Recognition Office said the 50- by 100-foot tent includes a dining area that will accommodate approximately 100 people. Additional seating will be located in the patio area next to the Rover Coffee Cart, and cafes 303 and 190 will receive additional seating as well.



Cafe on the Mall will be open from 6:30 a.m. to 3:30 p.m. To help avoid the lunch rush hour, Caltech Dining Services will offer a 5 percent discount to customers who purchase food (in the tent only) from 11 to 11:30 a.m. This promotion will be available for a limited time. Cafes 303 and 190, as well as Cafe on the Mall, will offer lunch from 11 a.m. to 2 p.m. during the 167 renovation.

Cafe on the Mall will offer many of the familiar cafe 167 menu items, such as a breakfast bar, hot cereals and omelet station; Latino Bistro, Rocket Fuel, "Panini" made-to-order deli, ready-to-go sushi, fresh pasta station and coffee blends. New offerings will include Texas style barbecue, featuring barbecued pork sandwiches, ribs, beef brisket and hot wings; carving station; Asian cuisine; and a gourmet salad bar.

Look for future updates on the status of the 167 cafe remodel at the Cafe on the Mall, Daily Planet and Universe.

Taking Care of Business

Briefing for Industry Provides Insight Into Teaming Opportunities at JPL

More than 200 business leaders from throughout Southern California gathered last month to learn about potential business opportunities with JPL. The sixth annual Briefing for Industry at the Pasadena Conference Center included presentations by all JPL directorates as well as small-group sessions with Laboratory project representatives, panel discussions, and networking opportunities.

Photo courtesy of Richard Hillquist and Dana Edler

Dr. Diane Evans, left, and Dr. Bill Weber were among JPL directorate leaders who made presentations at the Briefing for Industry.

BY MARK WHALEN

IN ADDITION, a luncheon address was delivered by Chris Scolese, deputy associate administrator of NASA's Office of Space Science. Scolese is responsible for oversight of the agency's space science flight program, mission studies, technology development and overall contract management of JPL.

Attendees were welcomed by JPL Deputy Director Gene Tattini, who participated in his first such briefing since joining the Lab last year. Tattini said he was "pleasantly surprised" by the strong attendance.

"The feedback I've been getting, both formally and informally, continues to rave about the benefits of attending and what they learned about JPL," Tattini said.

As a result of the day-long forum, Tattini said, JPL has already been approached by several contractors who have expressed interest in partnering with the Lab in the near future.

ONE OF THE GOALS of the meeting was to provide attendees with an opportunity for personal interaction with key JPL staff members, thus Tattini thought the networking and panel discussions were the highlight of the day.

Also, executives from each of JPL's directorates were in attendance, presenting potential teaming opportunities for the business community in the coming years.

Dr. Firouz Naderi, manager of JPL's Mars Exploration Office and director for Solar System Exploration Programs, noted that in the last 10 years the number of JPL projects has more than tripled, with 30 missions expected over the coming decade. The Lab's missions have become smaller but more frequent, and at the same time, the JPL workforce has been reduced by one-third.

In light of that, Naderi emphasized to the gathering that to manage this large number of projects, JPL will recruit, train and retain the best system engineers and project managers and "at the same time will work increasingly with outside organizations."

As a federally funded research and development center and a division of Caltech, Naderi explained, JPL is "about halfway between civil service and industry." The Lab strives to maintain significant depth in core engineering disciplines such as system-level design, he said, while maintaining lesser depth in engineering disciplines easily staffed by contractors, such as detailed design and manufacturing.

IN CREATING A BALANCED PORTFOLIO of in-house and contracted activities, Naderi noted, JPL's goal is to always have at least one in-house project in development, while partnering or contracting with industry and universities for majority of the missions and/or mission elements.

Dr. Fuk Li, deputy director, Solar System Exploration Programs Directorate, said that JPL plans to support principal investigators to pursue missions in NASA's New Frontiers Program, formulating integrated industry/JPL teams "to capitalize on the competitive edges of the team members." New Frontiers is structured and managed along the lines of the highly successful Discovery Program, with mission selection through a fully open and competitive process.

Li also told attendees of numerous teaming opportunities over the next few years in the Discovery Program, the Life Detection Science & Technology Program, Space Exploration Technology Program, Mars Technology Program and New Millennium Program.

Director John Beckman noted that Engineering and Science Directorate plans include "continuing and expanding the use of partnerships to promote and influence the development, infusion, and transfer of applicable technologies and mission concepts," as well as continuing the use of task and task-order contracts to meet the need for rapid technical support.

BECKMAN PROVIDED ATTENDEES with a list of contacts at JPL, including a breakdown of work elements and core competencies within Divisions 31, 32, 33, 34, 35 and 38.

Astronomy and Physics Director Larry Simmons noted that of the directorate's major projects over the next decade, "potential significant contracting opportunities" are available for the Disturbance Reduction System, a Space Technology-7 technology demonstration of precision spacecraft control (launch is planned for 2006); Laser Interferometer Space Antenna, a three-spacecraft constellation for the detection of gravity waves (launch in 2008); Mid-Infrared Instrument for the Next Generation Space Telescope, a facility infrared camera in the 5- to 27-micrometer range (launch in 2010); Terrestrial Planet Finder, which will detect and characterize Earth-like planets around as many as 150 stars up to 45 light-years away (launch anticipated in 2012–15); and Keck Interferometer, two 10-meter plus four 1.8-meter telescopes for direct detection of brown dwarfs and warm Jupiters plus study of zodiacal clouds (array first light in 2004–05).

Dr. Diane Evans, director of the Earth Science and Technology Directorate, described NASA's Earth Science Enterprise goals through 2025 on weather, climate and natural hazards, as well as examples of future measurement challenges.

She told the audience two or three Earth-science technology opportunities would be available each year through fy 2007. For Earth System Science Pathfinder missions, one mission will be awarded in fy 03 and another in fy 06.

Interplanetary Network Director Dr. Bill Weber characterized the directorate's challenges as "overcoming today's obstacles and bottlenecks, while increasing mission value."

HE NOTED THAT MAJOR NETWORK INVESTMENTS through fiscal year 2010 include upgrading the current Deep Space Network, demonstrating deep-space optical communications, providing prototype large arrays of small (10-meter) antennas, expanding the Mars network with communication satellites about Mars, and developing new mission and network operations tools and user tools.

Planetary Flight Projects Director Chris Jones pointed out that while subcontracted planetary flight projects work to industry is expected to drop from $245,000 this year to $196,000 in fiscal year 2003, it will spike at about $317,000 for '04. The following year is projected at about $288,000.

Among the panel discussions offered at the briefing, Bob Cox, assistant director for reimbursable programs, Earth Science and Technology Directorate, described collaborative technology areas, emphasizing developing technologies for NASA with Department of Defense applications. Cox provided attendees with JPL points of contact representing the U.S. Air Force, Army, Defense Advanced Research Projects Agency and civil agencies, other Department of Defense agencies, and the Multi-Agency Program.

Ken Wolfenbarger of Office 1318 discussed Tech Affiliates, a JPL program designed to increase competitiveness for U.S. businesses by utilizing JPL expertise to solve company problems, utilize unique JPL facilities, and support transfer of JPL-developed technology.

OTHER PANELS WERE LED by Byron Jackson of Office 135, who provided an overview of NASA's Small Business Innovation Research Program; Merle McKenzie, manager of JPL's Commercialization Technology and Regional Development Program; Al Pappano, manager of JPL's Collaborative Technology Development Office; and Andre Stefanovich of the Acquisition Division.

"We don't have a specific metric to measure the effectiveness of the event," Tattini said. "But everything I've seen has shown that the resources put into this were very much worth it."

Tattini credited the Acquisition Division for doing "a marvelous job in orchestrating this for us." He said plans call for the industry briefing to be held every other year. In alternating years, JPL will consider a smaller "industry town hall," which might include panel discussions with guests from NASA.

He also noted that directorate leaders, "as busy as they are, all felt the time invested was worth it. There's no question to our guests from industry how seriously we took this."

Interns sought for Mission Architect Development Program

As JPL's Mission Architect Development Program enters its sixth year at JPL, the search is underway for qualified participants to join the two-year internship program in July. Under the auspices of JPL's Center for Space Mission Architecture and Design, the Mission Architect Development Program aims to identify, select, and train the next generation of mission architects who will design and implement future JPL missions.

"We need people who can lead the way in changing and improving our processes and, ultimately, our product—as well as enabling a synergy between programs by seeing the bigger picture, and planning for the future," said Nick Thomas, who helped drive the program in its early years, and served as a mentor to many of the program's interns. During each of the first five years of the program, two or three interns were selected to participate.

The Mission Architect Development Program allows interns to work on a variety of projects in a number of disciplines. Interns will have the opportunity to work with the Advanced Projects Design Team (Team X), a team comprising representatives from all the major spacecraft and mission subsystems. Interns help develop mission proposals, become familiar with JPL tools in the automated design process, and work with JPL's industrial partners, gaining valuable perspective on how system design is performed. In addition, interns travel to other NASA centers, fill selected project-specific roles, and work within other JPL Centers of Excellence.

The program is tailored to fit the individual needs of its participants. Interns participate extensively in the planning of their two-year internship. Each intern's plan will be modified to take advantage of his or her expertise and professional interests. Interns' plan will also include study in areas considered to be crucial to his or her development as a well-rounded mission architect. Typical of the classes offered are Introduction to Space Science for Mission Architects, Introduction to Mission Operations, JPL Proposal Preparation, and Principles of Astrodynamics & Mission Design. And interns will be paired with a qualified mentor responsible for guiding and counseling that intern through the program.

Qualities being sought in potential interns include strong technical and problem-solving skills, leadership in technical innovation, and skills necessary to mentor and help others succeed. The selection committee seeks candidates with the following criteria:

- Significant technical skills and knowledge in the area of flight systems
- Effective communication skills
- Proven leadership abilities
- Innovative "Out-of-the-Box" thinking

To be considered you must be a full-time, benefit-based JPL employee, possess a bachelor's degree or equivalent work experience and have a minimum of five years of work experience that includes significant flight systems background. To apply for the program, submit a resume and a one- or two-page letter, with concurrence by your division manager, stating why you should be considered. Send the two documents to Tabitha Joiner, Human Resources Staffing, T1720-C, by Friday, Aug. 16. Applicants and their division manager should also retain copies. A Human Resources representative will forward them to the selection committee for consideration. The committee will interview finalists, and then select the Architect Development Program class of 2005.

All applicants will be informed of the selection committee's decision on Nov. 1.

For additional information, visit the Mission Architect Development Program's Web site at *http://eis/adp* or contact Mark Lopez at ext. 3-6878 or Brindley McGowan at 4-0901.

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

Universe

Editor
Mark Whalen

Design & Layout
Adriane Jach, Audrey Steffan/ Design Services

Chief Photographer
Bob Brown/Photo Lab

Advertising
Susan Braunheim-Kalogerakos

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

Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted 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

CHARLES SCHWITTERS, 83, a retired senior engineer associate, died June 26.

Schwitters worked at JPL from 1952–84. He is survived by his wife, Eunice, son Steve, daughter Bonnie van der Mark, and three grandchildren.

Services were private.

Letters

I would like to thank all my friends, Section 352 and JPL for your support following the recent passing of my father. I was very touched by your kind words, cards and flowers. I would like to remind everyone to take a moment to appreciate their family every day.

Yuki Salinas

Classifieds

For Sale

BABY ITEMS: soft front carrier, Evenflo, $7; car seat w/base, Century, rear-facing, $40; bathtub carousel, Safety1st, $7; all in superb cond., prices are obo; COFFEE MAKERS: Krups, 10 cups, white/gray, like new, $40/obo; Braun, 10 cups, white/black, like new, $30/obo. 626/791-6101.

BAR, solid oak, 5' X 40" x 2', with brass rail and two upholstered bar stools, $200/obo; PIANO, Spinet, with bench, Wurlitzer, dark wood, $700/obo; BEDROOM SET, twin, walnut finish, new mattress and box springs, night stand and chest of drawers, $250/obo; TABLE SAW, Inca, older, 10", attachments, $350; BLOCK PLANES, wooden, and antique tools. 346-3136.

BED, antique oak & rod iron, queen size w/rails, $125/obo; SKI SET, used, women's Head, 170s GALA radial & poles, Salomon boots, size 7 + bindings, see pictures @JPL Store, $120/obo. 626/744-9064.

BICYCLE, women's, 29", Centurion Comp TA road bike, equipped with Shimano 600 derailleur, etc, terrific cond., $60. 956-3745, Steve.

CAMCORDER, Sony Hi-8, model CCD-TR81, remote, carry case, 8 blank tapes, works well, $175/obo. 687-8627, Alberto.

CD PLAYER, Yamaha CDC 565, 5 disc, almost new, manual, remote control included, $60. 626/403-2165.

DESK, roll-top, $125; SURFBOARD, Local Motion Hawaii, 6-ft, $100; FREEZER, Whirlpool, 19.6 cu ft, $50; TABLE, folding, 6-ft, heavy duty, metal, $45; LAWN MOWER, Craftsman, gas, $35; DESK, small, metal, with lock, $35; CHAIR, upholstered, with wheels, $15. 952-6214.

DRYER, Whirlpool, full-size, electric, 4 cycles, 13 temperatures, exc. cond., $120/obo. 626/644-7361, day or 626/345-0413, eve.

HIKING BOOTS, ladies, Vasque, new, leather, size 7, $70. 626/798-6248.

INSECT KILLER, Flowtron, $10. 626/358-7390.

LANGUAGE BOOK/AUDIO TAPES, "Colloquial Croatian and Serbian: Complete Course for Beginners" by Celia Hawkesworth, used, vg cond., $30/obo. 323/268-6645, Priscilla.

LUGGAGE RACK, rooftop, $20. 626/797-6982.

MTN BIKE PARTS, from early 1990s, Shimano, Suntour and others, some new, most slightly used, too much to list, will e-mail a complete list if interested, take all for $75. 640-7479, Greg.

POTTED PLANT, Ficus Benjamina tree, about 15 ft. tall, 6 ft. wide, in large ceramic pot, used as outdoor front entrance décor, live, healthy and well maintained, $150. 626/339-5511.

PRINTER, color Apple StyleWriter 4100, almost new, needs ink cartridges, complete with software and cables, $40/obo. 323/255-8635.

REFRIGERATOR, 18 cu. ft., Frigidaire, white, less than 6 mo. old, $300/obo. 626/355-3621.

REFRIGERATOR, off-white, 18 cu. ft., Kenmore Coldspot, less than 1 yr old w/1 yr of warranty remaining, avail. Aug., $400/obo. 626/289-6359.

SHIRTS, new men's dress, long sleeve, 17 neck, assorted colors/stripes, new Hawaiian, L & XL, $7/ea.; SLACKS, 42-44 waist, $10; SUITS, 44-46, $15; SPORT COATS, $10; all in exc. cond. 790-6060.

SINK, bathroom, white, pedestal, 25 1/2" x 21 1/4", 8" center; pop-up drain, includes faucet assembly, barely used, $150/obo. 626/358-7390.

SOFA SLEEPER, makes into qn. size bed, abstract black, blue & mauve design, gd. cond., $300; BIKES, children's, 4, need TLC, $15/ea. 626/357-8210.

SOFAS, 2, white, new, can link together, firm and comfortable, many pillows to match, easy to move, $200. 626/254-0886, after 6 p.m.

TV, Mitsubishi 50" big screen, beautiful wood cabinet, front projection, $500. 790-1893.

VENDING MACHINES (9), table top, 9 slots, holds approx. 114 pieces of candy, manual, no elec., $1,000. 661/816-7799, Stan.

Vehicles/Accessories

'89 BAYLINER Capri boat, 19 ft. Cobra inboard/outboard, vg cond., approx. 40 hrs on eng., grt. family ski/fish boat, am/fm cass., many extras: skis, vests, life jackets, full canvas, etc., new tires on trailer, ready for summer, photo: www.mogensigns.com/boat.htm, $6,800/obo. 352-4102.

'88 BAYLINER 2655, 460 CI, King Cobra I/O, Loran, Fish Finder radar, fresh water cooling, VHF and more, pictures at ~dprice1551@earthlink.net, $19,500. 805/496-9572.

'97 BMW 328i, convertible, silver with black soft top, gray leather interior, 12,800 mi., mint cond., loaded w/sport pkg., 6-disc CD changer, dual-zone climate control & more, must see to believe, $27,500. 952-5689.

'81 CHEVROLET Corvette, silver/charcoal metallic, black interior, 193K mi., fair cond., $4,000. 661/299-4999.

'01 FLEETWOOD/Coleman folding trailer, 26', Niagara Elite, top of the line, 2 king beds, dining slide out, extras, retail range is $10K - $12K, sell for $9,800. 661/266-1259.

'98 FORD Ranger XLT, great cond, wht, 2 dr, V6, 4.0, 83K mi, 6" body lift, off-road tires, custom brush guard, pwr. everything, a/c, ABS, am/fm/cass, bedliner, tow hitch, spotlight, photos: code3media@crownvic.net, $13,000/obo. 822-6465.

'95 FORD Windstar XL minivan, rear air, quad seating (4 captain's chairs + bench for 3); console, roof rack, privacy glass, + many more features, 89K mi., one owner with all records, runs great, $5,500. 626/447-6423.

'96 FORD Escort LX, 2 dr. hatchback, stick shift, a/c, stereo, only 60K mi., great commuter car, exc. cond., $4,150. 909/985-6806.

'90 FORD Taurus L, 4-dr. sedan, 3L V6, auto., cruise, a/c, power locks, radio/cass., 101K mi., gd. cond., drives well, $1,850. 323/845-9340.

'87 FORD F-250 PU, 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, smog test, $5,000/obo. 626/963-5727.

'73 FORD Explorer XLT, 4 dr., 2 WD, loaded, new tires and battery, 105K miles, great cond., $6,000. 249-0573.

'67 FORD Mustang 390, 4-speed S Code coupe, Ford Blue exterior, new interior, great condition, must see, $6,500/obo. 626/339-9353, Greg.

'66 FORD Mustang, 4 spd., V6, original engine overhauled, new upholstery, brakes need work, tow away only, $2,500. 790-6136.

'00 HONDA Nighthawk motorcycle, 250cc, black, 962 original miles, exc. cond., always housed in a garage, $2,400. 626/792-7753, after 6 p.m.

'00 HONDA Odyssey 2000 EX, 3.5 V6, auto, a/c, in-dash CD, CD changer, electric rear doors 44,400+ mi., $23,500. 661/816-7799, Stan.

'96 HONDA Civic EX coupe, loaded, manual trans, 73,000 miles, dark green, must sell, $8,000. 626/357-4849, Tony.

'91 INFINITI G20, fair cond., $2,800. 957-3675.

'91 ISUZU Trooper LS, V6, 2.8L, 4WD, white, 5 sp. manual, a/c, am/fm/cass, p/s, p/w, cruise control, orig. owner, 90,000 miles, new trans and clutch, VG cond., $3,500. 626/398-0921.

'93 JEEP Wrangler, 5 spd., exc. cond., ~85K mi., runs great, new battery & tires, am/fm/cd, locking console & trunk, photos at http://www.mogensigns.com/jeep.htm, $7,300/obo. 352-4102.

'85 KOUNTRY Lite 5th wheel trailer, 30 ft., orig. owner, alum. frame, 13.5K mi., a/c, side bath, microwave, TV/VCP avail, new tires & water pump, sleeps 6., exc. cond., renewed lic.-Mar., $8,000/obo. 626/963-5727.

'80 MERCEDES 300D, blue exterior, beige interior, good cond., runs well, >30 mpg on freeway. 626/574-1558.

'75 PONTIAC Grand Prix LJ, classic, good cond., maroon with vinyl top, new engine, auto air, PS & PB, good tires, new stereo system w/CD changer, $2,600/obo. 346-3136.

'97 SAAB 900S, convertible, 5 spd., 59K mi., perfect So. Cal. car, $17K. 626/818-0760.

'96 SAAB 900SE turbo, convertible, 5 spd., red/black, leather interior, CD changer, all options, exc. cond., 43K mi., $15,900/obo. 249-1749.

'94 SATURN, 4 dr. sedan, 5 sp., no air, no radio, $1,900. 957-3675.

'94 SEADOO GTX, 2, both are 3-seaters, new upholstery, pre max required, 1 has new '94 engine, other has new top end, lake tuned, vg cond., incl. 2000 Ziena trailer, $6,500. 626/359-7666.

'86 SUZUKI GSX-R 750 motorcycle, 21K mi., Keihin CVK carbs, KN filters, Kerker K2 pipe, progressive front springs, degreed cams, great shape, lots of extras, $2,500. 640-7479, Greg.

'91 TOYOTA Corolla DX, good cond., manual transmission, 4 dr. sedan, aftermarket CD sound system, white with blue upholstry, 145,510 miles, $2,250/obo. 762-3599, Geoff.

TRUCK TIRES/RIMS, 4, Goodyear P286-60 R16, orig. $200/ea., American Racing rims, orig. $400/ea., $600/obo. 897-1203.

'00 VOLVO S40, auto, loaded, leather seats, moonroof, 23K miles, salvage history title, exc. cond., $13,500. 909/599-3230.

Wanted

DONATED ITEMS, for Amnesty Int'l Pasadena/Caltech fundraising sale July 21, household goods, clothes, toys, furniture; all proceeds for human rights activities. aigp22 @caltech.edu or 626/695-1785, Lucas.

GUESTHOUSE, at least 1 bdrm, for responsible JPL employee and her cat; in Pasadena, South Pas. or nearby areas; love pets, and would be happy to help feed/walk pets to pay less-than-market rent. 323/363-4101, Catherine.

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

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

Free

DOG, Pomeranian, honey-tan color, male, several years old; calm temperment for a small dog; needs a good home. 626/798-8456.

DOG, Pug, 3.5 years old, female, free to loving home. 626/799-7593.

MATTRESS, Simmons Elegante, Cal-king, good cond.; COMPUTER, Apple Macintosh II, 13" color monitor, extended keyboard, modem, good cond. 661/299-4999.

For Rent

ALTADENA, charming, freshly painted, 2 bd., 1 ba., house near Christmas Tree Lane, hardwood floors, fireplace, appliances, whole-house fan, fenced backyard, fruit trees, roses, see www.alumni.caltech. edu/~chrisc, $1,650/negotiable incl. water, gardener, trash. 626/794-9579, eves.

ARCADIA, 2 bd., 1 ba., front unit of quiet 4-plex, fireplace, stove, a/c, new carpet, blinds, paint and ceiling fans, enclosed carport w/storage, laundry room, $1,075. 909/594-0424.

GLENDALE condo, spacious 1 bd. + den; exc. area, walk to restaur./shops/theaters; pool, garden BBQ area, laundry, subterr. parking in security bldg; large ba. w/separate shower and double sinks, cent. heat/air; new paint, lin-oleum and carpet; very private & quiet, no pets, avail Aug., $925 + security & cleaning deposits. 548-5656.

LA CRESCENTA, house, 3 bd., 2 ba., 3 yrs. old, large yard, quiet wooded neighborhood $2,400. 249-2990.

MT. WASHINGTON, room in newly remodeled, lg. home in tranquil, bucolic setting; priv. bedroom w/full ba.; 15 minutes to JPL; includes basic utilities, washer/dryer, satellite TV, off-street parking; $900 + security dep. 323/478-1853, Priscilla.

MONROVIA HILLS, charming 2nd level of house w/a view, 2 bd., 1.5 ba., kitchen w/refrigerator & electric stove, dining rm., living rm, master bd. w/walk-in closet, laundry rm. area, $1,200 w/2-car gar. or $1,000 w/out garage. 626/256-0015.

PASADENA, near Caltech, very nice, large, 2 bd., 2.5 ba., w/hardwood floors, fireplace, patio, a/c, washer/dryer, refrig, stove, new carpet, 2 car parking, $1,600. 626/441-6955.

PASADENA, apt. to share, 2 bd., 2 ba., + loft, in luxury security complex nr Colorado/ Lake, living rm, loft & kitchen fully furn., DSL, balcony, pool, Jacz., gym, avail. Aug. 16, $750. 626/644-5431.

PASADENA, 1 bd. in a 2 bd., 1 ba. house, all privileges, male preferred, no pets, quiet area, walking dist. to Caltech & PCC, $325 dep. & 1st mo. rent required, $375 + util. 626/844-0425.

PASADENA, spacious 2-story condo, 3 bd., 2.5 ba., prestigious community, beaut. inter., bright ktch., prof. landscape, ctrl. air/heat, close to shops/schools, cozy l/r w/FP, end unit, frml. d/r, hdwd. flrs., immac. cond., $1,750. 626/396-9024.

PASADENA guest house, above Eaton Cyn. golf course, beautiful setting, about 1,000 sq. ft., washer & dryer, ideal for 1 person with a very quiet lifestyle, $895 plus util. 626/798-4056.

PASADENA, female preferred to share 2 bd., 2 ba. apt., near 210 fwy, separate phone line, mo.-to-mo. lease, secured bldg., pool, whirlpool, BBQ, laundry facil. in complex, $600 + half util. (gas, electric, cable ~$60). 626/795-8197, Denise.

SIERRA MADRE, small, charming, 2 bd. home, 1 ba., carpeted, stove, laundry room, storage, fenced yard, flowers, great neighborhood, water and trash included, 15 min./JPL, avail. Aug. 1, $1,275. 626/355-3492.

SYLMAR, spacious, 4 bd., 2.5 ba., 2,788 sq. ft., rent to own, gated, view, new pool, $10,000 credit toward purchase, $2,395. 626/584-6526.

Real Estate

SILVERLAKES, Calif., resort, 2 bd. condo for up to 6, 4 weeks free golf anytime each year at private PGA-rated course with driving range and putting greens, two lakes, many amenities, less than 2 hours from Pasadena, exchange rights with 3,000 resorts, reduced to sell due to illness, $15,000, easy terms. 805/967-7725.

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 + guest house comfortably slp 6, 3 bd., 2 ba., rustic/relaxing/beautiful, swimming, snork-eling, fishing, spectacular vw, near restaurants, golf and other attractions. 626/584-9632.

LAKE TAHOE, N. Shore, condo, 2 bd., 2.5 ba., slps 6, pool, priv. beach, all amenities, conv. location, 2 mi./casinos, avail. by the week only, special JPL discount. 626/355-3886, Rosemary/Ed.

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.

MAMMOTH townhome, sleeps 8; TV, VCR, pool, Jacuzzi, sauna, laundry, gameroom; tasteful decor; JPL discount (3rd night free). 626/794-6860, eves.

OCEANSIDE condo, fully furn., 2 bd., 2 ba., fireplace, full kitch., quiet, relaxing, beautiful beach-side setting; BBQ, pool, spa, game rm, great ocean vw, easy walk to pier & restaur., sleeps 8; avail. 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.

PUERTO VALLARTA, Villa del Mar, lg. studio, sleeps 4 max, rooms have microwave, kitchen, phones, cable TV, priv. patio, 3 pools, 3 restaurants, spa, priv. beach, charming town, top-rated resort, avail only 12/28/02 - 1/4/03, on-site New Year's Eve Fiesta, see http://www.myuvc.com/puerto_vallarta.shtm. 541-1340.

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, 2 bd. condo for up to 6, 4 wks free golf each yr. at priv. PGA-rated course w/driving range and putting greens, 2 lakes, many amenities, less than 2 hrs./Pasadena, exchange rights w/3,000 resorts, reduced to sell due to illness. 805/967-7725.