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Universe

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Employees asked to share visions for JPL of 2057

By MARK WHALEN

What will JPL be like in 60 years, when the space age turns 100? How might space research better serve everyone on Earth? And how might the Laboratory and NASA achieve what may be considered only dreams today?

Although, presumably, no one who now works at JPL will be around to see the Laboratory of 2057, employees are nonetheless being encouraged to share their visions of the possibilities of the distant future, as well as the ways to achieve them in the short term.

The effort was introduced with mid-June meetings for managers and supervisors led by JPL Director Dr. Edward Stone. The next stage starts the week of July 13, when a series of meetings hosted by members of the Executive Council will begin, allowing interested employees to contribute their thoughts on the Lab's future.

The meetings will address a variety of themes, said Legislative and International Affairs Office Manager Dr. Richard O'Toole, who is managing the overall effort. He explained that the themes describe specific project assignments as well as general areas of employee interest. A partial list of the themes includes:

- Origins
- Mars
- Earth science and instruments
- Technology development
- Flight operations
- Mission assurance
- Software
- Centers of excellence
- Best business practices
- Outreach

An online system at http://hr/et has been devised for those who wish to sign up for the sessions.

"Employees will be able to participate in a meeting with a theme to which they contribute today," O'Toole said, "or may also choose to propose ideas for theme areas they might like to be part of in the future."

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A year later, new Pathfinder conclusions

Rock composition, water history among latest findings

By FRANKLIN O'DONNELL

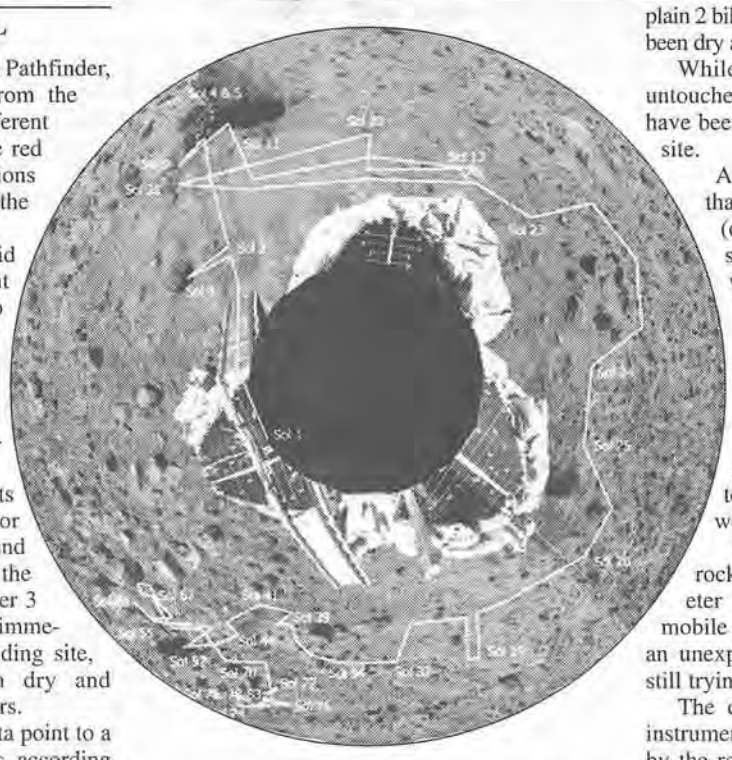
A year after the landing of Mars Pathfinder, mission scientists say that data from the spacecraft paint two strikingly different pictures of the role of water on the red planet, and yield surprising conclusions about the composition of rocks at the landing site.

"Many of the things that we said last summer during the excitement after the landing have held up well," said Dr. Matthew Golombek, Pathfinder project scientist at JPL. "But we have now had more time to study the data and are coming up with some new conclusions."

Similar to ongoing science results from JPL's Mars Global Surveyor spacecraft currently in orbit around Mars, Pathfinder data suggest that the planet may have been awash in water 3 billion to 4.5 billion years ago. The immediate vicinity of the Pathfinder landing site, however, appears to have been dry and unchanged for the past 2 billion years.

Several clues from Pathfinder data point to a wet and warm early history on Mars, according to Golombek. Magnetized dust particles and the possible presence of rocks that are conglomerates of smaller rocks, pebbles and soil suggest copious water in the distant past. In addition, the bulk of the landing site appears to have been deposited by large volumes of water, and the hills on the horizon known as Twin Peaks appear to be streamlined islands shaped by water.

But Pathfinder images also suggest that the landing site is essentially unchanged since catastrophic flooding sent rocks tumbling across the plain 2 billion years ago. "Since then this locale has been dry and static," he said.



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New Mars Pathfinder image indicates the route traveled by the Sojourner rover during 83 sols (Martian days) last year. The azimuth-elevation projection of the "gallery panorama" shows the rover against the rock Yogi, which it visited on the fourth and fifth Martian days following Pathfinder's July 4 landing. The rover path was reproduced using IMP camera "end of day" and "rover movie" image sequences and rover vehicle telemetry data as references.

While the area appears to have been untouched by water for eons, wind appears to have been steadily eroding rocks at the landing site.

Analysis of Pathfinder images shows that about about three to five centimeters (one to two inches) of material has been stripped away from the surface by wind, Golombek noted.

"Overall, this site has experienced a net erosion in recent times," Golombek said. "There are other places on Mars that are net 'sinks,' or places where dust ends up being deposited. Amazonis Planitia, for example, probably has about one to two meters (three to six feet) of fine, powdery dust that you would sink into if you stepped on it."

Chemical analysis of a number of rocks by the alpha proton X-ray spectrometer (APXS) instrument on Pathfinder's mobile Sojourner rover, meanwhile, reveals an unexpected composition that scientists are still trying to explain.

The current assessment of data from this instrument suggests that all of the rocks studied by the rover resemble a type of volcanic rock with a high silicon content known on Earth as andesite, covered with a fine layer of dust. All of the rocks appear to be chemically far different from meteorites discovered on Earth that are believed to have come from Mars.

"The APXS tells us that all of these rocks are the same thing with different amounts of dust on them," said Golombek. "But images suggest that there are different types of rocks. We don't yet

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Two JPLers named astronaut candidates

By ENRICO PIAZZA

JPL scientists Dr. Stanley Love and Dr. John Olivas have been selected by NASA for the 1998 Astronaut Candidate Program, and will report to NASA's Johnson Space Center in Houston in mid-August to begin one year of training and evaluation.

The two will train to become mission specialists, astronauts who are in charge of operating experiments, deploying satellites and handling many other aspects of space shuttle missions.

Both scientists said they have been fascinated with space since childhood. And as is often the case, both had previously applied for the astronaut program. Only 25 people were selected this year, out of more than 2,600 applicants.

Since joining JPL a year ago, Love has been a staff engineer working with computer models of space optical instruments, such as the Tropospheric Emission Spectrometer, which will determine the chemical composition of Earth's atmosphere with unprecedented accuracy.

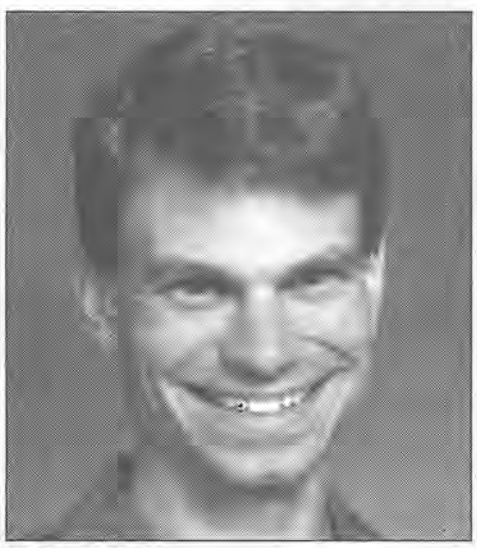
Love has been part of a team working to develop new methods for estimating the condition of the optics in space telescopes. He has applied these techniques to the Hubble Space Telescope, where they can be used to sharpen up existing images. Hubble also provides a useful test case for future missions, such as the Next Generation Space Telescope, which will have built-in optical adjustment capabilities. Love also worked on reengineering JPL engineering processes.

Love said his fascination with space started with science-fiction books.

"I started reading sci-fi books at 6, and I always loved space and astronomy," he said.

However, it was only when a fellow graduate of his college went on to become an astronaut that he realized he too could realize his dream to visit space.

"I thought, if he could do it, it is possible. So I started to apply while I was working on my Ph.D., and updated my application every year," he said.



Dr. Stan Love

Dr. John Olivas

His tenacity eventually paid off.

"I didn't get hired that time, didn't get hired the second time, then I finally got hired this time. I'm very honored, and delighted," he said.

Before joining JPL, Love for two years held a post-doctorate appointment in Caltech's Geological and Planetary Sciences Division. He researched how metal and minerals behave under hard pressures and violent impacts, as well as studying simulated asteroid collisions using a supercomputer.

After his high school graduation in 1983 in Eugene, Ore., Love earned a bachelor's degree in physics from Harvey Mudd College, then earned a master's degree and a doctorate in astronomy from the University of Washington.

A San Diego native, Love, 33, lives in Pasadena with his wife, Jancy McPhee, a molecular biologist at Caltech. They have a son, Gavin, who will turn 2 this month.

Olivas is a program element manager in JPL's Advanced Interconnect and Manufacturing Assurance Section. Joining the Laboratory in 1996, he has done extensive research for the Deep Space 2, Stardust and Champollion missions, as well as the X-33, a prototype reusable launch vehicle.

As a mechanical and material engineer, his research focuses on studying how different materials—from plastic to metal to ceramic—behave once exposed to light, radiation, increased temperature and pressure. The goal is to understand what the specific material does at the atomic level.

Olivas, 32, was born in North Hollywood and grew up in El Paso, Texas, where his parents still live.

Olivas said it was a summer trip to the Johnson Space Center and Kennedy Space Center with his family that inflamed his fascination with space. He was only 7 years old, but realized right away that that was his calling, and to become an astronaut has been a life-long dream ever since.

"For me it was just standing next to this Saturn V launch vehicle that was at JSC. I remember being very impressed by its size," he said. "That trip was really an inspiration, especially listening to those little voice-boxes in JSC's museum playing recording of the landing of the Apollo mission

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Io's volcanoes hotter than any planet: Galileo

By JANE PLATT

New observations by JPL's Galileo spacecraft reveal dozens of volcanic vents on Jupiter's fiery moon Io where lava sizzles hotter than the surface temperature of any other planet in our solar system. Temperatures this high are not known to have occurred on Earth for billions of years. At one such vent, known as Pillan Patera, two of Galileo's instruments have indicated the lava temperature may be 2,000 Kelvin (3,140 degrees Fahrenheit). These results are reported in the July 3 issue of the journal Science.

"The most likely explanation for these very high temperatures is that the eruptions contain magnesium-rich silicates," said Dr. Alfred McEwen of the University of Arizona, a member of Galileo's solid state imaging camera team. "We've tentatively identified magnesium-rich orthopyroxene in lava flows around these hot spots. This leads us to conclude that silicate volcanism is taking place with lava compositions expected to melt at a very high temperature. We must now think of Io's volcanoes in terms of the type of very high-temperature silicate volcanism which was found on Earth during its early days, and which we suspect occurred also on Venus and Mars."

The new findings by the Galileo camera and the spacecraft's near infrared mapping spectrometer have updated scientists' information on Io's volcanic processes. Previously, Io observations made by the Voyager spacecraft in 1979 put the highest temperature estimates at about 650 Kelvin (710 degrees Fahrenheit). This led many scientists to believe that Io's volcanic activity was caused by low-temperature sulfur volcanism. In 1986, ground-based telescope

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News Briefs

JPL Director **Dr. Edward Stone** has received the American Red Cross' first-ever CEO of the year award for his efforts in encouraging JPL employees to donate blood.

Stone accepted the award last month at a ceremony in Studio City. "When we host a blood drive, employees are encouraged to give the gift of life," he said. "I'm proud to say that the response of the JPL family over the years has been outstanding." ❑

Two JPL engineers have received the Association for Federal Information Resources Management's (AFFIRM) Innovation Leadership Award for their work on the Mars Pathfinder mission.

Al Sacks, manager of Pathfinder's ground data systems development, and **Dr. Henry Stone**, cognizant engineer for the Sojourner rover's control and navigation subsystems, received the award June 18 in Washington, D.C.

The pair's award was one of six handed out by AFFIRM, a nonprofit professional association that promotes the effective and efficient use of information technology in the federal government. The organization has approximately 300 members, which are equally divided between government and industry.

Sacks has been with JPL since 1970 and now serves as project manager of the X2000 mission data system. Stone, who joined the Lab in 1987, is currently leading control and navigation subsystems work on Mars rovers for missions in 2003 and 2005. ❑

TOPEX shows El Niño in retreat; La Niña next?

New sea surface height measurements taken by JPL's ocean-observing TOPEX/Poseidon satellite show the equatorial Pacific in a state of flux with the warm, high sea level El Niño-spawned waters in retreat and areas of colder, low sea level waters on the increase.

"Sea level is a measure of the heat stored in the ocean. In the last month or so, the tropical Pacific has been switching from warm to cold. Lower sea level indicates less heat, hence a colder ocean," said Dr. Lee-Lueng Fu, the project scientist for the U.S.-French TOPEX/Poseidon mission at JPL. "It appears now the central equatorial Pacific ocean will stay colder than normal for some time to come because sea level is about 18 centimeters (7 inches) below normal, creating a deficit in the heat supply to the surface waters. It is not clear yet, however, if this current cooling trend will eventually evolve into a long-lasting La Niña situation."

The 1997-98 El Niño—the strongest ever recorded—was responsible for record rainfall amounts in California, heavy flooding in Peru, drought and wildfires in Indonesia, tornadoes in the southeast United States and loss of life and property damage worldwide.

A "La Niña" (Spanish for "little girl") is essentially the opposite of an El Niño condition, where the trade winds are stronger than normal and the cold water that normally exists along the coast of South America extends to the central equatorial Pacific. A La Niña situation also changes global weather patterns and is associated with less moisture in the air resulting in less rain along the coasts of North and South America. TOPEX/Poseidon will be able to track a potentially developing La Nina with the same accuracy.

"It may be too soon to say 'goodbye' El Niño and 'hello' La Niña, because the effects of El Niño will remain in the climate system for a long time," said Dr. Bill Patzert, a research oceanographer at JPL. "However, if the Pacific is transitioning to a La Niña, we'd expect to see a clear, strong indication of it by late summer or early fall—in approximately August or September—just like we did last year with El Niño. The strongest impacts of a potential La Niña wouldn't be felt in the U.S. until next winter." A La Niña doesn't automatically follow an El Niño, Patzert added.

The new satellite image from June 14 is available online at http://www.jpl.nasa.gov/elnino . ❑

Future

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The meetings—which will be administered through Professional Development—will be part of the process of showing employees their individual roles in implementing JPL's strategy, O'Toole noted. In addition, employees will learn how they can contribute to the strategies of the Laboratory's directorates and divisions in carrying out JPL's strategic plan.

The directorates have prepared objectives for the future, with their completed plans due by the start of fiscal year 1999 at the end of September. O'Toole indicated that the plans will be posted July 17 on the strategic management home page at http://techinfo.jpl.nasa.gov/implementationplan. "People can peruse them and say, 'Are the things I think are important represented there, and how can I contribute to making them happen?'"

O'Toole added that by the next Employee Contribution and Planning (ECAP) period, all supervisors will be required to talk to employees "about where they fit in the larger scheme of things, about where their work fits into JPL's contributions to NASA's vision of the future."

To achieve the Laboratory's long-term vision, the theme meetings will be followed by a new JPL Implementation Plan, the first of an annual assessment required by NASA from each field center. This document includes the Lab's implementation strategies, outlines its planning and characterizes its alignment with the agency's strategic plan.

Prior to the managers' meeting, this new planning process actually began with an off-Lab meeting last month where Stone had a wide range of discussions with a group of 40 JPL employees representing a wide spectrum of the Lab population. "This was an exercise to think broadly about where we could be, to take this vision of a possible future and see if we're doing the things now that give us the best opportunity to move in that direction, and to build this into our current planning," O'Toole said.

The idea, he added, was to get people to dream of what could be possible, but "work from the future toward what you should be doing today to prepare yourself to move in the right direction. Part of the exercise was to determine the things we ought to do next year that would put us on a path consistent with this kind of a future."

The working group came up with some goals that reflected possible JPL futures in five, 15, 30 and 60 years. For example: 60 years from now, will the Lab have developed processes to design, fabricate and test a spacecraft in six weeks, resulting in several dozen launches every year? Or what kind of technologies would need to be developed so that JPL can help control El Niños, predict earthquakes and patch the ozone hole? By 2057, could there be—or should there be—a solar system Internet, where real-time data can be instantly accessed by anyone from billions of miles away?

O'Toole said interested employees can review these goals and make suggestions for improvements after July 17 at http://techinfo.jpl.nasa.gov/implementationplan .

"One of Dr. Stone's goals is to have space enrich the human experience for all," O'Toole said. "Right now, the space program enriches a limited subset of the population—scientists and others who are interested in it.

"People should think of us not just as the folks who go to Mars, but also as the people who develop technologies that create new industries and new jobs, and make life better here on Earth."

Visions of JPL's long-term future "won't replace the strategic plan," O'Toole said. "We still need to have strategies and change goals to guide us in how we do our day-to-day business, but this does provide a context for our near-term planning."

Because of the number of missions JPL manages and the speed required to develop them, "We want to show that the Laboratory is interdependent and that the directorates need to maintain an integrated working relationship, because you can't possibly plan the future otherwise," he added.

"How can we change the way we work in a Lab where 25 missions a year is the norm? It can't be the same as it was for the first 30 years of our NASA relationship."

O'Toole urged employees to participate in the upcoming meetings by "putting their work aside for an hour and a quarter. Be visionary; dream a bit about what the future could be and what you would like your legacy to be." ❑

ISO assessments continue next week

The second of four rounds of internal assessments in preparation for JPL's ISO 9001 certification will take place the week of July 13.

The first round of assessments performed in June came off as a "job well done, with objectives met," according to Peter Barry, who coordinated 17 teams comprising 68 assessors from across the Laboratory. The teams surveyed 483 Lab personnel on their level of awareness and comprehension of ISO 9001, process-based management and JPL's documentation structure. The group assessed represented roughly 9 percent of the Lab.

Barry said most of those surveyed were aware of ISO, but not many knew specifics. Plans are under way, he said, to communicate information to employees about the Define and Maintain the Institutional Environment (DMIE) user interface, process documentation and an improved ISO 9000 home page (http://iso).

Round two will focus on process documentation definitions and policies. Project/task and line organization documents will also be identified. The next two rounds of assessments are scheduled for August and September. ❑

Io

Continued from page 1

observations increased the temperature estimates to above 900 Kelvin (1,160 degrees Fahrenheit), which suggested that silicate volcanism was occurring at least occasionally, just as it does on Earth today. In 1996 and 1997, Galileo identified 30 locations with temperatures higher than 700 Kelvin (800 degrees Fahrenheit).

"This new data indicate that high-temperature eruptions on Io are a basic and common part of its active volcanic processes," said Galileo project scientist Dr. Torrence Johnson, who led the group that found the high temperature eruption in 1986. He is also a member of the near infrared mapping spectrometer team. "Io's current volcanic activity may have a lot in common with ancient volcanic processes on Earth and other planets. Since the geologic record from those times is very sparse, it's quite exciting to be able to study this type of volcanism going on today."

"This discovery of high-temperature silicate volcanism provides us with an extremely important clue to understanding the geophysical processes within Io," McEwen explained. Io is heated by periodic tides as it orbits Jupiter, along with the other Galilean satellites (Europa, Ganymede and Callisto).

Armed with this new information, scientists also hope to learn more about the composition of Io's crust. "Io's extreme volcanic activity is expected to result in a low-density crust rich in silica, sodium and potassium," said McEwen. "However, the high-temperature volcanism suggests that the crust may be composed of heavier lavas."

Galileo's solid state imaging camera observed Io during 11 eclipses in five orbits, when Io was in Jupiter's shadow, and sunlight was blocked so the camera could better see the glowing volcanic vents. Io's hot spots were also studied by the spacecraft's near infrared mapping spectrometer during 11 orbits, mostly when Io was not in eclipse. The camera provides high spatial resolution to image the hottest features and map color variations, while the spectrometer can observe at many wavelengths and is sensitive to a wider temperature range. Thus, the combination of both instruments provides a powerful means to study Io's volcanism. The camera and spectrometer together have discovered a total of 41 hot spots on Io.

Scientists hope to gather more detailed information about Io with two planned close flybys in late 1999, as long as the Galileo spacecraft remains healthy. Galileo's current extended journey, known as the Galileo Europa Mission, includes eight flybys of Europa and four of Callisto, in addition to the Io flybys. ❑

Special Events Calendar

Ongoing

Alcoholics Anonymous—Meeting at 11:30 a.m. Mondays, Tuesdays, Thursdays (women only) and Fridays. For more information, call Occupational Health Services at ext. 4-3319.

Codependents Anonymous—Meeting at noon every Wednesday. For more information, call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Support Group—Meets the first and third Fridays of the month at noon in Building 111-117. For more information, call employee assistance counselor Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—Meets the fourth Tuesday of the month at noon. Call Jayne Dutra at ext. 4-6400.

Senior Caregivers Support Group—Meets the second and fourth Wednesdays of the month at 6:30 p.m. at the Senior Care Network, 837 S. Fair Oaks Ave., Pasadena, conference room #1. For more information, call (626) 397-3110.

Friday, July 10

Bastille Day—The JPL French Club will celebrate the event with a dinner at Caltech's Athenaeum. For information and reservations, call Nicole Petrens at ext. 4-9189 or (626) 284-7592.

JPL Dance Club—Meeting at noon in Building 300-217.

Tuesday, July 14

Associated Retirees of JPL/Caltech—Members will visit the Aquarium of the Pacific in Long Beach. Cost: $35. Call Phil Neuhauser at (818) 353-2976.

JPL Scuba Club—Meeting at noon in Building 168-427.

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

Wednesday, July 15

JPL Drama Club—Meeting at noon in Building 301-127.

Thursday, July 16

ACW Seminar—Clinical psychologist and author Dr. Harriet Braiker's presentation, "The Type E Woman: Balancing Your Life," will focus on women who strive to excel in their careers and personal lives. At noon in von Kármán Auditorium.

Eudora Training for Technical Staff—This session features an introduction to using Eudora and its various features, and offers more detail than the sessions for business users. At 2 p.m. in the Building 167 conference room.

JPL Dance Club—Clogging class will be held at noon in Building 300-217.

JPL Astronomy Club—Meeting at noon in Building 198-102.

"New Fidelity Quarterly Statements"—Fidelity Investments representative Jasson Rasmussen will present this workshop at 10 a.m. and 2 p.m. in Building 180-101. For information, call Patrice Houlemard at ext. 4-2549.

Von Kármán Lecture Series—David Doody, operations engineer with Cassini's Realtime Operations Element, will discuss the basics of space flight at 7 p.m. in von Kármán Auditorium. Open to the public.

Friday, July 17

JPL Dance Club—Meeting at noon in Building 300-217.

Von Kármán Lecture Series—David Doody, operations engineer with Cassini's Realtime Operations Element, will discuss the basics of space flight at 7 p.m. in The Forum at Pasadena City College, 1570 E. Colorado Blvd. Open to the public.

Saturday, July 18

Folk Music—The Cyrus Clarke Band will appear in Caltech's Dabney Lounge at 8 p.m. Tickets are $12. For information, call (626) 395-4652.

Wednesday, July 22

JPL Drama Club—Meeting at noon in Building 301-127.

JPL Toastmasters Club—Meeting at 5:50 p.m. in the Building 167 conference room.

"Putting Up Web Pages... Or Putting Up with Web Pages"—Chris Hawley will provide an introduction to some of the processes required to create and distribute web pages on Lab. The overview will include insight into the creative process, site organization, content requirements, maintenance issues and resources available for web production. At noon in von Kármán Auditorium.

Thursday, July 23

JPL Dance Club—Clogging class will be held at noon in Building 300-217.

JPL Atari Club—Meeting at noon in Building 238-544.

NASA Honor Awards recognize best of JPL

JPL employees, contractors and partners were recognized for their outstanding work over the past year as the Lab held the annual NASA Honor Awards ceremony June 30.

JPL Director Dr. Edward Stone, Deputy Director Larry Dumas and NASA Associate Administrator for Space Science Dr. Wesley Huntress presented 182 awards to teams and individuals.

Huntress presided at the ceremony for the final time, as he recently announced that he will retire from NASA later this year. He told the audience he was proud of JPL's hard work and accomplishments, which "have delighted people around the world and have resulted in a rekindling of excitement and interest in space science."

He called the Pathfinder mission a "singularly delicious event" that set the pace for the future, but also urged the gathering to "look ahead, not back."

Huntress also praised JPL's technology development efforts. "A future of missions as scientifically engaging as Galileo and Cassini will be enabled by the very technologies you at JPL are now working on," he noted. "You are now in a position to define your own future."

Following is a list of teams and individuals receiving Honor Awards.

Public Service Group Achievement Award: *given to a group of nongovernment employees in recognition of an outstanding accomplishment that has contributed substantially to the NASA mission.*

Raytheon Systems Company.

Group Achievement Award: *given in recognition of an outstanding accomplishment that has been made through the coordination of many individual efforts and has contributed substantially to the accomplishment of the NASA mission. May be used to recognize the accomplishments of either a total government employee group or, as a team award, a group comprised of both government and nongovernment personnel.*

Alkali Metal Thermal-to-Electric Converter (AMTEC) Team; Automated Real-Time System for Navigation (ARTSN) Team; Automated Synthetic Aperture Radar Image Processor Development Team; Base Pay Program Implementation Team; Canberra Deep Space Communications Complex Mars Pathfinder Support Team; Cassini Program Team; Confined Helium Experiment Team; DCAPS (Data-Chaser Automated Planning and Scheduling System) Development Team; Galileo Project Team, Goldstone-Apple Valley Radio Telescope System Development Team, Goldstone Deep Space Communications Complex Mars Pathfinder Support Team, HiNet Implementation Team, Imager for Mars Pathfinder Operations Team, Interferometry Program Experiment (IPEX) Team, Interactive Voice Response (IVR) Implementation Team, Japan-U.S. High Data Rate Satellite Communications Experiments Group, Library-Archives Team, Madrid 34-meter Beam Waveguide Antenna (DSS 54) Implementation Team, Madrid Deep Space Communications Complex Mars Pathfinder Support Team, Mars Pathfinder Alpha Proton X-ray Spectrometer Operations Team, Mars Pathfinder Atmospheric Structure and Meteorology Instrument Operations Team, Mars Pathfinder Entry, Descent, and Landing Communications Team; Mars Pathfinder Flight Operations Team; Mars Pathfinder Microrover Operations Team; Mars Pathfinder Multimission Image Processing Team; Mars Pathfinder Operations Support Team; Mars Pathfinder Participating Scientists Experiment Operations Team; Mars Pathfinder Public Outreach Team; Mars Pathfinder Science Data Archiving Team; Mars Pathfinder Telecommunications and Mission Operations Support Team; NASA Scatterometer Science Team; NSTAR 8,000-hour Test Team; Purchase Card Implementation Team; TOPEX/Poseidon Science Data Analysis and Verification Team; Turbo Code Development Team.

PHOTO BY DUTCH SLAGER / JPL PHOTO LAB

Dr. Wesley Huntress, associate administrator of NASA's Office of Space Science, addresses audience at the agency's Honor Awards ceremony June 30.

Public Service Medal: *awarded to any individual who was not a government employee during the period in which the service was performed. The award is granted for exceptional contributions to the NASA mission.*

Shri Agarwal (ACRO Service Corp.), James Hodder (AlliedSignal Technical Services Corporation), Anthony Knight (AlliedSignal), Claude "Bud" McAnally III (Lockheed Martin Astronautics), William Mitchell (Orbital Sciences Corp.), Henry Moore (United States Geological Survey), Jack Morrison (Federal Data Corporation), Christopher Shinohara (University of Arizona), Jeffry Sincell (Worst Case Associates), Peter Smith (University of Arizona).

Exceptional Engineering Achievement Medal: *awarded for unusually significant engineering contributions toward achievement of the NASA mission. May be given for individual efforts or applications of engineering principles or methods that have resulted in a contribution of fundamental importance in this field or have significantly enhanced understanding of this field.*

Donald Bickler.

Exceptional Scientific Achievement Medal: *awarded for unusually significant scientific contributions toward achievement of the NASA mission. May be given for individual efforts that have resulted in a contribution of fundamental importance in this field or have significantly enhanced understanding of this field.*

Matthew Golombek, Richard Woo.

Exceptional Service Medal: *awarded for significant, sustained performance characterized by unusual initiative or creative ability that clearly demonstrates substantial improvements or contributions in engineering, aeronautics, space flight, administration, support or space-related endeavors that contribute to the NASA mission.*

Michael Chilicki, Annette deCharon, Jean Dickey, William Epping, Grant Faris, Jon Giorgini, Richard Haga, Michael Johnson, Sammy Kayali, Clyde King, Robert Kinkade, Wayne Lee, Michael Levesque, Marie Levine-West, Albert Nakata, James Pham, Stephen Prusha, James Riccio, Gail Robinson, Jeffrey Umland, JoBea Way, Kirby Willis.

Exceptional Achievement Medal: *awarded for significant, specific accomplishment or contribution clearly characterized by a substantial and significant improvement in operations, efficiency, service, financial savings, science or technology that contributes to the NASA mission.*

Laura Barnard, Kenneth Bartos, James Baughman, Joseph Beerer, Guy Beutelschies, David Bliss, Larry Broms, Robert Brooks, Carl Buck, Robert Bunker, Stanley Butman, Karen Buxbaum, George Chen, Kevin Clark, James Clawson, G. Curtis Cleven, Leslie Compton, Brian Cooper, Zainab Cox, Jeffery Culwell, Saterios Dallas, Gregory Davis, William Dias, Ronald Dupitas, Michael Ebersole, Howard Eisen, Pasquale Esposito, Gary Flandro, Lorraine Garcia, Dwight Geer, Brad Gibson, William Green, David Gruel, Fred Hadaegh, Fred Hammer, Jennifer Harris, Ken Herkenhoff, Randy Herrera, Christian Hidalgo, Ulf Israelsson, Kenneth Jewett, Martin Johnston, Pieter Kallemeyn Jr., Kenneth Klaasen, Carl Kloss Jr., Linda Kosmin, Donald Langford, William Layman, David Lehman, W. Timothy Liu, Leslie Livesay, Thomas Luchik, Justin Maki, Michael Mangano, Robert Manning, William

See Awards, page 4

Astronauts

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on the moon and the voice of Neil Armstrong."

Olivas said that he also likes the Earth-based portion of astronauts' job description: interacting with the public and helping others to realize their potential, especially children, who need to understand why is important to study science.

"I think that a big part of science can be very complex and intricate, very beautiful scientifically and mathematically," he said. "But it's only when you can take that science and turn it into something that people can really understand and relate to that we are really doing our jobs as scientists and engineers."

He credited the JPL environment and his family's support for his successful bid to join the astronaut program.

"I've been very fortunate in my career: I had a lot of good opportunities to work with dynamite people and I think that really helped me progress in my career," he said. "If you got the right people around you to support you, you can do pretty much everything. And I have a very supportive family."

Olivas earned a bachelor's degree in mechanical engineering from the University of Texas, El Paso, a master's degree in mechanical engineering from the University of Houston and a doctorate in mechanical engineering and materials at Rice University, Texas.

Olivas and his wife, Marie, live in Redondo Beach. They have a 3-year-old daughter, Isabella, and a 20-month-old son, James.

"My wife has been my biggest supporter. There have been times when I wanted to just say, 'That's it, I quit. I'm done with this nonsense.' But she's been there to push me to go further. In fact, I can say that without her, I really wouldn't be where I am today."

The training in Texas will last at least a year. In addition to classes on shuttle systems, candidates will study basic science and technology, from mathematics to geology to guidance and navigation. Candidates also receive training in parachute jumping, land and sea survival training, scuba diving and space suits.

Six JPL employees were previously selected for the Astronaut Candidate Program or have served as payload specialists. They include Jay Apt, G. David Low, Dr. Andy Thomas and Stephanie Wilson; Dr. Eugene Trinh and Dr. Taylor Wang flew their own experiments on the space shuttle as payload specialists. ❑

Stardust to carry names from Vietnam vets' memorial wall

By MARY BETH MURRILL

Names inscribed on the Vietnam Veterans Memorial in Washington, D.C. will be engraved on a microchip that will fly in space on JPL's Stardust mission to a comet, project officials have announced.

The names will join those of more than 400,000 people who have already submitted their names to fly, free-of-charge, on the Stardust spacecraft, which is scheduled for launch next February on a round-trip to a comet.

"This almost will be like sending a miniature version of the Vietnam Memorial into space as an eternal tribute to those who fell in America's longest war," said Jan Scruggs, founder and president of the Vietnam Veterans Memorial Fund. There are 58,214 names inscribed on the memorial, Scruggs said. Approximately 2.5 million people visit "The Wall" each year, making the Vietnam Veterans Memorial the most visited in Washington, D.C.

Stardust's prime mission is to return a sample of comet dust to Earth in 2006. The "Send Your Name to a Comet" effort has drawn attention from around the world as people submit their names via the Internet (http://stardust.jpl.nasa.gov) to the Stardust Project.

"We wanted to honor the memory of those who fell in the war," said Project Manager Dr. Kenneth Atkins, himself a Vietnam-era Air Force pilot with the Strategic Air Command from 1959 to 1968. "This is also an opportunity for veterans, their families and loved ones to create a special remembrance by having their names united on this peaceful exploration of space," he added.

Included is the name of Air Force pilot Michael Blassie, whose remains were recently identified and disinterred from the Tomb of the Unknowns at Arlington National Cemetery.

Atkins of JPL and Scruggs of the Vietnam Memorial both hope to link their education efforts to broaden the audiences of their respective organizations. The Stardust Project hopes to exhibit all the collected names in a museum after the comet sample has returned to Earth, Atkins said.

The names are electronically etched onto a fingernail-size silicon chip at JPL's Microdevices Lab. Writing on the microchip is so small that about 80 letters would equal the width of a human hair. Once inscribed, the names can be read only with the aid of an electron microscope.

The web page and a project-sponsored network of educators across the country are two of the main efforts Stardust is using to bring information about the mission, its science plans and eventual discoveries to as broad an audience as possible. ❑

Pathfinder

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know how to reconcile this."

When molten magma oozes up from a planet's mantle onto the surface of the outer crust, it usually freezes into igneous rock of a type that geologists call a basalt. This is typical on the floors of Earth's oceans, as well as on the maria of the moon and in many regions of Mercury and Venus. By contrast, andesites typically form on Earth in tectonically active regions when magma rises into pockets within the crust, where some of its iron and magnesium-rich components are removed, leaving rock with a higher silicon content. "We don't believe that Mars has had plate tectonics, so these andesites must have formed by a different mechanism," Golombek said.

The rocks studied by Pathfinder most closely resemble andesites found in Iceland and the Galapagos Islands, tectonic spreading centers where plates are being pushed apart, said Dr. Joy Crisp, an investigation scientist on the spectrometer experiment at JPL. Andesites from these areas have a different chemical signature from andesites formed at subduction zones, mostly because wet ocean sediments carry more water down into the mantle at the subduction zones. "On Mars, where the water content is probably lower and there is no evidence of subduction, we would expect a closer chemical similarity to Iceland andesites," Crisp said.

The Martian rocks may have other origins, however. They could be sedimentary and influenced by water processes; they could be formed by melting processes resulting from a meteor impact; or, a third alternative is that the rocks might be basaltic, but covered by a silicon-rich weathering coating. "In any event, the presence of andesites on Mars is a surprise, if it is borne out as we study the data further," Crisp said.

"Most rocks on Mars are expected to be basalts lower in silicon. If these are in fact andesites, they are probably not very abundant."

Pathfinder scientists are looking forward to more data from the Thermal Emission Spectrometer instrument on the Mars Global Surveyor to reveal more about the chemical composition of the planet's surface, especially once the orbiting spacecraft begins its prime circular mapping mission in spring 1999.

In other recent Pathfinder science findings, Dr. Steven Metzger of the University of Nevada found direct evidence of gusting winds called "dust devils" in images from Pathfinder's lander. Such dust devils had been seen in some Viking orbiter images and inferred from measurements of atmospheric pressure and winds by other instruments on the Pathfinder lander, but were not spotted in actual surface images until Metzger's discovery.

JPL planetary scientist Dr. Diana Blaney has been using data from Pathfinder, other spacecraft missions and ground-based observations to study weathering on Mars. Her work suggests that Mars is uniformly covered by a fine coating of dust formed by an unusual process involving meteor impacts and volcanic gases that add sulfur.

JPL's next Mars missions, the 1998 Mars Climate Orbiter and Mars Polar Lander, are in testing now for launch in December and January, respectively. Whereas Pathfinder's science focus was on exploring rocks with its mobile robotic geologist, the Mars Polar Lander will focus on a search for water under the planet's surface, equipped with a robot arm that will dig into the soil at the landing site near the planet's south pole. ❑

Spear finds a new path

Tony Spear, who oversaw the Mars Pathfinder mission from its conception through successful landing on July 4, 1997, has retired from JPL.

Spear, a 36-year veteran of the Laboratory, was instrumental in coordinating all facets of spacecraft development—such as flight hardware, computer systems and new technologies—to produce the innovative Pathfinder lander and the Sojourner rover—the first robotic rover ever to explore another planet.

After Pathfinder successfully touched down in an ancient outflow channel known as Ares Vallis, about 850 kilometers (525 miles) southeast of the location of the Viking Lander 1, Spear stepped down as project manager and joined the Advanced Deep Space System Development Program, called X2000, to develop advanced technologies for future exploration of the outer planets of the solar system.

Before serving on the Pathfinder project, Spear led the initial studies for NASA's Discovery program of faster, better, cheaper missions.

Tony Spear

Pathfinder was the second in that series of fast-track, low-cost missions with highly focused science goals.

Spear joined JPL in 1962 and worked on a variety of engineering positions over the years. He served as manager of the 1989 Magellan mission to map the surface of Venus, manager of the synthetic aperture imaging radar instruments that flew aboard several space shuttle missions in the early 1990s, and was an engineer on the 1978 Seasat oceanographic satellite mission.

Prior to that, Spear worked from 1974-75 as the Advanced Projects Planning manager for the NASA/JPL Deep Space Communications and Spacecraft Tracking Network. From 1962-74, he worked in the Deep Space Telecommunications System for the 1964 and 1969 Mariner missions to Mars and the 1973 Mariner mission to Venus and Mercury. He also participated in the design of the lander and orbiter relay communications link for the 1976 Viking mission to Mars.

Spear received his bachelor of science degree in electrical engineering in 1962 from Carnegie Mellon University in Pittsburgh and his master's degree in engineering from USC. He earned a second master's degree in mechanical engineering in 1968 from UCLA.

A native of Martins Ferry, Ohio, Spear served in the U.S. Air Force from 1954 to 1958, specializing in radio communications for jet fighters.

Spear is a resident of Pasadena and has two daughters. ❑

SFA honorees enjoy Florida

Nine JPL employees recently joined those from other NASA centers and industrial partners who were recognized for their dedication to quality work and flight safety.

In all, about 300 honorees converged on Cocoa Beach, Fla. for several days of activities, culminating with a viewing of the launch of STS-91, Space Shuttle Discovery, on June 2.

JPL employees honored for this trip were Chris Alvarado of Section 776; John Baker, Section 311; Enrique Gamez, Section 518; Connie Gennaro, Section 795; Nelson Leiva, Section 357; Ginger Loesh, Section 622; Irma Lopez, Section 761; James Oyama, Section 350; and Mark Whalen, Section 181. Joining them were "distinguished guest" Kirk Dawson, JPL's associate director, and JPL program coordinator Laurie Lincoln.

Honorees attended a luncheon at which they were presented certificates of recognition by astronaut and former JPL engineer Stephanie Wilson.

In terms of former JPLers, the voyage of Discovery was also fitting. A critical aspect of the STS-91 crew's mission was the docking with the Russian space station Mir for four days—completing the ninth and final NASA-Mir mission—and bringing home with them former JPL scientist Dr. Andrew Thomas, who had been onboard Mir for four-and-a-half months. Thomas was the seventh U.S. astronaut to serve as a Mir crew member.

JPL associate director and Space Flight Awareness Program "distinguished guest" Kirk Dawson, standing at left, and astronaut Stephanie Wilson, fourth from left, join most recent honorees in Cocoa Beach, Fla. From left, starting next to Dawson, are James Oyama, Nelson Leiva, John Baker, Enrique Gamez, Mark Whalen and Chris Alvarado. Sitting, from left, are Ginger Loesh, Connie Gennaro and Irma Lopez.

Those honored also took a VIP tour of Kennedy Space Center—which included views of work in progress on the international space station—and attended a dinner reception where they met a host of current and former astronauts.

Honorees were also rewarded with a special gift bag containing such items as a desk clock, commemorative collector's plate and STS-91 memorabilia, all provided by NASA and its contractors.

The Space Flight Awareness Program, the highest tribute paid by NASA to government and industry workers, is directed by the Office of Space Flight at NASA Headquarters. At JPL, it is part of the Reward & Recognition Program. For more information, go online to http://eis.jpl.nasa.gov/sec614/reward/sfa.htm. ❑

Awards

Continued from page 3

Mateer II, Timothy McElrath, Bruce McLaughlin, Jitendra Mehta, Andrew Mishkin, Cindy Oda-Biesiadecki, Jeffrey Ostman, George Pace Jr., Brian Paczkowski, J. Morgan Parker, Susan Pateracki, Chia-Yen Peng, Dennis Potts, Glenn Reeves, Tommaso Rivellini, Allan Runkle, Dara Sabahi, Allan Sacks, Christopher Salvo, Miguel San Martin, John Schofield, Mike Shirbacheh, Craig Sholes, Kendra Short, Wayne Sidney, Allen Sirota, William Smythe, Gerald Snyder, Sugi Sorensen, Kathleen Spellman, David Spencer, Santosh Srivastava, Carl Steiner, Henry Stone, Scot Stride, Leslie Tamppari, Michael Tankenson, E. Eilene Theilig, Peter Theisinger, Arthur Thompson, Thomas Thorpe, Sam Thurman, Matthew Wallace, Richard Weidner, John Wellman, Charles Whetsel, Shirley Whittington, Gordon Wood, Jesse Wright.

Outstanding Leadership Medal: *awarded for notably outstanding leadership that has had a pronounced effect upon NASA technical or administrative programs. May be given for an act of leadership or for sustained contributions based on an individual's effectiveness as a leader, the productivity of the individual's program, or demonstrated ability to develop the administrative or technical talents of other employees.*

Richard Cook, Glenn Cunningham, Jacob Matijevic, Robert Mitchell, Brian Muirhead.

Distinguished Service Medal: *awarded to any person in the federal service who, by distinguished service, ability, or courage, has personally made a contribution representing substantial progress to the NASA mission in the interest of the United States. The contribution must be so extraordinary that the other forms of recognition by NASA would be inadequate. This is the highest honor that NASA confers.*

Anthony Spear, Richard Spehalski, Edward Stone. ❑

LETTERS

A special thank you to my friends at JPL, and especially to my husband, Shannon, for your empathy and loving support when I learned of the recent death of my father. Thank you, also, to ERC, for the lovely plant.

Carol Jackson

❑❑❑

I would like to thank my friends and coworkers for the cards, condolences and prayers upon the passing of my mother. A special thanks to the ERC for the beautiful plant.

Pat Wieclawek

❑❑❑

I want to thank everyone involved in my going-away party and for the lovely crystal vase. It is so beautiful. I had a wonderful time seeing and chatting with every one of you. A special thanks to my special friends Mari Castillo and Juliana Murphy for all your hard work in organizing the
party. JPL has been a very special place for me, and I will miss you all.
Thank you - Eloise Kennedy

FOR SALE

ANTIQUES: China cabinet, 1930s, beautiful walnut w/inlaid wood and casters, $375; walnut carved pie-shaped end table, $75; 1900s oak armchair w/leather seat, $100. 957-4722.

BABY ITEMS: crib + changing table, $120; Evenflo "On-my-way" stroller/carrier/car seat $80; rocking-sliding chair w/feet support, $100; Gerry infant front-pack carrier, $20; Fisher-Price alarm radio set, $15; Arizona nursing bag, $15; car seat pad $5; baby bath tubs (2), $5 ea. 626/447-0444, 7-9 p.m.

BARBIE DOLL, collectible, 1997 winter, $25. 310/549-7551, Audrey.

BED, double, brass-plated, incl. mattress & box spring, gd. cond., $125/obo. 626/574-1495, Suzi.

BED, Sealy Posturepedic x-long twin mattress & box spring, exc. cond., $200. 626/284-6192.

BED, twin, used, exc. cond., incl. headrest & footrest assy. and top/bottom mattresses; made of heavy, sturdy wood, not compressed; $80/ea. 626/287-2996.

CAMCORDER, Sony ccdtr-5 Handycam, brand new in the box; incl. accessory kit & extra batt.; originally $1,000, sell $400/obo. 249-9437, eves.

CAMERA, Minolta 35 mm, auto. Freedom Zoom 90EX, exc. cond., cost $150, hardly used, sell for $50. 548-5656.

CANISTERS, ceramic, for tea, sugar, coffee; two 5" diameter and two 6" diameter; white w/blue flower designs; all 4 for $11/obo. 626/568-8298.

CEILING FAN, Hunter 5-blade, wooden blades, perf. cond., $100. 909/392-7216.

CHAIRS (6), antique Windsor Arrowback, exc. cond., $1,000. 626/284-6192.

CRIB and chest of drawers with changing table, Bellini, Milano style w/mahogany., exc. cond.; $600 for the set. 626/304-1030, after 6 p.m.

DRESS, flower girl's, sz. 7/8, white chiffon, trimmed in white satin w/detachable peach/white flowery bow, peach/white flowery crown, white satin gloves, sz. 7/8 and white satin basket; see to appreciate, $100. 626/798-0033.

EDGER, power "Edg-Mor," vg cond., $25. 352-3588.

ENTERTAINMENT ARMOIRE, Broyhill Fontana, 2 yrs. old, 80" H x 41 ¼" W x 21" D, holds up to 32" TV, 2 drawers & cabinet for stereo equip., $700. 805/263-2918.

EXERCISE BIKE, Schwinn deluxe, heavy duty, exc. cond., $25. 248-8413.

EXERCISE/WEIGHT MACHINE, from Germany, mounts on wall w/fold out bench, ~200# for arm/leg exercises, w/accessories, $85. 626/797-6824.

FILM, 35mm negatives and slides, professional/amateur, Fuji/Kodak, 50/100/200/400 ISO, kept in a cool and dry place, expire mid-'99, much cheaper than stores. 548-9274.

FREEZER, Whirlpool chest, white, 15 cu', works great, gd. for fishing/hunting storage, model #153EEHFW8, pls pick up, $250/obo. 213/268-0993, Millie.

FURNITURE, bedroom, 7-pc, French Provincial set, Charles Link, exc. cond., $300. 249-4603.

GARAGE SALE, 2 families, Sat., July 18, 8 a.m.-3 p.m., 37 West Carter Ave., Sierra Madre. 626/355-0401.

GPS RECEIVER, 4000XL Magellan, never get lost again, use for camping, boating, cycling, hiking; more features than 2000XL; new, still in box; $175 firm. 805/299-2477.

GRANDFATHER CLOCK, Howard Miller, 3-chime setting, key-drive, dial, $750; LAWNMOWER, MTD, hi-whl., 5.5 HP Tecumseh (new), rear-bagger/mulcher, 21" cut, $280, 249-6071.

HUMIDIFIER, Montgomery Ward. 352-3588.

LAWNMOWER, Honda HRA 215, self-propelled, vg cond., $200. 352-3588.

MOVING SALE: Answering mach., $25; pager, $15; bookcases; 3 walnut barstools, $75; office desk & chair $399; typewriter table $15; drafting table $20; letter desk $90; flr. lamp, $5; antique dining set, $899; 2 brass lamps/shades, $75; Whirlpool 18 cu. ft. refrig., $349; blender, $25; glassware, $30; ironing board and iron, $15; double mattress and box spring, $99; 3.5 hp gas lawnmower w/bag, $125; Ryobi heavy weed wacker, $50; snow cable (new), $15; large Weber kettle BBQ, $20; recliner exercise bike, 300 mi., $100; 10-sp. bike, $50; stereo cabinet, $40. 626/798-0033.

MOVING SALE: Black, pillowed-back sofa & loveseat w/fine rose and teal lines, gd. cond., $270; matching dining table w/smoked glass & 4 chairs, vg cond., $270; entertainment center, black w/mirrored front, exc. cond., $300; 2 end tables, smoked-glass tops, black and brass stands, $50; cocktail table, no glass, free w/end tables; wall unit, plywood, 7 open shelves $50. 626/858-9730.

MOVING SALE: couch, end tables, lamps, desk. 626/357-7546.

PIANO, Kimball, artist Spinet, upright, genuine walnut, matching bench, lots of beginner books, looks and plays great, $900. 909/350-9218.

PUPPIES, Pomeranian, adorable, great pets, exc. w/kids; males $200, females $150. 246-5515.

SKIS, boots, bindings, poles, $150/neg. 626/796-7584, Chris.

TABLE, dining rm., oak-veneer top and solid oak frame and legs, seats 4 comfortably, and 8 w/pull-out leaf; exc. cond., $80. 626/796-6971.

TABLE, dining rm., oval, cherry; sits 8 w/one extension; exc. cond., $300/obo. 626/568-8298, Ben or Connie.

TABLE, dining rm., round, mahogany; sits 8 w/two extensions; almost new cond.; comes w/6 matching chairs, $1,000/obo. 626/568-8298.

TABLE, outdoor, redwood, 4 ft. diameter w/4 benches, seats 8, fair cond., $15. 626/798-5855.

TABLES (coffee and end), oiled walnut, Lane, vg cond., $100. 249-4603.

TENT, cabin, 9 x 11, 80" high, free-standing, sleeps 6, gd. cond., $60. 626/797-6982.

TENTS: dome, new, lg. family-sz., 10' x 11.5' x 6' hi, 3-pole tent & rainfly, lots of fresh air, upper net siding, lower solid nylon for privacy, $85/obo; dome, 7' x 7' x 54" hi, "Coleman sundowner," looks new, exc. cond., very clean, $60/obo. 626/795-7217.

TYPEWRITERS: Olympia electronic, xtra-wide carriage, font/pitch change, underlining, correction, etc., exc. cond., incl. 6 new ribbons & 12 correction tapes, $100/obo; Smith-Corona portable elec. typewriters, gd. cond., $25/ea.; BED FRAME, queen-sz., $15; END TABLE, drum-style, covered storage, $20; SOFTWARE, Quicken for Windows, unopened, $20; VIDEO GAME, Atari w/8 cartridges, a "blast from the past", gd. cond., $20 for all. 626/355-3886, Rosemary/Ed.

VCR, Sony 4-head, $75; STEREO RECEIVER, JVC basic model, ~10 yrs. old, $30; CD PLAYER, Kenwood portable, $50. 957-2898, Keith.

VIDEO GAMES for Nintendo 64 and Sony Playstation, exc. cond., $10-$20/ea. 268-9520.

VIDEOTAPES, Beta, approx. 40, $1 ea./obo. 548-5656.

WASHER, top of the line Whirlpool; 2 speeds, 4 cycles, perm. press; needs new motor; $25/obo. 626/568-8298.

WASHER/DRYER, Kenmore, gd. cond., moving, must sell, $250 the pair. 909/596-9202.

VEHICLES / EQUIPMENT

'92 ACURA Legend, taupe ext. and int., loaded, 98K mi., exc. cond., $11,950. 909/598-0065.

'88 BUICK, only 40,000 mi., 4-dr sedan, loaded, gold in color, exc. cond., must sell, $4,000. 362-7427 eves., Bobbi.

'89 CADILLAC Sedan DeVille, dark blue in/out, loaded, digital dash, leather, 4.5L V8, 69K mi., exc. cond., orig. owner, $6,900. 790-4028.

'89 CHEVROLET Z24 convertible, V6, auto, fully equipped, gd. cond., $4,500/obo. 952-5434.

'97 DODGE Ram 3500 turbo diesel, Dully, $25,000 w/camper shell. 626/357-7546.

'97 FORD Escort wagon, white, stick, 9k mi., exc. cond., $9,700. 845-8449, Ray.

'94 FORD Explorer XLT, 4-dr., white, 4-spd. auto, a/c, am/fm/cass., running boards, car guard alarm; improved pwr., 62,000 mi., $12,500. 248-9693.

'89 FORD T-Bird, 2-dr. coupe, silver, grt. engine (60k mi.), no mjr. work, 3.8L V6 auto, pwr. win/dr/seat/mir., am/fm/cd, cruise cont., a/c, coded entry, orig. owner, gt. upkeep, $3,950/obo. 626/577-2765, Rose.

'87 FORD Ranger pickup, black, 96K, $3,000/obo. 626/335-2605 or 323/278-0623.

'86 FORD Mustang convertible, exc. cond., new paint, new tires, etc., $2,100. 346-3136.

'57 FORD T-Bird, "D" Model, all power, original per invoice, 3-owner Calif. car, gorgeous, $24,000/obo until 9/1/98. 909/624-2148.

'97 HONDA Civic DX, 45k mi., dark-green, 5-spd., 2-dr., AM/FM/cass, A/C, runs great, $11,500/obo. 243.4464.

'94 HONDA Passport, 4WD, A/C, garaged, 21K mi., $14.5K. 899-8182.

'90 HONDA Accord EX, 4-dr., auto, dk. blue, new tires & stereo, gd. cond., $8,000. 909/392-7216.

'89 HONDA Accord DX, 2-dr. coupe, gd. cond., $3,700. 246-9328.

'85 HONDA Shadow 700cc, V-Twin, shaft drive, auto valve adjustment, water cooled, exc. tires, low maint., reliable, gd. cond., red & black, $1,800. 626/794-0886, Ted.

INNOVATION camper shell for red '96 Dodge, $300/obo. 909/392-0169, lv. msg.

'65 KIT COMPANION 5th wheel, 28', vg cond. w/new equip. and lots of storage, $5,000/obo. 520/757-2651.

'75 LINCOLN Continental, V8 classic, white over blue, custom upholstered, rebuilt w/700 new miles; total 98.5k; new tires/battery/starter/smog & tags; see to apprec.; was intended for daughter, now exc. cond., $4,125. 626/962-7668, 7-9pm or lv. msg.

'90 MALIBU ski boat, 19-ft., V8, inboard/outboard, prop, blue/gray, exc. cond., 250 hrs., extras, $8,000/obo. 909/599-3032.

'86 MASERATI Quattroporte, all orig. car, 41k mi., dark gray metallic paint, saddle tan leather interior garaged for last 8 yrs., needs new home with TLC, $12,000/obo. 909/624-2880.

'97 MAZDA Miata, air, ps/b, 5-spd., am/fm/cass., very clean, $8,850/obo. 504-6256.

'95 MAZDA Miata, red ext., black int., loaded, 50K mi., exc. cond., $12,950. 909/598-0065.

'97 NISSAN 200 SX, loaded, auto, sunroof, spoiler, alloy locking wheels, 2-dr., white, black multi-color interior, $18,950/obo. 626/296-1235.

'87 MAZDA RX7, GXL model, full equip'd, leather int., Kenwood AM/FM/CD stereo, lo blu. bk., $2,900/obo. 626/797-6824.

'87 NISSAN Maxima SE, 4-dr., V6, 3L, auto, FWD, a/c, pwr. steering/windows/dr. locks, cruise cont., am/fm/cass., moonrf., 133K mi., $3,500. 892-8303.

'77 OLDSMOBILE Toranado, Olds version of El Dorado, rare XE, wrap-around rear window, approx. 42K mi., 403 eng., new paint, senior owned, $1,200/obo. 626/791-2700.

'87 PONTIAC Fiero GT, exc. cond., $4,000/obo. 626/357-7546.

'79 PORSCHE 924, exc. orig. cond., 39k mi., pwr. win, sunroof, new Pirellis, owner since '80, been in storage, $3,900. 360-6154.

'96 RASCAL convertible electric cart, $1,700/obo. 626/445-1294.

'92 SATURN Sport Coupe, red, 2-dr., exc. cond., dealership-maintained, 1 owner, sunroof, A/C, removable CD stereo, black interior, 90K, $6,500. 368-9520.

SATURN SL2, 4-dr., full pwr, full auto, air, cruise, security, maint. recs, exc. cond., $7,900. 909/599-3936.

'72 SUZUKI T250, 18,500 mi., runs, $100/obo. 626/797-4807.

'95 TOYOTA 4-Runner, V6, 2WD, 72,000 mi., loaded, exc. cond., $16,500. 626/914-1737.

'93 TOYOTA Camry XLE, exc. cond., 65K mi., $10,950. 310/589-9802.

'90 TOYOTA Camry DX, single owner, maroon, auto, A/C, AM/FM, exc. maint., $2,799. 626/945-6605.

'95 ULTRA ski boat, 460 Harman Marine motor, open bow, Hensley tandem trailer, Dominator jet, low hrs., exc. cond., $21,000. 248-8413.

'88 VW Jetta, 2 dr., white, new Alpine stereo, gd. cond., $2,700/obo. 626/798-5896.

'70 VW Bug, 1,835cc motor, needs paint, $1,100. 562/464-0446.

WHEELS for VW Beetle, Cragar aluminum alloy w/new Firestone tires, matching lug nuts; cling to the road, $300/obo. 626/797-4527.

WANTED

BED, twin. 626/574-1495, Suzi.

FORD BRONCO II, '88-'90 4 x 4, stick, smogged; cash or will trade '97 Escort diff. 845-8449, Ray.

GUNS & SWORDS (old), pinball and slot machines, other games. 991-6811, Jerry.

HOUSESITTING by professor from Rome, Italy from July 25 to Aug. 12-14 (dates flexible), will be at JPL for 2 mo. w/wife & 2 children. 952-4141.

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

TV (color), phone and answering machine. 626/683-9202.

VANPOOL RIDER, full-time, for #20, stops in Northridge and Granada Hills. Ext. 4-0307, Marilyn.

VIDEO CARD, PCI for PC. 626/405-1971, Joe Sanok.

VOLLEYBALL PLAYERS, coed, all levels of play, Tues. nights 8-10 at Eagle Rock High School, $4/night. 956-1744, Barbara.

FREE

DOG, Husky mix puppy rescued, "Kino," 5 mo. old, very intelligent, beautiful and friendly; OK w/cats, 1st set of shots. 626/796-3466.

DOG, male Rottweiler, 14 mo. old, gd. health; friendly, loving pet for companionship, great w/children. 626/969-8830.

DESK, executive's chair, small child's bicycle. 626/798-0329.

FILL DIRT, clean, mostly gravel-like, you haul, several cu yds.; take as little or as much as you like; 3 blks ESE of NY & Hill, Altadena. 798-5152.

FOR RENT

GLENDALE, 3 bd., 2 ba., SFR, formal dining rm, attached gar., enclosed yd., 1,890 sq. ft., very close to JPL/Caltech, $310,000. 213/728-9356, Esther.

GLENDORA, above Foothill, 4 bd., 2.5 ba., lg. pool, 2-car garage, cent. heat/air, gardener, pool service included, avail. July 21, $1,700. 626/355-8409.

LA CANADA, studio guest house w/ba., kitch. facilities; priv. rear garden/patio; walk or bike to JPL; vg cond., exc. loc. on cul-de sac, carport and attic for storage; $460, references req. 626/577-9944, lv. msg.

MONTROSE, share 2-bd. apt., nice complex w/pool, 5 min./JPL, $375 +1/2 util. 541-0794, or 626/397-7362, Marty.

PALM DESERT, exquisite, 2-bd., 2-ba. villa, for vacations or long term, newly remodeled, w/skylight, patio & 2-car gar.; across from the Living Desert, great priv., secure resort w/ tennis cts., multiple pools & spas and clubhouse facilities; great locality, around 2 top resorts. 909/620-1364.

PASADENA apt., 2 bd. + den, pvt. baths, blt-in range/oven, 2 frplcs., carpets, drapes, laundry, covered prkg., cent. a/c, disposal, $995. 790-7062.

PASADENA, 1 lg. rm. in 3-bd., 2-ba. apt., water incl., cent. air and heat, on S. El Molino Av. nr. Del Mar, $325 + util. 626/683-9202.

PASADENA, 2-bd., 1-ba. front house, 2 units in lot, parking, porch, nr. Caltech & PCC, 202 S. Parkwood, drive by first, $800. 626/447-0466.

PASADENA, room w/2 others, 3-bd. apt. w/washer/dryer in unit, pool, sauna, parking; $385 +1/3 util. 626/564-1078.

PASADENA townhouse-style apt., 2 bd., 1 ½ ba., blt.-in range & oven, cent. a/c, carpets, drapes, laundry, disposal, $725. 790-7062.

SOUTH PASADENA, bungalow studio apt., furnished, gd. area on 1718 Huntington Dr. nr. Marengo, electric heat/air cond.; prkng and laundry faci.; non-smoker; $565, includes util. 626/792-9053, Marilyn.

TOWNHOME, near PCC, 2 bd. + den; 2 1/2 ba., LR w/ FP; DR, pvt 2-car gar., $975. 244-8253.

VALLEY VILLAGE, next to Studio City, 2-bd., 2 ½-ba. condo, very spacious, washer/dryer, avail. end of July, $1,150. 626/798-6588.

REAL ESTATE

BIG BEAR, new cabin 2 blocks from lake, 2 bd., 2 ba., mud/laundry rm., $129,000. 909/585-9026.

GREEN VALLEY LAKE, a secluded village in the San Bernardino Mtns., custom 3-story log home and buildable adjacent lot; beau. 180-deg. vw w/lg. decks, shade trees, walk to lake and skiing; cabin and adj. lot $144,000. 303-1927.

LAKE CO., N. Calif., 2 1/2 acre lot in beautiful Kelseyville near Clear Lake, perfect site for permanent or retirement home, 30 walnut trees, paved rd., electricity, $36,000. 626/337-7522.

PALM DESERT, exquisite, 2-bd., 2-ba. villa, newly remodeled, w/skylight, patio & 2-car gar.; across from the Living Desert, great priv., secure resort w/ tennis cts., multiple pools & spas and clubhouse facilities; great locality, around 2 top resorts. 909/620-1364.

TOWNHOUSE, near PCC, sale or lease, 2 bd. + den; 2 1/2 ba., LR w/FP, DR, pvt. 2-car gar., $129,500. 244-8253.

VACATION RENTALS

BIG BEAR, 7 mi./slopes, full kitch. f/p, 2 bd., 1 ba., sleeps 6; reasonable rates; 2-nt. min.; no smokers, no pets; exc. hiking, biking, fishing nearby. 909/585-9026, Pat & Mary Ann Carroll.

BIG BEAR cabin, walk to village, 2 bd., sleeps 8, TV/VCP, F/P, $75/night. 249-8515.

BIG BEAR LAKE cabin, near lake, shops, village, forest trails; 2 bd., sleeps up to 6, fireplace, TV, VCR, phone, microwave, BBQ and more; JPL disc. price from $65/night. 909/599-5225.

BIG BEAR LAKEFRONT luxury townhome, 2 decks, slps. 6, tennis, pool, spa. 714/786-6548.

CAMBRIA, ocean front house, exc. view, sleeps up to 4, $125/night for 2, $175/night for 4. 248-8853.

LAKE TAHOE, N. shore, 2 bd., 2-1/2 ba. condo, sleeps 6-7; great loc., all amen., priv. sandy beach, pool, sauna; walk to golf, fishing 150 yards/front door, 2 mi./casinos; special JPL Aug. rates, $650/wk. (incl. tax, cleaning), reduced rates after Labor Day. 626/355-3886, Rosemary or Ed.

KONA, HAWAII, on 166 ft. of ocean front on Keauhou Bay, priv. house & guest house comfortably sleep 6; 3 bd., 2 ba., swimming, snorkeling, fishing, spectac. vws., nr. restaur., golf and other attractions. 626/584-9632.

MAMMOTH at Snowcreek, 2 bd., 2 ba., + loft., slps. 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 disc. 626/798-9222 or 626/794-0455.

MAMMOTH condo, studio + loft, 2 ba., fireplace, Jacuzzi, sauna, game rm., color cbl. TV/VCR, full kitch. w/microwave, terrace, view, amen., low rates. 714/870-1872.

MAMMOTH condo, 2 bd. + loft, 3 ba., slps 8, pool, spa, full kitch., TV/VCR, JPL disc. rates. 249-8088.

MAMMOTH condo in Chamonix; 2 bd., 2 full ba., slps. 6, fully equipped elec. kitchen, incl. microwave & extras, t/p & wood, color TV, VCR, FM stereo; sauna, game, & lndry. rms.; pool, sun area, & o/d Jacuzzis; play & BBQ areas; walk to Warming Hut and lifts; conv. for hiking, shops, summer events. 249-8524.

MAUI condo, on beach w/ocean view, 25 ft. from surf, 1 bd. w/loft, compl. furn., incl. phone, color TV, VCR, microwave, dishwasher, pool & priv. lanai, slps. 4, 4/15-12/14 rate $95/nite/2, 12/15-4/14 rate $110/nite/2, $10/nite/add'l person, less 10% JPL & Caltech disc. 949/348-8047.

OCEANSIDE, on the sand, charming 1 bd.+ condo, panoramic view, walk to pier/marina, pool, spa, game rm. 714/786-6548.

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

ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis court, 18-hole golf w/in 6 miles on scenic rd., short walk to beach, private secure parking. 626/794-3906.

SAN FRANCISCO, Nob Hill honeymoon suite (for 2 only); kitchen, maid, concierge; $105/nite. 626/797-3156.

S. LAKE TAHOE Keys waterfront home, 4 bd., 3 ba., sleeps 12+, fireplace on 2 levels, decks, gourm. kitch., bikes, 20' sail and paddle boats, 3 color TVs, VCR, stereo w/tape/disk, pools, hot tub & beach; lighted tennis courts, 10 min./skiing, casinos/golf, 1 hr./wine country; $995/wk. high seas. [15 June to 15 Sept; 22 Nov. to 1 March]; $495/wk. low seas. + $90 cleaning fee; 3-day min. 626/578-1503, Jim Douglas.

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Universe

Editor
Mark Whalen

Photos
JPL Photo Lab

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Jet Propulsion Laboratory

UniverSe

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Lab will establish Near-Earth Object Program Office for NASA

By MARY BETH MURRILL and MARK WHALEN

A new program office to coordinate NASA-sponsored efforts to detect, track and characterize potentially hazardous asteroids and comets that could approach Earth will be established at JPL.

The agency's Near-Earth Object Program Office will focus on the goal of locating at least 90 percent of the estimated 2,000 asteroids and comets that approach the Earth and are larger than about 1 kilometer (about 2/3-mile) in diameter, by the end of the next decade.

"These are objects that are difficult to detect because of their relatively small size, but are large enough to cause global effects if one hit the Earth," said astronomer Dr. Donald Yeomans of JPL, who will head the new program office. "Finding a majority of this population will require the efforts of researchers at several NASA centers, at universities and at observatories across the country, and will require the participation by the international astronomy community as well."

"We determined that in order to achieve our goals we need a more formal focusing of our near-Earth object tracking efforts and related communications with the supporting research community," said Dr. Carl Pilcher, science director for Solar System Exploration in NASA's Office of Space Science, NASA Headquarters. "I want to emphasize that science research solicitations and resulting peer reviews, international coordination, and strategic planning regarding future missions will remain the responsibility of NASA Headquarters."

In addition to managing the detection and cataloging of near-Earth objects, the new NASA office will be responsible for facilitating communications between the astronomical community and the public should any potentially hazardous objects be discovered as a result of the program, Pilcher said.

JPL was selected to host the program office because of its expertise in precision tracking of the positions and predicted paths of asteroids and comets. No significant additional staff hiring at JPL is expected at this time.

"There is some extraordinary research being done on near-Earth objects and much of it is ongoing here at JPL," Yeomans said.

See Near-Earth, page 3

Dr. Donald Yeomans will manage the new Near-Earth Object Program Office at JPL.

Galileo reveals variety of features on Ganymede

New high-resolution images taken by JPL's Galileo spacecraft of Jupiter's largest moon, Ganymede, have been unveiled and are available online at http://photojournal.jpl.nasa.gov .

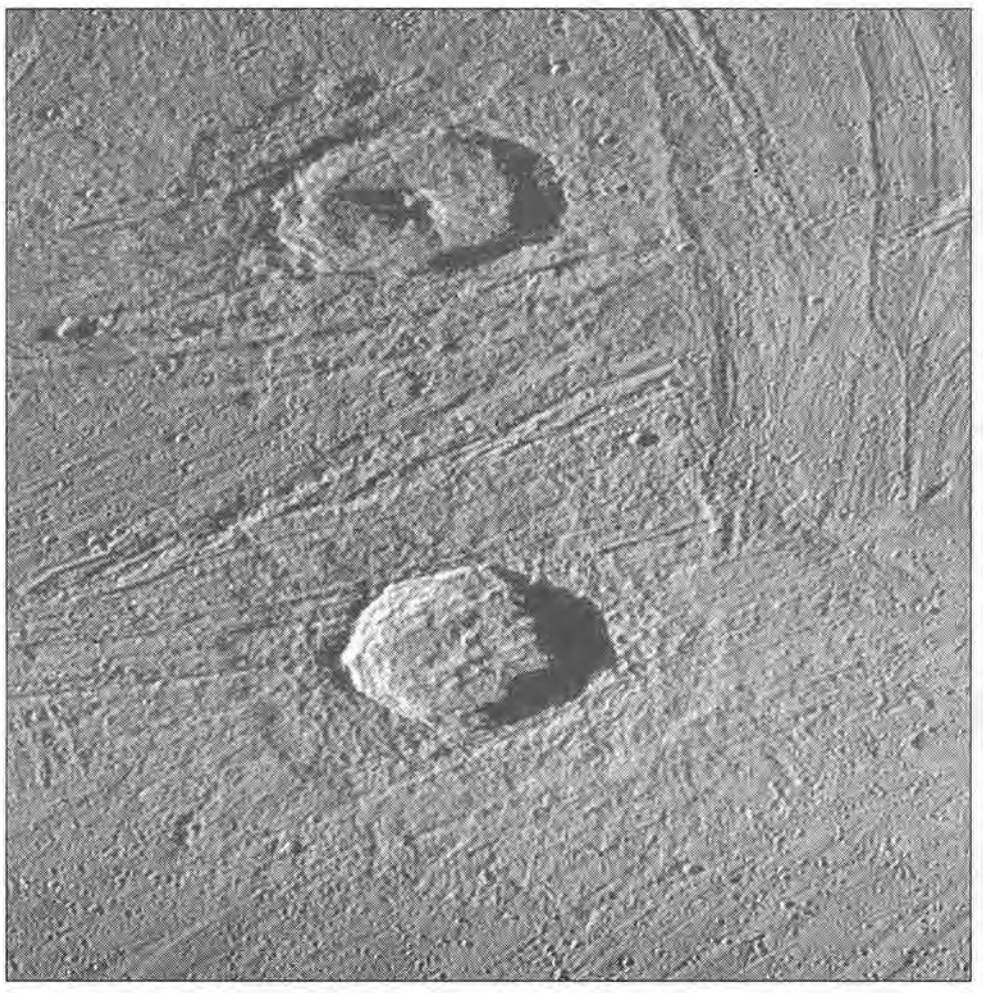
The images were taken by Galileo's camera during several Ganymede flybys between June 1996 and June 1997. They reveal impact craters with unusual pedestals, dark ejecta haloes, evidence of tectonic activity and possible signs of icy volcanic flows. A crater chain seems to be the result of impacts from a broken-up comet, like the 1994 Shoemaker-Levy impact on Jupiter.

Ganymede is the largest moon of any planet in the solar system. Its distinctive surface is composed half of bright water ice, and half of older, dark, heavily cratered terrain containing ice and rocks. The new images show surface details including abundant remnants of old craters and basins in the dark terrain, thought to date from early in the solar system's history. The images also reveal a complex transition from dark, old terrain to bright, new terrain, where parallel rows of linear mountain-like ridges extend for hundreds of kilometers.

During the early part of Ganymede's history, it is very likely that a global ocean existed below the surface, just as an ocean may exist on Europa today. A complex valley with a lobe-shaped flow appears to be a source of liquid water volcanism. Younger faults are seen cross-cutting older features, which helps scientists piece together the sequence of events in Ganymede's history.

"These new, unprecedented views of Ganymede allow us to address scientific mysteries revealed by earlier spacecraft. By analyzing these images, scientists will lay the cornerstone for interpreting other icy satellites around Jupiter, Saturn, Uranus and Neptune," said Dr. James Head, a Brown University planetary scientist and member of the Galileo imaging team.

Galileo has spent 2-1/2 years orbiting Jupiter and imaging its four largest moons. It wrapped up its primary mission in December 1997, and its current, extended Galileo Europa Mission will continue through December 1999. The mission includes eight Europa flybys, four Callisto flybys, and one or two of Io, as long as the spacecraft remains healthy. ❑



Oblique view of two fresh impact craters in bright grooved terrain near the north pole of Jupiter's moon, Ganymede. The craters postdate the grooved terrain since each is surrounded by swarms of smaller craters formed by material that was ejected out of the crater as it formed, and which subsequently reimpacted onto the surrounding surface. The crater to the north, Gula, which is 38 kilometers (24 miles) in diameter, has a distinctive central peak, while the crater to the south, Achelous (32 kilometers or 20 miles in diameter) has an outer lobate ejecta deposit extending about a crater radius from the rim. Such images show the range of structural details of impact craters, and help in understanding the processes that form them. North is to the top of the picture and the sun illuminates the surface from the right. The image covers an area approximately 142 by 132 kilometers (88 by 82 kilometers). The resolution is 175 meters per picture element. The images were taken on April 5, 1997 at a range of 17,531 kilometers (about 10,900 miles) by Galileo's solid state imaging system.

PIA01609

Team to review Mars program architecture

By MARK WHALEN

Several factors have prompted the development of a Mars Program Architecture Team at JPL to provide a comprehensive review of the Mars Program's plans over the next few years.

The team, which began its work at the end of June and will continue into the fall, is led by Space and Earth Science Programs Director Dr. Charles Elachi.

Five working groups at JPL will tackle different aspects of the Mars program's goals and how to best achieve them. The groups have a number of meetings scheduled throughout the summer. Their work will be augmented, Elachi said, by a formal architecture team comprising international scientists, engineers and technologists that will will convene on Lab at the end of July and in early September.

Changes to the 2001 mission, which has been modified to include three experiments for NASA's Human Exploration and Development of Space (HEDS) initiative, mark one reason for the architecture review.

Some experiments that were planned for the Athena rover on '01 will be moved to the lander or are still under study. Of those, said Mars Surveyor 2001 project engineer Lynn Lowry, plans for the '01 lander now include a panoramic camera and a miniature thermal emission spectrometer. Also, mission planners are studying the feasibility of flying the Marie Curie rover on '01, which is a virtual twin of Pathfinder's Sojourner. If Marie Curie flies, she said, it will include an alpha proton X-ray spectrometer, as did Sojourner. Also under study is the possibility of including a Mossbauer spectrometer on the lander.

The need to redefine the entire program's architecture, Elachi said, was also due to international interest in Mars program participation and the public's engagement of Mars due to the success of the Pathfinder mission.

"This should not be looked at as threatening or negative," Elachi said. "We are doing some really bold things in studying Mars, making discoveries and exploring new territory. So I think we ought to revisit the plan on a regular basis, and more formally every two years. We should ask ourselves what new discoveries and developments occur every two years and how we adjust our architecture to make sure we capitalize on any such advancements."

Dr. Frank Jordan, manager of the Mars Program Planning and Architecture Office, will provide technical leadership for the JPL working groups' efforts. Following are the working groups and their areas of study:

Conducting a program of continual expansion of scientific knowledge of Mars. Led by Doug Stetson. Under discussion will be "micromissions" with which scientists would learn more about Mars that would aid sample-return missions, the first of which will be launched in 2005. Micromissions could include instrumented payloads such as orbiters, penetrators, atmospheric balloons and gliders.

Selecting the right sites and acquiring the right samples. Led by Dr. Daniel McCleese. This group will look at global and local surveying of Mars, searching for samples and making in-situ measurements. The group will determine how to best utilize mobility on the Martian surface, and how to best instrument rovers and landers.

See Mars, page 3

NASA, France to explore cooperative Mars missions

NASA and the French space agency Centre National d'Etudes Spatiales (CNES) have agreed to explore joint cooperation on the exploration of Mars, telemedicine and education.

NASA Administrator Daniel Goldin and Professor Claude Allegre, French Minister for National Education, Research and Technology, met in June in Washington, D.C., to discuss current and future space cooperation.

Mars exploration is envisioned as an

See France, page 3

Strategic plan rollout meetings set

The Executive Council is sponsoring a series of meetings to offer employees the opportunity to make inputs to JPL's plans for next year and to explore their dreams for the future of the Laboratory. The 14 theme-oriented sessions scheduled for July and August are listed below. Personnel may sign up for one or more meeting that interests them. For more details and enrollment information, go online to http://hr/et . ❑

Theme	Sponsors	Date	Time	Location
Human Resources	Susan Henry, Bill Weber, Bill Harrison	July 28	1:00-2:30	von Kármán
Centers of Excellence	Bill Weber, Kirk Dawson, Susan Henry	Aug. 3	9:00-10:30	180-101
Reimbursable Programs	Mike Sander, Susan Henry	Aug. 3	3:00-4:30	167 Conf.
Process Owners	Larry Dumas, Bill Weber	Aug. 4	9:30-11:00	180-101
Earth Science and Instruments	Moustafa Chahine, Charles Elachi	Aug. 7	10:00-11:30	180-101
IT Systems	Kirk Dawson, Harry Detweiler, Gael Squibb	Aug. 14	9:00-10:30	167 Conf.
Technology Development	Mike Sander, Moustafa Chahine, Susan Henry	Aug. 18	2:00-3:30	von Kármán
Basic Research	Moustafa Chahine, Kirk Dawson, Susan Henry	Aug. 20	2:00-3:30	von Kármán
Project Management	Norm Haynes, Mike Sander, Susan Henry	Aug. 21	1:00-2:30	von Kármán
Flight Operations	Gael Squibb, Mike Sander	Aug. 24	1:30-3:00	von Kármán
Engineering and Science	Bill Weber, Susan Henry	Aug. 25	2:00-3:30	von Kármán
Management Systems	Bill Harrison, Kirk Dawson, Susan Henry	Aug. 26	11:00-12:30	167 Conf.
Business Operations	Daryal Gant, Mike Sander, Susan Henry	Aug. 28	1:00-2:30	von Kármán
I Don't See Myself In Any Theme	Larry Dumas, Gael Squibb, Susan Henry	Aug. 31	9:00-10:30	180-101

PHOTO BY BOB BROWN / JPL PHOTO LAB

Artist Joseph Giri paints a Martian landscape on the wall of the new Mars Yard.

New 'Mars Yard' gets an artist's touch

By MARK WHALEN

Artist Joseph Giri, an old hand at painting Mars landscapes, came back to JPL in recent months for a shot at producing an updated version of his one-of-a-kind work.

Giri, who painted the backdrop of the original 'Mars Yard' a couple of years ago by utilizing photos taken by the Viking spacecraft, has painted the landscape images for the new Mars Yard. This time, he painted surfaces to emulate Mars by using photos from last year's Pathfinder mission.

The rover testing ground was moved to the east of Building 280, a bit north and east of its original location, to make way for a new emergency services building now under construction.

The Long Beach–based Giri's work usually leans toward painting larger-than-life images on the outside of buildings.

He did, in fact, manage to paint a building as part of the new Mars mural. There is a research trailer at the west end of the Mars Yard, as well as a chain-link fence with slats in it on the east side, and both surfaces are now meant to look like Pathfinder's Mars.

Dr. Richard Volpe, cognizant engineer for the long-range science rover Rocky 7, which is being pointed for a 2003 Mars mission, said the trailer and fence were also painted because a camera will soon be in place in the southern part of the yard to provide Internet broadcasts of robotics work, and "we wanted to have a panoramic, 180-degree view of Mars," he said.

Giri, who started the job in May and completed it this month, said he worked by using a spray gun for the first 70 percent of the job, then finished up with paint brushes. "It's done with a layering process," he said, "starting with dark colors, then working through to the lighter ones."

Another aspect of Giri's usual work is that many of his paintings have people in them. Not this time, of course, but Giri joked that a couple of unidentified robotics personnel challenged him to paint something on the mural that definitely didn't belong there: a rabbit or tortoise.

Volpe didn't know who made such a request, but said "If he did paint that, we never found it." ❑

Cal Poly Pomona chosen as high-tech business incubator

By JOHN G. WATSON

NASA has selected California State Polytechnic University, Pomona, to work with the agency in transferring technologies developed for the space program to private industry and the educational sector.

The NASA Management Office at JPL and the Dryden Flight Research Center, Edwards, Calif., have chosen the university for a cooperative agreement to serve as a high-technology business incubator.

Cal Poly Pomona will establish a dedicated 560-square-meter (6,000-square-foot) facility to be known as the NASA Commercialization Center, with ample room for expansion within a 26-hectare (65-acre) technology park developed on university land. This new center will augment the Pomona Technology Center, an independently developed incubator located in the technology park. The university's administration has pledged faculty and staff to provide substantial expertise in business and engineering disciplines as in-kind support.

The incubator will provide U.S. start-up or existing high-technology firms and U.S. educational institutions with business development support services, including advice on such topics as marketing, sales, finance, accounting, and legal and manufacturing issues.

As needed, these companies will be teamed with JPL and/or Dryden personnel to solve engineering challenges. In addition, the incubator will serve as a special resource for new companies whose key products or services are based on licenses of technologies developed at JPL or Dryden.

Further details about JPL's and Dryden's current technology transfer activities are available at their web sites at http://techtrans.jpl.nasa.gov/tu.html and http://www.dfrc.nasa.gov/TechTransfer/TechTransfer.html. ❑

ISO, processed-based management becoming more familiar to JPLers

By KERRY LYN CASSIDY
ISO 9001 Implementation Team

A second round of ISO 9001 internal assessments—with an emphasis on process documentation and the relationship between processes and line organizations—was held on Lab the week of July 13. A team of JPL assessors interviewed process owners and other selected employees to see how far along JPL is in documenting its processes.

Seventy-two assessors interviewed more than 80 percent of JPL process owners and nearly 300 people in line organizations. Employees in line organizations were questioned on their understanding of their processes and the existing documentation supporting those processes. Assessment feedback questionnaires were sent out to ascertain employees' responses to the assessments and their understanding in general of process-based management and ISO.

The assessors are JPL employees who were selected by division and section managers and are trained to assist in getting the Laboratory ISO certified by March 1999. Assessors evaluate how well processes and procedures are being documented; they do not evaluate the people who develop and use them.

As ISO and process-based management become more familiar concepts to the Lab population, the road to certification is more easily negotiated. ISO (International Organization for Standardization) is an international agency that promotes the development of standards for quality products and services.

Process-based management is a radical redefinition of work with revolutionary import for employees. The ultimate result of focusing on processes should empower the employee to take responsibility for the work they do and for the ways in which processes can be improved.

How do ISO 9000 and process-based management work hand-in-hand? A part of ISO standardization is involved in the development and implementation of a quality product delivery system. Process documentation—which under ISO standards can be reviewed, critiqued, changed and updated—will allow JPL to work smarter to provide products and services that "meet or exceed customer expectations, while reducing cycle time and cost" (JPL's Quality Policy).

An ISO 9001 management seminar is currently being offered at JPL. To enroll, go to the Education Consortium web site at http://hr/et . Future classes are now being designed to include all employees.

More information on ISO 9001 and process-based management at JPL can be found at a temporary web site: http://iso. A new and more comprehensive site is currently under construction. ❑

Special Events Calendar

Ongoing

Alcoholics Anonymous—Meeting at 11:30 a.m. Mondays, Tuesdays, Thursdays (women only) and Fridays. For more information, call Occupational Health Services at ext. 4-3319.

Codependents Anonymous—Meeting at noon every Wednesday. For more information, call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Support Group—Meets the first and third Fridays of the month at noon in Building 111-117. For more information, call employee assistance counselor Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—Meets the fourth Tuesday of the month at noon. For location, call Jayne Dutra at ext. 4-6400.

Senior Caregivers Support Group—Meets the second and fourth Wednesdays of the month at 6:30 p.m. at the Senior Care Network, 837 S. Fair Oaks Ave., Pasadena, conference room #1. For more information, call (626) 397-3110.

Friday, July 24

JPL Dance Club—Meeting at noon in Building 300-217.

Wednesday, July 29

JPL Drama Club—Meeting at noon in Building 301-127.

Thursday, July 30

JPL Dance Club—Clogging class will be held at noon in Building 300-217.

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

Friday, July 31

JPL Dance Club—Meeting at noon in Building 300-217.

Tuesday, August 4

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

JPL Genealogy Club—Meeting at noon in Building 301-169.

Wednesday, August 5

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

JPL Drama Club—Meeting at noon in Building 301-127.

Thursday, August 6

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

Friday, August 7

JPL Dance Club—Meeting at noon in Building 300-217.

SRTM stretches out for inspection

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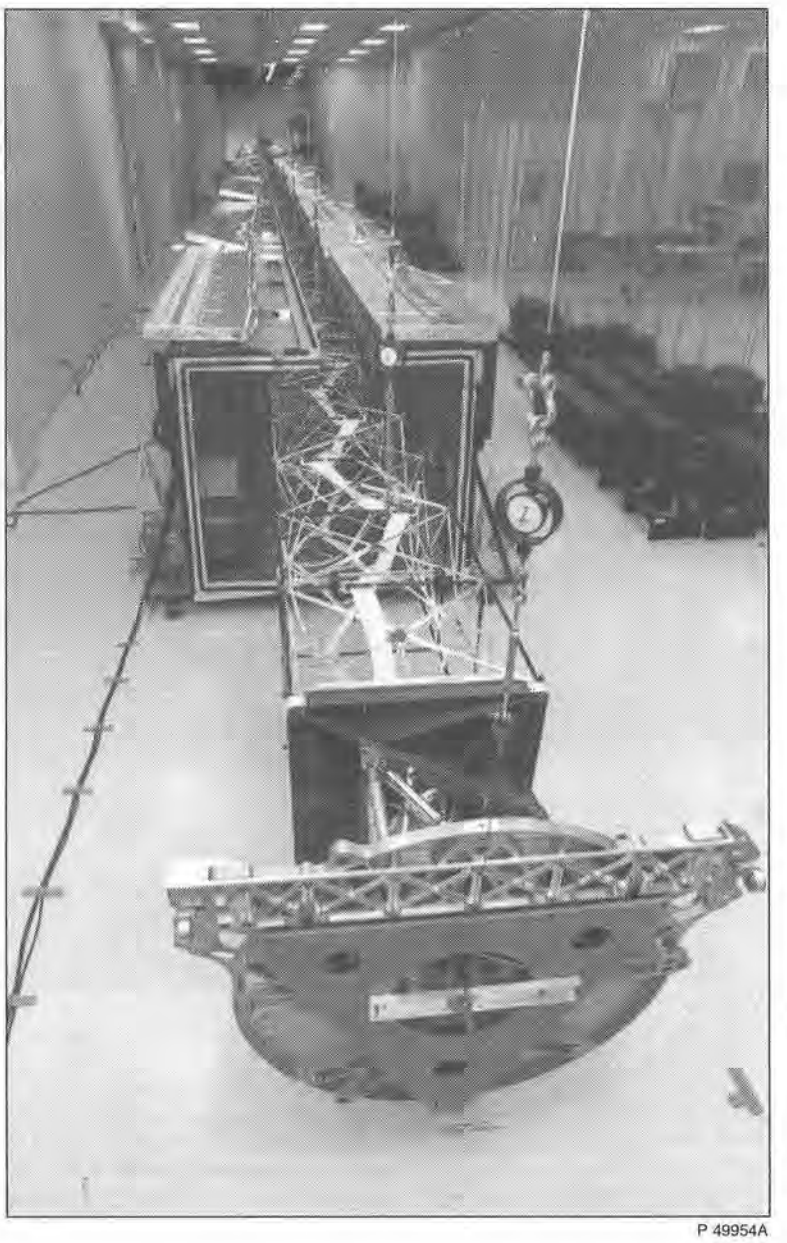

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JPL Director Dr. Edward Stone, right, and Major General James King, acting director of the National Imagery and Mapping Agency, check out a closeup view of the 60-meter (200-foot) mast built for JPL's Shuttle Radar Topography Mission (SRTM) by AEC-Able Engineering Company, as described by David Messner, left, the company's director of articulated mechanisms, at AEC-Able's facility in Goleta. SRTM, scheduled to be flown on an 11-day mission in September 1999, will utilize radar interferometry to compare images taken from the radar antennas in the space shuttle's payload bay and from antennas at the end of the mast. The mission will produce the most accurate and complete topographic map of Earth's surface ever assembled.

Near-Earth

Continued from page 1

"There is the near-Earth asteroid tracking program (NEAT) run by Eleanor Helin and her colleagues, the radar studies done by Steve Ostro and his colleagues, observations at Table Mountain Observ-atory, and dynamical studies by Al Harris, Paul Weissman and Paul Chodas, to name a few. JPL is also involved with seven missions to comets and asteroids in the next decade and a half," Yeomans added.

The establishment of the program office, he said, is an effort to facilitate and coordinate the ground-based observations of near-Earth objects and to develop a strategy for the scientific exploration of these objects, including their discovery, tracking, physical characterization, spacecraft observations and resource potential. Driven by more sensitive charged-couple device (CCD) detectors, the rate of discovery of near-Earth objects continues to accelerate, he noted.

Yeomans noted that personnel within the program office will maintain an up-to-date database of near-Earth objects and "routinely propagate their motions forward for tens of years to see whether any of these objects will make interesting, close-Earth approaches."

This activity is not only for hazard assessment, he said, but also to identify optimal opportunities for ground- and space-based observations of these objects and "to identify which bodies might be exploited for their mineral wealth in the next century. Asteroids offer extraordinary mineral resources for the structures required to colonize the inner solar system and comets, and with their vast supplies of water ice, could provide life-sustaining water as well as the liquid oxygen and hydrogen required for rocket fuel."

"It seems ironic that the very objects that bear watching because they could threaten Earth are the same ones that are most easily accessible to future space missions—missions that might exploit their considerable resources," he said.

More information on NASA's research related to asteroids and comets is available on the Internet at http://www.hq.nasa.gov/office/pao/facts/HTML/FS-023-HQ.htm . ❑

Mars

Continued from page 1

Returning a sample from the surface of Mars to the Surface of the Earth. Led by Bill O'Neil. The technical challenges of delivering sample return vehicles to Mars will be studied, including Mars ascent to orbit; rendezvous, docking and sample transfer; Earth return, entry and landing; sample containment and planetary protection (both Earth and Mars).

In conjunction with this group's work, a sample-return workshop was held earlier this month with representatives from JPL and the science and industrial communities; another session is scheduled for August. "There's a philosophy here of casting a wide net across diverse communities to try to get the best ideas possible to characterize the architecture of the sample return missions and the Mars Program architecture as a whole," Jordan said.

Characterizing Mars for Human Exploration. Led by Dr. Roger Bourke. This group will discuss Mars' soil and dust properties, radiation environment and indigenous resources. "We already see the influence of this area of study on our program, with three lander experiments and one orbiter experiment on the 2001 mission," Jordan noted.

Systems for Communications, Navigation and Information Transfer. Led by Dr. Chad Edwards. Studies will involve the development of an infrastructure to support a robotic and eventually human continual presence on Mars. Included topics are telecommunications, surface positioning, navigation and information transfer back to Earth.

Finally, Jordan will lead an architecture integration group. "We have a major challenge," he said. "We're looking to narrow down to an architecture that not only has budgetary integrity, but also support from our various stakeholders: Headquarters, the scientific community, HEDS and our international partners."

While the JPL working groups meet about 10 times over the summer, the aforementioned architecture team, comprising international scientists, engineers and technologists, will meet on Lab July 27 and 28 and again Sept. 2, 3 and 4. Elachi said this team, through its exposure to the JPL working groups' ideas, will provide "direction and advice" to aid the entire architecture's focus.

Elachi added that a draft architecture is scheduled to be presented to NASA Headquarters in late September. The international architecture team then will again provide guidance to prepare for a final presentation to Headquarters in November.

"With Mars, our goal is still the same," Elachi said. "We are still heading in the same general direction, but based on new knowledge, we should be reviewing and readjusting on a regular basis."

Elachi offered a historical example: Lewis and Clark, the pioneering explorers of the North American continent in the early 1800s, "didn't plan every step of their journey all the way to the Pacific," he said. "They made new discoveries, and made adjustments to their path."

When the architecture study is completed, Elachi added, "I hope we will have a framework and a clear path of how we're going to do sample return for the next few opportunities: 2003, 2005 and 2007.

"The architecture will allow for the fact that if there are bumps or surprises downstream, say a year or two from now, it doesn't mean we have to make fundamental changes. We can apply judicious adjustments to the architecture as we go along. The key challenge is to convince Headquarters that this approach is resilient and flexible."

Elachi added that he was "delighted" with the excitement and engagement of the many employees who offered their help and ideas during the initial stages of the architecture study. "This really says that we have a tremendous wealth of good ideas here at JPL," he said. "And the attitude of people looking for other solutions—not only counting on solutions that have already been invented—really works well for us.

"I'm very optimistic and confident that we will come up with an excellent architecture." ❑

France

Continued from page 1

international endeavor involving bilateral and multilateral cooperation, and France and the United States are interested in expanding cooperation in this area.

NASA and CNES have agreed to explore joint cooperation on the exploration of Mars, with focus on the first Mars sample return mission, now scheduled for launch in the summer of 2005. Current baseline discussions anticipate French provision of an Ariane-5 launch vehicle and other hardware including the orbiter and science packages. NASA will be responsible for the overall Mars sample return mission, including the lander, rover, and other mission elements. As part of this cooperation, French scientists also will participate in various science activities associated with the Mars Surveyor Program; for example, those addressing landing site and sample selection criteria and sample analysis.

NASA and CNES already are cooperating in the Mars Global Surveyor mission, with CNES providing the Mars relay communications package and contributing to the scientific payload. ❑

—NASA Headquarters

Garvey talk highlights safety awards

By MARK WHALEN

More than 300 JPL employees were recognized for their commitment to a safe workplace during the Lab's annual Safety Incentive Awards, held July 15.

The event, sponsored by the Safety Operations Section 601, included employees from selected sections in Divisions 62, 64 and 66.

The celebration was held in recognition of JPL's having reduced lost-time accidents by 84 percent over the last year—from 295 such accidents down to 47. According to Char Fliege of Safety Operations, the safer workplace has also resulted in a 90 percent reduction in lost-time accidents since the inception of the safety incentive program in 1990.

Honorees were treated to not only a complimentary breakfast at the 303 cafeteria, but also an appearance by former Dodger Steve Garvey, who now works as an inspirational speaker.

Former baseball great Steve Garvey congratulates Vince Bethel of Section 661, left, following Safety Incentive Awards July 15. At right is Char Fliege of the Safety Operations Section.

Garvey discussed his baseball career—including the subject of change—noting how he had to deal with the end of his Dodger career and start anew with the San Diego Padres in 1982.

"I told myself at the time," Garvey said, 'just because I've made the transition from one team to another doesn't mean I can't still be a better player and get to the World Series.'" Garvey was one of the leaders on the Padres' only World Series team, in 1984. ❑

Passings

Martin Dietl, 83, a retired senior engineer from the former Section 291, died of cancer May 30 at his home in La Cañada.

Dietl worked at JPL from 1957–77. He is survived by his wife, Ruth.

No services were held. ❑

Edward "Ted" Cook, 86, a retired member of the technical staff from the former Section 130, died of cancer June 3 at his home in Lake Havasu City, Ariz.

Cook joined the Laboratory in 1964 and retired in 1984. He is survived by his wife, Rheta, son Anthony and daughter Lindsay Morgan.

No services were held. ❑

Eleanore Scruggs, 75, a retired secretary from Section 339, died of cancer June 5.

Scruggs worked at JPL from 1966–86. She is survived by her husband, John, and daughter Jonnell Conroy.

Services were held at Forest Lawn Memorial Park in Glendale. ❑

William Westlake, 73, a retired senior engineering technician from Section 341, died of an aneurysm June 15 at a hospital near his home in Goldbar, Wash.

Westlake joined the Lab in 1979 and retired in 1989. He is survived by his wife, Elsie; sons William Westlake and George Lewis and daughter Jacqueline Lewis.

No services were held. ❑

George Reed, 77, former technical manager of JPL's All Source Analysis System/Enemy Situation Correlation Element Project, died of cancer June 16 at his home in Santa Rosa, Calif.

Reed joined JPL in 1970 and retired in 1984. He is survived by his wife, Joanne, and daughters Debra Fish and Rita Casey.

No services were held. ❑

Leona Fowler, 74, a retired senior technical typist from the former Section 655, died of lung cancer June 18.

Fowler worked at the Laboratory from 1968–89. She is survived by her daughter, Kathy Graham, and son Michael Lopardo.

Services were held in her hometown of Joplin, Mo. ❑

James Willett, 57, former science coordinator and team chief with the Galileo mission, died of brain cancer June 19 at his home in Clarksville, Md.

Willett joined the Laboratory in 1970. In 1990, he took an assignment at NASA Headquarters as a JPL liaison.

He is survived by his wife, Lin; daughters Theresa Willett, Jessie Wyant and Hallie Rose.

Memorial services were held June 22 in his hometown. ❑

Retirees

The following employees retired in July:

K. Gordon Maughan, 44 years, Section 644; **Donald Kindt**, 42 years, Section 140; **James Riccio**, 42 years, Section 323; **O. Fred Thompson**, 40 years Section 349; **Gerald Fleischer**, 39 years, Section 393; **Richard Spehalski**, 39 years, Section 990; **John Gregoire**, 37 years, Section 644; **Anthony Spear**, 36 years, Section 705; **John Miller**, 33 years, Section 506; **Robert Rice**, 32 years, Section 344; **John Rice**, 31 years, Section 349; **Irwin Doerksen**, 24 years, Section 313; **Gerald Voecks**, 24 years, Section 354; **Dusan Petrac**, 20 years, Section 359; **Arthur Stoute**, 20 years, Section 665; **Ernesto Murga**, 19 years, Section 665; **Jimmie McFerguson**, 16 years, Section 665; **Carl Day**, 14 years, Section 665; **Arthur Wilson Jr.**, 14 years, Section 665; **Anna Flores**, 12 years; Section 665; **Joseph Johnson**, 12 years; Section 665. ❑

New developments in sun shields

Based on technology developed by JPL's inflatable structures technology program, a team from JPL, Goddard Space Flight Center, and industrial partners L'Garde and ILC Dover on June 30 demonstrated controlled deployment and rigidization of a half-scale, inflation-deployed sun shield for the Next Generation Space Telescope. The event took place at ILC Dover facilities in Delaware. The shield is diamond- or kite-shaped. The half scale size is large, 16 by 7 meters, with four thermally separated shield layers. The result of this highly successful demonstration is that the technology is ready for flight validation. The Next Generation Space Telescope is part of the JPL-managed Origins Program, which includes JPL's Space Infrared Telescope Facility (SIRTF), as well as two proposed Laboratory projects, the Space Interferometry Mission (SIM) and the Terrestrial Planet Finder.

LETTERS

Thanks to everyone who participated in my retirement party on June 24, especially those who traveled at long distance. It was a very special event for my family and me. Special thanks to Mary Parrish and Julie Corpe for organizing the party, and to those who spoke so kindly of me. I was privileged to work with you all. My best wishes to each of you in all you do in life.

John E. Miller

❑❑❑

We would like to thank all our friends in the Inet group for the Hawaiian Honeymoon party and all the beautiful gifts! Not many newlyweds get to have their honeymoon on-Lab! Special thanks to Bonnie.

Mary Kay & David

❑❑❑

To the MUSES-CN Team and my colleagues in Section 336: Thank you for your kind and generous expressions of condolence at the sudden and unexpected passing of my father. Your support in this time of great sorrow has been most appreciated by Cheryl, Kristen and me. I am honored to call you my friends, and I will always be in debt to you.

Jan Tarsala

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Universe

Editor
Mark Whalen

Photos
JPL Photo Lab

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For change of address, contact your section office or the HRS Help Desk at ext. 4-9559 (on-Lab personnel) or Xerox Business Services at (626) 844-4102 (for JPL retirees and others).

FOR SALE

BEDROOM SET, oak finish, includes single bed, 2 nightstands, chest of drawers and dresser w/mirror, $250. 909/596-5774.

BICYCLE, Cannondale road 60cm full dura-ace 80-spd STI w/time carbon fiber fork, cost $2,500 new, sell for $800/obo. 805/943-8313.

CANDLES, boxes of 12, 12" & 8", various colors: $6/box. 626/398-4960.

CELLULAR PHONE system: Motorola micro TAC 550 flip phone (w/menu), $65; 6V Motorola ni-cad att. std. and overnight charger incl.; rechargeable NiMH thin batt., $25; leather case, $10; car batt. adapter, $15; total $115. 626/446-5718.

COMPUTER SYSTEM, 486 PC clone w/interior modem, monitor and Hewlett Packard Ink Jet printer, gd. working cond., all for $300/obo. 213/258-8698.

COUCH/LOVE SEAT, Lazy Boy dual-recliner, country blue floral, gd. cond., $50. 352-2036.

DESK, executive office (6 ft.), and chair, credenza, file cabinet, 2 lamps, all matching, cost $2,400, sell $600/obo, DINING TABLE w/smoked glass and 6 matching chairs (black), $175/obo. 805/945-8638.

DESKS, two antique oak, single pedestal, approx. 30" x 45", $100/ea. 626/355-9181.

ENGINEERING MEMORABILIA: 2 slide rules w/cases in exc. cond.; all-metal Pickering and wooden K&E, exc. cond.; make offer. 626/332-7305.

EXERCISE BIKE, Schwinn deluxe, heavy duty, exc. cond., $25. 248-8413.

MEAT GRINDER/FOOD CHOPPER/grater/shredder, commercial qual., orig. $500, sell $60. 626/398-4960.

MODEM, Macintosh external supra fax 33.6, $30. 805/297-8533.

MOVING SALE: queen-sz. bed purchased in 2/98, $350; couch, 3 seats, $100; halogen lamp, $15; lamps, $10/ea.; book cabinet, commode, $20/ea. 626/256-9233.

PAINTING, orig. oil on canvas, impressionistic landscape, 42" x 52", w/invisible frame, $250. 626/797-3156.

PIANO, Kimball, artist Spinet, genuine walnut, incl. matching bench and beginner books, looks and plays great, $850. 909/350-9218.

POOL TABLE: full sz., ball return, needs recovering, damaged corner, accessories incl., make offer. 626/398-7090.

PRINTER, HP DeskJet 600, 2 yrs. old, w/PC cable and extra color cartridge, $85. 213/663-0769.

RECLINER, Lazy Boy, $20. 352-2036.

REFRIGERATOR/FREEZER, side-by-side, frost-free, outside dimensions W-31", D-29", H-66", vg cond., $150. 626/794-2965, lv. msg.

SECURITY SYSTEM, DSC PC1500 w/motion detector, siren, Yuasa batt, trsf, wiring, $50. 790-7062.

SOFA & LOVESEAT, tan, vg cond., sofa 90" long, $125; loveseat, 64" long, $75; or sell as set for $150. 546-1402.

TEACUPS, Franciscanware, desert rose pattern, $7/ea. 626/398-4960.

TENTS: new lg. family dome, 10' x 11.5' x 6' high, 3-pole tent & rainfly, lots of fresh air, upper net siding, lower solid nylon for privacy, $85/obo; dome, 7' x 7' x 54" high "Coleman sundowner," looks new, exc. cond., very clean, $60/obo. 626/795-7217.

TYPEWRITERS: Olympia electronic, xtra-wide carriage, font/pitch change, underlining, correction, etc.; exc. cond., incl. 6 new ribbons and 12 correction tapes, $100/obo; (2) Smith-Corona portable electric typewriters, gd. cond., $25/ea.; BED FRAME, queen-sz., $15; END TABLE, drum-style, $20; SOFTWARE, Quicken for Windows, unopened, $20; VIDEO GAME, Atari, w/8 cartridges, gd. cond., $20 for all. 626/355-3886, Rosemary/Ed.

WASHING MACHINE, Frigidaire, lg. capacity, heavy duty, $150; WEIGHT BENCH, Olympic, has leg extension, over 200 lbs. of cast iron weights, $90. 248-6924.

WEDDING DRESSES: lots of sequence and pearls, approx. sz. 8-10, with long train, cost $1,200, sell $300/obo; pearly white, approx. sz. 11-12, cost $700, sell $200/obo. 805/945-8638.

VEHICLES / ACCESSORIES

'89 BMW 325i, gray, 4 dr., 5 spd., 90M, exc. cond., very clean, guar. to impress, pw, pdl, sunroof, alarm, 6-speak. ster., $5,999. 247-5272, pgr 327-3227.

'89 CHEVROLET Z24 convertible, V6, auto, 100K mi, all pwr., grt. engine, gd. cond., $3,950/obo. 952-5434.

DASH COVER for '94 Toyota Corolla, dk. brown, new in box, $30/obo. 626/795-7217.

'97 FORD Escort wagon, white, stick, 10.5k miles, exc. cond., $9,700. 845-8449, Ray.

'97 FORD Taurus GL, 4 dr., only 19k mi., exc. cond., auto, a/c, loaded, moving, must sell, $13,000/obo. 626/282-5428.

'94 FORD Escort LX station wagon, 36,000 mi., a/c, am/fm, airbag, new tires, vg cond., $4,000/obo. 626/256-9233, after 6 p.m.

'89 FORD Escort GT, white, tan int., dependable, 5 spd., 4 cyl., 130K mi., recently tuned, new catalytic conv., new muffler, smogged, tags gd. 'til Apr. '99, $1,400 or trade for motorcycle [prefer Enduro/dual sport] or personal watercraft. 626/237-4153.

'89 FORD Mustang 5.0 LX conv., maroon/wht top, auto, 99.7k, exc. cond , $5,900. 790-7835.

'87 FORD Ranger XLT extra cab, 4x4, cruise, a/c am/fm cassette ster., lifted, tinted windows, white exterior, vg cond., $4,300/obo. 805/252-5276.

'87 FORD Tempo, 2 dr, hdtop, 4 cyl, auto trans, ps/pb/ac, AM/FM cass. radio, tilt wheel, new brakes, tires, muffler; reliable, runs great; $1,200/obo. 213/465-9514, lv. msg.

'93 HONDA Civic DX, 4 dr., auto, a/c, am/fm cass., 60k mi., gd. cond., $7,500/obo. 626/282-5428.

'89 HONDA Accord, hatchback, auto, 95,000 mi., A/C, CD, orig. owner, gd cond., $5,000/obo. 626/799-7409.

'85 JEEP Cherokee, 4WD, 2 dr., manual, air, CD, 125K mi., new brakes, rebuilt trans., $3,200/obo. 626/577-9364, Ben.

'87 MAZDA RX7, GXL model, full equip'd, leather int., Kenwood AM/FM/CD stereo, lo blu. bk., $2,500/obo. 626/797-6824.

'86 MERCEDES BENZ 190E, auto, all pwr., org. owner, $3,500. 790-3802.

'73 MERCEDES BENZ 450 SEL, 160K mi., blk. w/chrome lining., blk and tan interior, new paint, new tires, rebuilt eng., sunroof, original rims, car cover, looks great. 626/398-3536, Elizabeth.

SAILBOAT, 24-ft. Columbia Challenger, w/sink and built-in ice chest, slps. 4, $1,500/obo. 909/986-1931.

'95 SATURN SL2, auto, a/c, cruise, p/w/dl, cass, snrf, new tires, exc. cond., 48K mi., wht. w/gry int., $10,500/obo. 626/398-7090.

TIMING BELT for '92 Acura Integra, original Honda parts, brand new in orig. packaging; retail $70, sell for $40. 562/420-2313.

'87 TOYOTA Corolla, 4 dr., 5 sp., coppertone color, 100k orig. mi., complete maint. rec., exc. cond., $3,800. 626/440-0609.

'85 TOYOTA Cressida, maroon, auto, air, 6 cyl., 4 dr., sunroof, pwr. windows/steering/brakes, am/fm cass., equalizer, alarm, orig. owner, 150m, $3,000. 243-4597 eves./weekends.

'95 ULTRA ski boat, 460 Harman Marine motor, open bow, Hensley tandem trailer, Dominator jet, low hrs., like new, $21,000. 248-8413.

'88 VW Fox, 30K mi. on rebuilt eng., orig. owner, A/C, gd. cond., great gas mileage, $1,500/obo. 352.7244.

WANTED

CARPOOLER for Arcadia, 7:15 to 4; Ext. 4-1024, Shary.

CARPOOLERS from Palmdale-Lancaster to JPL; 7:30 to 4:15 sched. Ext. 4-0310, Vachik Garkanian.

DRIVER: to Phoenix, to pick up a slot machine and bring back to L.A.; will negotiate expenses. 909/624-2148, Doe.

FORD BRONCO II, '88-90 4 x 4, stick, smogged; cash or will trade '97 Escort less bluebook diff. 845-8449, Ray.

HOUSESITTING OPPORTUNITY for female occupational therapist for August; single, no pets, non-smoker. 626/398-3192, Gordy.

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

TOY pieces or sets, used, "Knex "and "Brio Mec." 626/303-3016, Ellyn.

VANPOOL RIDER, full-tm. for # 20 with stops in Northridge and Granada Hills. Ext. 4-0307, Marilyn.

WALL FOUNTAIN, lg., Italian style. 626/584-9632.

FREE

FILL DIRT, clean, mostly gravel-like, you haul, several cu yds., take as little or as much as you like, 3 blks SSE of NY & Hill, Altadena. 798-5152.

KITTENS, Siamese mix, rescued litter of 6, litter trained, blue eyes, Siamese markings, very cute. 626/796-3466.

FOR RENT

ARCADIA house, 2 bd., 1 ba., garden, garage, very nice, $900 + deposit. 626/447-0759.

LA CRESCENTA, priv. 2-bd. home w/pool high above Foothill; fireplace, beamed ceilings; $1,350. 952-6007.

MONTROSE, share 2-bd. apt., nice complex w/pool, 5 min./JPL, $375 + 1/2 util. 541-0794, or 626/397-7362, Marty.

PALM DESERT, exquisite, 2 bd., 2 ba. villa for vacations or long term, newly remodeled, w/skylight, patio & 2-car gar.; located across Living Desert; great locality; priv., secure resort w/ tennis cts., multiple pools, spas and clubhouse facilities; around 2 top resorts. 909/620-1364.

PASADENA, 3 bd., 2½ ba., near PCC , twnhse.-style apt., 2 frplcs., cent. a/c, blt-in range & oven, cpts, drapes, dspsl, lndry, cvrd. pkng., $990. 790-7062.

PASADENA, rm. to share w/2 others in 3-bd. apt., pool, washer/dryer in unit, parking, air cond., $385 + 1/3 util. 626/564-1078.

MONTEREY PARK, bright, airy spacious rm., lots of storage & closet space, off-st. parking, quiet, tree-lined community, $98/wk. 626/280-7659.

SAN GABRIEL, housemate to share 3-bd., 2-ba. house, avail. 1 Aug. to non-smoker. 9 mi./JPL. $500. 626 281-2179, Mike.

SIERRA MADRE apt., 2 bd., 1 ba., view, 6-unit bldg, upper, $700. 626/355-7318.

SOUTH PASADENA, fully furn. apt. on 1 level; nice area on Huntington Dr. betw. Milan/Marengo, near shopping; util. pd., laundry facil. on premises, parking space; non-smoker; $565. 626/792-9053, Marilyn.

REAL ESTATE

BIG BEAR, new cabin 2 blocks from lake, 2 bd., 2 ba., mud/laundry rm., $129,000. 909/585-9026.

CALIENTE, Calif., new custom home near Tehachapi mtns., 2,200 sq. ft., 3 bd., 2 ba., 2-car gar., new Dutch barn on 2½ acres, $165,000 omc. 626/446-0078, Margaret.

L.A./GLENDALE-adjacent, charming house, 2 bd., 1 ba., detached bonus rm., din. rm., indoor/outdoor fireplaces, 2 patios, lg. enclosed yd., laundry rm., vw., close to JPL & Caltech, $174,900. 549-4140, Debi.

PALM DESERT, exquisite, 2 bd., 2 ba. villa, newly remodeled, w/skylight, patio & 2-car gar.; located across Living Desert; great locality; priv., secure resort w/ tennis cts., multiple pools, spas and clubhouse facilities; around 2 top resorts. 909/620-1364.

TRINITY COUNTY, Douglas City, Deer Lick Springs area, 2 bd., 2 ba. mobile on 12+- acres; beaut. vw. of Blanchard's Flat and surrounding oak-covered rolling hills; over 1/4 mile of creek frontage; perfect for vacation or perm. home. $84,500. 530/623-4917, John Small.

VACATION RENTALS

BIG BEAR, 7 mi./slopes, full kitch., f/p, 2 bd., 1 ba., sleeps 6, reasonable rates; 2-nt. min., no smokers, no pets; exc. hiking, biking, fishing nearby. 909/585-9026, Pat & Mary Ann Carroll.

BIG BEAR cabin, walk to village, quiet area, 2 bd., sleeps 8, completely furn., F/P, TV/VCP, $75/night. 249-8515.

BIG BEAR LAKE cabin, near lake, shops, village, forest trails; 2 bd., sleeps up to 6, fireplace, TV, VCR, phone, microwave, BBQ and more; JPL disc. price from $65/nite. 909/599-5225.

BIG BEAR LAKEFRONT, 1-bd, 1-ba. condo; sleeps 4, full kitchen, gym, indoor pool, Jacz., BBQ areas; Oct. 16-23, $75/night. 213/296-6641.

BIG BEAR LAKEFRONT lux. townhome, 2 decks, sleeps 6, tennis, pool, spa. 949/786-6548.

MAUI condo, on beach w/ ocean view, 25 ft from surf, 1bd w/loft, compl. furn., include. phone, color tv, vcr, microwave, dishwasher, pool & priv. lanai, slps. 4, 4/15-12/14 rate $95/nite/2, 12/15-4/14 rate $110/nite/2, $10/nite/add'l person, less 10% JPL & Caltech disc. 949/348-8047

CAMBRIA, ocean front house, exc. vw., sleeps up to 4, $125/nt. for 2, $175/nt. for 4. 248-8853.

KONA, HAWAII: on 166 ft. of ocean front on Keauhou Bay, priv. house and guest house comfortably sleep 6; 3 bd., 2 ba.; swimming, snorkeling, fishing, spectacular views, near restaur., golf courses and more. 626/584-9632.

LAGUNA BEACH timeshare condo, on the water, ocean-front unit, sleeps 4, July 24-31, $1,000. 244-8253, Tony Pearson.

LAKE TAHOE, N. Shore, 2-bd., 2-1/2 ba. condo, sleeps 6-7; great loc., all amen., private sandy beach, pool, sauna; walk to golf, fishing 150 yds./front dr., 2 mi./casinos; 1 summer week left, Aug. 29-Sept. 5; special JPL rate, $630/wk (incl. tax, cleaning); reduced daily/weekly rates after mid-Sept. 626/355-3886, Rosemary or Ed.

MAMMOTH condo, studio + loft, 2 ba., fireplace, Jacz., sauna, game rm., color cbl. TV/VCR, full kitch. w/microwave, terrace, view, amen., low rates. 714/870-1872.

MAMMOTH condo, 2 bd. + loft, 3 ba., slps 8, spa, full kitch., TV/VCR, JPL disc. rates, walk to Canyon Lodge. 249-8088.

MAUI condo, on beach w/ocean view, 25 ft. from surf, 1 bd. w/loft, compl. furn., incl. phone, color TV, VCR, microwave, dishwasher, pool & priv. lanai, slps. 4, 4/15-12/14 rate $95/nite/2, 12/15-4/14 rate $110/nite/2, $10/nite/add'l person, less 10% JPL & Caltech disc. 949/348-8047.

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

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

PALM SPRINGS, 1-bd. condo, slps. 4, pool, spa, tennis, cable tv/vcr, all furn., rugs, paint & cooking utensils new. 626/445-0884.

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.

S. LAKE TAHOE Keys waterfront home, 4 bd., 3 ba., sleeps 12+, frplc. on 2 levels, decks overlook priv. dock/ski lifts, gourm. kitch., bikes, boats, 3 color TVs, VCR, stereo w/tape/disk, indoor/outdoor pools, hot tub and beach; tennis, 10 min./skiing, casinos/golf, 1 hr./ wine country; $995/wk. high season [15 June to 15 Sept; 22 Nov. to 1 March]; $495/wk. low season, + $90 cleaning; 3-day min. 626/578-1503, Jim Douglas.