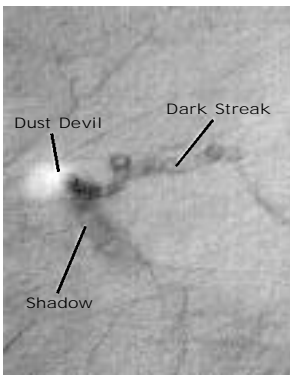


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Surveyor continues providing new discoveries at Mars

Dust devils, vast differences in polar caps shown in recent images

By Mary Hardin



The camera onboard Mars Global Surveyor caught a dust devil in the act of formation last December, just hours before the picture was played back to Earth. The dust devil is less than 100 meters (100 yards) wide.

New images from JPL's Mars Global Surveyor spacecraft have caught dust devils and landslides in the act of changing the surface of Mars, giving scientists more clues about how Mother Nature's vandals are leaving their mark on the changing Martian landscape. Other new images show that while Mars' north polar cap has a relatively flat, pitted surface that resembles cottage cheese, the south polar cap has larger pits, trough and flat mesas that give it a holey, Swiss cheese appearance.

Since Mars Global Surveyor arrived in September 1997, its high-resolution camera has been snapping pictures of puzzling dark streaks and lines that seemed to defy simple explanation—until now. In December 1999, scientists had their first solid evidence, a picture of a dust devil caught like a graffiti artist in the act of etching the surface of Mars.

"Dust devils are spinning columns of air that move across the landscape and look somewhat like miniature tornadoes," said Dr. Ken Edgett, a staff scientist at Malin Space Science Systems in San Diego. "We've captured them in the midst of sweeping up dust and leaving behind a dark streak. This is the 'smoking gun' that explains the wild, sometimes twisted 'spaghetti' of dark streaks and trails we have been seeing. I get the feeling when I look at these pictures that something is 'moving.' These things send shivers down my spine."

Dust devils, a common occurrence in dry and desert landscapes on Earth as well as Mars, form when the ground heats up during the day, warming the air immediately above the surface. The warmed air nearest the surface begins to rise, and a spinning column begins to move across the surface and picks up loose dust. The dust makes the vortex visible and gives it the "dust devil" or tornado-like appearance. On Earth, dust devils typically last for only a few minutes and the same is probably true for Mars.

"We are witness to one of the processes that help explain cause of some of the seasonal variations in the bright and dark surfaces on Mars," Edgett explained. The dust devils remove some of the bright dust and cause the surfaces to appear to darken in the spring and summer seasons. Each little dust devil that runs across the landscape makes the surface in that region just a little bit darker. This isn't happening every-

where, but it seems to be most common in Mars' mid-latitudes. In recent weeks, we have seen as many as five to 10 devils at a time running across the floors of the giant impact basins of Hellas and Argyre."

Scientists have known for decades that winds change the surface of Mars, but Global Surveyor has also captured other dark streaks that scientists now believe are the result of recent landslides.

"This is the first time we have been able to detect from orbit a change caused by some other geologic process. Gravity is acting to move loose dust and sand down these crater slopes," said Edgett. "It's not a big surprise, but it is exciting to have captured the results of several new landslides that occurred in less than one Martian year." Mars Global Surveyor's camera is observing how often these streaks form, which will provide scientists with some idea of the rate at which Martian slopes are modified. "Knowing how long it takes for any process that changes the landscape to occur can tell us more about the how the planet came to look the way it does today," Edgett said.

Global Surveyor's camera has also revealed the erosion of the upper layer of the Martian south polar residual cap, "leaving flat-topped mesas into which are set circular depressions," said Dr. Peter Thomas of Cornell University, Ithaca, N.Y. and lead author of the paper. "Nothing like this has ever been seen anywhere on Mars except within the south polar cap, leading to some speculation that these landforms may have something to do with the carbon dioxide thought to be frozen in the south polar region."

In a paper published March 9 in the journal *Nature*, members of the Mars Global Surveyor imaging team have described some of the newly discovered differences in polar terrain.

"The unusual shapes of the landforms on the north and south polar caps suggest that these regions have had different climates and histories for thousands or perhaps even millions of years," Thomas said.

"These landforms may be telling us what the south polar cap is made of," said Caltech professor Dr. Andrew Ingersoll, one of the authors of the paper. "The north residual cap—the part that survives the summer—is made of water ice. The south residual cap seems to be made of carbon dioxide or dry ice, but we don't know if this is a veneer a few meters thick or a solid block that extends down 2 or 3 kilometers (1.24 or 1.86 miles). These images may help us decide."

The new images can be seen online at <http://photojournal.nasa.gov/new>.

Newfound quasar most distant in the universe

By Michelle Viotti

If Guinness had a book of cosmic records, a newly discovered quasar in the constellation Cetus would make the front page.

This distant quasar easily skates past the previous record-holder, placing it among the earliest known structures ever to form in the universe.

A team of astronomers identified the candidate after nights of long-exposure imaging at Caltech's 5-meter (200-inch) Hale Telescope at Palomar Observatory and at the National Science Foundation's 4-meter (157-inch) Mayall Telescope at Kitt Peak, Ariz. A spectral analysis of the quasar's light was then completed at the Keck Observatory in Hawaii.

"As soon as we saw the spectrum, we knew we had something special," said Dr. Daniel Stern of JPL, who played a key role in the discovery. "In images, quasars can look very much like stars, but a spectral analysis of a quasar's light reveals its true character. This quasar told us that it was an 'Ancient'—one of the universe's first structures."

Quasars, packed into a volume roughly equal to our solar system, emit an astonishing amount of energy—up to 10,000 times that of the whole Milky Way galaxy.

The recent findings will be presented in an upcoming issue of the *Astrophysical Journal Letters*. One of Stern's co-authors was Dr. Peter Eisenhardt of JPL.

Images are online at <http://www.jpl.nasa.gov/pictures/quasar>.

Galileo extended through year-end

Simultaneous observations of Jupiter planned with Cassini

By Jane Platt

The Galileo mission to explore Jupiter and its moons has been extended by NASA through the end of 2000, when the JPL-managed spacecraft may embark on a joint scientific expedition with Saturn-bound Cassini.

"This extended travel ticket enables us to continue studying Jupiter and its fascinating moons," said Galileo Project Manager Jim Erickson.

During this new extension, the Galileo Millennium Mission, tour planners hope to include three high-priority scientific observations this year:

- Galileo would team with Cassini for simultaneous observations of the Jupiter system and its magnetic environment from two vantage points. Cassini will visit Jupiter's neighborhood in December 2000 and the planet's powerful gravity will be used to "sling-shot" Cassini toward Saturn.
- Galileo will perform two additional flybys of Jupiter's moon Ganymede, the largest moon in the solar system, on May 20 and Dec. 28. Scientists hope these flybys will reveal more about Ganymede's geologic history, including the highest-resolution pictures ever taken of this icy world.
- Results will be analyzed from the Jan. 3 flyby of Jupiter's moon Europa and the closest-ever flyby of the volcanic moon Io on Feb. 22. That encounter, at an altitude of only 200 kilometers (124 miles), may have been the last tour of that unique environment for years to come. The close-up images will add to Galileo's bulging scrapbook, which already contains about 14,000 pictures beamed back to Earth so far.

By April 2001, after the spacecraft transmits to Earth pictures and scientific information stored on its tape recorder during the flybys in 2000, Galileo will have traveled nearly 4-1/2 billion kilometers (2.8 billion miles).

"For the first time ever, two spacecraft will simultaneously explore an outer planet," Cassini Project Scientist Dr. Dennis Matson said about the planned Jupiter observation by Cassini and Galileo. "One spacecraft will be inside Jupiter's magnetic envelope, with the other outside where it can observe the powerful solar wind pressing on the envelope. From the two vantage points, we'll watch cause and effect as the wind changes the magnetic properties around Jupiter."

"We have a unique opportunity to study this dynamic system with two highly capable spacecraft at the same time," added Galileo Project Scientist Dr. Torrence Johnson. "It's a real bonus for both missions."

Galileo mission planners are currently exploring various options for the mission's eventual conclusion, including possible further encounters with Io and another Jovian moon, Callisto. Planners are looking into a possible impact with Io or Jupiter for a mission finale, with other options are also being considered. They are trying to avoid an impact with Europa because recent evidence suggests there may be a liquid ocean beneath its icy crust, raising the possibility that life could exist there.

News Briefs

Search team seeks volunteers

The JPL Urban Search and Rescue Reserve Team is seeking new members. This is a volunteer organization that trains in a wide range of skills in preparation for natural and human disasters at JPL.

When a disaster strikes JPL, local emergency response resources may be overwhelmed. The JPL Urban Search and Rescue Team was developed by Emergency Preparedness Administrator ERIC FULLER to provide internal disaster response in conjunction with the JPL Fire Department and JPL Plant Protection. The team may also be called upon to assist other NASA centers in disaster response.

Typical training topics include rope systems, cribbing and shoring, first aid, confined space operations, triage, emergency response to terrorism, and helicopter operations. Training is conducted with the JPL Fire Department every Wednesday from noon to 1 p.m.

Those interested may attend an orientation meeting for new members on March 22 in the JPL emergency operations center, Building 310-109, from noon to 1 p.m. For further information, contact the Emergency Preparedness Office at ext. 4-5535 or e-mail Charlene.Wolf@jpl.nasa.gov.

E-mail 'netiquette' suggested

With the proliferation of e-mail communication at the Lab, JPL Ombudsman LEWIS REDDING has developed some suggested guidelines to avoid misunderstanding and conflict.

"E-mail is both fast and efficient, but attached to its use is the potential for significant miscommunication and misunderstanding between individuals, as well as the potential for inappropriate avoidance of face-to-face interchange with other human beings," Redding noted.

The anonymity of e-mail, he said, "eliminates any possibility of 'reading' the physical cues—tone of voice, facial expressions, and physical gestures—that are a substantial part of human communication. It is with those issues in mind that the Laboratory provides the following broad guidelines for e-mail use and etiquette, culled from a variety of academic and for-profit institutions and organizations."

- Know your reader.
- Do not send threatening, abusive, or bigoted messages.
- If you would not want someone whom you respected or cared about to read the e-mail you are sending, don't send it.
- Think twice before sending anything remotely angry or hostile. Should a message you send result in a misunderstanding, accept responsibility for it.
- Treat received e-mail of a sensitive nature and its attachments as private and confidential; request permission from the sender before forwarding to others.
- Clarify a misunderstood e-mail face-to-face, or via telephone; don't assume that what you found offensive

in an e-mail was deliberately intended.

- Be careful in using symbols for feelings in e-mail, as your reader may not understand their meaning; similarly, be careful utilizing acronyms or other writing short-cuts.
- Don't ramble.
- Don't spam (distribute unsolicited mail to an entire mailing list).
- Don't use all capital letters (it is the equivalent of "shouting").
- Do not forward chain mail.
- Sign your messages.

NASA cost symposium a success

JPL welcomed about 50 cost estimators representing NASA centers, the U.S. Air Force, and support contractors March 1-3 at the agency's Cost Estimation Symposium.

Hosted by Section 311, the objective of meeting was to "establish greater collaboration among cost estimators across NASA and with other government agencies developing and operating space systems," said DR. HAMID HABIB-AGAHI, supervisor of the Engineering Economics and Costing Group in Section 311.

The meeting focused on design-based cost-estimation processes, he said. Another major topic of discussion was how NASA's cost community will function with newly established Systems Management Offices and the concomitant requirement for independent cost offices at each center. Thirty papers and presentations were given during the symposium, "providing a very useful interchange of information, including the demonstration of the latest cost estimation models, tools, and databases," he added.

Presentations from the symposium are available online at <http://transit.larc.nasa.gov/ipao.htm>.

Heritage Week theme, logo sought

JPL's American Heritage Week planning committee seeks entries for the annual event's theme and logo contest.

Entries must be the participant's original design and may not contain the trademarks, logos, copyrighted works or intellectual property of any third parties.

Submittals are due March 31 to BOBBI MARIN at mail stop 238-528 or e-mail Bobbi.Marin@jpl.nasa.gov.

The 20th annual celebration will be held on Lab June 12 to 15. Prize winners will be announced April 7.

Athletes needed to compete for JPL

Male and female participants are needed for the Southern California regional of the Corporate Sports Battle to be held Saturday, May 6 at Cal State Long Beach.

Employees who can run, swim, shoot hoops, and do a variety of other events are invited to register for JPL's team, which will try to advance to the national finals at DisneyWorld in October.

More information, and a registration form, can be found online at <http://www.jplerc.org/battle.html>.

Special Events Calendar

Ongoing Support Groups

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

Codependents Anonymous—Meeting at noon every Wednesday. 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. Call employee assistance counselor Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—Meets the third Thursday of the month at noon in Building 167-111. Call Greg Hickey at ext. 4-0776.

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. Call (626) 397-3110.

Friday, March 17

Von Kármán Lecture Series—"Mars in the Mind of Man" will be the topic of a panel discussion at 7 p.m. in The Forum at Pasadena City College, 1570 E. Colorado Blvd. Open to the public.

Tuesday, March 21

E-mail Efficiency—Jeff Sachs and messaging team members from Section 366 will discuss how to retrieve e-mail more quickly, organize and archive mail, use the JPL directory and search e-mail to locate information. At noon in von Kármán Auditorium.

"The College of Comedy"—Veteran comic Alan King will host a taping of PBS' Great Performances with guests Larry Gelbart, Shecky Greene, Bill Maher and Rita Rudner. Tickets are \$5. At 8 p.m. in Caltech's Beckman Auditorium. Also held with different guests on March 23. Call (626) 395-4652.

JPL Hiking Club—Meeting at noon in Building 303-209.

Wednesday, March 22

JPL Toastmasters Club—Meeting at 5:30 p.m. in the Building 167 conference room. Guests welcome. Call Mary Sue O'Brien at ext. 4-5090.

Thursday, March 23

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

"The College of Comedy"—Veteran

comic Alan King will host a taping of PBS' Great Performances with guests Brad Garrett, Kathy Najimy, Carl Reiner, Caroline Rhea and George Wallace. Tickets are \$5. At 8 p.m. in Caltech's Beckman Auditorium. Call (626) 395-4652.

JPL Stories—Sarah Gavit, manager of the Interstellar and Solar Sail Technology Program, will present "Green Eggs and Ham—JPL Style with Salsa" at 4 p.m. in the Library customer service area, west end of Building 111.

Friday, March 24

JPL Hiking Club—Guest speaker Graham Mackintosh will present a narrative and slides of his 3,000-mile walk around the coast of Baja California. From noon to 1 p.m. in von Kármán Auditorium.

Saturday, March 25

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

Monday, March 27

Deep Space 2 Lessons Learned—The project team will be on hand from 1 to 3 p.m. in the Building 167 conference room.

Institutional Network Upgrade—JPLNet, the Lab's institutional network group, will discuss a major network upgrade beginning this month, which includes new functionality at the backbone and desktop levels. These two efforts will pave the way for new services such as delivery of digital video over the network as well as full bandwidth connectivity to Internet2 and other high-performance networks. Held at 10 a.m. in von Kármán Auditorium. For more information on upgrades, the notification process for any scheduled service interruptions during upgrades and the new services being planned, see the About Us section of the JPLNet home page at <http://jplnet.jpl.nasa.gov>.

Thursday, March 30

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

Friday, March 31

Women's History Month—JPL's Director's Advisory Council for Women will hold a panel discussion themed "1900-2000: An Extraordinary Century for Women—Now, Imagine the Future." The panel will discuss this year's plans and engage the audience in planning a bright future for the employment environment that women experience at JPL. In von Kármán Auditorium from noon to 1 p.m.

Interns sought for architect program

JPL's Architect Development Program seeks applicants for the two-year internship program that will begin in July.

In its fifth year, the program, under the auspices of JPL's Center for Space Mission Architecture and Design, aims to identify, select and train the next generation of mission architects who will design and implement future JPL missions.

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

The program allows interns to work on a variety of projects in a number of disciplines, including work with the Advanced Projects Design Team (Team X), a team comprising representatives from all major spacecraft and

mission subsystems. Interns help develop mission proposals, become familiar with JPL tools in the automated design process, and work with JPL's industrial partners, gaining valuable perspective on how system design is performed. Interns will also travel to other NASA centers, fill selected project-specific roles, and work within other JPL Centers of Excellence.

The program is tailored to fit the individual needs of interns, who participate extensively in the planning of the internship. Plans will be modified to take advantage of interns' expertise and professional interests, and will also include study in areas considered to be crucial to his or her development as a well-rounded mission architect. Typical of the classes offered are "Introduction to Space Science for Mission Architects," "Politics of Space," "JPL Proposal Preparation," and "Principles of Astrodynamics & Mission Design." Also, interns will be paired with a qualified mentor who will guide and counsel the intern through the program.

Qualities sought in potential interns include strong technical and problem-solving skills,

leadership in technical innovation, and skills necessary to mentor and help others succeed. The selection committee seeks candidates with technical skills and knowledge; communication, leadership and innovation skills; and flight systems experience.

Applicants must be full-time, benefit-based JPL employees, possess a BS/BA degree or equivalent work experience and have at least of five years of experience that includes significant flight systems background.

To apply, submit a resume and a one- or two-page letter, with concurrence by your division manager, stating why you should be considered, to Maria Raygoza, Staffing, mail stop 1720-C, by Friday, April 14. (You and your division manager should also retain copies.) Applications will be forwarded to the selection committee, which will interview finalists and then select the program's class of 2002. All applicants will be informed of the committee's decision around the end of May.

For additional information, visit the program's Web site at <http://eis/adp>, or contact Bill Christensen at ext. x4-2096.

Laboratory Director Dr. Edward Stone discusses NASA's current assessment of Mars program management and its possible effects on JPL's future.



Bob Brown/JPL Photo

LESSONS LEARNED

Q Activity surrounding JPL's Mars program seems to be picking up on a lot of fronts. Can you tell us what is going on?

A You're right. There's a great deal going on. Let's start with the review boards. There are currently four separate NASA reviews underway. One, headed up by Tony Spear [JPL retired Mars Pathfinder project manager], examines the faster, better, cheaper approach to project implementation. A second is part two of the Stephenson report. Part one, as you will recall, examined the loss of the Mars Climate Orbiter. Part two broadens out to look at other NASA programs. [Editor's note: The Spear and Stephenson Reports were released by NASA on March 13, and are available at <http://www.nasa.gov/today/index.html>]. A third report is from the Young team, which has a broad mandate to look at the Mars program. According to NASA, that's due out at the end of the month. The fourth report, Space Shuttle Independent Assessment, was released by NASA last Friday [Editor's note: this report can be found at <http://www.hq.nasa.gov/osf/siat.pdf>]. Then there is a fifth report on the loss of the Mars Polar Lander and Deep Space 2 missions, from the JPL Special Review Board headed by John Casani [JPL retired]. Like the Young report, the Casani findings are due by the end of the month.

This is all to say that there's a lot of NASA self-assessment going on at the moment. That's good, because I believe all these reports are going to be about fixing problems, not fixing blame. They are bound to point out lessons we can learn, and we want to concentrate the Lab's attention on learning from these experiences.

Q If self-assessment is good for the soul, how about external assessments? Aren't we looking at congressional hearings, too? And a lot of media attention?

A Yes, we are. The NASA administrator testified before a House Appropriations subcommittee hearing March 15 regarding the 2001 budget. Beyond that, the plans for hearings may be subject to change. But the House Science Committee and the Senate Commerce subcommittee on Science, Technology and Space may hold hearings later this month. While I don't believe these hearings will be specifically directed at JPL, I expect that our recent experiences at Mars will be one of the agenda items. Congress and the White House have been supportive of Mars exploration. It's entirely understandable that they want to explore the reasons for the loss of our recent Mars missions, to hear us articulate the lessons we have learned from those losses, and see how we plan on implementing those lessons learned in the future. Such probing is not always comfortable, but is a necessary part of national governance.

As you point out, all of this means JPL will be back in the news. Some of what is going to be said in the NASA reports, in the press, and by members of Congress will be critical of JPL and how we've managed our Mars program. Being on the receiving end of criticism is never fun. At the same time, we expect some very useful feedback from these events that can make for a better JPL. That's what we're going to be focusing on.

Q Can you give us an idea of what the reports are going to say?

A I haven't seen all of the reports, and it would not be appropriate to comment on a report until it is released. In the process of interacting with various panels, I've formed my own set of observations about lessons learned. When we started on Mars Surveyor 98 five years ago we accepted the challenge of developing a new orbiter and lander for about the same cost of Mars Pathfinder—that was at a time when Pathfinder was still a year away from launch. That was just too big a challenge within the available funding. We had limited JPL engagement with the system contractor, which limited our insight into the development and test activities and understanding the level of technical risk we were taking. We clearly had an inadequate test program. We needed additional checks and balances for risk assessment. Because the JPL team was so small, they had limited contact with the rest of the technical side of the Lab. For all these reasons, Mars Surveyor 98 lacked engineering robustness. The hand-off of the project from a development group to an operational group prompted inter-team communications problems.

But the bottom line is that we did not have adequate institutional ownership. And that is the focus of the upcoming Executive Council retreat March 23-26. We're going to go away and come back

with a plan to make sure that there is institutional ownership of each project. We're going to strengthen the connection between the project and the line. And we're going to establish and follow institutional policies and processes that assure mission success.

We're going to create a checklist of actions and we're going to check them off. We already have a number of corrective action steps underway, and we will review the upcoming reports in depth to make sure we've identified all the issues. I assure you that we're going to move on identified issues quickly.

Q How quickly?

A Very quickly. We have to work these issues as a priority for the entire Laboratory because if any of our projects fail, the whole Laboratory has failed.

Of course, when you talk about changes such as this, I realize a normal reaction is uncertainty and some anxiety. But as I have said all along, we're going to fix the problem, not fix the blame. That's not going to change. And as I said, I'm convinced we'll have a better JPL when all is said and done.

Q Recently a NASA official was quoted as calling the present Mars exploration architecture "a failure." Would you agree with that assessment?

A In retrospect, we have to conclude that the plan adopted by NASA and JPL was too ambitious for the funds available. I believe we need to examine the focus and pace of the Mars program. We need a broad-based program with the resilience to accommodate new developments. You can break it down into four phases. First is an orbiter phase, where we might find out as much as we can from the relative safety of orbit. Next, of course, is getting down on the ground for in-situ exploration. Then comes sample return. And after that a permanent robotic presence that allows us to dig deeper for samples. All these elements have to be robust from a technical standpoint, and we will need an implementation plan with valid cost estimates before we can commit to proceed. We will be working closely with NASA to develop such a program over the coming weeks.

Q So what does this say about Faster, Better, Cheaper at JPL?

A Faster, Better, Cheaper is not going to go away, nor should it. No one should expect to see a return to billion-dollar missions in the near future. But don't take my word for it. Representative Sensenbrenner made that point to us when he addressed the Lab on his visit late last year. JPL has helped lead the way to low-cost, quick turnaround missions. We have every right to be proud of what we've done. Stardust is an example of this. So was QuikScat. So was Pathfinder. So was SRTM. There's a lot that's right that we're doing here at the Lab, and we need to remember that while we're working on things that need fixing.

"We already have a number of corrective action steps underway, and we will review the upcoming reports in depth to make sure we've identified all the issues. I assure you that we're going to move on identified issues quickly."

— Dr. Edward Stone,
JPL director

External ISO 9001 audit next week

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Notice to Advertisers

No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission.

Ads must be submitted on ad cards, available at the ERC and the Universe office, Bldg. 186-118, or via e-mail to universe@jpl.nasa.gov.

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

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

JPL is preparing for an ISO 9001 surveillance audit that will be conducted on Lab March 27 to 30.

An auditor from JPL's auditing company Det Norske Veritas will conduct the audit, which will focus on acquisition; control of inspection, measuring and test equipment; and control of product delivery system records.

JPL internal assessments coordinator Peter Barry said the following elements will also be considered by the auditor: management responsibility (management review in particular); product

delivery system; document and data control; corrective/preventive action; and internal assessments.

The JPL internal assessments program conducts internal assessments to determine the status of the system. These assessments also help employees prepare for the audit. "The program is supported by part-time assessors from across the Lab, predominantly from 3X," Barry said. "In their role as assessors, they gain a broad view of the way JPL really does work."

The CloudSat Project is one of many Lab organizations that have

prepared for the audit. Project Manager Tom Livermore credited the Lab's Develop New Products group with "providing the processes and tools to help us meet ISO standards. Now we're relatively assured that our documentation is in place."

Barry noted that the Det Norske Veritas auditor will be accompanied by two JPL employees: a guide and a scribe. "The guide will see that the auditor gets where they need to go, while the scribe takes notes on the nature and context of the interviews between the auditor and JPL employees. Both are JPL internal

assessors conversant in the ISO 9001 standard."

To help employees find out what the auditor will be looking for, the chances of being audited and what can be done to prepare, briefings will be offered March 21 at 3 p.m. in von Kármán Auditorium and March 23 at 2 p.m. in the Building 167 conference room.

Other resources are available through the ISO 9001 web site at <http://iso.jpl.nasa.gov>. Employee notebooks that can be used to coordinate audit information are available for pickup at Building 125-204.

Letters

I wish to thank all my friends at JPL for my outrageous retirement party. It was an incredible experience working at JPL, especially for Merle McKenzie in the Commercialization Office. Special thanks to Merle, Teresa Bingham, Deborah Avila, Kim Johnson and Nancy Schweiner for making my last day so wonderful.

Madeline Wallace

Thank you, dear friends, colleagues and co-workers for the wonderful retirement send-off. I appreciated the opportunity to work together with so many of you. Thanks for taking time from your busy schedule to wish me well; it meant a lot to me. You gave me a day I'll always remember. I will miss you as I look forward to new adventures in creating a good life.

Deanna Kraemer

Retirees

The following JPL employees retired in March:

Kenneth Russ, 34 years, Section 824; Lutha Shaw Jr., 33 years, Section 313; Ted Sivalon, 33 years, Section 300; Joseph Gleason, 30 years, Section 360; Manuel Banuelos, 28 years, Section 351; Jack Perrine, 26 years, Section 366; Carol Young, 20 years, Section 505; Homer Cross, 18 years, Section 357; Deanna Kraemer, 18 years, Section 197; David McGee, 16 years, Section 344; John Koch, 15 years, Section 505; Betty Sivalon, 15 years, Section 800; William Crowell, 11 years, Section 349; Robert Baker, 10 years, Section 368; Maria Valosay, 10 years, Section 300.

Classifieds

For Sale

ANTIQUES: dresser, ash w/tall mirror, \$300; wash stand, marble-top, hand-painted tiles, \$275; clothes wringer & stand, \$150; beer tray collection & misc. fans & radios; make offer. 790-1279.

BAR STOOL set, 4 unfinished, hvy. duty, wooden, w/arms & swivel seats, early American style, \$100/obo; EXERCISER, Nordic Track, unused, orig. \$900, \$500/obo. 957-3022, eves.

BED SET, twin day bed w/hideaway folding twin bed underneath, cream, ornate, tubular metal head/side/footboard, 4 tubular pillows, bedspread, pillowcases, etc., \$350. 363-1328.

BEDROOM SET, beaut., French antique, 6 pc., head/footboard, 2 nt. tables, vanity w/folding mirrors, armoire w/mirror, must see, sacrifice, \$5,000/offer. 626/794-0455, Ollie.

BIKE, road, men's 25" Schwinn Le Tour, vg cond., except leather seat is dried out, \$125/obo. 248-9432, Stan.

CABINET, metal, to store supplies, list price \$120, sell \$20/obo. 626/792-8272.

CAMERA, Sony Mavica, dig. w/10X zoom, orig., \$499, sell, \$339; SATELLITE DISH, Sony, \$29; SHARING DEVICE, Belkin, 4 to 1 peripheral, orig., \$99, sell \$49; CABLE, new, high speed, for ATA66 HD, orig., \$20, sell \$7; new Multimedia Bible or Photostudio software, \$6. 366-6134

COFFEE PERCOLATOR, Regal, 40 cup, \$22; SKILSAW, extra blade, \$24; TOASTER OVEN, G.E., \$19, all in gd. cond., 626/793-1895.

COFFEE TABLE & matching end table, oak; ROCKING CHAIR, bamboo. 626/359-7666.

COMPUTER, Palm Pilot IIIe, special ed., clear case, 2 mos. old, selling to upgrade to Palm V, all soft/hardware/documentation incl., \$120. 909/340-3447.

COMPUTER, 166 MHz Pentium, 32 MB RAM, Trident SVGA video card, 1.5 GB HD, 56K modem, \$295/obo. 626/797-3310, eves/wkend.

CRIB, natural, made in Japan, bedding only, 2 matt. positions, exc. cond., \$60. 626/585-1858.

DESK, computer, oak, very nice cond., \$50. 951-6880.

DESK, computer, Sauder, dark cherry, 35.5 x 19.5 x 29.5"H, keybd. tray, printer shelf, hidden whls., 1 yr. old, exc. cond., \$120 new at Staples, sell \$80/obo. 805/388-8524, Trish, eves.

DESK, perfect for home office, never used, in box, \$175/obo. 626/403-9002.

DRESSES, 2 new, white, Jessica McClintock, confirmation/communion, sz. 5 & 10, never worn, pd. \$40, sell \$20/ea. 626/797-1310.

DINING SET, oak, 6 chairs; CHINA CABINET, very nice, gd. cond., mostly display, only used for special occasions, owner refurbishing. 626/794-2394 or 798-5289.

FREEZER, Whirlpool, 15 cu. ft., 4 yrs. old, used 2 yrs., like new, \$400. 626/286-2464

HARD DRIVE, internal: Quantum Viking 2GB ultra-wide SCSI 68-pin conn., \$75. 626/795-6530, eves.

LAWN MOWER, Honda commercial Snapper, 5HP gas eng., rear bag. \$300/obo. 626/584-3204 days, 909/592-0780 eve/weekend.

LUGGAGE, hard-sided, men's Samsonite, drk. brown, 21" & 27"; women's American Tourister, red, 24" & 27"; Bel-air, lt. brown, 22". 626/577-8107.

MATTRESS & BOX SPRING set, Beautyrest, queen sz., clean. \$140; SNAKE, red-tail boa, about 1 yr. old, likes to be held, beaut. coloring, \$90; HAMSTER CAGES. 952-8455.

MISC, shelf, wall-mounted, Ethan Allen, cherry wood, exc. cond., \$35; comforter, Fieldcrest, dust ruffle, pillow sham set, full sz., exc. cond., \$30; steam iron, GE Power Spray, vg cond., \$15; floor lamp, black base & pole, off-white shade, gd. cond., \$12. 626/577-8107.

MOVING SALE: washer & dryer, Speedqueen, gas, \$400/pr., exc. cond.; REFRIGERATOR, side by side, \$200; BED, full sz. w/matt./box spring, \$50; DRESSER, \$30. 626/256-8528.

ORGAN, Lovry Genie 88 stereo, w/Genie Chords, band box, 44-note dual keyboards, 13-note pedalboard, asstd. music books/sheet music, perfect for beginner, \$450/obo. 248-8727, after 7 p.m.

PIANO, Roland 6000S elec./digital, full keyboard, handsome dark brown oak finish, like new, pur. new in 1988, \$4,175/best offer. 626/441-2487.

POOL TABLE, Olhausen Oak Gibraltar 9', oak legs, leather pkts., elec. blue felt, new, hardly used, perfect cond., see to appreciate, \$2,700/sacrifice \$1,800. pager 626/580-9043, Paul.

REFRIGERATOR, Whirlpool, white, 25 CF, side-by-side, 2nd dr. within main compartment door, freezer door water/ice dispenser, \$150/obo. 626/584-3204 day, 909/592-0780 eve/wkend.

REFRIGERATOR/FREEZER, Kenmore side-by-side, ice & water dispenser, almond, like new, \$375; MOUNTAIN BIKES, 2 ea., collapsible 26" can stow in trunk, \$50 ea; CABINETS, storage, 2 ea., metal w/shelves, 6 x 3 x 1.5', \$15 ea. 790-1279.

SAW, Craftsman 10", radial, arm, 3-drawer cab., base on rollers, new table hardware, \$400; INSERTS, 4, for coffee/end table top, 2, leaded glass, 20"x24" w/14"x18" beveled glass, \$10 ea; LAWNMOWER, Craftsman, rotary, \$50. 626/303-1927.

SCUBA EQUIPMENT, the works, prices vary: FRAME, bed, metal, adjustable, \$5; AQUARIUM, cute, 2 gal. hexagon, desktop w/lamp & pump, \$15. 541-0782.

SPEAKER CABINETS, 4, for musical instruments or PA sys., 12" speakers, hi-frequency tweeters in folded horn cabs. exc. for keyboards, similar in design to Altec "Voice of the Theater.", \$25/ea. 626/791-8848.

WALL UNIT & table, light oak, \$300/obo; CABINET, stereo, from 1970s, walnut, works, needs some maint., make offer. 957-8169.

WASHER & DRYER, Maytag Neptune, 5 yr. warr.; REFRIGERATOR, Westinghouse; DINING SET, Mexican Mahogany. 909/593-2815.

WASHER & DRYER, Roper, white, washer: top load, dryer: gas, both heavy duty, \$150 ea./\$250 both/obo. 626/584-3204 days, 909/592-0780, eve/wkend.

WORD PROCESSOR, Brother WP-3600D, 12" mon., typewriter capability, used twice, cost \$300, sell \$75. 626/351-8036.

WORK BENCH, electronic, 72" x 36" w/shelf, drawer, 2 ea., component racks, \$100/obo. 365-3799, Dave or Lucy.

'86 CHAMPION RV, 19', first sold '88, Chevy truck chassis '85, built in Canada, a/c, cab roof air, hot water tank, fridge/freezer, roof vent w/fan, shower, am/fm/cass., toilet, sink, medicine cab & mirror, elect. water syst., batt. in

eng. & under seat, cruise cont., shades, pwr. strng, tilt wheel, table, stove, leak detector, heater, fresh water storage, trailer hitch, 5.7L V8, \$14,000. 626/444-6691.

'94 CHEVROLET S10 Blazer Tahoe LT, 4 dr., 2 WD, high output 4.3L V6, full pwr., a/c, leather int., towing pkg., alloy wheels; 64K orig. owner mi., exc. cond. in/out, \$10,900. 352-7321 any-time, 626/395-4122 wkdays.

'84 DODGE D-50 pickup, VG cond., auto, bedliner, shell, very clean, all maint. records, possibly needs new carburetor, 138K, orig. owner, \$1,600. 626/332-2682.

'95 FORD Mustang, 3.8L V6, 5-spd. manual, 52K mi., silver, a/c, pwr. everything, cruise, stereo, CD/cass., dual air bags, \$9,000/obo. 249-0038.

'94 GEO Metro, 2 dr., blue, auto, 90K mi., am/fm, a/c, \$1,000/obo. 323/222-3612.

'96 HONDA Civic EX, black ext., 54,000 mi., new tires, reg. just pd., \$11,000/obo. 909/709-2073, Mary.

'92 HONDA Civic sedan DX, maroon, gray int., 5 spd., am/fm/cass., a/c, new belts, all records, vg cond., 126K, \$3,300/obo. 626/403-9002.

'91 HONDA CRX Si hatchback, met. green, 82K orig. mi., mint cond., LoJack & ignit. disabler, sunroof, a/c, pull-out stereo/cass., new alloy tires, 1 owner, compl. serv. records, must sell, \$5,900/obo. 626/296-6762.

'96 INFINITI G20, 4-dr sedan, leather, auto, moonroof, CD/cass., pwr. seats, dual air bag, ABS, keyless entry, etc., 47,500 mi., \$14,500. 548-3671.

'97 JEEP Wrangler Sport, 6 cyl., 4.0, a/c, P/S, twin air bags, stereo, sound bar, 12 CD changer, alarm, hvy. duty shocks, 30" wheels, 38K mi., great cond., Kelly BB \$19,565, sell \$17,000/obo. 626/356-2998, Matt.

'92 MITSUBISHI Eclipse, 16V DOHC, auto, air, pwr. steering/windows/locks/antenna, cruise, am/fm/cass., 59,000 mi., grt. shape, \$6,000. 353-1851.

'96 NISSAN 300ZX, exc. cond., only 32,500 mi., red, T-top, Bose sound sys., auto, all maint. records, \$23,500. 562/943-2097 eves.

'86 TIOGA motor home, 25', fully self-contained, sleeps 6, roof air, awning, TV ant., 2 eating areas, clean in/out, under 30,000 mi., \$13,500/obo. 353-0267.

'97 TOYOTA 4Runner, DesertDune color, 2WD 35K mi., exc. cond, AT, a/c, fm/am/cass., cc, power/s/w/d, privacy glass, running boards, \$18,500/obo. 310/207-5771, Felix.

'87 TOYOTA Camry, 4-dr. sedan, dk. gray, new trans/brakes/water pump/timing belt/ wheel bearings/tuneup, great cond., retired educator, Santa Monica, 90,000 mi., \$5,500. 310/393-1951, Nadiamusdoc@juno.com

'83 TOYOTA Supra, white, blue int., 220K mi., 6 cyl., cruise, sunroof, CD, pwr. win./drs., alarm, looks gd., runs very well, \$1,500/obo. 353-1907.

WINCH, portable, for 4WD vehicle, never used, \$100. 541-0782.

Wanted

CARPOOL RIDERS (2), from Diamond Bar area, to form a 4-person carpool, work hours: 7:30-4:15, flexible, flex. driving arrangements. Ext. 4-8629, Dan.

SNOWBOARD w/bindings, & boots, about sz. 4, for child about 4'5" tall. 952-8455.

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

SQUASH PLAYER, intermediate level. 626/449-7958, Dan.

STROLLER, double, front to back. 626/398-9984, Mark.

TO RENT apartment or guest house in La Canada/Pasadena to 18 y.o. male, up to \$650. 800/733-3380 x114 days, 909/823-4711, eves, Bill Osmond.

TO RENT furnished studio/1 bd. or room in April/May/June 2000, Pas./La Canada area, visiting student. 626/564-8483, Christophe Dumas (JPL contact) or delsanti@iap.fr.

Free

DOG, rescued, beaut. black lab/chow mix, 2-3 yr. old male, trained, healthy/shots, needs loving family, great companion. 661/257-5817.

KITTEN, 4-5 months, rescue from L.A. streets, male, med. length, black fur, all heart, shots/fixed, to loving home, all homes screened & require follow-up visit, donation suggested to cat rescue group. 626/792-8272.

For Rent

ALTADENA, rm for lease in beaut. brand new, 4 bd., 3 ba. home, 3 min./JPL, nice neighbors/area, seeking responsible, clean roommate,

female pref., rent \$ + 1/2 util. 626/798-1988.

ALTADENA condo for lease, minutes/JPL, 2 bd., 1 3/4 ba., nice closets w/organizers, f/p, c/a, pool, storage rm., 2-car gar., carport, tile counter top & marble floor in kit., lg. landscaped patio, planters & oriental garden w/waterfall & spa., end unit, wins./3 sides, cable, rent by owner, \$1,200. 626/398-1988.

GLENDAL, north; triplex, 2 bd., 1 ba., up-stairs unit, new decor/paint/carpet/vert. blinds, hrdwd. flrs., a/c, priv. deck, dish-washer., laundry hook-ups, 1 car gar./remote, no smoke/ pets, water/gardner pd., \$925. 246-2688.

LA CRESCENTA home, cozy, pool, 2 bd., 1 ba., stove, f/p, laundry hookups in house, very quiet, \$1,400. 790-7904.

PASADENA apt. to share, 3 br., 3 ba., furn., laundry facil., 2 mi./Caltech, \$425+1/3 util. 626/351-9641.

PASADENA nr San Marino border, share 2-bd., 2-ba. condo, hrdwd. flrs., all privileges, parking, pool, Jacz., very quiet, walk to Caltech, PCC, S. Lake, prefer female professional or mature student, no smoke/drugs, have 2 cats, small pet OK, \$495. 626/577-2747, Kathy.

Real Estate

ALTADENA, the Meadows, 180-degree view home on lg. level corner lot, 2 bd., 1 ba., 540 sq. ft. living-din. rm. w/vaulted beam ceiling, lg. fireplace, lots of windows, lg. kitchen, \$220,000 owner-agent. 310/937-7900.

PASADENA bungalow home, near JPL/Caltech, f/p, wood flr., nice kitchen, lots of storage, master bd., full ba., laundry rm., huge gar.: w/working shop area, huge back yard w/fruit trees/flowers, see to appreciate, as is, \$185,000. 626/794-0455, Ollie or Bill.

SHADOW HILLS, 1/2 acre, RV parking, 3 br., 1 3/4 ba., c/h/a, new paint/plumbing, newer roof, zoned for horses, 1,416 sq. ft., 2 car detached gar., eat-in kit., fdr., f/p, 12 mi./JPL, \$239,900. 919/352-8935, Sally.

Vacation Rentals

BIG BEAR cabin, quiet area near village, 2 bd., sleeps 8, F/P, TV, VCR, completely furn., \$75/nt. 249-8515.

BIG BEAR LAKE cabin, nr. ski area, lake, shops, village, forest, 2 bd., sleeps up to 6, f/p, TV, VCR, phone, microwave, BBQ & more, JPL disc. from \$65/nt. 909/210-9182.

BIG BEAR LAKEFRONT, lux. townhome, indoor pool/spa, near skiing, beaut. master bd. suite, sleeps 6. 949/786-6548.

CAMBRIA ocean front house, sleeps up to 4, exc. view. 248-8853.

HAWAII, Kona, on 166 feet of ocean front on Keauhou Bay, priv. house & guest house, comfortably sleep 6, 3 bd., 2 ba., rustic, relaxing & beaut., swim, snorkel, fish, spectac. views, near restaur., golf courses, other attractions. 626/584-9632.

HAWAII, Maui condo, NW coast, on beach w/ocean vw., 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microw., d/washer, pool, priv. lanai, slps. 4, 4/15-12/14 rate \$100/nite/2, 12/15-4/14 rate \$115/nite/2, \$10/nite add'l. person. 949/348-8047.

HAWAII, W. Maui luxury condo, ocean-front loc., fully furn. lv. rm., 2 bd. rm., kit., \$140/day/2. 805/646-0810.

LAKE TAHOE, west shore @ Homewood, close to northern ski areas: Squaw, Alpine Meadows, Homewood, etc., 3 bd. + loft, 2 ba., slps. 8, linens provided, full kitch. & laundry, TV/VCR, stove w/wood pitched, 2 day min., JPL disc., \$75 cleaning fee. 626/585-0321, Bob or Nicole.

MAMMOTH, Chamonix condo, at lifts 7, 8, 16, 17; walk to Warming Hut, 2 bd., 2 full ba., sleeps 6, fully equip. elec. kitch. w/mcrown & extras, f/p & wood, color TV, VCR, cable FM stereo, old Jacuzzi, sauna, game, rec. & laundry rms; convenient to lifts/shops/events, special midweek rates. 249-8524.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equip. kit. incl. mcrown, 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.

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

PACIFIC GROVE house, 3 bd., 2 ba., fp, cbl tv/vcr, stereo/CD, well-eqpd. kitch. w/microw, beaut. furn., close to golf, beaches., 17 Mile Dr. Aquar'm, Cannery Row, JPL disc. 626/441-3265.

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

SOUTH LAKE TAHOE KEYS waterfront, 4 bd., 3 ba., 1 bd. & liv. rm. upstairs, hcp. access fair, slps. 12+, f/p/s, decks, gourmet kitch., boats, TV's, VCR, stereo, assn. in & outdoor pools, beach, tennis, 10 min./ski/casinos/ golf; wine country, 3-day min., \$1,195/wk. [1 June-15 Sept; 22 Nov-1 April], \$595/wk. low seas., + \$90 cleaning. 949/515-5812.