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Genesis capsule falls to Earth

The Genesis sample return capsule entered Earth's atmosphere on Wednesday at 9:52:47 a.m. Mountain Daylight Time and entered the preplanned entry ellipse in the Utah Test and Training Range as predicted. However, the Genesis capsule, as a result of its parachute not deploying, impacted the ground at a speed of 311 kilometers per hour (193 mph). The impact occurred near Granite Peak on a remote portion of the range. No people or structures were anywhere near the area.

"We have the capsule," said Genesis Project Manager Don Sweetnam of JPL. "It is on the ground. We have previously written procedures and tools at our disposal for such an event. We are beginning capsule recovery operations at this time."

By the time the capsule entered Earth's atmosphere, the flight crews tasked to capture Genesis were already in the air. Once it was confirmed the capsule touched down out on the range, the flight crews were guided toward the site to initiate a previously developed contingency plan. They landed close to the capsule and, per the plan, began to document the capsule and the area.

"For the velocity of the impact, I thought there was surprisingly little damage," said Roy Haggard of Vertigo Inc., Lake Elsinore, Calif., who took part in the initial reconnaissance of the capsule. "I observed the capsule penetrated the soil about 50 percent of its diameter. The shell had been breached about 3 inches and I could see the science canister inside and that also appeared to have a small breach," he said.

The safety of recovery personnel has been the top priority. The capsule's separation charge had to be confirmed safe before the capsule could be moved.

Genesis' science canister was moved into the cleanroom at the U.S. Army Dugway Proving Ground in Utah early Wednesday evening. First, a team of

specialists plucked pieces of dirt and mud that had lodged in the canister after the sample return capsule landed. The Genesis team was to begin examining the contents of the canister on Thursday morning.

Dr. David Lindstrom, Genesis program scientist at NASA Headquarters, said Thursday that the scientific community is optimistic that some of the samples will be saved for study, each of which requires just a square millimeter of material.

Genesis was launched in August 2001 on a journey to capture samples from the storehouse of 99 percent of all the material in our solar system—the sun.

For more information, visit <http://www.nasa.gov/genesis>.



Still image from NASA TV shows the Genesis capsule following impact.

Cassini discovers ring, possible moons at Saturn

By Carolina Martinez

Scientists examining Saturn's contorted F ring, which has baffled them since its discovery, have found one small body, possibly two, orbiting in the F ring region, and a ring of material associated with Saturn's moon Atlas.

A small object was discovered moving near the outside edge of the F ring, interior to the orbit of Saturn's moon Pandora. The object was seen by Dr. Carl Murray, imaging team member at Queen Mary, University of London, in images taken on June 21, 2004, just days before Cassini arrived at Saturn. "I noticed this barely detectable object skirting the outer part of the F ring. It was an incredible privilege to be the first person to spot it," he said. Murray's group at Queen Mary then calculated an orbit for the object.

Scientists cannot yet definitively say if the object is a moon or a temporary clump. If it is a moon, its diameter is estimated at 4 to 5 kilometers (2 to 3 miles) and it is located 1,000 kilometers (620 miles) from the F ring, Saturn's outmost ring. It is at a distance of approximately 141,000 kilometers (86,000 miles) from the center of Saturn and within 300 kilometers (190 miles) of the orbit of Pandora. The object has been provisionally named S/2004 S3.

Scientists are not sure if the object is alone. This is because of results from a search through other images that might capture the object to pin down its orbit. The search by Dr. Joseph Spitale, a planetary scientist working with team leader Dr. Carolyn Porco at the Space Science Institute in Boulder, Colo., revealed something strange. Spitale said, "When I went to look for additional images of this object to refine its orbit, I found that about five hours after first being sighted, it seemed to be orbiting interior to the F ring," said Spitale. "If this is the same object then it has an orbit that crosses the F ring, which makes it a strange object." Because of the puzzling dynamical implications of having a body that crosses the ring, the inner object sighted by Spitale is presently considered a separate object with the temporary designation S/2004 S 4. S4 is roughly the same size as S3.

In the process of examining the F ring region, Murray also detected a previously unknown ring, S/2004 1R, associated with Saturn's moon Atlas. "We knew from Voyager that the region between the main rings and the F ring is dusty, but the role of the moons in this region was a mystery," said Murray. "It was while studying the F ring in these images that I discovered the faint ring of material. My immediate hunch was that it might be associated with the orbit of one of Saturn's moons, and after some calculation I identified Atlas as the prime suspect."

Spitzer arrives at scene of galactic collision

By Whitney Clavin



Spitzer image of colliding "Antennae" galaxies, about 68 million light-years away.

The JPL-managed Spitzer Space Telescope has set its infrared sight on a major galactic collision and witnessed not death, but a teeming nest of life.

The colliding galaxies, called the Antennae galaxies, are in the process of merging together. As they churn into each other, they throw off massive streamers of stars and dark clouds of dust. Spitzer's heat-seeking eyes peered through that dust and found a hidden population of newborn stars.

The new Spitzer image, available at www.spitzer.caltech.edu/Media/releases/ssc2004-14/visuals.shtml, is reported in one of 86 Spitzer papers published in the September issue of the Astrophysical Journal Supplement. This special all-Spitzer issue comes just after the one-year anniversary of the observatory's launch, and testifies to its tremendously successful first year in space.

"This abundance of Spitzer papers just one year after launch shows that the telescope is truly providing a new window on the universe," said Project Scientist Dr. Michael Werner. "These papers report the earliest results, so the best is yet to come."

In the latest Antennae galaxies study, Spitzer uncovered a new generation of stars at the site where the two galaxies clash.

"We theorized that there were stars forming at that site, but we weren't sure to what degree," said Dr. Zhong Wang, lead author of the new paper and an astronomer at the Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass. "Now we see that the majority of star-forming activity in both galaxies occurs in the overlap regions where the two meet."

The Antennae galaxies are a classic example of a galactic merger in action. These two spiral galaxies, located 68 million light-years away

from Earth, began falling into each other around a common center of gravity about 800 million years ago. As they continue to crash together, clouds of gas are shocked and compressed in a process thought to trigger the birth of new stars. Astronomers believe that the two galaxies will ultimately merge into one spheroidal-shaped galaxy, leaving only hints of their varied pasts.

Galactic mergers are common throughout the universe and play a key role in determining how galaxies grow and evolve. Our own Milky Way galaxy, for example, will eventually collide with our closest neighbor, the Andromeda galaxy.

Previous images of the Antennae taken by visible-light telescopes show striking views of the swirling duo, with bright pockets of young stars dotting the spiral arms. At the center of the galaxies, however, where the two overlap, only a dark cloud of dust can be seen. In the new false-color Spitzer image, which has been combined with an image from a ground-based, visible-light telescope to highlight new features, this cloud of buried stars appears bright red. The visible-light information, on the other hand, is colored blue and indicates regions containing older stars. The nuclei, or centers, of the two galaxies are white.

"This more complete picture of star-formation in the Antennae will help us better understand the evolution of colliding galaxies, and the eventual fate of our own," said Dr. Giovanni Fazio, a co-author of the research and an astronomer at the Harvard-Smithsonian Center for Astrophysics. Fazio is principal investigator for the infrared array camera on Spitzer, which captured the new Antennae image.

For more information, visit about Spitzer, log on to <http://www.spitzer.caltech.edu>.

News Briefs



Dr. Ayanna Howard

Odyssey now working overtime

JPL's Mars Odyssey orbiter began working overtime Aug. 25 after completing a prime mission that discovered vast supplies of frozen water, ran a safety check for future astronauts, and mapped surface textures and minerals all over Mars, among other feats.

"Odyssey has accomplished all of its mission-success criteria," said Project Manager DR. PHILIP VARGHESE. The spacecraft has been examining Mars in detail since February 2002, more than a full Mars year of about 23 Earth months. NASA has approved an extended mission through September 2006.

"This extension gives us another martian year to build on what we have already learned," said Project Scientist DR. JEFF PLAUT. "One goal is to look for climate change. During the prime mission we tracked dramatic seasonal changes, such as the comings and goings of polar ice, clouds and dust storms. Now, we have begun watching for year-to-year differences at the same time of year."

The extension will also continue Odyssey's support for other Mars missions. About 85 percent of images and other data from the twin Mars rovers, Spirit and Opportunity, have reached Earth via communications relay by Odyssey. The orbiter helped analyze potential landing sites for the rovers and is doing the same for NASA's Phoenix mission, scheduled to land on Mars in 2008. Plans call for Odyssey to aid the Mars Reconnaissance Orbiter, due to reach Mars in March 2006, by monitoring atmospheric conditions during months when the newly arrived orbiter uses calculated dips into the atmosphere to alter its orbit into the desired shape.

Howard selected as young innovator

JPL electrical engineer DR. AYANNA HOWARD has been selected to participate in the National Academy of Engineering's annual engineering symposium, to be held Sept. 9–11 in Irvine.

The event brings together engineers ages 30 to 45 who perform cutting-edge engineering research and technical work in a variety of areas. Howard and the 85 other participants were nominated by fellow engineers or organizations.

"It's an honor to have my research acknowledged as part of the technological future," she said. "I just do what I love, and somehow the opportunities continue to evolve."

Several employees from JPL, Caltech and other NASA centers were selected to speak at the event.

Howard sees a future where humans and machines work together to explore new environments. Her expertise is in robotics, neural networks and machine vision. She joined JPL in 1991, where she has led research efforts on various projects. Currently, she is working on a software system that mimics the decisions humans make and allows robotic spacecraft to safely navigate along the martian surface.

Howard is actively involved in community service activities, talking with students around the world about the wonders of robotics, computers and technology. She also started the Pasadena Delta Academy, a mentoring program for at-risk girls that encourages careers in math and science.

Lab featured at AIAA conference

JPL will have a major presence at the American Institute of Aeronautics and Astronautics' SPACE 2004 Conference and Exposition, set for Sept. 28–30 at the San Diego Convention Center.

Out of about 90 scheduled technical sessions, 10 are chaired by JPLers. JPLers are also presenting 35 technical papers. The conference expects approximately 1,000 attendees from industry, NASA, the U.S. Air Force and academia.

Speakers will include NASA Administrator SEAN O'KEEFE, JPL Director DR. CHARLES ELACHI and Deputy Director GENE TATTINI.

With the overall theme "Realizing the Potential of Space," the conference will include 11 technical tracks spanning science, technology and policy in two primary categories:

- Major Missions and Markets (military space missions, human space flight and exploration, space science and robotic missions, Earth science and environmental space missions);
- Key Enablers (space access and nuclear propulsion, orbital systems and operations, ground operations of space assets, enabling technologies, strategic planning and policy, education and workforce development and space economics).

On Sept. 29, the conference will offer an inaugural AIAA lecture in honor of former JPL director DR. WILLIAM PICKERING.

For the schedule of events and registration information, log on to <http://www.aiaa.org/space2004>.

JPL's Mars Exploration Rover Opportunity has resumed using its rock abrasion tool after a pebble fell out that had jammed the tool's rotors in late August.

The abrasion tool successfully spun a wire brush on Aug. 30 to scrub dust off two patches of a rock inside "Endurance Crater," and engineering data received Aug. 31 confirmed that the tool is fully recovered. Rover wranglers at JPL plan to use the tool's grinding rotor next to cut a hole exposing the interior of the rock.

"We're delighted to be using Opportunity's rock abrasion tool again," said Dr. Stephen Gorevan of Honeybee Robotics, New York, lead scientist for that tool on both rovers. "We had planned to kick out that pebble by turning the rotors in reverse, but just the jostling of the rover's movements seems to have shaken it loose even before we tried that. The rock abrasion tool has functioned beyond engineering expectations as a window for Mars Exploration Rover science. The new imaging consultation makes it clear that not only does the tool appear to be undamaged, but also that its teeth have not worn very much at all."

Opportunity and its twin, Spirit, have each conducted more than four months of bonus exploration and discoveries after successfully completing their three-month primary missions. Opportunity's rock abrasion tool has now been used 18 times to grind into rocks and five times to brush rocks. Spirit's tool has ground nine times and brushed 28 times. The criteria set in advance for successful use of the abrasion tools was for each rover to grind at least one rock.

Mars and Earth are approaching the point in their orbits when Mars, on Sept. 16, will pass nearly behind the Sun, a geometry called "conjunction." For several days around conjunction, the energetic environment close to the sun will interfere with radio communications between the two planets. Rover operators have planned a hiatus in sending up daily commands. The rovers will use longer-term instructions to continue doing daily research and to attempt daily communications until the conjunction period is over.

"Based on experience with other spacecraft, we expect that when the Mars-Sun-Earth angle is 2 degrees or less, the ability to successfully communicate degrades rapidly," said JPL systems engineer Scott Doudrick, who has been organizing conjunction operations for both rovers. "To be cautious, we're allowing three days on either side of that period."

The planned gap in sending daily plans runs for about 12 days beginning Sept. 8 for Spirit and Sept. 9 for Opportunity. The rovers will be instructed ahead of time to continue doing atmospheric operations and Moessbauer spectrometer readings daily during that period. No movements of the wheels or the robotic arms are in the conjunction-period plans, but the camera masts may move for making observations.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meets Wednesdays at 11 a.m. in Building 125-B16A.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (the Wellness Place).

Codependents Anonymous—Meets at noon Wednesdays in Building 111-117.

Lambda (Gay, Lesbian, Bisexual and Transgender Networking Group)—Meets the first Friday and third Thursday of the month at noon in Building 111-117.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in Building 167-111 (the Wellness Place).

For more information on these groups, please contact the Employee Assistance Program at ext. 4-3680.

Friday, September 10

Caltech Folk Music Society—Singer/songwriter Michael Smith will appear at 8 p.m. in Beckman Institute Auditorium. Tickets are \$15 for adults, \$5 for children under 12. For more information, call (626) 395-4652 or check the Folk Music Society website at <http://www.folkmusic.caltech.edu>.

Tuesday, September 14

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

Thursday, September 16

JPL Astronomy Club—Meeting at noon in Building 306-400.

New Professionals Network—New to JPL? Attend a general meeting at 1:30 p.m. in Building 180-101 to plan activities for the rest of the year.

Thu.-Fri., September 16-17

Von Kármán Lecture Series—Genesis Project Manager Donald Sweetnam will present "Catching a Piece of the Sun: The Genesis Sample Return Mission" at 7 p.m. Thursday in von Kármán Auditorium and Friday in Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. Thursday's lecture will be webcast at www.jpl.nasa.gov/events/lectures/sep04.cfm. For more information, call Public Services at ext. 4-0112.

Friday, September 17

Center for Space Mission Architecture and Design Talk—Dr. Stephen Lu, professor of aerospace and mechanical engineering, computer science, and industrial and systems engineering at USC, will present "An Adaptive and Interactive Modeling System To Support Model-Based Engineering Design" at 11:30 a.m. in conference room 180-101.

Investment Advice—Fidelity will offer one-on-one counseling in Building 249-114. For an appointment, call (800) 642-7131.

Mon.-Tues., Sept. 20-21

Investment Advice—TIAA/CREF will offer one-on-one counseling in Building 249-114. For an appointment, visit www.tiaa-cref.org or call (877) 209-3140, ext. 2614.

Wednesday, September 22

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Dirk Runge at ext. 3-0465 for information.

Thursday, September 23

Clogging Class—Meets at noon in Building 300-217. For more information, call Shary DeVore at ext. 4-1024.

JPL Stories—Matt Wallace, Mars Exploration Rover assembly, launch and test team manager and Opportunity mission manager, will present "Double, Double, Toil and Trouble: Getting Spirit and Opportunity to the Pad," at 4 p.m. in the Library, Building 111-104. This is the story of the ups and downs of rovers before the fairytale endings at Gusev Crater and Meridiani Planum. If you have questions about the JPL Story series or wish to participate, please call Teresa Bailey at ext. 4-9233.

Sat.-Sun., Sept. 25-26

Put the Finishing Touches on Kidspace—From 10 a.m. to 3 p.m., children will design colorful wall tiles for the museum. For more information, see www.kid-spacemuseum.org.

Sunday, September 26

Caltech Women's Club—The Fall Family Potluck will be held from 4 to 7 p.m. in Tournament Park. For information, call Nancy Hewett at (626) 793-2535 or e-mail nancyhewett@earthlink.net.

RAT is back to work on Mars

By Guy Webster

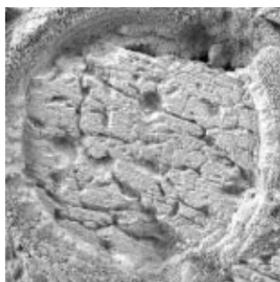


Image from Opportunity shows a target dubbed 'Grindstone' on a rock called 'Manitoba' in 'Endurance Crater.'

New small-planet system found

Astronomers announced on Aug. 31 the first discovery of a new class of planets beyond our solar system about 10 to 20 times the size of Earth—far smaller than any previously detected. The planets make up a new class of Neptune-sized extrasolar planets.

In addition, one of the new planets joins three others around the nearby star 55 Cancri to form the first known four-planet system.

The discoveries consist of two new planets. They were discovered by the world renowned planet-hunting team of Drs. Paul Butler and Geoffrey Marcy of the Carnegie Institute of Washington and U.C. Berkeley, respectively; and Barbara McArthur of the University of Texas. Both findings were peer-reviewed and accepted for future publication in the *Astrophysical Journal*. NASA and the National Science Foundation funded the research.

"NASA, along with our partner NSF, is extremely proud of this significant planetary discovery," said Al Diaz, associate administrator of NASA's Science Mission Directorate. "The outcome of the tremendous work of the project scientists is a shining example of the value of space exploration."

"These Neptune-sized planets prove that Jupiter-sized gas giants aren't the only planets out there," Marcy said. Butler added, "We are beginning to see smaller and smaller planets. Earth-like planets are the next destination."

Future NASA planet-hunting missions, including Kepler, the Space Interferometry Mission and the Terrestrial Planet Finder, each to be managed by JPL, will seek such Earth-like planets. Nearly 140 extrasolar planets have been discovered.

Both of the new planets stick very close to their parent stars, whipping around them in a matter of days. The first planet, discovered by Marcy and Butler, circles a small star called Gliese 436 about every 2 1/2 days at just a small fraction of the distance between Earth and the Sun, or 4.1 million kilometers (2.6 million miles). This planet is only the second known to orbit an M dwarf, a type of low-mass star four-tenths the size of our own sun. Gliese 436 is located in our galactic backyard, 30 light-years away in the constellation Leo.

The second planet, found by McArthur, speeds around 55 Cancri in just under three days, also at a fraction of the distance between Earth and the sun, at approximately 5.6 million kilometers (3.5 million miles).

Lab set to make key contributions
to nation's space vision

Moving technology forward



Mike Sander manages JPL's Exploration Systems and Technology Office (190), which supports NASA's Exploration Systems Mission Directorate (ESMD). He discusses his office's current and near-future activities.

By Mark Whalen

Was your office created at the same time as the Exploration Systems Mission Directorate?

Yes. When the president's space initiative was announced, Charles Elachi recognized this was not a passing, casual event but would have profound implications for the whole agency. He thought JPL's best response was to create an organization—the Exploration Systems and Technology Office

(ESTO)—which would align and focus JPL's capabilities on the new initiative. The Jupiter Icy Moons Orbiter (JIMO) project, which had been in existence for two years prior to the announcement, was kept as a stand-alone project reporting directly to Charles. Thus the newly created ESMD at NASA Headquarters has two organizations supporting it at JPL—the JIMO project and "1 minus JIMO," as ESTO has been called.

JIMO Project Manager John Casani and I stay in touch, but we both support different aspects of the ESMD.

Now, as the directorate develops and refines its plans, the roles of the centers are beginning to take shape. It's far from a done deal, but it's clear that NASA centers will have deep engagement in technology development partnered with each other, universities and industry. The centers will also be a significant factor in the insight/oversight of industry as the flight elements of the initiative are developed. It is even possible that, on a competitive basis, the centers can be partners to industry for the development work. Other roles will emerge with time.

How is the directorate organized, and what are JPL's roles?

The space technology work funded by the former Office of Aerospace Technology (the former Code R) and the Office of Biological and Physical Science (the former Code U) were merged with ESMD at Headquarters. The office created at JPL has

the interface responsibility for all these elements of ESMD. This means that ESTO's work will be in the areas of space technology and our support of Project Constellation.

ESMD encouraged all the NASA centers to form similar offices.

Project Constellation is a broad label for all the human spaceflight elements associated with the Moon/Mars Initiative. The requirements development and architecture work have been underway for Constellation at Headquarters with support from the centers, and now, with 11 recently announced contracts, there will be broad engagement with industry.

JPL's participation will be through a set of Integrated Discipline Teams whose role will be to provide technical input for the Project Constellation Crew Exploration Vehicle contract development, contractor selection process, and technical insight/oversight for the development phase.

We also have people from JPL working on Institutional Program Assignments at Headquarters, helping with the architecture requirements (Jennifer Trosper), Lunar Robotic Program development (John Baker), surface systems definition (Matt Barry), and interactions with the National Science Foundation (Minoo Dastoor).

How long will they stay?

Assignments vary, but somewhere between one and two years. We are looking for candidates to staff positions at Headquarters as other center staff rotate back to their centers. Anyone interested in such an assignment should give me a call.

Back in the early '80s, I worked as deputy director of the Space Life Sciences Division and as Director of the Shuttle Payloads Engineering Division. It was a great experience. You really learn how NASA and the U.S. government work. It was a very rewarding experience.

What funding and resources has ESMD made available since it started business?

The first thing the ESMD did with the block of space technology funds they got from the old Code R was to redirect it to meet the needs of the new "Exploration Vision." ESMD initiated a set of four competitions. The first is called the Intramural Competition—a set of

technology dollars that was targeted primarily to the NASA centers. The competition was set up to encourage partnering between centers and was very successful. In our case, about one-third of the dollars awarded to JPL will be sent to other NASA centers and other partners. It's interesting that the dollars are almost exactly replaced by funds other centers will be sending to us, as JPLers were recruited to be co-investigators on other centers' successful proposals.

This has brought about a level of teaming and interaction between centers that I have never seen before. It's really been a good thing.

Headquarters ended up with more than 1,300 "Notices of Intent," then down-selected to 130 of the notices to proceed with proposals. JPL was permitted to submit 20 of the 130. Of those 20, we won 10 proposals. NASA awarded 50 total proposals to all the centers.

This was a very intense process, and I have real admiration for the tenacity and ingenuity of the JPL technology community for both sticking with it and for producing some really extraordinary ideas.

When the dust settled, the total resources the Lab is getting in the technology world are very similar to what we were getting from Code R, but the content and nature of the proposals are quite different. Rather than funding a large number of modest-sized proposals, ESMD chose to fund a smaller number of larger proposals—these are funded at \$8 million to \$20 million each, over four years.

The principal investigators on JPL's winning proposals are Erik Brandon (Section 346), Ratnakumar Bugga (346), Hamid Hemmati (331), Gerald Holzmann (360), Joseph Lewis (353), Juergen Mueller (353), Robert Oberto (311), Adrian Stoica (344), Michael Turmon (367) and Brian Wilcox (348).

The proposals are far more like those for space instruments than NASA's typical individual technology proposal awards. So these are big deals and are getting an awful lot of attention both internally and externally.

The next round of proposals is called the Extramural Broad Area Announcement. The principal investigators or project managers will be selected from non-NASA organizations—industry or university. But NASA centers are encouraged to participate.

NASA is using the same process as in the Intramural Competition — proposers provided Notices of Intent and then NASA down-selected from those a certain number to proceed with proposals.

JPL was asked to partner in about 300 NOIs out of about 3,800 received by the agency. We were just notified of the results of the NOI down-select process. At the last count, we will be co-investigators on 107 industry and university proposals. NASA invited a total of 500 proposals. Headquarters expects a 5-to-1 down-select to the winning proposal set, so when the dust is settled, we might expect to participate in about 20 tasks.

The Extramural call will place JPL in a position of partnering with many outside companies. This has really broadened our engagement and the level of interaction with industry and the university community. It's a win-win for the Lab and also for the agency.

There will be two more opportunities to propose in 2005. One opportunity is the Gap Filler Broad Area Announce-

ment. NASA plans to use this opportunity to fill holes in the technology portfolio left after the intramural and extramural competitions. About three months later will be the fourth in the set of proposal opportunities, called the Safety Net Broad Area Announcement. Details of this fourth competition have not been worked out.

Between these four opportunities we're very optimistic that JPL will provide a significant amount of technology support for the ESMD.

Does all this concern both the human and non-human aspects of the Mars/Moon initiative?

Yes. There will be a family of robotic missions to both the moon and Mars that are driven by the early needs of the exploration vision. These missions not primarily scientific missions, but rather are engineering development or technology demonstration missions.

The number and the content are still a work in progress, and probably will be for some time to come. As the architecture is developed we will discover what the technology demonstration needs are and what further information is needed about the moon and Mars that might not otherwise naturally come out of the science missions. Those needs will be met by ESMD-driven robotic missions.

We anticipate that there would be a significant robotic component leading up to the human missions, and also anticipate that even when humans have landed on those bodies, they would be supported by a significant robotic infrastructure.

All this proposal activity is quite a start. What's next?

We are now staffing up to support Project Constellation integration teams. At the moment that consists of 12 teams of subject matter experts in various fields such as structures, computers, communications and software. These experts will be helping in contract development and acquisition of industry partners and will be providing technical oversight for those industry contracts. JPL has 18 full-time equivalent staff supporting this activity.

We are in the project-planning phase for the 10 technology projects we did win, which will be a major activity until the end of the year. We are also actively participating with the external partners on the next round of competitions, and are preparing to participate in the Gap Filler proposal next year.

Who else works with you here on Lab?

Garry Burdick heads the Project Prometheus effort. Barbara Wilson, who is working for Headquarters on the Institutional Program Assignment, is part of the 190 staff.

There is a matrixed group representing the technology program managers: Steve Prusha (Organization 133), Tim Krabach (650), Satish Khanna (660), John Hong (710), Ken Wolfenbarger (820), Jim Lesh (970) and Rich Doyle (980). Alice Wessen (186) is the outreach manager. Jody Brown has been doing double duty as the head of the Contract Management Office and the acting business manager for the office.

How has it been to work with the Headquarters team?

I've found the Code T team to be a highly energetic, very dedicated cadre who have made a great deal of progress in a very short period of time. The Headquarters group, supported by highly motivated center teams, is working hard to put some substance and flesh to the fundamental ideas in the nation's Exploration Vision.

PlanetQuest goes shopping



Visitors to The Oaks mall in Thousand Oaks view the Navigator Program's new "PlanetQuest" interactive kiosk, which was on display in July and August. Supplied by Education and Public Outreach, the kiosk uses 3-D visualization technology to communicate Navigator science themes through animations, videos and interactive activities.

Passings

ROBERT STEWART, 78, a retired physicist who contributed to some of JPL's earliest space missions, died July 23.

He was a member of the navigation team for Explorer, the first U.S. satellite. He also contributed to and was named on the patents for the original rocket guidance systems, some of which are still in use today.

Stewart is survived by his son, James, and daughter Lynn Stewart-Ruiz. A memorial is planned for Sunday, Sept. 26, at 3 p.m. Call (818) 713-1257 for details.

IAN "RED" MARNOCH, 72, retired supervisor of the Quality Assurance Mechanical Group, Flight Systems Section, died Aug. 15.

Marnoch retired from the Lab in 1990 following 24 years of service.

He is survived by his wife, Linda. Services were held Aug. 19 in Nampa, Idaho. In his memory, the family requests donations to Horizon Hospice, 900 N. Linder, Suite C, Meridian, ID, 83642.

Letters

To my JPL co-workers and friends: On behalf of my family and myself, I would like to express my heartfelt thanks and gratitude to the 700 Directorate and each employee within, Employee Services and Recognition Office, and each person at JPL who shared our grief and sorrow, prayed for us, sent flowers, sent cards and e-mails, phoned and visited us at home and was present at the funeral. Your special thoughts and actions have touched us and helped to ease and lift the pain and the misery of losing my beloved mother Alice Bas-madjian to the tragic accident on Aug. 12th on the 210 Freeway. We are deeply indebted to your kindness. Please do remember to love one another, smile to each other and take care of each other, as if this is the last day of your lives. May the good Lord bless you and your families abundantly.

Annie Aroyan and family

I would like to thank all my friends and co-workers for their prayers and support at the recent passing of my mother. Thanks to JPL and everyone who sent flowers and cards. Your expression of sympathy provided much comfort to our family during this difficult time.

Helen Mortensen

Classifieds

For Sale

BABY ITEMS: Aprica stroller, teal green, was \$350, now \$95; booster seat, 30-80 lbs, with armrest and cup holder, Century Breverra Asc-ent SE44892, like new, was \$70, now \$50. 626/850-4378.

BICYCLES: 10 speeds, need work, \$50/obo. 626/282-5815.

CLOTHES: infant; jacket, red/navy blue, zip-up w/hood (old navy), size 2T, exc. cond., \$5/obo; sweater, sky blue w/navy trim, buttons, size 3T, \$1/obo; zipper shoes, Spongebob motif, size 11M, exc. cond., \$5/obo; photo of each item available. 626/791-6101.

COMPUTER DESK: on wheels, cherry veneer, made by O'Sullivan, model 61925, exc. cond., like new; sell for best offer. 626/449-0997.

DESK w/credenza & matching file cabinet, black w/brushed silver pulls, pull-out keyboard holder, exc. quality, from Restoration Hardware, \$200 for all 3 pieces. 626/797-3110.

DINING ROOM SET, Spanish revival table & 8 high-back chairs, exc. cond., \$1,200. 626/799-3087. 626/644-2889.

DRYER, electric, 5 cu. ft., white, perfect work-

ing condition, \$75. 626/963-9613.

EXERCISE MACHINE, Ab Scissor, used a few times, great cond., includes custom workout timer & how-to-use video, retails new for \$250+, sell for \$160. 323/369-0365. lv. msg. **EXERCISE MACHINE,** NordicTrack ski, near-new cond., can deliver to JPL. \$125. 626/796-7554.

EXERCISE SYSTEM, Club Weider 565 w/bench and barbell, like new, owner moved and doesn't have room, includes 300 lbs. of weights and plate tree, easy assembly, manual & exercise guide incl., \$250/obo. 951/675-8292.

FURNITURE: child's "Fun Plus" loft twin bed w/game console area (21" TV fits), shelves, drawers & homework/computer desk all in 1, orig. from Levitz, only 2 yrs old, mattr. incl., cost \$699 new, sell \$250; child's lg. 6-drawer dresser & matching hutch, matching heavy 2-pc. dresser drawers + shelving unit, \$200, buy both loft bed & dresser/hutch for \$400; will e-mail pics., you pick up. 626/301-0723. Kelly. **FURNITURE:** bedroom set: queen frame, 2 nightstands, 6-drawer dresser with mirror; dining room set, white Italian Lacquer, table, 6 chairs, both, \$300/obo, will sell separately. 548-5082.

HOUSEHOLD ITEMS: loveseat, light blue, \$100; convection oven, Farberware, \$45; chest of drawers, small, \$20; floor lamp, Xenon, 6', black, \$20; toaster ovens (4), \$6 ea. 626/282-5815.

INKJET CARTRIDGE, replaces 51626A, for HP DeskJet 4xx, 5xx, Plus, Fax, etc., new, generic brand, one avail., \$16. 626/679-5168.

JUICE FOUNTAIN, Breville, powerful, stainless steel motor, great for daily juicing, bought 10/03, used 2-3 times only, original package, \$100/obo. 626/840-0955.

JUICER, Kenmore, brand new, 400W power for optimum extraction, extra-wide, 3" feed tube eliminates most precutting, 32 oz. cup included, \$70. 400-2081, 6-10 p.m.

MEDICAL EQUIPMENT, Invacare walker, dual-release w/3" fixed wheels, model # 6291-3F, lightweight, height adjustments, ergonomic folding mechanisms, 300 lb. weight capacity, lifetime warranty, almost new cond., sell for \$50 (new \$130), Invacare commode also avail. 714/280-7368.

MISC: pool table, 8', \$500; tablecloths, 2 slate blue oval, 18 matching napkins & rings; bunk bed \$50; mailbox, oversized, green, \$10; mailbox, new, black, \$10; wig, red, shoulder length, never used, \$20; electric frying pan, \$10; answering mach., \$5; basketball set, portable, needs net, \$200; fishing pole, salt-water, \$25; mattress for bunk bed, gd. cond., \$10. 626/357-8210.

MISC: Grahl task chair, Premier 200, light blue, great cond., \$100; book, Purpose Driven Life by Rick Warren, hardcover, \$9; racquetball racket, Head, titanium, #T1185XL, \$40; tennis racket, Prince Triple Threat Hornet, gd. cond., \$50; scuba, Sea-quest balance BC, med. with tech 40+ w/retractor, great, \$200. 352-0075, 5-7:30 M-F, Helen.

MONITOR, Envision, 17" flat CRT, little used, \$110/obo. 626/281-8954.

PUPPIES, pure-bred Rotweilers, \$100 ea. 909/255-2335. Ken, or leave message at 626/797-0852.

REFRIGERATOR, white, 16 cu. ft., Hotpoint, exc. cond., \$150. 626/794-5484.

SECTIONAL, 2-piece Bassett (1 piece is a sleeper), floral print, photo & dimensions available, cushions need new covers, rest in vg cond., \$250/obo. 626/791-6101.

SHREDDER, GBC Shredmaster, shreds 3 folded letters, strip-cut, in original box, \$12. 626/679-5168.

TELEVISION, 19" color Toshiba + TV cart, \$35 for both. 626/359-7666.

TOY BOX, Little Tykes, girl's, exc. cond., \$30. **VANITY,** girl's w/seat \$10; inexpensive wooden puzzles, toys, games, blocks. 249-6248.

TROMBONES: Bach, exc. cond., like new, \$695 firm, Yamaha; gd. cond., \$495 firm. 626/850-4378.

ROPICAL PLANTS, plumerias, variety of colors and sizes; shell gingers. 626/444-6156, Annie & Bob DePonte.

WASTEBASKET, white, plastic w/metal guide rail, about 1 x 2 x 3 ft. tall, installs inside kitchen cabinets to hide trash, brand new, in original box with screws for installation, \$80/obo. 626/840-0955, leave msg.

Vehicles / Accessories

'96 ACURA, 2.5TL, 118K mi., all electric options, spoiler, cc, auto, sunroof, white, non-smoking owner, exceptional cond., \$7,500. 626/793-7937.

'95 AIRBUS by Rexall motorhome, 28K mi., king bed, double bed, single bed, exc. cond., \$32,000. 626/303-5571, Al.

AUTOMOTIVE SERVICE RAMP, 16" W x 16" L, 21 in. lift, rear fold-down legs w/bridge, very heavy-duty, nr. new, \$850. 909/596-2848.

'99 BMW K1200RS motorcycle, 5K mi., 130 hp, water-cooled engine, 6-speed drive shaft transmission, adult owned, several extras, exc. cond., email or call for pics., \$9,500. 480/216-5645, kfeagans1007@yahoo.com.

'92 CADILLAC Eldorado, 2 dr., hard leather top, wheat color, leather interior, loaded, extras, 150K mi., exc. cond., just passed full mech. checkup, \$4,100. 626/969-7484.

'97 CHEVROLET Suburban LS, V8, driver &

passenger airbags, pwr. everything, no accidents, flawless cond., vake3377@yahoo.com for pics. \$11,000/obo. 846-0053.

'95 CHEVROLET Tahoe LT, V8, exc. cond., 80K mi., auto, CD/tape/am/fm, a/c, power steering, new tires, all extras, incl. trailer tow pkg., see to appreciate, \$8,750. 626/794-1272.

ENGINE for '98 Corvette LS-1, short block, great deal, 70K mi., includes heads, water pump, intake manifold & intake body, spark plug coils, brand new heavy duty folding engine stand, \$1,495/obo. 951/675-8292 or danegarvin@yahoo.com.

'99 GMC Yukon Denali, 76K mi., loaded, 4WD, leather, 6-CD changer, exc. cond., \$16,000/obo. 800/937-9200, Levi or Cathy.

'91 HARLEY DAVIDSON Sportster 883, 4,369 orig. mi., custom vivid yellow paint, new carb., new plugs, new wires, always garaged, some chrome parts added, remarkable cond., \$4,700 firm. 339-3209.

'81 HONDA Civic wagon, 4 door, automatic, gd. cond., great transportation, \$1,000. 626/791-0486, Dave.

'00 LEXUS ES300, loaded, V6, CD changer, moonroof, power leather seats, auto, 29K mi., exc. cond., \$19,500. 909/630-5176.

'93 MERCURY Sable GS, automatic wagon, 4 dr., V6, 3.8L, silver, second owner, very gd. cond., regular maint., 120K, \$1,600/obo (kbb \$2,100). 626/304-9249.

SAILBOAT, Coronado 23 ft., Nissan 5 hp, exc. cond., radio, sails, other equip. incl., ready to sail to Catalina, perfect for new sailors, must see, \$2,300/obo. 626/584-1164, Muriel.

TIRES, OEM (215/55R-16)/16," 5-spoke, alloy wheels pkg. off a 2003 Saturn I300, V6, exc. cond., 6.995 mi., \$850. 626/798-9027, eve.

'02 TOYOTA Camry LE V6, loaded, 37,000 miles, silver color, \$12,950. 360-6364.

'99 TOYOTA Camry XLE, top of the line, loaded, V6, CD changer, moonroof, power leather seats, auto, 50K mi., exc. cond., \$11,500. 909/630-5176.

'99 VOLKSWAGEN GTI VR6, 5-spd., silver w/black leather, vg cond., 86K mi., \$9,500/obo. 952-6181.

Free

CAT, beautiful and sweet black adult male, "Salem" needs loving home; indoor, neutered, declawed, is FIV positive, so he cannot live with other cats, but can live a long healthy life; for more info on FIV e-mail Erin Johnson @ceconline.org. 415-1152, Erin Johnson or 209-8804, Jason Johnson.

KITTEN, sweet neutered male needs a good home, 6 mo. old, has all shots and vet care. 323/856-9044.

Lost & Found

FOUND: watch, near Trailer 1722 on 8/30. Ext. 3-5164.

Wanted

HOMEWORK HELPER/tutor for 6th grade LCF girl, prefer student or person with flexible schedule who can work these hours reliably every week: Mon.-Thur., 3:15-4:15, start ASAP. 790-1893.

MATH TUTOR, Jr. & Sr. high school level geometry, pre-algebra, algebra I & II, SAT math, etc. evens, and/or weekends. 888/784-1639, David, please leave msg.

MEMORABILIA, Friends TV show, poster, T-shirt, cap, key-chain, mouse pad, etc. 909/263-5271, Shu.

PICTURES and literature of space exploration, then/now/future, material will be used to teach home-schooled children, ages 12 to 16, mail to tenjs@sprynet.com or Ed Jones, 6810 Bentley Rd. E., Puyallup, WA 98371.

RIMS for Volkswagen GTi, 2004 model year, 17", 15 spokes, similar to 18" R32, will consider 18" R32's, too, but prefer 17's. mkracer3@yahoo.com.

ROOM to rent in the Glendora/San Dimas vicinity, female, non-smoker, Christian, needs to move immediately. 903-4128, Laura.

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

VANPOOL RIDERS, from Victor Valley/Hesperia. Ext. 4-1424, Scott.

VIDEOCAM, must be in good working cond. to play Sony 8mm format videotapes. 805/529-4555, Rick.

For Rent

ALTADENA "sabbatical house," 3 bd. + study, boundary Angeles Nat'l Forest, 3 mi. from JPL (trails to Lab behind house), view, hardwood floors, antiques, completely furn.: includes dinnerware, utensils, pots/pans, linens & towels, fine soaps, necessities included, just bring toothbrush & clothes. TV/DVD/VHS, Dish satellite, wireless DSL, garden, fruit trees, patio, BBQ, parking, private, immaculate, available Oct. 626/798-3235, info/visit.

ARCADIA apt., 2 bd.+ large den, 1 ba., garage, remodeled kitchen, washer/dryer in unit, a/c, stove, dishwasher; clean, spacious, walking distance to shops, exc. neighborhood, no pets, water/gardener/trash included, \$1,390 +util. & sec. deposit. 626/576-7333.

BURBANK "character house," remodeled & kept originality, 2 bd., 1 ba. + detached office w/bath & fireplace, granite countertops, hardwood & marble floors, living rm. w/stone fireplace, dining rm., shutters, appliances, laundry, central heat, a/c, back/front yard w/trees, patio, 2-car garage, virtual tour http://www.circlepix.com/home2/kfhd9, \$2,450. 845-4064, Nilou.

GLENDALE room, nice, quiet area, \$300 + assisted living. 626/398-1875.

GLENDALE, 2 bd., 1.5 ba. apt., Pacific & Glenoaks, 10 min to JPL, new paint, new a/c, clean, \$925 + \$750 down. 626/398-1875.

MONROVIA, beautiful townhouse, 2 bd., 1.5 ba., near Old Town, 2-car garage, a/c, private patio, lg. 2nd floor deck w/mtn. view, lg. kitchen, stove/dishwasher/washer/dryer, cats ok, water/gardener/trash paid. 626/791-7000.

MONTEREY PARK condo, 2 bd., 1.5 ba, 2-car garage, new carpet, paint, hardwood floors, marble tiles. 952-3008, eves.

PASADENA, spacious rm., priv. ba. in 2 bd. apt., no smoking, quiet environment, 1/2 block from Caltech, central a/c, gas heating, refrigerator, carport, unfurn., \$600 + shared util. hkimura@gps.caltech.edu, Hiroto Kimura.

PASADENA room, very unique 2 bd. apt., furn. or empty, quiet, shady st. by Calif./Marengo, walking dist. to Old Town, quick commute to JPL, hardwood floors, fireplace, lg. porch with BBQ & mtn. views, wireless internet, parking, no cable, non-smoker a must, no dogs, \$585 + portion of utilities. 734/846-9699, Rob.

SAN BERNARDINO house, 3 bd., 1 3/4 ba., 2-car garage, large lot on northern edge, 3 mi. east of CSUSB, stove, refrigerator, dishwasher incl., \$1,700. 317-1070.

SAN MARINO house, 3 bd., 2 ba., 2-car gar. w/automatic opener, newly painted, remodeled kit., dishwasher, a/c, laundry hooks, fireplace, spacious family rm. overlooking yard, no pets, exc. neighborhood and school district, \$3,000 + utilities & sec. dep. 626/576-7333.

Real Estate

GLENDORA, 3 bd., 2 ba., home in quiet neighborhood, hardwood floors, lg. bonus rm., over 1,300 sq. ft., cozy, close to 210 fwy., schools & shops. 626/335-3538, Gary or Daniel.

LA CANADA home, 3 bd., 2 ba., living room, family room, plus 1 bd., 1 ba., living room, apartment for in-law/nanny, 2,339 sq. ft. on sewers, playhouse, large live oak, gate to trail and JPL, open Sun., Sept. 12, 1-5, 4810 Viro Rd., \$935,600. 790-5593.

PASADENA, beautiful 1927 traditional, near JPL, 3 bd., 2 ba., 1,690 sq. ft., \$699K; see http://krl.caltech.edu/~adami/woodbury.html.

SAN GABRIEL home, very quiet cul-de-sac, Temple City school district, walking distance to shops and MTA, 3 bd., 1.75 ba., detached 2-stall garage, new carpet in all bd., Pergo in kitchen and dining, brick fireplace, separate indoor laundry rm., 1,400 sq. ft., built 1966, \$475,000. 626/287-1958.

Vacation Rentals

ARROWHEAD cabin, sleeps 8, all knotty pine, weekend \$180, week \$425, security deposit req. 818/952-6221 Mon.-Thur.: 909/337-1036 Fri.-Sun.

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

CAMBRIA house, ocean front, exceptional white water view, accom. up to 4 people, all amenities provided. 702/256-1359 & ereynolds2@cox.net.

FLORIDA condo, beautifully furnished 2 bd., 2 ba., second floor, on the surf of New Smyrna Beach, half-hour to Cape Canaveral, 90 mins. to Walt Disney World, enjoy all the comforts of home, quiet, relaxing, overlooking beach and Atlantic Ocean, BBQ, pool, game room, easy walk to stores and restaurants. 760/439-7821, Darlene, or dfhaug@yahoo.com.

GREEN VALLEY LAKE cabin, sleeps 6, near Big Bear, cable TV, fully equipped kit., fenced deck, BBQ, pets okay, fishing, swimming, hiking, \$100/nt. 949/859-2237 or 323/258-4464.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, d/v, pool, priv. lanai, slps. 4, laundry fac., low season rate \$115/nite/2, high season rate \$130/nite/2, \$15/nite/add'l person. 949/348-8047 or jackandrandy@cox.net.

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

OCEANSIDE condo, on the sand, charming, 1 bd., panoramic view, walk to pier or harbor, pool/spa, game room, slps. 4. 949/786-6548. **RESORTS,** 5-star Hyatt and Marriott, incl. Carmel, Tahoe, Sedona, Colorado Rockies, Florida Puerto Rico; luxurious residential-style studios w/furnished kitchenette, starting at \$480 for 7 nights; Palm Springs, Vail, Orlando, Puerto Vallarta specials, studio, \$399 for 7 nights, 1 & 2 bds. w/full kitchens, and partial weeks also avail. 626/794-9579 or fivevaresorts@earthlink.net.

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.

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