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NASA FY '01 budget represents increase

By Mark Whalen

President Clinton signed into law on Oct. 27 a bill authorizing a \$14.285 billion budget for NASA in fiscal year 2001. This represents an increase of about \$250 million above the president's request to Congress and is about \$685 million more than the agency's budget last year.

NASA's Space Science Enterprise, which sponsors the lion's share of work allocated to JPL, received the largest year-to-year increase in the overall budget—about \$300 million. The FY 2001 budget for space science is set at \$2.508 billion, which is roughly \$109 million more than Clinton's request to Congress.

For the Earth Science Enterprise—another major provider of work for JPL—the budget is \$1.497 billion, \$54 million more than last year and about \$91 million above Clinton's request.

"Thanks to the efforts of key members of the House and Senate, and with the support of the Administration, this measure provides an excellent budget for NASA," said NASA Administrator Daniel Goldin. "Our supporters in the Congress faced considerable difficulties in reaching this outcome, and we should all be very grateful for their championing of the nation's civil space and aeronautics program.

"Very importantly, you—the men and women of NASA—are to be credited for this robust budget," Goldin added. "This is a budget that is moving in the right direction. The Congress has recognized that the revolution has taken hold at NASA, and that our faster, better, cheaper way of doing business has allowed us to do more for less, with spectacular mission success, while increasing productivity.

"While NASA will, no doubt, face some challenges in addressing emer-

gent needs in Earth Science and Space Science, we are very fortunate to be starting the fiscal year from a great vantage point. Congratulations to all, and thank you for your dedication and hard work."

JPL's budget for FY 2001 is \$1.36 billion, about \$130 million more than FY 2000.

"Overall, the FY 2001 budget represents some real positive developments for JPL," said Dr. Richard O'Toole, manager of the Lab's Legislative and International Affairs Office. "All of JPL's plans have been funded at their requested levels."

O'Toole noted that NASA has 60 days from the signing of the budget bill to submit a final operating plan to Congress. In the meantime, NASA will allocate a general funding reduction of \$49 million for science, aeronautics and technology, which encompasses space and Earth sciences as well as other programs throughout NASA.

The Mars 2003 Lander Program was provided with a \$75 million augmentation by House-Senate conferees.

Under NASA's Supporting Research and Technology category, Advanced Deep Space Systems—which includes Outer Planets Program technologies—received an increase of \$19.6 million, to \$181.8 million. Funding for flight validation technologies, which includes those in the New Millennium Program, increased from \$15.8 million to \$43.8 million.

O'Toole also noted the significance of a five-year budget plan that foresees an increase in the NASA budget to more than \$15.5 billion in FY 2005. "This plan is very aggressive and more than compensates for inflation," he said. "It's the first time that the Clinton administration has done that."

Much ado about asteroid 2000 SG344

Last Saturday a syndicated sportswriter compared L.A. Lakers center Shaquille O'Neal to 2000 SG344, a newly-discovered near-Earth object. During Shaq's game the night before, O'Neal had barreled into the opposing center "like 2000 SG344—that object hurtling toward Earth." Fortunately for basketball fans, O'Neal is far more likely to score a free throw than 2000 SG344 is to crash land on our planet.

Although SG344 is nearby now, scientists say there is no appreciable chance of a collision for at least 70 years. (Shaq, on the other hand, should make plenty of baskets between now and then.)

2000 SG344 was discovered by asteroid-hunters on Sept. 29 as it was gliding by Earth approximately 20 times farther away than the moon. Astronomers quickly realized that the faint object was unusual. Its 354-day orbit is very much like Earth's, so much so that 2000 SG344 might not be an asteroid at all, but rather a piece of manmade rocket debris.

Our planet and 2000 SG344 move through space like two runners racing along a track at nearly the same speed; it takes a long time for one to lap the other. The object, which is moving a bit faster than Earth, is slowly drifting away and won't return for 30 years.

As recently as last Friday astronomers were concerned that the next encounter might be too close for comfort. A panel convened by the International Astronomical Union (IAU) announced on Nov. 3 that 2000 SG344 might hit Earth in the year 2030. The chances of an impact were slim, they said, and new data to refine the object's orbit would likely rule out a

collision altogether.

That's exactly what happened. Shortly after the IAU announcement, astronomer Carl Her-genrother found "pre-discovery" images of 2000 SG344 from May 1999 in archives from the Catalina Sky Survey.

"The pre-discovery images let us calculate a better orbit that absolutely rules out a collision in 2030," said Dr. Donald Yeomans, manager of NASA's Near Earth Object Program at JPL. "It won't come any closer to Earth than 11 lunar distances. However," he added, "the new orbit increases the chances of encounters in years after that. For example, there is a 1-in-1,000 chance of a collision on Sept. 16, 2071."

For more information, go online to
<http://neo.jpl.nasa.gov/news.html>

Just as the possible 2030 encounter was excluded by better data, Yeomans anticipates the same will happen to the 2071 date. "Additional observations this year and in 2030, when SG344 comes back again, will certainly alter our conclusions as we learn even more about its orbit."

If Earth and 2000 SG344 do cross paths in the future, what happens will depend on the nature of the near-Earth object. When the object was first discovered it appeared to be a small asteroid, but another possibility is gaining favor among researchers. "The orbit of SG344 is so Earth-like, it makes you wonder if came from our own planet," mused Yeomans.

In 1971, the last time 2000 SG344 was in the vicinity of Earth, NASA's Apollo program was in full swing. 2000 SG344 may well be debris from an Apollo-era rocket masquerading as a space rock.

"Initially we thought it was too bright (and thus too large) to be a rocket fragment, but it's possible that this is the S-IVB stage from a big Saturn V," continued Yeomans. "S-IVBs" were booster rockets that propelled Apollo Command and Service Modules toward the moon from their parking orbits around Earth. "Many of those boosters were targeted to hit the moon, but the S-IVBs from Apollo 8 through 12 went into orbit."

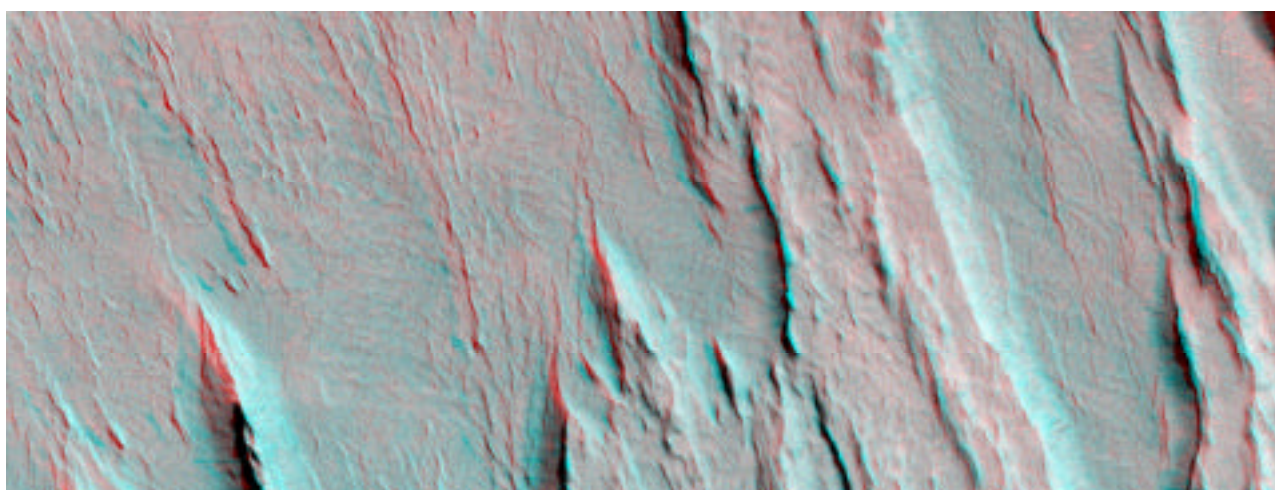
If SG344 is a derelict rocket booster, it's probably no larger than 15 meters and wouldn't pose much of a threat even if it did strike Earth. An incoming S-IVB would burn up in the atmosphere as a dazzling but mostly-harmless fireball. Spectators in Texas and Oklahoma witnessed just such a display last month when the casing from a Russian Proton rocket disintegrated over North America.

On the other hand, if 2000 SG344 is a bona fide space rock, it's likely to be bigger and more dangerous. Typical near-Earth asteroids reflect about 3% to 20% of the sunlight that falls on them. The apparent brightness of 2000 SG344 corresponds to such an asteroid 30 to 70 meters across.

"Whatever it is, 2000 SG344 is certainly no dinosaur killer," Yeomans added, referring to a 10-kilometer space rock that may have triggered mass extinctions when it hit Earth 65 million years ago.

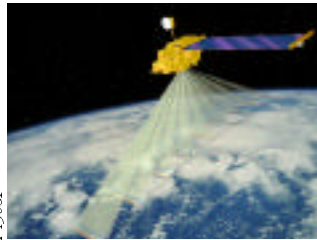
Layers of bedrock etched by wind to form sharp, elongated ridges are commonplace in the souther Elysium Planitia/southern Amazonis region of Mars, as imaged by the Mars Global Surveyor camera. The image is best viewed online with red-blue 3-D glasses at <http://mars.jpl.nasa.gov>.

MGS 3-D image shows layered red planet



JPL Mars Program Manager Dr. Firouz Naderi explains NASA's new Mars architecture plans on page 3

News Briefs



EOS-AM1 spacecraft with MISR instrument.

MISR using new methods

Scientists have developed new methods of retrieving information about cloud heights, winds, airborne particles, and Earth's surface using data from the JPL-managed Multi-Angle Imaging SpectroRadiometer (MISR) instrument orbiting on NASA's Terra satellite.

MISR acquires images of the Earth at nine angles simultaneously, using nine separate cameras pointed forward, downward, and backward along its flight path.

Examples of images and atmospheric information that MISR can provide are available at <http://www.jpl.nasa.gov/pictures/misr/>.

The first example gives three views of Hurricane Debby. One shows the storm's eastern edge as seen by the instrument's downward-looking camera. The others display cloud heights and motions generated by taking advantage of the instrument's multi-angle stereoscopic imaging capability.

The second example illustrates how MISR can detect and measure the abundance of particles, including pollution, in the atmosphere.

The samples and MISR camera image data are available to the public through the Atmospheric Sciences Data Center (ASDC) at NASA's Langley Research Center, Hampton, Va., at <http://eosweb.larc.nasa.gov>.

Blood drive coming up

The next JPL/Red Cross Blood Drive will be held in von Kármán Auditorium on Nov. 14 from 10 a.m. to 4 p.m. and Nov. 15 from 7 a.m. to 1 p.m.

JPL's Occupational Health Services Office said the Red Cross is continuing to experience a critical shortage of O-type blood.

Sign-up sheets for the blood drive will be available at Building 310-202 and Occupational Health Services' home page at http://eis/medical/blood_form.html.

JPL has recommended and NASA agreed to terminate the Muses-CN nanorover, which would have been part of the U.S. contribution to a Japanese mission to an asteroid, the first asteroid sample return mission. The primary reasons for the cancellation were development and mission risk, cost increases, low margins for mass, power and schedule.

NASA's acting director of solar system exploration, Dr. Jay Bergstrahl, ordered JPL to transfer the material and resources already developed to be available for possible use in other projects.

"The decision to cancel the MUSES-CN nanorover was difficult and distasteful; it certainly represents lost

opportunities," Bergstrahl said. "In the end, however, there was no viable alternative."

"MUSES-CN was a very tough technical task and the team has made great advances, which I am sure will be used in future missions," added Tom Gavin, manager of JPL's Space Science Flight Projects Directorate.

JPL was developing the rover, which was small enough to fit in the palm of a hand and weighed a little more than 2 kilograms (about 5 pounds). The rover would have been equipped with visible-light and infrared cameras and could

If you have not signed up ahead of time, or wish to change your appointment, call the Pasadena Red Cross at (626) 799-0841, ext. 630.

Mentoring program seeks secretaries

JPL's Office Professionals Mentoring Group, which works to identify secretarial needs and gather appropriate resources, is now accepting applications for its January 2001 program.

Formed in September 1999, the group recently designed a web site (<http://hr/development/careers>) that provides access to office procedures, and was recently invited to form a pilot group to contribute to the new JPL portal being developed by Institutional Computing and Information Services. The mentoring group meets twice monthly during the lunch period.

For more information, call JOY HODGES at ext. 4-7041.

Auditions open for Othello at Caltech

JPL employees, retirees, and family members are invited to audition for the Theater Arts at Caltech production of Shakespeare's Othello in Ramo Auditorium on the Caltech campus at the following times:

Nov. 11, 2 to 5 p.m.; Nov. 12 and Nov. 15, 7:30 to 10:30 p.m.; Nov. 18, 2 to 5 p.m. See www.its.caltech.edu/~tactic for related information as it becomes available. Othello will be performed during winter term on three consecutive weekends beginning Feb. 16, 2001.

Caltech bands seek musicians

JPL staff are invited to join two Caltech bands.

Music director BILL BING said flute players are needed for the Concert Band, which rehearses at Caltech on Thursday nights from 7:30-9:15 p.m.

Trombone players are needed for the Swing Band, which rehearses at Caltech on Mondays from 7:30-9:15 p.m.

If interested, e-mail Bing at wbing@caltech.edu.

be modified for use on other places such as comets, moons of other planets and on Mars.

"I want to personally thank project personnel for their amazing work," said JPL Project Manager Ross Jones. "No one on the project team failed. Everyone worked very hard, and all are to be congratulated and applauded for the long hours they've put in."

Jones said about 30 people working on the project would be reassigned to other work at JPL.

In addition to building the nanorover, the Laboratory was also to arrange for supplemental tracking of the Muses-C spacecraft by the Deep Space Network, as well as navigation support. A NASA science team was also slated to work closely with their Japanese counterparts on science return.

Jones said the project was developing several technologies for miniature components and miniature electronic packaging to be used in extreme environments, ranging in temperature from minus 180 C (minus 292 F) to 125C (257 F). "The development of these miniature, extreme-environment technologies is acknowledged to be important for future missions," Jones said. "We hope NASA will see them through to their completion."

Bergstrahl said NASA will hold discussions with the Japanese Institute of Space and Astronautical Science to consider alternative cooperation in the Mu Space Engineering Spacecraft-C (MUSES-C) mission, scheduled for launch in late 2002, with arrival at asteroid 1998 SF36 in September 2005 and return to Earth in June 2007. The designation "MUSES-CN" referred specifically to the NASA/JPL project that provided the nanorover.

More information on the MUSES-CN rover is available online at <http://www.jpl.nasa.gov/facts/muses.pdf>.

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 the Employee Assistance Program 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 first Tuesday of each month in Building 167-111. For information, call the Employee Assistance Program at ext. 4-3680.

Friday, November 10

Travel Film—*Marco Polo's China Today* will be presented at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$9 and \$7. Call (626) 395-4652.

Fri., Nov. 10—Sun., Nov. 12

Hedda Gabler—Theatre Arts at Caltech will present the Ibsen play at Dabney Lounge at 8 p.m. on Friday and Saturday, 2 p.m. on Sunday. Tickets are \$15. Call (626) 395-4652.

Tuesday, November 14

Caltech/JPL Flying Club—The fall membership meeting at 7:30 p.m. in room 201, East Bridge Hall, Caltech, will feature speaker Dick Rutan, the pilot best known for his unrefueled, non-stop flight around the world in the Voyager aircraft in 1986. Anyone interested in aviation in general, or in learning to fly, is invited. For more information, call Bob Ferber at ext. 4-3463 or Peter Gluck at ext. 4-9425.

Investment Workshops—TIAA/CREF will present two sessions in Building 180-101. The 10 a.m. presentation will focus on key issues to consider when developing an investment strategy, including diversification, risk tolerance and time horizons. The 2 p.m. workshop will cover the benefits of tax-deferred savings in reaching retirement financial goals.

Employees newly eligible to participate in the Caltech/JPL retirement plan can enroll for TIAA/CREF investment options at a noon work-shop in Building 180-101. Those interested should bring their enrollment packages.

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

Tues., Nov. 14—Wed., Nov. 15

Investment Advice—A TIAA/CREF representative will be available for one-on-one counseling in Trailer 1720. Call (877) 209-3140, ext. 2614 for an appointment.

Wednesday, November 15

"Memories of Caltech Past"—Caltech faculty associate and registrar Dr. Judy Goodstein will give this free lecture at 8 p.m. in Beckman Auditorium. Call (626) 395-4652.

Thursday, November 16

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.

Investment Advice—Fidelity will be conducting one-on-one counseling in Trailer 1720. Call (800) 642-7131 for an appointment.

JPL 2000 Lecture—"Working for JPL: More Than a Job, It's an Adventure!" will be presented by Mark Helmlinger, field research engineer on the Earth Observing System's Multi-Angle Imaging Spectroradiometer (MISR) Project, who will discuss his latest fieldwork in Africa. Held from 11 a.m. to 12:30 p.m. in von Kármán Auditorium.

JPL Stories—Jennifer Harris Trospen of the Mars Exploration Rover Project will present "Women Are from Mars, Too!" from 4-5 p.m. in the customer services area of the Library, west end of Building 111-104. She will describe firsthand accounts of what it was like to be a part of the Pathfinder team. For questions about the JPL Story series or participation information, call Teresa Bailey at ext. 4-9233.

Von Kármán Lecture Series—JPL Director Dr. Edward Stone will present "JPL's Three Great Eras" at 7 p.m. in von Kármán Auditorium. Open to the public.

Friday, November 17

Caltech-Occidental Concert Band—The groups' annual free fall concert will be presented at 8 p.m. in Caltech's Beckman Auditorium. Call (626) 395-4652.

Von Kármán Lecture Series—JPL Director Dr. Edward Stone will present "JPL's Three Great Eras" at 7 p.m. in The Forum at Pasadena City College, 1570 E. Colorado Blvd. Open to the public.

Fri., Nov. 17—Sun., Nov. 19

Hedda Gabler—Theatre Arts at Caltech will present the Ibsen play at Dabney Lounge at 8 p.m. on Friday and Saturday, 2 p.m. on Sunday. Tickets are \$15. For information, call (626) 395-4652.

Saturday, November 18

Shangri-La Chinese Acrobats—Acrobatic displays, Kung Fu, colorful costumes and Chinese comedy will be displayed in this performance at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$22, \$18 and \$14. For more information, call (626) 395-4652.

Sunday, November 19

Caltech-Occidental Symphony Orchestra—The program for this free concert is to be determined. It will be held at 7:30 p.m. in Caltech's Ramo Auditorium. Call (626) 395-4652.

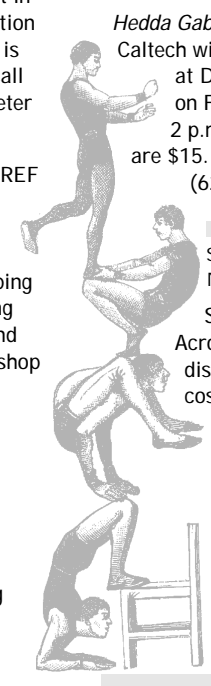
Chamber Music—The Brazilian Guitar Quartet will perform at 3:30 p.m. in Caltech's Beckman Auditorium. Tickets are \$27, \$23, \$19 and \$15. Call (626) 395-4652.

Tuesday, November 21

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

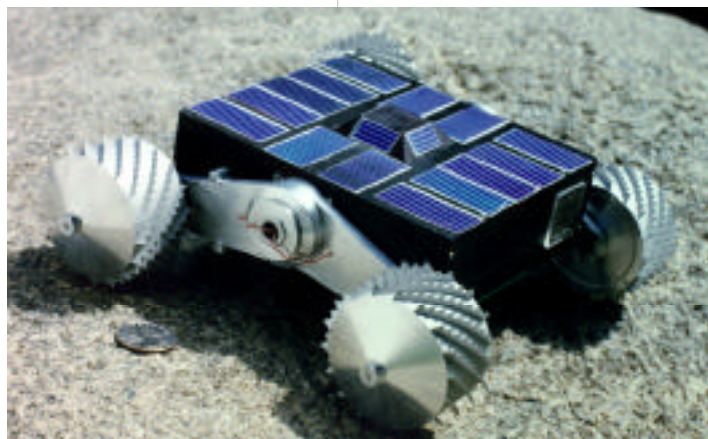
Wednesday, November 22

JPL Toastmasters Club—Meeting at 5:30 p.m. in the Building 167 conference room. Guests welcome. Call Jim Raney at ext. 4-6301.



Asteriod rover mission canceled

By Mark Whalen



The Muses-CN rover was intended for the first sample return mission to an asteroid.

MARS ARCHITECTURE

THROUGH THE DECADE

By Mark Whalen

Mars Program Office Manager Dr. Firouz Naderi addressed Lab employees Oct. 31 to explain the restructured Mars Program plan, which was developed over the last six months. The presentation focused on science goals, management strategies, technology development and resources.



2001



2003



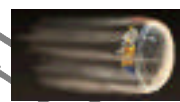
2005



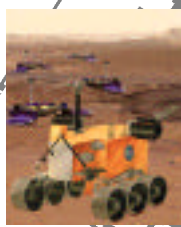
2007



2009



2011



THE NEW PLAN BUILDS on the missions previously announced (extended Mars Global Surveyor mission, the 2001 Odyssey orbiter due to be launched in five months, and the twin 2003 rovers). International participation, especially from Italy and France, will add significantly to the plan. The next step will be an 18-month programmatic systems engineering study to refine the costs and technology needs.

Beyond the previously scheduled missions, Naderi said, will be the launch of the Mars Reconnaissance Orbiter in 2005. It will focus on analyzing the surface at new scales in an effort to follow the tantalizing hints of water from Mars Global Surveyor as well as follow up on observations by 2001 Odyssey.

The Reconnaissance Orbiter has two "marquee instruments," Naderi noted. A sophisticated camera will image Mars with 20- to 30-centimeter (8- to 12-inch) resolution, good enough to observe rocks the size of beach balls. Also, a visible near infrared spectrometer will improve on Odyssey's thermal emission spectrometer by a factor of 10.

The instruments' development will be competed in the science community, with an announcement of opportunity due to be released next spring.

In addition, Naderi said, after its prime science mission of two years, the 2005 orbiter will continue to serve as a long-term telecommunications relay for landed assets on Mars. "Starting with Reconnaissance Orbiter," he added, "from now on the policy of the program will be that, every science orbiter around Mars will also serve as a telecom relay satellite and will function as such beyond its primary mission for an extended mission up to five or six years."

Next, NASA proposes to develop and launch in 2007 a long-range, long-duration mobile science laboratory that will be a major leap in surface measurements and pave the way for a future sample return mission. This would be the start of the next generation "smart landers," Naderi explained, that would allow accurate landing and hazard avoidance, and reduce the "g load" during entry to aid future human missions to the planet. "During the last stages of landing, we want to land with our eyes open and be able to move laterally, as much as a football field (metric or 300 feet) to avoid an ominous hazard," Naderi said. Staff in Division 34 are currently researching this technology, he added.

A related goal for 2007 is to reduce the size of the landing error ellipse to achieve more precision landing. "During the initial stages of descent we want to have some control so that if there's an excursion from the desired trajectory, the lander will have the smarts to get back on course," Naderi said. "Once the spacecraft enters Mars'

atmosphere, we want to do a guided, not ballistic, entry. What we will probably do is add a trim tab to the aeroshell, to give us enough of a lift so that we will be able to manipulate the spacecraft and rotate it to get enough lift to achieve a guided entry." This would reduce a landing error ellipse to 5 to 6 kilometers, compared to the 300-kilometer target used by Mars Pathfinder in 1997.

Naderi said the program is looking at a number of different techniques for touchdown structures in 2007, including a crushable pallet system, airbags, and landers with outriggers.

The rover under proposal for 2007 continues the evolution from Pathfinder in '97 to the Mars Exploration Rovers in 2003. Pathfinder's Sojourner rover had about 1 kilogram of payload capability, and could travel a maximum of about 100 meters. The 2003 rovers will be able to accommodate a 22-kilogram payload and go about 1 kilometer (about 2/3 of a mile). The 2007 rover, by contrast, will have a payload capability of about 300 kilograms, and "probably can go from here to San Diego (about 240 kilometers or 150 miles)," Naderi said.

Also planned for launch in 2007 is a new line of small "Scout" missions that would be selected from proposals from the science community, and might involve airborne vehicles, balloons or small landers. These missions would also be up for competition in the science community, with a cap of about \$300 million.

The Mars Program will collaborate in 2007 with the French Space Agency to demonstrate two technologies for Mars orbiters—"aerocapture," a technique that will allow orbit insertion to be achieved with much less expenditure of fuel, and rendezvous techniques that would be needed as a precursor to return Martian samples to Earth.

For 2009, Naderi said, the program intends to collaborate with the Italian Space Agency on a science orbiter.

Current plans call for the first sample return mission to be launched as early as 2011, "but this would require some budget augmentation," Naderi said. Technology development for advanced capabilities such as miniaturized surface science instruments and deep drilling to several hundred feet will also be carried out in this period.

Naderi also reported the good news of a significant increase in NASA's technology investment over the next 12 years to \$660 million. This includes \$60 million for fiscal year 2001, more than six times the amount allocated for technology development last year. About half of the technology funding will be in house at JPL, with the other 50% for academia, industry and other government, or other NASA centers.

The overall Mars Program budget for this year is about \$470 million—a \$200 million increase over last year. Naderi noted that about 700 people at JPL work on the Mars Program.

"During the last stages of landing, we want to land with our eyes open and be able to move laterally, as much as a football field."



Bob Brown / JPL Photo

Dr. Firouz Naderi, Mars Program Office manager, discussing "smart landers" proposed for 2007.

Halloween!

Happy



Bob Brown / JPL Photos



All kinds of characters joined in the fun during the ERC Halloween Fashion Show Oct. 31, including master of ceremonies Fritz Coleman of Channel 4 conversing with a pumpkin.



View this and previous issues of Universe online

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

Universe

Editor

Mark Whalen

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Adriane Jach
Audrey Riethle/
Design Services

Chief Photographer

Bob Brown/Photo Lab

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Notice to Advertisers

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

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

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

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

Letters

My family and I would like to thank our friends at JPL for their kind expressions of sympathy on the recent passing of Sherry's father. We would also like to thank the staff at ERC for the beautiful plant.

Steven and Sherry Bard

I would like to thank ERC Hospitality for the plant sent in honor of my mother's passing. I am eternally grateful to all of my friends and co-workers at JPL for their prayers, generosity and support throughout. In His love,

Tracy Pellegrino

My husband and I would like to thank all those at JPL who offered their sympathy and support to us on the recent passing of my mother-in-law. Also, thanks to the ERC for the beautiful plant sent to our home which will grow in her memory.

Carolyn Murray

Vicki and I would like to express our appreciation and thank our friends at JPL for their expressions of sympathy at the recent passing of her mother. Thanks also go out to the ERC for beautiful plant sent to our home.

Michael Chillicki

I am thankful to all my friends in the 514 organization who supported me after the recent death of my 97-year-old mother; also to ERC for the beautiful red Bromelaid plant sent to my house. It will make a good companion to the plant received last year following the death of my 98-year-old father.

Ken Evans

Retirees

The following employees retired in November: Norman Haynes, 42 years, Section 500; Elliot Framan, 38 years, Section 872; Jo Jean Kos, 37 years, section 174; Harold Land, 20 years, Section 323; Richard Kuberry, 15 years, Section 505; Donal Sweeney, 10 years, Section 194.

Classifieds

For Sale

BASEBALL CARDS, Post cereal, for 1992-94, 30-card sets plus checklists, \$12 each or all three for \$30; 1995 Tombstone Pizza set for \$20. 626/332-2682, Steve.
BUNKBED, This-End-Up furn., 80" x 68" x 42", very sturdy, eastern Yellow Pine, exc. cond., incl. mattress pads and Simmons Beauty Rest mattresses, \$650. 790-8018.
CLAY POTS, round, large (2-ft and 3-ft diameter), \$50/obo each 2", \$60/obo each 3". 626/398-3480.
COMPUTER CASES, with power supplies, desk top, used, make offer or donation. 626/794-9579.
COMPUTER, Gateway 2000 PC, 100 MHz, 486, 32M memory, 1.2G hard drive, 17-in.

Viewsonic monitor, speakers, Epson LQ-570+ printer, \$150/obo. 626/445-5214.
COMPUTERS, IBM Aptiva, about 2 yrs. old, 233 MHz, 6 GB hard drive, 56K fax and data modem, and voice, mini-tower, \$200; refurbished IBM Aptiva, still in box, 500 MHz, 10 GB hard drive, 56K fax and data modem and voice, mini-tower, \$450. 626/914-1237, Gene.

CONCERT TICKETS (2), L.A. Philharmonic, orchestra level, for Nov. 25, 8 p.m., Dorothy Chandler Pavilion, Mahler: Symphony No. 2 ("Resurrection"), \$27 each. 626/564-1654.
CONVECTION OVEN, by Décor, self cleaning, electric, white, wall mount, \$150/obo. 626/584-9632.

FURNITURE, oak: computer desk, 2-piece L-shape w/butcher block top, keyboard drawer, 5 drawers (2 for files, 1 w/lock); file cabinet, vertical, 4 drawers (1 w/lock); shelf unit w/8 shelves 50w x 60h x 12d; all in very good condition; all for \$500/obo. 626/791-6101.

FURNITURE, bedroom: dresser w/mirror and 2 matching nightstands; dresser is 70" wide by 30" high with 9 drawers; nightstands are 26" wide by 23" high with 2 drawers; all for \$245 or best offer. 626/914-7853.

FUTON, solid maple, queen mattress, plus cover, clean, mint condition, \$235. 952-7434.

FUTON, solid oak, full size, bed w/burgundy pad, less than 1 yr. old, \$350/obo. 909/899-3410.

MISC.: PIANO, Kimball upright, rich oak finish, \$1,400; REFRIGERATOR, GE, white, 20.7 cu. ft., \$100; BDRM SET, white, wicker, hdbrd qn/full, 2 nt. stands, chair/love seat, excel. cond., \$150; RUBY RINGS, 2, \$50 & \$75; CHAIR/LOVESEAT. 248-2807.

OVEN, gas, Hotpoint elec. ignition with clock/timer, warranty till Nov. 2001, \$300/obo; DRYER, Kenmore 70 series, heavy-duty super capacity plus, \$250/obo; WASHING MACHINE, Kenmore 70 series, heavy duty super capacity plus, \$250/obo; SOFA, black/white/gray pattern, 86 in., \$250/obo. 509-1862, Karen.

POWER TOOLS, 10" Craftsman compound mitre saw, \$150; SANDER, Craftsman 6 x 48" belt/9" disk with stand, extra belt, disks, very good condition, \$150. 626/446-2762.

SOFA, 7 ft. tapestry material, multi-color floral pattern, dark oak trim, like new, \$500. 626/334-1535, after 6 p.m.

TABLE dinette, square glass top 5' x 5' w/metal feet and 4 matching chairs, \$800/obo; BAR STOOLS, 4 matching, metal frame, all in excellent condition, \$400/obo. 626/398-3480.

TELEVISION, Panasonic 25" diagonal, wooden cabinet, remote control, 8 yrs. old, \$150/obo. 626/398-3480.

VCR, Sony 4-head hi-fi w/remote, \$50; AMP, Pignose Hog 30 watt, for guitar, bass or keyboard, \$125; TABLE, kitchen, oval 3 x 5, \$15; BABY SWING, Graco, \$10; BOUNCY CHAIR, Kid II, voice-activated, \$25. 626/795-5126.

VCR, Panasonic 4-head VHS hi-fi/stereo, VCR Plus programming, on-screen menus, cable box control, universal remote, excellent condition, \$50. 626/577-0068.

VIDEOTAPE of the original Disney Fantasia, unopened, \$40. 626/797-3310.
WASHER & DRYER SET, Kenmore 70 series washer, type 3, heavy duty, 3-spd. motor w/4 spd combinations, Kenmore 70 series gas dryer, type 3, both like new, sacrifice both for \$550; AIR CONDITIONER, Kenmore, used 4 mo., 7000 BTU, \$150. 395-4317.

WASHER & DRYER, GE, good working condition, white, \$285 for both. 731-0470.

Vehicles/Accessories

ACURA Legend compact spare tire, w/rim, \$30. 248-2807.

'88 ACURA Integra LS, 4-dr hatchback, 5-speed, body and interior are beautiful, new clutch, struts, starter, two tires, almost new ignition system and two tires, runs well but needs engine, will not pass smog test, as is, \$3,000. 772-7611, Amy.

'88 BUICK Reatta, red, vg cond., orig. owners, 136K miles, \$4,500/obo. 248-2807.

'89 CHEVROLET Corvette coupe, am/fm/cd stereo, a/c, leather int., 6-speed trans., glass and hard tops, metallic gray, performance suspension, bra and car cover, 64K miles, \$12,500. 790-1893.

'98 DODGE Durango SLT, 4x4, loaded, 22K miles, \$24,500. 661/255-5645.

'84 DODGE D-50 pickup truck, excellent cond., auto trans., 2.6L eng., bedliner, shell, new battery and carburetor, very clean, well

maintained, all service recs., 139K mi., orig. owner, \$2,500/obo. 626/332-2682, Steve.

'97 FORD Explorer XLT, only 23,000 mi., excellent condition, 2 wd, new tires, tan/gold color, all paperwork avail., am/fm cassette. 626/355-5631, betw. 6 and 10 p.m.

'93 FORD Escort, 80K miles, good running cond., body in good shape, \$2,500. 249-9525.

'66 FORD Mustang, one owner, original invoice & most repair/service receipts, yellow with parchment interior, 289 V-8, exc. mech. cond., new rear brakes & front Michelin tires, driven nearly every day, very clean inside & out, no dents, see & drive to appreciate, \$5,900. 626/794-7007.

'92 HARLEY Sportster, 1200cc, exc. cond., low miles, Mikuni, Dyna. S, progressive shocks, belt drive, bags, pipes, sissy bar and pillion, steel base gsks, maint. free batt., no leaks, \$7,000/obo. 248-8841.

'91 LEXUS LS400, 122 K mi., 3 EQN 543, \$12,500. 790-0697, Joe.

'89 MAZDA 323, runs great, auto, CD player w/large speakers; new transmission, tires and brakes; needs A/C repair, good for beginners, 120K miles, \$2,200/obo. 626/914-2385, eve.

'89 MERCURY Tracer, 2 door hatch, 5x manual, A/C, alarm, AM/FM cass., exc. cond., well maintained, garaged, red, \$1,800/obo. 626/345-9111, Reuben.

'93 RANGE ROVER County LWB, green, air suspension, sunroof, brush guard, CD, leather, 90K mi., d/r. maintained, exc. cond., \$14,990. 760/249-4262 (bus), 760/249-6428 (res).
'99 SATURN 3-door coupe SC2, blue, 5 speed, sunroof, CD player, premium wheels, prepaid factory service, 24 K fwy. miles, really fun car, excellent condition, \$13,500. 310/364-0125.

'95 TOYOTA T-100 SR5 pickup, extended cab, LoJack, bedliner, cassette, aluminum oversize wheels, excellent cond., 70,500 mi., \$13,000/obo. 310/316-0848.

'93 TOYOTA shortbed pickup, 90K miles, 5-speed, metallic gray, cloth interior, very good condition, \$4,200/obo. 323/550-8139. VOLKSWAGEN shop manual, for 1970-74 Beetle, \$10. 626/398-0921.

VOLVO ski rack, new, OEM cross-bars and ski rack, 1/2 original price, \$110. 790-6185, Tim.

'86 YAMAHA Route 66, 250 cc. motorcycle, low miles, needs minor repairs, parts included, \$1,250. 626/795-5126.

Wanted

GUEST HOUSE or cottage, small: single male JPL contractor with 2 indoor cat, quiet neighborhood, location not important. 626/397-7224, Charlie.

HOST FAMILIES needed to host Caltech International Students for Thanksgiving Day, at 626/395-6330, Tara, or taratram@caltech.edu.

SCUBA DIVER, newly certified, looking for dive buddies for shore and boat dives around Southern California. frank@inkbox.net, Frank O'Donnell.

SEWING MACHINE, Berning, Viking or other, in excellent condition: KNITTING MACHINE in good condition. 626/794-5858.

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

TOWNHOUSE for sale: JPL contractor seeks quiet, older neighborhood, fixer upper preferred, general Pasadena/South Pasadena/Altadena areas. 626/397-7224, Charlie.

VOLLEYBALL PLAYERS, coed, all levels of play, Tues. nights, 8-10, Eagle Rock H.S., \$3/nt. 956-1744, Barbara.

WIND INSTRUMENTS, for free or very low price, bassoon, bass clarinet, oboe, recorders, all needed for use in church orchestra. 957-5673, Janis.

For Rent

ALTADENA, 11 min./JPL, large furn. rm., cable TV, priv. ba., plus share large, quiet, hilltop house, yard, patios, etc., with retired JPL engr., all amen., c/a/h, kitchen, laundry, panor. view, priv., off str. prkg. spot, smoking OK, owner smokes cig., JPL empl./contr. pref'd., \$480. incl. all util., + dep., 626/794-1050, after 5 p.m., Harry.

ALTADENA, in excellent Rubio Canyon area, furnished room in home with access privileges to kitchen/laundry/dining room, no smoking, no pets, \$350. 626/797-8082.

ALTADENA, large room in a house less than 3 miles to JPL, secluded area, garage parking, private entrance, new carpet, central heating, kitchen & laundry priv., DSL

access, required clean & non-smoker, \$500, all utilities. 626/296-0844.

BURBANK, guest house studio, detached from the house, private, fireplace, A/C, kitchenette with oven/refrigerator/cabinet, bath, indoor garage, min. from police/fire dept., quiet, by Castaway Restaurant and golf courses, good for grad. students, utilities included, \$650. 845-4064 or tniloufar@hotmail.com.

LA CANADA FLINTRDGE, room, private bath, kitchen privileges, pool, BBQ, parking, avail. 12/1. 790-1280.

LA CRESCENTA guest house, 1 bd., 1 ba., prkng., patio, laundry, A/C, refrig., priv. entry, no pets, no smoking, credit check, \$650 util. incl. 957-2173.

N. ALHAMBRA rear house, 1 lg. bd., 1 ba., in good quiet residential area, 725 sq. ft., hardwood floor, very clean, 1-car garage, fenced private yard, stove, water, trash and gardener provided; see to appreciate, \$680. 626/683-9935, evenings.

PASADENA apt. to share, 2 bd., 1.5 ba., fully furn., laundry facil., 2.5 mi. to Caltech, \$575 plus 1/2 util. 626/351-9641.

PASADENA, part of a beautiful home, nice setting, private entrance, one room, kitchenette, full bath, ideal for person w/quiet lifestyle, \$550. 626/798-4056.

PASADENA, room in lg. apt., 2 1/2 ba., lg. liv. rm., dining room, kitchen. \$400 plus 1/2 utilities (electric). 626/794-9566 or 626/422-6746.

SAN GABRIEL, beautiful home, 3 bd., 2 ba., excellent cond., separate dining rm., fireplace, patio, hardwood floors, gardener paid, big fenced yard, double garage, laundry rm., 610 Abbot Ave., 20 min. from JPL, \$1,400. 626/792-3732.

SHADOW HILLS-SUNLAND horse ranch, 3bd., 2 ba., large parcel, end of road, 2 level on mt. side, quiet, \$1,395. 626/584-6526, Fred.

Vacation Rentals

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

BIG BEAR LAKEFRONT, lux. townhome, 2 decks, tennis, pool/spa, nr. skiing, beaut. master bdrm. suite, sleeps 6. 949/786-6548.

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

HAWAII, Kona, on 166 feet of ocean front on Keauhou Bay, private house and guest house comfortably sleep 6, 3 bd., 2 ba., rustic, relaxing and beautiful, swimming, snorkeling, fishing, spectacular views, near restaurants, golf courses and other attractions. 626/584-9632.

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

LAKE TAHOE, North Shore, 2 bd., 2.5 ba., sleeps 6, great location, all amenities, 2 miles to casinos, 3-night minimum or week-lies, JPL discount rates except holidays.

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, wood stove; 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., slps. 6, fully equip. elec. kitch. w/mcrown. & extras, f/p & wood, color TV, VCR, cable, FM stereo, pool & sun area, o/d Jacuzzi, sauna, game, rec. & laundry rms., play & BBQ areas, convenient to lifts, shops, events, daily/special midweek rates. 249-8524.

MAMMOTH, beautiful studio condo in a very nice complex near chair 15, on the ski bus route, special rates for JPL/Caltech. 626/791-5376, William.

MAMMOTH, Snowcreek, 2 bd., 2 ba., w/loft, sleeps 6-8, fully equip'd kitchen incl. microwave, d/w, cable TV, VCR, phone, balcony w/view to mtns., Jacuzzi, sauna, streams, fishponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455.

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

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