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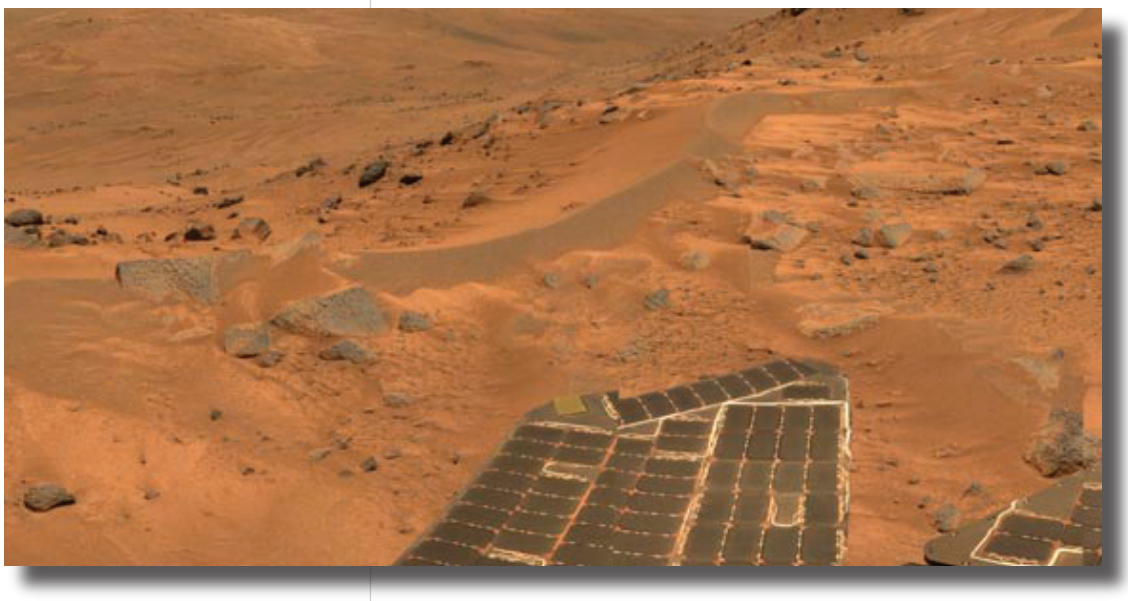


A hilltop view with Spirit

By Guy Webster

The above mini-panorama was taken by Spirit on Aug. 23, just as the rover completed its climb up "Husband Hill."

Working atop a range of Martian hills, JPL's Spirit rover is rewarding researchers with tempting scenes filled with evidence of past planet environments.

"When the images came down and we could see horizon all the way around, that was every bit as exhilarating as getting to the top of any mountain I've climbed on Earth," said Chris Leger, a rover planner at JPL.

The summit sits 82 meters (269 feet) above the edge of the surrounding plains. It is 106 meters (348 feet) higher than the site where Spirit landed nearly 20 months ago. Spirit and its twin rover, Opportunity, successfully completed their three-month prime missions in April 2004. They have inspected dozens of rocks and soil targets since then, continuing their pursuit of geological evidence about formerly wet conditions on Mars.

"Spirit has climbed to the hilltop and looked over the other side, but NASA did not do this just to say we can do it. The Mars rovers are addressing fundamental questions about Martian history and planetary environments," said NASA's Mars Exploration Program Director Doug McCuistion.

The crest of "Husband Hill" offers Spirit's views of possible routes into a basin to the south with apparently layered outcrops. Shortly after Spirit landed, it observed a cluster of seven hills about 3 kilometers (2 miles) east of its landing site. NASA proposed naming the range "Columbia Hills" in tribute to the last crew of Space Shuttle Columbia. The tallest of the hills commemorates Rick Husband, Columbia's commander.

Volcanic rocks covering the plain Spirit crossed on its way to the hills bore evidence of only slight alteration by water. When Spirit reached the base of the hills five months after landing, it immediately began finding rocks with wetter histories.

"This climb was motivated by science," said Steve Squyres of Cornell University, principal investigator for the rovers' science instruments. "Every time Spirit has gained altitude, we've found different rock types. Also, we're doing what any field geologist would do in an area like this: climbing to a good vantage point for plotting a route."

Researchers are viewing possible routes south to apparently layered ledges and to a feature dubbed "home plate," which might be a plateau of older rock or a filled-in crater.

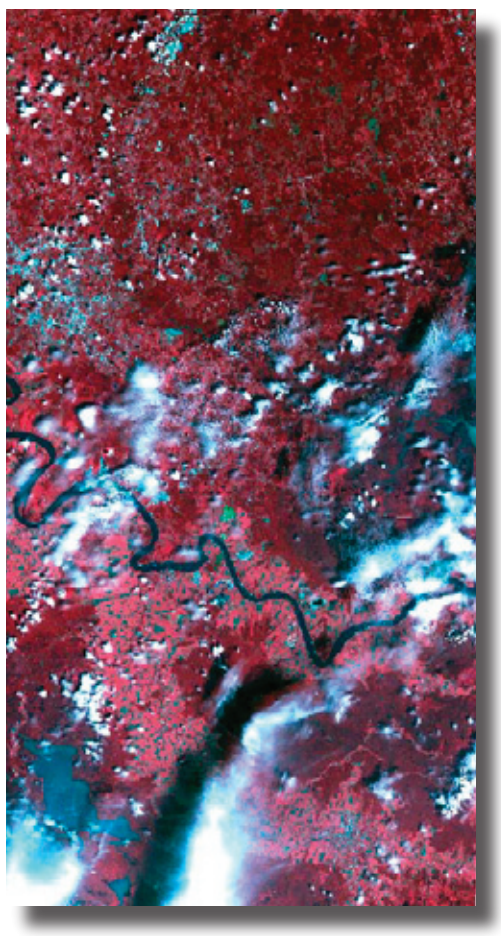
The landing site and the Columbia Hills are within Gusev Crater, a bowl about 150 kilometers (95 miles) in diameter. The crater was selected as the landing site for the Spirit rover because the shape of the terrain suggests the crater once held a lake. Volcanic deposits appear to have covered any sign of ancient lakebed geology out on the plain, but scientists say the hills expose older layers that have been lifted and tipped by a meteorite impact or other event.

"We're finding abundant evidence for alteration of rocks in a water environment," said Ray Arvidson of Washington University, St. Louis, the deputy principal investigator for the rovers' science instruments. "What we want to do is figure out which layers were on top of which other layers. To do that it has been helpful to keep climbing for good views of how the layers are tilted to varying degrees. Understanding the sequence of layers is equivalent to having a deep drill core from drilling beneath the plains."

Both Spirit and Opportunity have been extremely successful. Their solar panels are generating plenty of energy thanks to repeated dust-cleaning events. Spirit has driven 4,827 meters (3 miles), and Opportunity 5,737 meters (3.56 miles).

NASA instruments assess Katrina's impact

Lab's ASTER and QuikScat contribute



This image of Louisiana was acquired Aug. 30 by the Advanced Spaceborne Thermal Emission and Reflection Radiometer on NASA's Terra spacecraft soon after Hurricane Katrina made landfall.

NASA science instruments and Earth-orbiting satellites are providing detailed insight about the environmental impact caused by Hurricane Katrina. Images and data are helping characterize the extent of flooding; damage to homes, businesses and infrastructure; and potential hazards caused by the storm and its aftermath.

NASA, along with academic institutions and partner agencies, is working to ensure the Department of Homeland Security and the Federal Emergency Management Agency have the best available information to aid in responding to this catastrophic event.

NASA's partner agencies in this endeavor include the U.S. Geological Survey, the National Oceanic and Atmospheric Administration, the National Geospatial-Intelligence Agency, the Environmental Protection Agency and the U.S. Department of Agriculture.

Coordinated assistance by numerous academic institutions and laboratories working under NASA grants will be employed by the Gulf Coast relief and recovery efforts to provide geospatial information useful to first responders and decision makers.

NASA aircraft are providing detailed observations of the disaster area. The aircraft are taking high-resolution observations that can be used to assess the amount of damage to communities and the environment. For example, at the request of the U.S. Geological Survey in cooperation with the Federal Emergency Management Agency and the Army Corps of Engineers, NASA's Experimental Advanced Airborne Research Light Detection and Ranging system is surveying the gulf coastline.

This system, carried on a Cessna 310, surveyed the northern gulf coastline on Thursday, Sept. 1. On Sept. 3 the aircraft was scheduled to fly over the perimeter and surrounding levee around New Orleans to assist in damage assessment of the system.

While making its observations of the land, the system has the ability to "see" through vegetation, like trees and shrubs, to view the land underneath. Near the coast it can map the beach surface under water. This will help in the recovery of the shoreline infrastructure, determine hazard areas and environmental loss.

The Terra, Aqua and Tropical Rainfall Measuring Mission satellites have already provided Earth observations for land cover and rainfall. Terra's Advanced Spaceborne Thermal Emission and Reflection Radiometer is providing data on the magnitude and extent of damage and flooding to the U.S. Geological Survey Emergency Response Team through its Earth Resources Observation Systems Data Center in Sioux Falls, S.D. JPL is responsible for the American side of the joint U.S.–Japan science team that is validating and calibrating that instrument and its data products.

NASA's Moderate Resolution Imaging Spectroradiometer instrument on the Terra and Aqua satellites provided images of flooding, including pre- and post-disaster comparisons.

Data from NASA's QuikScat satellite, developed and managed by JPL, was one source of wind observations used by the National Oceanic and Atmospheric Administration's Hurricane Research Division to analyze the wind field of the storm and to track its path.

Another NASA satellite in use is the Earth Observing Mission 1. The Advanced Land Imagery multispectral instrument on this satellite provided land use and land cover observations useful in determining hurricane damage areas and in aiding in recovery, response and mitigation.

NASA satellites are used to improve weather predictions and to study climate and natural hazards. The knowledge gained during these missions aids assessment and recovery operations.

For satellite images and additional information, visit *www.nasa.gov/hurricane* and *www.aoml.noaa.gov/hrd/Storm_pages/katrina2005/wind.html*. For information about the Advanced Spaceborne Thermal Emission and Reflection Radiometer and QuikScat spacecraft, visit *http://asterweb.jpl.nasa.gov/index.asp* and *http://winds.jpl.nasa.gov/ missions/quikscat/index.cfm*.

News Briefs

One NASA awards bestowed

RICHARD ROMER of Section 315A, NANCY KAPELL of Section 1123 and DAVID DINER of Section 3285 recently received One NASA Peer Awards.

Romer was honored for his facilitation and teaming with Ames Research Center, Goddard Space Flight Center and JPL to establish a new third-party software patching process. This innovation now provides timely patching to multiple flight projects.

Kapell was recognized for forging relationships to improve collaboration among all NASA centers and space shuttle contractors, and for improving Space Flight Awareness Program processes.

Diner was honored for his participation in the Active-Passive Airborne Instrument Suite for Aerosol Measurements Team.

From left: Richard Romer, Nancy Kapell, David Diner.

The One NASA Peer Award recognizes individuals and teams who demonstrate the One NASA behaviors of decision-making for the common good, collaborating to leverage existing capabilities and standardizing to achieve efficiencies agency-wide. Candidates must be nominated by their peers, rather than by their supervisors.

To nominate someone or for more information about the award, see *http://hr.jpl.nasa.gov/ers/OneNASA.*

2005 JPL Children's Art Contest

Children and grandchildren of JPL employees are encouraged to illustrate their favorite idea on space exploration in the new JPL Children's Art Contest. Entries are due Sept. 30.

The contest is open to children age 16 and younger. Entrants will be divided into three age groups (1–6, 7–12 and 13–16).

Prizes are funded by Caltech. The grand-prize winner will receive a $100 gift certificate, with 11 runner-up prizes of $50 gift certificates.

Artwork must be on a flat medium and be no larger than 8.5" x 11". Electronic entries must be in jpg or tiff format.

Winning entries will be used in future JPL printed materials and will also be displayed in JPL's visitor's center from mid-November through year end.

Judging will be held on Oct. 15, with winners notified by Oct. 20. Prizes will be awarded in November.

For an entry form, visit *http://dailyplanet.jpl.nasa.gov.*

For more information, call DONNA CAMPBELL, ext. 4-3406.

Enter the Invention Challenge

Registration is nearing for JPL's annual Invention Challenge. This year's competition, the Strike a Match Contest, will be held Dec. 2.

The contest is open to all JPL employees, contractors and immediate family members, as well as to teams of students from Southern California middle schools and high schools.

Applications for school teams must be filled out and submitted to event organizer PAUL MACNEAL between Sept. 12 and Oct. 7. Applications for JPLers and immediate family members are due to MacNeal prior to Nov. 25.

For more information, visit *http://education.jpl.nasa.gov/inventionchallenge/index.html* or call MacNeal at ext. 4-7824.

Weight-loss program offered

Participation is offered in an employee peer group that plans to follow a renowned eating and exercise program for six weeks. Goals include a weight reduction of 20 pounds.

Interested JPL and contractor employees can contact PAUL KASKIEWICZ at *skylark1207@earthlink.net* for information.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meets Wednesdays at 11:30 a.m.

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

Codependents Anonymous—Meets at noon every Wednesday.

Lambda (Gay, Lesbian, Bisexual and Transgender Networking Group)—Meets the first Friday and third Thursday of the month at noon in Building 111-117. For more information, call Randy Herrera, ext. 3-0664.

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 any of the support groups, call the Employee Assistance Program at ext. 4-3680.

Tuesday, September 13

JPL Genealogy Club—Meeting at noon in Building 301-271.

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

Wednesday, September 14

JPL Amateur Radio Club—Meeting at noon in Building 238-543.

JPL Library Orientation—Stop by Building 111-104 at 11:30 a.m. for an overview of the Library's products and services, and learn how to access numerous electronic resources from your desktop. For more information, call the reference desk, ext. 4-4200.

JPL Toastmasters Club—Meeting at 5 p.m. in conference room 167. Call Dirk Runge, ext. 3-0465, or visit *www.jplcaltechtoastmasters.com.*

Thu.–Fri., September 15–16

Von Kármán Lecture Series—Dr. Daniel McCleese, chief scientist for the Mars Exploration Program, will present "Mars Exploration: The Past, Present, and Future" 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/sep05.cfm.* For more information, call Public Services at ext. 4-0112.

Friday, September 16

Caltech Women's Club—A "welcoming coffee" is offered from 9:30 to 11 a.m. in the garden of the president's residence at 415 S. Hill St., Pasadena. New members are invited. For more information, contact Katie Clark at (626) 403-7163 or *ktclark@caltech.edu* or Vilia Zmuidzinas, (626) 398-4413, *vilia@caltech.edu.*

Saturday, September 17

Caltech Folk Music Society—Scottish singer Andy Stewart will be joined by Irish musician Gerry O'Beirne in Ramo Auditorium at 8 p.m. Tickets are $15 for adults, $5 for children. For more information, call the Caltech Ticket Office at (626) 395-4652 or visit *http://folkmusic.caltech.edu.*

Thursday, September 22

Caltech Architectural Tour—Hosted by the Caltech Women's Club, from 11 a.m. to 12:30 p.m. Free and open to the public. Meet at the Athenaeum front hall, 551 S. Hill Ave. For reservations, call Susan Lee, (626) 395-6327.

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

Sunday, September 25

Chamber Music—The Emerson String Quartet will perform at 3:30 p.m. in Caltech's Beckman Auditorium. Tickets are $32, $27, $22 and $18. For more information, call (626) 395-4652.

Deep Impact adds color to unfolding comet picture

Painting by the numbers is a good description of how scientists create pictures of everything from atoms in our bodies to asteroids and comets in our solar system. Researchers involved in the JPL-managed Deep Impact mission have been doing this kind of work since the mission's July 4 collision with comet Tempel 1.

"Prior to our Deep Impact experiment, scientists had a lot of questions and untested ideas about the structure and composition of the nucleus, or solid body of a comet, but we had almost no real knowledge," said Deep Impact principal investigator Dr. Michael A'Hearn, a professor of astronomy at the University of Maryland. "Our analysis of data produced by Deep Impact is revealing a great deal, much of it rather surprising."

For example, comet Tempel 1 has a very fluffy structure that is weaker than a bank of powder snow. The fine dust of the comet is held together by gravity. However, that gravity is so weak, if you could stand on the bank and jump, you would launch yourself into space.

Another surprise for A'Hearn and his colleagues was the evidence of what appears to be impact craters on the surface of the comet. Previously, two other comets had their nuclei closely observed and neither showed evidence of impact craters.

"The nucleus of Tempel 1 has distinct layers shown in topographic relief ranging from very smooth areas to areas with features that satisfy all the criteria for impact craters, including varying size," A'Hearn said. "The problem in stating with certainty that these are impact craters is that we don't know of a mechanism by which some comets would collide with the flotsam and jetsam in our solar system, while others would not."

According to A'Hearn, one of the more interesting findings may be the huge increase in carbon-containing molecules detected in spectral analysis of the ejection plume. This finding indicates comets contain a substantial amount of organic material, so they could have brought such material to Earth early in the planet's history when strikes by asteroids and meteors were common.

Another finding is the comet interior is well shielded from the solar heating experienced by the surface of the comet nucleus. Mission data indicate the nucleus of Tempel 1 is extremely porous. Its porosity allows the surface of the nucleus to heat up and cool down almost instantly in response to sunlight. This suggests heat is not easily conducted to the interior and the ice and other material deep inside the nucleus may be pristine and unchanged from the early days of the solar system, just as many scientists had suggested.

"The infrared spectrometer gave us the first temperature map of a comet, allowing us to measure the surface's thermal inertia, or ability to conduct heat to the interior," said Dr. Olivier Groussin, the University of Maryland research scientist who generated the map.

It is this diligent and time-consuming analysis of spectral data that is providing much of the "color" with which Deep Impact scientists are painting the first-ever detailed picture of a comet. For example, researchers recently saw emission bands for water vaporized by the heat of the impact, followed a few seconds later by absorption bands from ice particles ejected from below the surface and not melted or vaporized.

"In a couple of seconds the fast, hot-moving plume containing water vapor left the view of the spectrometer, and we are suddenly seeing the excavation of subsurface ice and dust," said co-investigator Dr. Jessica Sunshine, from Science Applications International Corporation, Chantilly, Va. "It is the most dramatic spectral change I've ever seen."

These findings are published in the Sept. 9 issue of the journal Science.

JPL legend Stewart celebrates 90th

Homer Stewart visits with John Beckman and Dr. Charles Elachi.

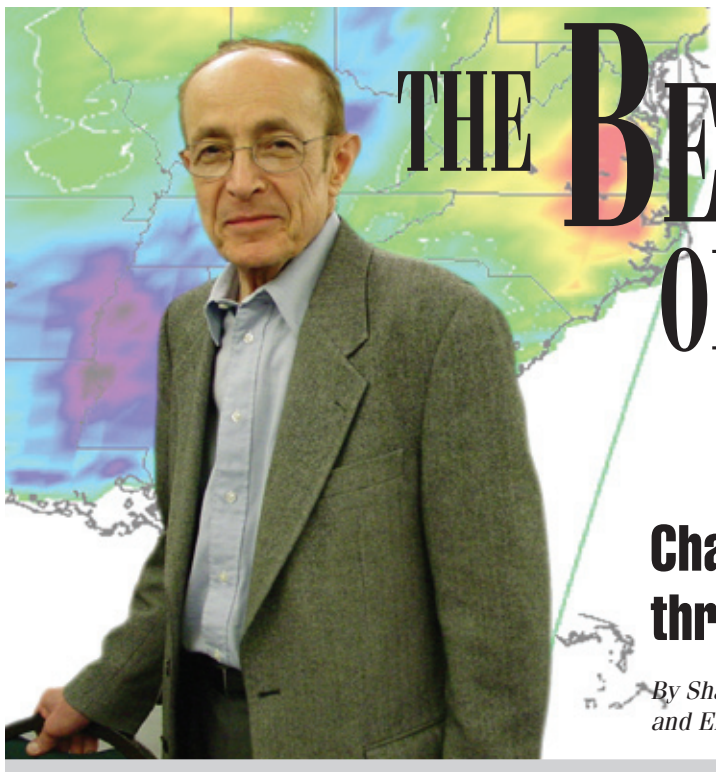
Homer Stewart, whose work with the American space program traces all the way back to JPL's beginning in the 1930s, dropped by the Lab on the occasion of his 90th birthday last month.

It was 50 years ago that Stewart chaired the Advisory Group on Special Capabilities, set up by the assistant Secretary of Defense for Research and Development. The Stewart Committee's mandate was to examine proposals for launch vehicles designed to place the first American satellite, Explorer 1, into orbit, in 1958. JPL designed, built and operated Explorer 1.

Stewart joined the Caltech faculty in 1938, and earned his doctorate there two years later. In 1939 he took part in pioneering rocket research with other Caltech engineers and scientists, including Frank Malina, in the foothills of Pasadena. Out of their efforts, JPL arose, and Stewart maintained his interest in rocketry here.

In 1958, on leave from Caltech, he became director of NASA's program planning and evaluation office, returning to Caltech in 1960 to a variety of positions, including chief of the advanced studies office at JPL (1963–67) and professor of aeronautics at Caltech.

Stewart's return to JPL in mid-August included a brief tour and a visit with former colleague and current JPL executive John Casani.



THE BEST VIEWS ON CLIMATE

Chahine's vision lives through AIRS

By Sharon Okonek, AIRS outreach coordinator, and Erik Conway, JPL Historian

It was 1957, the era of Sputnik, and Moustafa Chahine, or "Mous" as he came to be known by his colleagues while working on his Ph.D. at U.C. Berkeley, saw a picture of JPL Director William Pickering, Wernher von Braun, and Iowa professor Jim Van Allen, standing shoulder-to-shoulder triumphantly holding over their heads a model of the Explorer 1 satellite they had just launched into space. "It was fantastic," Chahine recalls, and the moment crystallized his own decision to work in the space program.

From fluid flow to remote sensing

Invited to work at JPL in 1960, Chahine began his career studying shockwaves to attack problems associated with the reentry of a space capsule to Earth. But with the Lab redirecting much of its resources to the ambitious Voyager project, Chahine was faced with the decision to either leave and continue his research elsewhere or stay and change his field of interest. Chahine stayed, and chose to re-focus his efforts on a challenge that shared a common component that dovetailed with his previous research. That common component was Earth's atmosphere, and the challenge involved the interpretation of radiation, or light waves at many wavelengths, emitted from an atmosphere as measured by a satellite. This exploration would lead him to develop a method for retrieving temperature profiles to study Earth and other planets. His first application was to study the cloudy atmosphere of Venus.

In the meantime, the science of weather prediction was evolving, and an intersection between Chahine's work and the work being done to create global data sets of Earth's atmosphere would become inevitable.

A history of weather forecasting

The motivation for temperature sounding from space came from the development of numerical weather prediction during the 1950s. MIT meteorology professor Jule Charney, who in the mid-1950s first demonstrated that a computer could predict the weather, believed the only information needed was accurate vertical temperature profiles of the atmosphere. The forecast model could then use the information in the profiles to infer wind velocity and predict the movement of fronts.

Charney, however, had a problem. There wasn't enough data to feed a global model. Temperature profiles were routinely gathered by the Weather Bureau from balloons but only over land, and lots of interesting weather happened over the oceans. To compound the problem, only the relatively wealthy Northern Hemisphere countries operated balloon networks and shared the data.

Charney's connections to one of the great figures in 20th century meteorology, the U.S. Weather Bureau's Dr. Harry Wexler, offered the solution to his problem. One of the first goals for NASA leaders when the agency started operations in late 1958 was to prove the utility of space technology, and improving weather forecasting was obviously a useful thing to try to do. So NASA arranged with Wexler's Weather Bureau to develop weather satellites. The new Goddard Space Flight Center in Maryland became home base for the effort, which initially focused on imagery satellites based on an Army reconnaissance satellite design.

The idea for generating temperature profiles from satellites came from another U.S. Weather Bureau alumnus, Lewis D. Kaplan, who in 1959 proposed that one could infer atmospheric temperature from the energy emitted by carbon dioxide molecules in the atmosphere. With this latest advancement, Charney could now finally envision a way to get the global data he needed.

After arriving at JPL by way of MIT, Kaplan influenced Chahine's decision to apply his fluid flow analytical skills to the equations necessary to transform satellite infrared data into atmospheric temperature profiles.

Chahine, who had spent much of the 1970s building JPL's oceanography program and working to get funds to build his atmospheric temperature sounder idea, thought the next-generation sensor should have a vertical resolution of 1 kilometer, and an accuracy of 1 degree Celsius.

The National Climate Program Act of 1978 succeeded in getting the planning for climate research started, including the development of an observing system to support the research. This effort went nowhere quickly, however. On paper, the observing system was massively expanded to become part of the "Space Station Freedom" project with a set of giant, astronaut-tended polar platforms that were supposed to provide every kind of Earth observation possible. Chahine's instrument proposal, the Atmospheric Infrared Sounder (AIRS), received its earliest funding as part of this concept.

Chahine and AIRS had a number of advantages over other investigators. One was that as a weather prediction instrument, AIRS had strong support even from people who weren't interested in climate, and the Department of Defense was interested in its infrared detector technology. Additionally, AIRS contributed directly to climate studies. Most climate models showed that as greenhouse gases increased, the atmosphere would get warmer and wetter. There would also be a pattern to the warming: the upper troposphere would warm more than the lower troposphere, the stratosphere would actually cool, and the boundary between the troposphere and the stratosphere (the tropopause), would move.

The older National Oceanic and Atmospheric Administration temperature sounders didn't have the resolution to see these changes, but AIRS could, if its measurements were maintained long enough. So AIRS stayed alive. Initially, it was scheduled for two platforms, in morning and afternoon orbits, but finally wound up on only one, the satellite formerly known as EOS-PM, now called Aqua.

The AIRS achievement

Since its launch aboard Aqua in 2002 from Vandenberg Air Force Base, AIRS has operated like a champ, maintaining flawless operations with superb calibration accuracy and stability. Its global data sets are being distributed to numerical weather prediction centers around the world, and AIRS has provided the first-ever global maps of water vapor in the upper troposphere. AIRS is also providing new maps of global carbon dioxide in its highest resolution yet, and the first-ever global map of carbon dioxide is in the works. Beyond the goal of improving weather forecasting, AIRS was also the first instrument ever designed with the sensitivity requirements to study climate change. AIRS water vapor measurements in the upper troposphere have proven to be accurate enough to make it possible to determine if the average amount is increasing or decreasing, which would answer one of the important questions about global warming. Other theorized consequences of global warming—such as a speed-up of the cycling of water through the atmosphere by evaporation, cloud formation and precipitation, and an increase in the frequency and intensity of severe storms (such as Hurricane Katrina)—can also now be tested with the global and continuous coverage that AIRS provides. For most climate investigations the "signal" is so small and the change so gradual that many years of observations must be accumulated. But AIRS is so accurate that the steady increase in atmospheric carbon dioxide, one of the primary greenhouse gases, is clearly discernible even with just a couple of years of data from its 2002 launch.

The future

Since the ability to study climate change requires a long period of top-quality observations, it is very important to continue the task that the AIRS project has started, even after the AIRS instrument system eventually reaches the end of its mission lifespan. NASA and its sister organizations recognize the importance of such "data continuity,"

Continued on page 4

The AIRS team.

AIRS

Continued from page 3

and a series of satellites has been planned to provide that continuity. In perhaps a decade, a new series of weather satellites called the National Polar-orbiting Operational Environmental Satellite System (NPOESS) will be launched. It is hoped that the accuracy and quality of the observations from these satellites will also meet the requirements for climate studies.

In the meantime, there is also the NPOESS Preparatory Project, a satellite intended to bridge the expected gap between the end of the Aqua satellite mission—which includes AIRS—and the launch of the first NPOESS satellite. Many of the AIRS scientists are also members of the NPOESS and Preparatory Project science teams, and will bring their expertise to ensuing programs that will carry weather and climate studies into the future.

Almost 30 years have passed since Chahine's first idea of creating an instrument to provide a high-resolution data set of Earth's atmosphere. Along the way, Chahine founded JPL's Science Division, spent 15 years as the Lab's Chief Scientist and worked with the World Climate Research Programme to establish a program to study the Earth's global energy and water cycle. But he never stopped guiding the idea of AIRS into reality, and AIRS management, science, engineering and support personnel have all participated in making the AIRS mission a successful one.

After so many successes to date, what is the brightest? Perhaps the biggest validation comes from AIRS' latest achievement: the Joint Center for Satellite Data Assimilation has shown that by using just one tenth of a percent of the AIRS data, the forecasts improved in one fell swoop by as much as it would normally take several years of steady computer work to achieve. The JCSDA is now planning to use much more of the AIRS data, which they expect to result in yet another leap forward in forecast improvement.

The challenges were many, and the twists and turns were precarious. Was it worth it? With the work currently underway by the AIRS team at JPL and elsewhere, Chahine says, "Wait, this is just the beginning!" Chahine's vision lives through AIRS.

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Letters

To my co-workers in Division 27, and my many dear friends at JPL, my family and I thank you for the many well wishes, gifts and the wonderful retirement party. These and the many memories I have of my 41 years at JPL will remain with me always.

Yvonne Barraza

A heartfelt thanks to all my friends and colleagues at JPL for the cards, plants and thoughtful expressions of condolences that I received at the recent passing of my beloved mother. During this most difficult time your kind words of encouragement, prayers and support have been greatly appreciated.

Jim Constantine

Thanks to all my friends and colleagues for the warm support and thoughtfulness during the passing of our mother. Your card and flowers have been immensely appreciated by my family in this difficult time.

Ming-Taun Leu

Retirees

The following JPL employees retired in September:

John Hardy, 40 years, Section 3284; David Carta, 31 years, Section 3140; David Collins, 27 years, Section 313H; Rondle Nelson, 17 years, Section 3458; Valery Altunin, 13 years, Section 9110.

Classifieds

For Sale

ART CLASSICS, Disney; set of 4 Mickey Through the Years, a limited set, never been opened, includes 4 bases, paid $650, sell for $400; Dumbo, Mickey Birthday Party and Tinker Bell with stand, make offer. 653-3061, Jennifer.

BED, king-size mattress, box spring and frame, firm, excellent cond., $250. 626/794-0081, Bonnie.

BED, queen-sized, 1.8 years old, Sleep Tell OrthoPedic mattress with accompanying box spring and steel bed frame, $190. 626/808-8813, Joe.

BED, twin mattress set and frame, barely used, $150; headboard, $25; DESK, black with matching desktop organizer and file cabinet, good quality from Restoration Hardware, $150. 326-1872.

BICYCLE, boys 20" GT Dyno, excellent cond., $65. 626/798-1839.

BOOKCASE, antique style, solid dark oak with beveled, leaded glass enclosures for two bookshelves, approx. 22"W, 32"H, 13"D, good cond., $60. 249-6786.

CAMPSITE, Carpinteria State Beach, Oct. 6 for 4 nights, $107 (actual cost). 640-5157, cell, Barbara.

CHAISE, white, excellent condition, now $50, was $695. 626/646-1937.

CHINA CABINET, oak, new item, 5' wide, 6'6" tall, cost $1,200, sell at $500. 562/693-2986, Rother.

CLOTHING: Jones of New York: pantsuit w/fully lined jacket, size 12, brand new, paid $100+, sell for $40; assortment of women's jackets, size large, value b/t $80-$130, sell for $8/ea. 626/398-4960.

COMPUTER PRINTER, brand new Dell 720 inkjet color, $20/obo. 362-2003, Derek.

CONCERT TICKETS, Neil Diamond, 4 single tickets, Friday, Sept. 30, 8 pm, Staples Center; 1 in sec. PR11, row 10, seat 5; 1 in sec. PR11, row 11, seat 13; 1 in sec. 114, row 13, seat 16; 1 in sec. 117, row 16, seat 14; these are $95 tickets; will sell for $20/ea. 626/395-1801, Pat.

CONCERT TICKETS (2), Oasis/Jet, Hollywood Bowl, Sept. 12, 7:30 p.m., sec. M2, row 2, seats 106-105, for seating chart see www.hollywoodbowl.com/tix/seating_chart.cfm, great place to see a concert, selling at face value + Ticketmaster fees, $120 for both tickets/obo. pauline.hwang@gmail.com, Pauline.

DESK, wooden, light brown, 26" (depth) x 26.5" (height) x 43.25" (width), includes built-in cupboard, $40. 626/808-8813, Joe.

DIGITAL CAMERA, HP Photosmart 315, used twice; comes with USB connections, wrist strap; software includes HP Photo Imaging, ArcSoft PhotoImpression and ArcSoft PhotoMontage; 2.1 megapixels, 2.5x digital zoom, 1.8" LCD, HP JetSend infrared, auto flash, auto focus and exposure, self timer; best offer. 653-3061, Jennifer.

DOG FEEDER, used, automatic, electronic timer design plugs into wall outlet, best with large-breed kibbles, bought in '02 for $100, $20/obo. 249-4683.

ENTERTAINMENT CENTER, custom 2-piece Golden Oak, TV/stereo cabinet, 55W x 60H x 24D (on rollers) + matching 3-shelf bookcase, 15.5" W x 24" D x 60" H, excellent condition; bonus: solid wood, audio/visual sliding shelves; $300/obo. 970-8456, Steve.

ENTERTAINMENT UNIT, oak veneer, great cond., $500 new, sell $100; QUEEN BED SOFA and matching recliner/rocker, good cond., $50/set; RECLINER, brown, very comfy, good cond., $50; 2 STEAMER TRUNKS, need to be refinished, $20/ea.; pictures of all avail. on request. 249-6208, tom_nolan1@yahoo.com.

FLATWARE, International Silverplate set for 8, Orleans, $200; TABLE, mahogany drop leaf w/2 leaves, $300; WOOL RUG, Chinese, 6' x 9,' $100. 626/445-2616, jazzqt@earthlink.net.

FURNITURE: small decorative side table from Mexico, folk art look, dark brown wood with hand-carved design, tile top, lifts as tray, fan seashell design on tiles, small bottom shelf, nice gift idea, $45; sturdy wicker stand, medium natural color with small black trim weave, 3 shelves, good cond., 22 L x 27 H x 10 D, $30. 626/289-2795.

GRANDFATHER CLOCK, Ridgeway walnut case, 3 chimes, $2,200; ART POTTERY, misc., Van Briggle, Roseville, various prices. 626/441-3265.

GUITAR, new 2005 Gibson Les Paul 1958 custom shop reissue, mint condition, beautiful washed-cherry finish, custom hard-shell case, $2,400. 249-2420.

GUITAR, Guild 12-string, glossy finish, dreadnought of solid spruce top, laminated mahogany sides and arched mahogany back, model D25-12-NT-E, serial AD421392, including hard case, $840/obo. 957-2852.

LAWNMOWER, McLane 7 reel, gas. $65. 626/289-3373.

LAWNMOWER, gas, $60/obo. 626/914-7853.

MISC.: fishing pole (saltwater), $25; baseball glove (small, left handed) & conditioner, good cond., $15; landscape oil painting, autumn tones, $100; trash can w/wheels, $5; '50s Motorola TV "shell," $20; antique pot w/handle, $10; wig, red, shoulder length, never used; $20; home gym, $75. 626/357-8210.

MOVE-IN SALE: Sharp microwave w/carousel, $50/obo; baby cribs (1 white metal & 1 beechwood), $20; adult diapers, $20/box; walker, shower chair, bedside commode, $20/ea; external USB CD/RW, $20; framed impressionist paintings, home decoration, Samsonite suit carrier, $20; old LPs ('70s and '80s); all items are located within 15 min. of JPL. 395-8448.

OVEN/MICROWAVE combination, Whirlpool, excellent condition, $150; TROMBONES: Yamaha, excellent cond., $425; Bach, excellent cond., $575. 626/646-1937.

PRINT, professionally framed, Monet's "Artist's Garden at Vetheuil," version without child (28 x 39), $50; OIL PAINTING, sea and mountain scene, carved Polynesian-style black frame with white highlights, 21 x 17, $30; POTTED PLANTS, assorted, from covered patio, prices vary. 626/289-2795.

SCANNER, Nikon Super CoolScan 8000ED for 35mm, 6 x 6 and 6 x 9 negatives or positives, w/glass covered rotating holder for medium format film; like new, includes Tamron padded case; all for $1,200. 626/905-1929, Adam.

SOUND SYSTEM: Bose Acoustimass 10 II Home Entertainment speakers, 5 double + subwoofer (black), $485; sells on eBay for $500-$560 plus shipping; Bose floor stand pair (black), $60; 4 Bose wall/ceiling speaker brackets (black), $20 each; all in vg to excellent cond. 249-6786.

STEREO STUFF: oak cabinet on wheels, 36 x 24 x 17, tinted glass magnetic doors, $50; Kenwood multiple 5-disc carousel CD player, model DP-R791 w/remote, 1-bit dual D/A converter, exc. cond., $40; Kenwood integrated stereo system, model KRX-891 w/digital tuner, twin dubbing cassette decks and amp. w/remote, $75. 626/398-4960.

TROPICAL PLANTS, plumerias, variety of colors and sizes; shell gingers. 626/444-6156.

TV, 27" Zenith color with remote, excellent condition, in spare room so not used much, $100. 248-8727.

Vehicles / Accessories

'02 BMW 325i 4-dr. sedan, 2.5 inline-6, 5-sp. manual, power locks/mirrors/windows, CD, iPod adapter, keyless entry & alarm, white on sand leatherette, exc. condition, only 22K miles, free maintenance until 48K miles, $21K. 626/449-0997.

'68 CHEVROLET Camaro SS, 350 hp, 49,000 mi., clean int., engine runs great, a restoration/street rod project I'm unable to complete, front right replacement fender is in primer color, add new paint and you have a fantastic car, see www.sassybee.com/camaro, $16,000/obo. 310/445-6625, Steve.

'74 FORD F-100 4x4, 89K miles, 4-spd. manual transmission, new 12-16.5 tires on aluminum wheels, new engine (<1K mi.) & Ford camper shell painted to match body and interior, excellent condition, $3,500. 661/965-3994.

'01 HONDA Accord EX coupe, silver, power windows/locks, moonroof, CD player, full body kit: front/side/rear, spoiler, HID fog lights (Xenon), 18" wheels, 85K miles, excellent condition, clean title, $11K. 626/512-9212, Vonne.

'96 HONDA Prelude, 115,000 miles, automatic, a/c, moonroof, good condition, power windows/locks/mirrors, $5,750. 909/599-3230.

'95 JEEP Grand Cherokee, 2WD, dark green, vg, clean cond., 113,000 mi., $3,995. 323/225-5092, Elda.

'95 LAND ROVER Range Rover SE V8, 4.0 L, auto, 4 WD, 138K, tan, leather seats, cd, ps, pw, dual airbags, moonroof, runs great, good cond., $6,300/obo. 626/296-9073 or 818/515-2461.

'03 LAYTON SCOUT travel trailer, 32,' used 8 times, sleeps 6, 12-ft. super slide-out, full kitchen with micro, stove, oven, etc., full tub/shower, lots of storage inside and out, hydraulic lift hitch, includes stabilizing bars for towing, $15,500. jewlsins@aol.com, Julie or 909/518-9961.

'90 LEXUS 250, good running & physical cond., only 133K miles, $4,200/obo. 957-2421.

'87 MITSUBISHI LS van/wagon, 7 passenger, 110K miles, great body & interior, new alternator, belts, new front brakes/rotors, license, newer exhaust/converter, needs intermittent fuel pump repaired, $500. 248-2931.

'98 NISSAN Altima GLE, black exterior, gray leather interior, loaded, pwr. everything, sunroof, CD, 115K miles, everything in great cond.; see ad at http://losangeles.craigslist.org/car/94023100.html for pics, $5,500/obo. 323/793-0162, Jason, or jasonheidecker@gmail.com.

'97 NISSAN Maxima, white color, 4-door sedan, full automatic, clean, 90K, in vg shape, $7,000 ($8,000 in Blue Book). 249-7946, Greg (day), 957-8614 (eve).

'93 SATURN SC2 2-door coupe, 116K miles, silver w/black leather interior, 5-spd. manual, 1.9 L eng., ps/pw/pm/ac, am/fm radio, airbag, brand new tires & front brakes, no rust (driven in CA and AZ only), a/c needs refill, $1,500/obo. 626/744-1805 or hfakos@netscape.net.

'04 TOYOTA Tacoma SR5 Extra Cab, manual trans., 18,000 mi., red w/gray interior, no accidents or scratches, $14,500. 626/524-0690, until 8 p.m.

'00 TOYOTA Camry LE V6, 77K, black, good cond., CD, spoiler, premium wheels, $8,500. 626/797-4226, Shaun.

'94 TOYOTA Camry, 4-door, gold, auto, a/c, 150K mi., clean, tinted windows, Kenwood premier stereo system w/10-CD changer, alarm/keyless entry system, wheel locks, all maintenance records avail., $4,200. http://home.earthlink.net/~briazen, 626/398-6564.

'93 TOYOTA 4Runner, 4WD, 5-speed manual, 31" tires, 145K miles, good condition, runs great, a/c, power windows, CD, $4,500/obo. 790-7372.

'99 VW New Beetle GL, black, auto, 66K, keyless entry & alarm, 16" alloy wheels, new front tires, front airbags, pwr. windows/door locks/mirrors, fog lamps, $7,500/obo. 310/575-3030.

Lost & Found

LOST on Lab: 2 cats, one all black, one orange tabby, have collars and tags, they live on Viro Rd., reward. 203-8284, Roy.

Free

PET DOOR, used, 9" x 15" opening for large dogs, ~13" x adjustable from ~78" to 81" vertical panel, installs quickly into standard size sliding door frame. 249-4683.

Wanted

CHIPPER/SHREDDER for chopping garden clippings into mulch. 909/596-4390.

HOUSE TO RENT, 2 bd., max $1,500/mo., in Temple City schools area. 626/292-1914.

MATH TUTOR, jr. & sr. high school level classes (geometry, pre-algebra, algebra I & II, SAT math, etc); eves and/or weekends; also looking for English tutors. 888/784-1639, David, please leave msg.

ROOMMATE to share large back house (2,200 sq. ft.) in Altadena; your own bedroom, bathroom, office space (internet ready-cable), and garage parking; share laundry room, kitchen, lots of space, central air/heat; non-smoker, clean, no pets, month-to-month lease, $1,100 + 1/2 utilities; applicant must be approved by house owners. 687-8408 Brenda.

SINGER, 20-26 years of age; influences: Sevendust, 311, Deftones. 626/357-8210.

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

VANPOOL RIDERS, from Fontana w/stops in Rancho Cucamonga & La Verne, save gas, be energy-efficient and ride in a 2005 Ford 14-passenger van, full-time riders (JPL employees) can qualify for a $50/mo. vanpool subsidy and $300 TVS subsidy. Ext. 4-5831, Rhea Clearwater or 4-8343, Mike Taylor.

For Rent

ALTADENA, comprehensively furnished extended-stay sabbatical house: boundary Angeles Nat'l Forest, 3 mi. from JPL, trail access, view; 3 bd., study, fireplace, oak floors, antiques; furniture, beds, dinnerware, utensils, pots/pans, all linens & towels, fine soaps, necessities included; just bring toothbrush & clothes; TV/DVD/VHS, Dish satellite, wireless DSL; garden, fruit trees, patio, garage; private, immaculate; avail. October. 626/798-3235.

ALTADENA, charming, 2 bd./1 ba. house near Christmas Tree Lane; hardwood floors, fireplace, appliances, whole-house fan, fenced backyard, fruit trees, roses; see www.alumni.caltech.edu/~chrisc; $1,850, negotiable (incl. water, gardener, trash). 626/794-9579, eves.

ALTADENA, room in a very nice area next to Christmas Tree Lane, all necessities furnished; laundry, sheets, towels, dishes, TV, VCR; parking, small patio enclosed; close to JPL; very quiet and clean; $600. 626/798-4821.

GLENDALE/PASADENA–area house, unfurnished, large 1 bd., living room, dining room, laundry hook-ups and garage, new interior paint and carpet, includes gardener, 12 miles from JPL, available Oct. 1, $1,200 + security/cleaning deposit of $600, current TRW required. 353-7103.

PASADENA, 1 large room w/private bath in a 3-bd. charming house w/JPL/Caltech employees; beautiful and safe neighborhood (near Orange Grove and Hill), easy 15-min. drive to JPL; gated parking, in-ground pool, patio, deck, built in BBQ, large backyard with gardens, cable modem, fireplace, HW floors, etc.; $800, includes all utilities (power, water, gas, etc). 626/590-8844.

PASADENA, near Caltech and Lake Ave. shopping, charming 1920s era apt., ~1,450 sq. ft., 2 bd., 2 ba., LR, DR w/Batchelder FP, bonus room, front and back enclosed decks, 2 cov. parking spaces, a/c, water, trash & gardener paid, $1,800. 818/249-3602 or 626/710-8091.

PASADENA tri-level townhouse, 2 master bd. each with own bathroom on upper level; kitchen, dining area, living area, fireplace, 1/2 bath and patio deck on main level; attached 2-car garage with washer/dryer hookups on lower level; central heat and a/c; near PCC, Caltech and Gold Line; 110 N. Meridith Ave #5; no smoking, no pets; $1,600 + $1,800 security deposit. 626/462-1497.

Vacation Rentals

BALBOA ISLAND, cute, 2 bd., 1 ba., fully furnished upstairs apartment w/covered deck, located just steps from the bay on Little Island & a short walk to the main street; includes laundry, sleeps 5; avail. beginning mid-September at winter rates of $95/nite. 626/351-9641 or bettyrs@earthlink.net.

BIG BEAR LAKE, cozy cabin, blocks from Snow Summit, sleeps 6, very private, plenty of parking, cable TV, DVD, shuffleboard, see "Antler Lodge" @ www.getaway2bigbear.com, 20% discount for JPLers. 726-1270.

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

FLORIDA condo, beautifully furn. 2 bd., 2 ba., 2nd floor, on the surf of New Smyrna Beach, half-hour to Cape Canaveral, 90 min. to Disney World; enjoy all the comforts of home, quiet, relaxing, overlooks beach, BBQ/pool/game room, easy walk to stores and restaurants. 760/439-7821, Darlene, dfhauge@yahoo.com.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn. phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps. 4, laundry fac., rate $145/nite/2, $20/nite/add'l person. 949/348-8047, jackandrandy@cox.net.

HAWAII, Maui Westin Ka'anapali Ocean Resort, 7 nights, Oct. 30-Nov. 6; 5-star luxury on the beach; 1 bd. w/king heavenly bed, living rm. w/queen sofa bed, fully furn. kitchen, 2 TVs, DVD player, whirlpool tub, plush bathrobes, private balcony, wash/dryer, free high-speed internet, large pool w/water slide, fitness center; sleeps 4, 900 sq. ft.; view resort at www.westinkaanapali.com; $165/night/obo. 626/794-9579 or fivestarresorts@earthlink.net.

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

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

Universe

Jet Propulsion Laboratory

Inside

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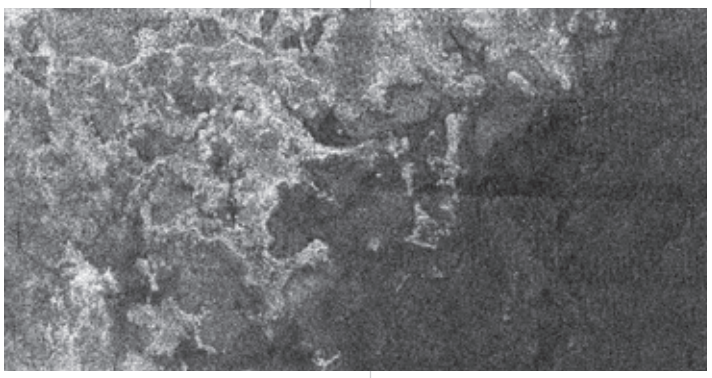
Cassini's day at the beach?

By Carolina Martinez

Images returned during Cassini's recent flyby of Titan show captivating evidence of what appears to be a large shoreline cutting across the smoggy moon's southern hemisphere. Hints that this area was once wet, or currently has liquid present, are evident.

"We've been looking for evidence of oceans or seas on Titan for some time," said Steve Wall, radar deputy team leader at JPL. "This radar data is among the most telling evidence so far for a shoreline."

The images show what looks like a shoreline dividing a distinct bright and dark region roughly 1,700 kilometers long by 170 kilometers wide (1,060 by 106 miles). Directly to the right of a bright and possibly rough area is one that is very dark and smooth.



This Cassini image of Titan shows an area 175 kilometers by 330 kilometers (109 miles by 205 miles). The patterns in the dark area indicate that it may once have been flooded.

"This is the area where liquid or a wet surface has most likely been present, now or in the recent past," Wall said. "Titan probably has episodic periods of rainfall or massive seepages of liquid from the ground."

The brightness patterns in the dark area indicate that it may once have been flooded with liquid that may now have partially receded. Bay-like features also lead scientists to speculate that the bright–dark boundary is most likely a shoreline.

"We also see a network of channels that run across the bright terrain, indicating that fluids, probably liquid hydrocarbons, have flowed across this region," said Dr. Ellen Stofan, Cassini associate radar team member from Proxemy Research, Laytonsville, Md.

Taken together with the two other radar passes in October 2004 and February 2005, these very high-resolution images have identified at least two distinct types of drainage and channel formation on Titan. Some channels in images from this pass are long and deep, with angular patterns and few tributaries, suggesting that fluids flow over great distances. By contrast, others show channels that form a denser network that might indicate rainfall.

"It looks as though fluid flowed in these channels, cutting deeply into the icy crust of Titan," noted Dr. Larry Soderblom of the U.S. Geological Survey in Flagstaff, Ariz. "Some of the channels extend over 100 kilometers (60 miles). Some of them may have been fed by springs, while others are more complicated networks that were likely filled by rainfall."

The new radar images can be seen at *www.nasa.gov/cassini* and *http://saturn.jpl.nasa.gov.*

Titan has an environment somewhat similar to that of Earth before biological activity forever altered the composition of Earth's atmosphere. The major difference on Titan, however, is the absence of liquid water, and Titan's very low temperature. With a thick, nitrogen-rich atmosphere, Titan was until recently presumed to hold large seas or oceans of liquid methane. Cassini has been in orbit around Saturn for a year and has found no evidence for these large seas.

Cassini encountered an anomaly with one of two solid-state recorders during the Sept. 7 close flyby, resulting in some data not being recorded. Half of the data from the flyby was received, much to the delight of anxious scientists. The spacecraft team is trouble-shooting the cause, and early indications point to a software problem that would be correctable with no long-term impacts.

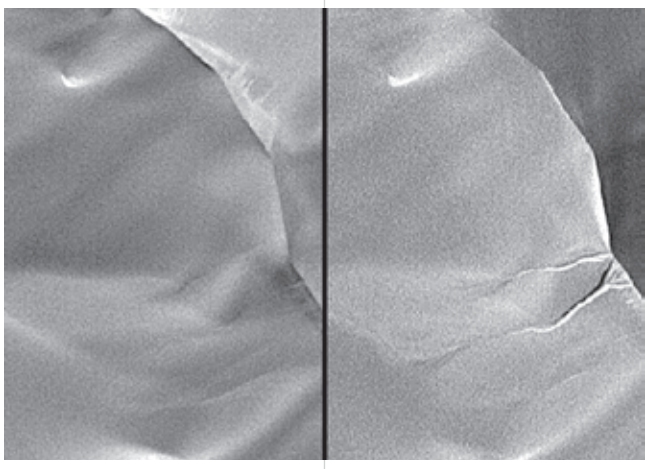
This was Cassini's eighth out of 45 Titan flybys planned in the nominal four-year tour. The next radar pass will be Oct. 26, when the team will focus on the Huygens probe landing site close to the equator.

MGS sees new gullies

By Guy Webster

New gullies that did not exist in mid-2002 have appeared on a Martian sand dune.

That's just one of the surprising discoveries that have resulted from the extended life of JPL's Mars Global Surveyor, which this month began its ninth year in orbit around Mars. Boulders tumbling down a martian slope left tracks that weren't there two years ago. New impact craters formed since the 1970s suggest changes to age-estimating models. And for three Mars summers in a row, deposits of frozen carbon dioxide near Mars' south pole have shrunk from the previous year's size, suggesting a climate change in progress.



Images compare the same area photographed by Mars Global Surveyor in July 2002 (left) and April 2005.

"Our prime mission ended in early 2001, but many of the most important findings have come since then, and even bigger ones might lie ahead," said Mars Global Surveyor Project Manager Tom Thorpe. "The orbiter is healthy and may be able to continue studying Mars for five to 10 more years," he said.

Mars years are nearly twice as long as Earth years. The orbiter's longevity has enabled monitoring of year-to-year patterns on Mars, such as seasonal dust storms and changes in the polar caps. "Mars is an active planet, and over a range of timescales changes occur, even in the surface," said Dr. Michael Malin of Malin Space Science Systems, San Diego, principal investigator for Mars Global Surveyor's camera.

"To see new gullies and other changes in Mars surface features on a time span of a few years presents us with a more active, dynamic planet than many suspected before Mars Global Surveyor got there," said Michael Meyer, Mars Exploration Program chief scientist, NASA Headquarters.

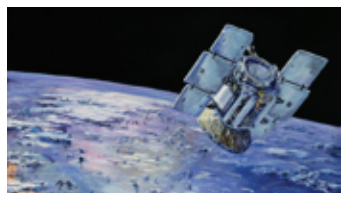
Two gullies appear in an April 2005 image of a sand-dune slope where they did not exist in July 2002. The Mars Orbiter Camera team has found many sites on Mars with fresh-looking gullies, and checked back at more than 100 gullied sites for possible changes between imaging dates, but this is the first such find. Some gullies, on slopes of large sand dunes, might have formed when frozen carbon dioxide, trapped by windblown sand during winter, vaporized rapidly in spring, releasing gas that made the sand flow as a gully-carving fluid.

At another site, more than a dozen boulders left tracks when they rolled down a hill sometime between the taking of images in November 2003 and December 2004. It is possible that they were set in motion by strong wind or by a "marsquake," Malin said.

Some changes are slower than expected. Studies suggest new impact craters might appear at only about one-fifth the pace assumed previously, Malin said. That pace is important because crater counts are used to estimate the ages of Mars surfaces.

The camera has recorded seasonal patterns of clouds and dust within the atmosphere over the entire planet. In addition, other instruments on Mars Global Surveyor have provided information about atmospheric changes and year-to-year patterns on Mars as the mission has persisted. Daily mapping of dust abundance in Mars' atmosphere by the thermal emission spectrometer has shown dust over large areas during three Mars southern hemisphere summers in a row. However, the extent and duration of dust storms varied from year to year.

For newly released images, visit *www.nasa.gov/vision/universe/solarsystem/mgs-092005-images.html.*



Oct. 26 launch for CloudSat

Two NASA satellites, planned for launch no earlier than Oct. 26, will give us a unique view of Earth's atmosphere. CloudSat, managed by JPL, and Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (Calipso) are undergoing final preparations for launch from Vandenberg Air Force Base, Calif.

CloudSat and Calipso will provide a new, 3-D perspective on clouds and airborne particles called aerosols. The satellites will answer questions about how clouds and aerosols form, evolve and affect water supply, climate, weather and air quality.

CloudSat and Calipso employ revolutionary tools that will probe the atmosphere. Each spacecraft carries an "active" instrument that transmits pulses of energy and measures the portion of the pulses scattered back to the instrument.

CloudSat has cloud-profiling radar that is more than 1,000 times more sensitive than typical weather radar. It can detect clouds and distinguish between cloud particles and precipitation. "The new information from CloudSat will answer basic questions about how rain and snow are produced by clouds, how rain and snow are distributed worldwide and how clouds affect Earth's climate," said Dr. Graeme Stephens, CloudSat principal investigator at Colorado State University.

The satellites will be launched into a 705-kilometer (438-mile) circular, sun-synchronous polar orbit, where they will fly in formation just 15 seconds apart as members of NASA's "A-Train" constellation with three other Earth Observing System satellites—NASA's Aqua and Aura satellites and France's Polarization and Anisotropy of Reflectances for Atmospheric Sciences coupled with observations from a Lidar satellite.

The usefulness of data from CloudSat, Calipso and the other A-Train satellites will be much greater when combined. The combined set of measurements will provide new insight into the global distribution and evolution of clouds that will lead to improvements in weather forecasting and climate prediction.

CloudSat's radar instrument was developed at JPL, with hardware contributions from the Canadian Space Agency.

For more information on CloudSat and Calipso, visit *http://www.nasa.gov/cloudsat* and *http://www.nasa.gov/calipso.*

News Briefs

JPL scores in Earth-sun proposals

NASA's Science Mission Directorate has selected proposals for the component technology development program in support of the Earth–Sun System Division.

Of the 14 selected for funding, eight are led by JPL principal investigators. Two other proposals have JPL staff as co-investigators.

The Advanced Component Technology Program will provide core component and subsystem technology developments that will enable new Earth- and sun-science measurements and visionary concepts.

Ninety-two NASA Research Announcement proposals were received. The 14 selected proposals, awarded through the Earth–Sun System Technology Office at Goddard Space Flight Center, carry a total dollar value over a three-year period of about $12 million.

Here are the JPL principal investigators and their proposals:

WENDY EDELSTEIN: Adaptive Self-Correcting Transit/Receive Module for Phase-Stable Array Antennas;

EASTWOOD IM: High-Precision Adaptive Control of Large Antenna Surface;

WILLIAM IMBRIALE: Micro-Electro-Mechanical System (MEMS) Actuated Wave Front Controller;

PEKKA KANGASLAHTI: Miniature Monolithic Microwave Integrated-Circuit (MMIC) Low Mass/Power Radiometer Modules for the 180 GHz GeoSTAR Array;

KAREN LEE: Ultra Low Noise Radiometers for Tropospheric and Stratospheric Limb Sounding;

SIMON YUEH: Compact Ku-Band Transit/Receive Module for Wide-Swath High-Resolution Radar Imaging of Cold Land Processes.

JPL co-investigators and their proposals:

MICHAEL TOPE: Advanced Performance Two-Channel Ku- and Ka-Band Dual-Downconverters for Interferometric Radar Applications, led by PAUL SIQUEIRA, University of Massachusetts;

BJORN LAMBRIGTSEN, ALAN TANNER and WILLIAM WILSON: Lightweight, Low Power, High Speed Digital Signal Distribution Technology for Thinned Aperture Radiometer Application, led by STEVE HORACEK, Ball Aerospace.

Women's Club celebrates 90 years

The Caltech Women's Club is celebrating its 90th year.

Today the club counts close to 300 members, both women and men, from across the Caltech-JPL community and its affiliates. What remains unchanged, however, is the club's aim—"to promote friendliness and the sharing of mutual interests."

Following the annual fall gathering on Thursday, Sept. 29 (see Calendar), prospective members are also invited to welcoming coffees, the next of which will be on Friday, Nov. 4, from 11 a.m. to 1 p.m. in von Kármán Auditorium.

For more information, visit *www.its.caltech.edu/~cwclub* or e-mail *cwclub@its.caltech.edu.*

Weight-loss program offered

Participation is offered in an employee peer group that plans to follow a renowned eating and exercise program for six weeks starting Sept. 30. Goals include a weight reduction of 20 pounds.

Interested JPL and contractor employees can contact PAUL KASKIEWICZ at *skylark1207@earthlink.net* for information.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meets Wednesdays at 11:30 a.m.

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

Codependents Anonymous—Meets at noon every Wednesday.

Lambda (Gay, Lesbian, Bisexual and Transgender Networking Group)—Meets the first Friday and third Thursday of the month at noon in Building 111-117. For more information, call Randy Herrera, ext. 3-0664.

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 any of the support groups, call the Employee Assistance Program at ext. 4-3680.

Tuesday, September 27

"Turning Classical Physics Upside Down: How Einstein Found Relativity Theory"—Jurgen Renn, director of the Max Planck Institute for the History of Science in Berlin, will give this free lecture at 8 p.m. in Caltech's Beckman Auditorium. For more information, call (626) 395-4652.

Wednesday, September 28

JPL Toastmasters Club—Meeting at 5 p.m. in conference room 167. Call Dirk Runge, ext. 3-0465, or visit *www.jplcaltechtoastmasters.com.*

Thursday, September 29

Caltech Women's Club—The annual Fall Gathering will be held from 11:30 a.m. to 1 p.m. in the Athenaeum. New and returning members are welcomed. Childcare is available at the Children's Center. Lunch is $18. For reservations, contact Carol Andersen, (818) 790-8175 or *carol@vis.caltech.edu.*

"Entrepreneurial Space: An Insider's Observations"—Rex Ridenoure, chief executive officer of Ecliptic Enterprises Corp., will speak from 4:45 to 6 p.m. in von Kármán Auditorium in this Caltech Management Association–sponsored event. For more information, e-mail *cma.announce@jpl.nasa.gov* or call Michael Eastwood, ext. 4-9273.

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

JPL Stories—Pete Theisinger, former Mars Exploration Rover project manager, will present "MER: A Retrospective from the Top" at 4 p.m. in the Library, Building 111-104. For more information, call Teresa Bailey, ext. 4-9233.

Sunday, October 2

Caltech Women's Club—A family potluck will be offered from 4 to 7 p.m. in Tournament Park. The event includes a traveling nature class at 5 p.m. with live animals. Plates, cups, utensils and drinks will be provided. Call Katie Clark at (626) 403-7163 or Caroline Haider Sutton, (626) 792-2076.

Tuesday, October 4

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

JPL Genealogy Club—Meeting at noon in Building 301-271.

Wednesday, October 5

JPL Web Developers—Meeting at noon in the 167 conference room.

"Math By the NUMB3RS: How Caltech Helps A CBS Television Show Do The Math"—Gary Lorden, Caltech executive officer for math and technical advisor for "NUMB3RS," will give this free lecture at 8 p.m. in Beckman Auditorium. For more information, call (626) 395-4652.

Thursday, October 6

Investment Advice—Fidelity will offer one-on-one counseling in T1720-144. For an appointment, call (800) 642-7131.

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

"Keeping Your Investment Strategy on Track"—This Fidelity workshop at noon in T1720-137 is designed to help participants actively review, revise and rebalance their portfolios on an ongoing basis to meet their current or restated savings goals. It will compare current investment mix to target asset mix, help you determine if you are saving enough, and show how to manage your account online. Please bring a copy of your account statement.

JPLers help Katrina victims

By Mark Whalen

Jim Chase doesn't have any friends or relatives along the Gulf Coast. But after seeing news accounts of the wrath of Hurricane Katrina and its aftermath, that didn't matter. He knew he had to help somehow.

"Authorities were asking for money to help the rescue effort," the JPL systems engineer said. "But that takes too much time to get to people who need it. I wanted to travel to the area myself to see if I could make a difference."

So Chase's Labor Day weekend turned into a mission of mercy. Along with a friend from UCLA, Chase flew to Austin, Texas to join an uncle, cousin, and another friend. From Austin, they drove two vans through Houston toward Louisiana.

The vans were packed with supplies—mostly baby food, formula and diapers—that were purchased with about $650 in cash donated primarily by six other JPL employees. The group also had another $3,000 in cash donations.

JPL's Jim Chase is third from left. Next to him are cousin Anthony and his girlfriend Bhumika; at right is Chase's uncle, Clive. The group is shown in Austin, Texas, prior to their trip to Louisiana.

Learning from news reports that New Orleans looked dangerous, they decided to help the relief effort in Lafayette, located a little more than two hours from The Big Easy. In Lafayette, they encountered no shortage of people in need.

Chase and friends began their volunteering efforts at a Red Cross shelter. They served snacks, which for some was the first time they had eaten in days, and entertained kids with checkers and card tricks. Red Cross staff members—grateful for their donations and their help—served them chicken gumbo. It was there that they heard about some church groups that also needed help.

With some of their donated cash, they took two groups to a local store to buy whatever supplies were in need. There were more shopping trips on the excursion—in Lafayette, they restocked their vans with air mattresses, blankets and the like; and at the Cajundome, a sports facility on the campus of the University of Louisiana in Lafayette, baby items were distributed to grateful families.

At the Cajundome, one volunteer showed up with a flatbed trailer loaded with 50 air mattresses and 500 tubes of toothpaste. Up to 10,000 evacuees filled the arena, Chase said. Beds, cots and air mattresses jammed floors everywhere they would fit—even in front of restrooms.

While Lafayette escaped Katrina's wrath, it became a major hub for rescue operations. Estimates have the city's population increasing by 50 percent or more in the last few weeks as evacuees have—for the most part—been welcomed with open arms.

At the outset the city had plenty of resources, but obviously not all went well in the rescue effort. Chase reported a bit of logistical trouble as he and his group attempted to help—he said cell phone calls only worked about 20 percent of the time, and overwhelmed credit card agencies cancelled many transactions.

But he feels it was worth the trouble. While volunteering in the Astrodome in Houston, Chase witnessed one of many individual acts of compassion—the type that largely escaped news reports—when a locally based volunteer offered up his home to a family of three that had been turned away from an evacuation bus.

In all, Chase and friends spent five days, including two for travel, to assist those in need.

"We feel very much like we did the right thing," Chase said. "The fact that we were able to work one-on-one with the families affected and the people who were caring for them to help meet their specific needs allowed us to make excellent use of our time and the donations we raised. All five of us felt good that we could help people directly."

Katrina is gone and most of those who remain in ravaged areas now have access to food and water. But much more help is needed, Chase said, including volunteers to clean up and help begin the rebuilding process. Medical staff is also in short supply.

"Still, though, I believe that we made a significant difference," Chase said, "both through the delivery of supplies and through the time we spent meeting and helping some of the folks affected."

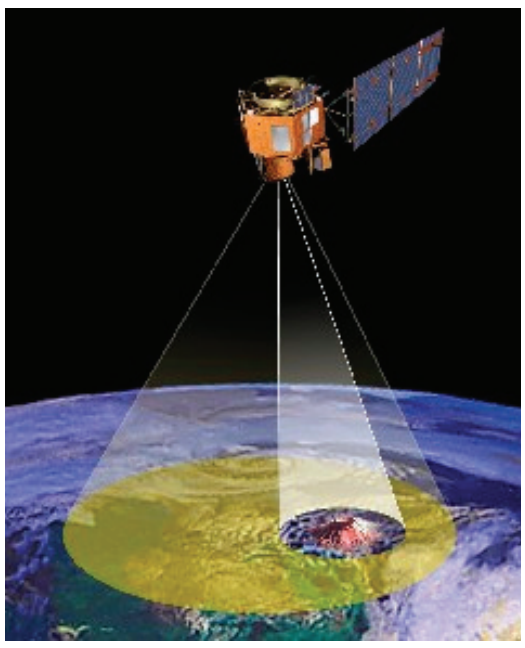
Closer to home, JPL's Ken Hicks quickly organized a one-day book drive on Lab in the hope that reading material would help allay Gulf evacuees' boredom and stress. JPLers responded with a trickle of donated literature on Wednesday, Sept. 7, but by the end of the next day dozens of bags and boxes of books and periodicals filled the Laboratory's west entrance. Hicks said a 26-foot moving truck was packed to the roof, front-to-back, by the time the book drive was over.

Hicks spearheaded the book drive with the help of a neighbor, who indicated that more than 15,000 books were collected over a one-week period, with more than half the total coming from JPL in that single day.

JPL emergency preparedness administrator Eric Fuller noted that at the request of NASA and the Federal Emergency Management Agency, the Lab's 25-member search-and-rescue team was mobilized and standing by to help post-Katrina. The call to respond to the Gulf never came, but "It's good to know that we do have a team ready to respond to any emergency," he said.

JPL experiment wins NASA software honors

By Susan Braunheim-Kalogerakos



Among the Autonomous Sciencecraft Experiment's software components are onboard science algorithms that will analyze the image data to detect trigger conditions such as science events, interesting features, changes relative to previous observations, and cloud detection for onboard image editing.

Top: Autonomous Sciencecraft Experiment team members, from left: Daniel Tran, Ashley Davies, Rob Sherwood, Steve Chien.

For the second year in a row, JPL is co-winner of the NASA Software of the Year competition. JPL's submission, the Autonomous Sciencecraft Experiment (ASE) software, was selected as a winner along with the Land Information System Software V4.0, submitted by the Goddard Space Flight Center.

JPL's award recipients are Steve Chien, Rob Sherwood, Daniel Tran, Benjamin Cichy, Ashley Davies, Rebecca Castano and Gregg Rabideau.

The ASE software uses onboard continuous planning, machine learning and pattern recognition to autonomously detect and track dynamic scientific processes, including geological events. This enables a spacecraft to significantly increase science returns and allows a much quicker reaction to interesting events.

If, for example, the software detects a volcanic eruption, it is capable of redirecting the spacecraft to observe the event on subsequent overflights. If the software detects no eruption, the spacecraft remains on its planned course of action. Using ASE, this can all take place with no intervention from ground control.

It has flown on the Earth Observing One (EO-1) mission for more than 18 months and has been used as the primary means of operations since November 2004.

The spacecraft can now respond autonomously and rapidly to detected events instead of relying on ground data processing and operations planning. On EO-1, ASE greatly improves the monitoring capability from space of volcanic activity and flooding, and the onset and progress of freezing and thawing, processes that can impact millions of people.

Davies is the ASE lead scientist. "For JPL, this is a whole new way of doing business," he said. "ASE puts JPL where it belongs: at the forefront of innovation and technology development to maximize the efficiency of robotic missions."

The value added to NASA has already reached millions of dollars and will undoubtedly increase as ASE software is integrated into future missions. The software is in development for use on the Mars Exploration Rovers and Mars Odyssey missions and is under consideration for numerous future NASA missions.

Because it allows the spacecraft to respond autonomously to detected science occurrences, the software represents a complete paradigm shift. "This is in stark contrast to traditional labor-intensive ground-based operations," said Sherwood, experiment manager for the project. "This autonomy will enable a new class of missions at JPL including subsurface explorers, autonomous rovers, and coordinated systems of multiple spacecraft and sensors."

Chien is the ASE team lead. "This and other autonomy software will enable future NASA missions to acquire more data, do better science, and go to hostile, unknown environments that previously would be off limits," he said.

The Software of the Year award is the highest award given to software by the NASA Inventions and Contributions Board. JPL has won the award six out of the 12 years this competition has been held. "This software is a prime example of the cutting-edge technology that is consistently developed by our innovators," said JPL Awards Liaison Officer Christopher Jaggers. "Everyone at JPL should be proud of this achievement as it reflects not only on the excellent work by this year's winners but also on the quality of the technology produced at JPL as a whole."

Chien said working on the project was an extremely exciting and challenging undertaking. "We had an outstanding team and it was thrilling to be working on things that no one had ever been able to do before, a completely different way of flying space missions."

Goddard's co-winning software is a high-performance data assimilation system that integrates parallel and distributed computing technologies with modern land-surface modeling capabilities.

All of the software innovators received a monetary award and Software of the Year medals in a NASA Headquarters ceremony Sept. 6.

Software eligible for this award must have NASA intellectual property interest, be of commercial grade and be available to appropriate commercial users or dedicated to a NASA mission.

For more information on the Autonomous Sciencecraft Experiment, visit *http://ase.jpl.nasa.gov*. For more information about the Software of the Year Award, visit *http://icb.nasa.gov/nasaswy.html*.

Rover team takes engineering award

Eight JPL engineers responsible for the design and implementation of the Mars Exploration Rover spacecraft and rovers have won the American Society of Mechanical Engineers Design Engineering Division's Leonardo da Vinci Award. The award will be presented at a luncheon at the organization's annual conference on Sept. 28 in Long Beach.

Receiving honors will be spacecraft mechanical development lead James Baughman; rover mechanical development lead Randel Lindemann; rover deck mechanical lead system engineer Joseph Melko; rover structure lead Richard Rainen; chief mechanical architect Dara Sabahi; chief mechanical engineer Donald Sevilla; entry, descent and landing mechanical system engineering lead Dr. Adam Steltzner and rover mobility lead Christopher Voorhees.

The da Vinci Award, the organization said, is bestowed for "eminent achievement in the design or invention of a product which is universally recognized as an important advance in mechanical design." The rover team was cited for "the captivating, novel, and highly effective design for the Mars Exploration Rover spacecraft and the Spirit and Opportunity rovers."

From left: Adam Steltzner, Richard Rainen, Donald Sevilla, Randel Lindemann, James Baughman, Christopher Voorhees.

David Swenson

JPL'S ONLINE NEWS SOURCE

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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 via e-mail to universe@jpl.nasa.gov *and are due at 2 p.m. on the Monday after publication for the following issue.*

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

Passings

DAVID SWENSON, manager of the Project Support Office, died Sept. 4.

Swenson joined the Lab in 1967 and held numerous engineering and managerial positions. He served as chief engineer in the former Space and Earth Science Programs Directorate, program engineer for the Office of Space Science and Instruments, systems engineer for the Wide Field and Planetary Camera Project and flight instruments manager in the Special Projects Office.

He is survived by his wife, Deanne, daughters Michelle and Sandra, and son Stephen.

Funeral services were held at the Church of Jesus Christ of Latter Day Saints in La Crescenta.

ROBERT H. EVANS, retired from Section 430, died Aug. 31.

Evans joined JPL in 1965 and retired in 1989. He is survived by his wife, Gloria, son Kenneth, daughter-in-law Nancy and grandchildren Paul and Brian.

Letters

I would like to thank all of my JPL friends for the beautiful plant, flowers and all their warm expressions of sympathy on the passing of my father. It has been very healing to feel such caring from my JPL family. Sincerely,

Ruthie Dios

To all my friends and colleagues at JPL, in particular the Flight Network Team, my deepest appreciation for your cards and flowers on my brother Carl's passing. Your thoughtfulness and caring have helped to ease these difficult times for my family and myself.

David Carroll

We would like to express our appreciation for the condolences and well wishes received from our co-workers on the unexpected passing of our brother, Dennis French. We also wish to thank JPL for the lovely plants. Our mother, Bonnie Storms, extends her thanks to members of the Associated Retirees of Caltech/JPL for their thoughtfulness and cards.

Laura Thompson and Jim Storms

Lori and I would like to thank the good people of sections 334 and 351 for their support after the passing of my father. He was a great man. Our family appreciated the cards, flowers and thoughts.

Bruce and Lori Carrico

I would like to express my sincere thanks and appreciation to everyone for your unending support, words of comfort and prayers during our time of sorrow.

Domingo Dongon

A belated thank you from Virginia to y'all who contributed to and attended my Section 353 retirement party last Fall. A special thank you for the gifts, memorabilia and the "manual Powerpoint" presentation of my 47 years at the Lab.

Bob Toomath

Classifieds

For Sale

ANIMAL CARRIER, small, 15 x 18 x 24, used once, $20. 957-5382.

AQUARIUM, premium Japanese quality with matching black lacquered stand and complete with Fluval 203 filter system: tank: 35" L x 21.5" H x 18" D; stand: 36" L x 29.5" H x 19" D; must see to appreciate value, pick up in Baldwin Park; originally purchased for $700, sell for only $150. 714/325-0658, Steven.

BED, king-sized mattress, box spring, and frame, firm, excellent condition, $250. 626/794-0081, Bonnie.

BED, queen, 1.8 yrs. old, Sleep Tell OrthoPedic mattress w/accompanying box spring & steel bed frame, $190. 626/808-8813, Joe.

BED, twin mattress set and frame, barely used, $150, headboard, $25; DESK, black with matching desktop organizer and file cabinet, good quality from Restoration Hardware, $150. 626/797-3110.

BICYCLE, man's, European make, 27" wheels, short frame, red, fitted with western comfort saddle and western handlebars, w/helmet, like new, good tires. 626/793-1895, Albert.

BICYCLE: boys 20" GT Dyno, excellent condition, $65. 626/798-1839.

CAMPSITE, Carpinteria St. Beach, Oct. 6 for 4 nights, $107 (actual cost). 640-5157, cell, Barbara.

COMPUTER MONITORS (4), Viewsonic 21," each $100; OFFICE FURNITURE: several beautiful oak 4-post drafting tables, 37.5" x 72" with Borco board covers, large pencil drawer and hanging drawers, $500/ea. 626/584-0860 (day) or 626/794-3144 (eve.), Donna.

DANCE TICKETS (2), for Alvin Ailey American Dance, Dorothy Chandler Pavilion, Feb. 22, 7:30, seats in founders circle, $135. 790-8523.

DESK, wooden, light brown, 26" (depth) x 26.5" (height) x 43.25" (width), includes built-in cupboard, $40. 626/808-8813, Joe.

DINING ROOM SET, Ethan Allen French Country oval dining table w/2 extensions, 2 splat-back arm and 4 side chairs, upholstered in green petit point (originally $3.5K) $1,500/obo; matching buffet and china cabinet (originally $3K), $1,500/obo. 841-1288, Colleen.

DRUM SET, Tama, w/3 ZBT Zildjian cymbals, 2 pearl boom stands, $325. 957-6821.

GRANDFATHER CLOCK, Ridgeway walnut case, 3 chimes, $2,200; misc. ART POTTERY, Van Briggle, Roseville, various prices. 626/441-3265.

JEWELRY: diamond anniversary ring (1 CTTW) w/gift box, $750; diamond ring (chip), 10K YG w/gift box, $99; Suunto S6 wrist-top computer, great for the sports enthusiast, $250/obo. 364-1283, Valerie.

MINING EQUIPMENT, miscellaneous, used; includes jaw crusher, steel ladders, Ingersoll-Rand air compressor, high-pressure hoses, jackhammer bits, winches, steel cables and heavy duty bearings; was used by a serious hobbyist; also various sizes and shapes of angle iron & I-beams, and assorted lumber & timbers. 626/355-4475, JLesh@keyway.net.

MISC.: fishing pole (saltwater), $25; baseball glove, small, left handed, & conditioner, good cond., $15; landscape oil painting, autumn tones, $75; trash can w/wheels, $5; '50s Motorola TV "shell," $20; antique pot with handle, $10; wig, red, shoulder length, never used, $20; home gym, $75. 626/357-8210.

MISC.: toaster oven, works well, $10; electric dinner bun warmer, good condition, $7; turkey roaster, self-basting, 15 x 11 x 7.5, $7; Corningware 7" baking dish w/Pyrex glass cover, $8; chef's knife, heavy 8" stainless steel, $4; many other kitchen items. 626/793-1895.

MISC.: fax cartridge for Brother machines, model pc-102rf, brand new, $20; diet tapes, Jenny Craig, set of 14, $25; computer power control center, 5 power switches + 1 master switch, 5 surge-protected outlets + 2 modem/fax/phone jacks, new, $20. 790-3899.

MOUNTAIN BIKE, boy's 20", six-speed grip shift, vg condition, seldom ridden, $35. 626/303-1927.

MOVING SALE: 32" Sony TV, Toshiba 20" TV, 16 cu" refrigerator, vacuum cleaner, microwave, computer table & chair(s), HP printer, coffee table, 3-drawer dresser, 4-shelf bookshelf, 5-piece luggage + much more; pics at http://pg. photos.yahoo.com/ph/lzhong/album?.dir=de36; 626/757-5609, Kwan or e-mail ewkwan@earthlink.net.

MOVING SALE: Sealy Italian leather sofa set with ottoman, light ocean blue color, $800 (bought for $2,500); high-end breakfast table with 2 matching chairs, $300 (bought for $1,200; pics at http://pg. photos.yahoo.com/ph/lzhong/album?.dir=de36; 626/757-5609, Kwan or e-mail ewkwan@earthlink.net.

ORGAN, Yamaha 415 electronic console w/13 pedals, 3 keyboards, 144 rhythm patterns, pd. $7,500, sacrifice for $2,000. 790-3899.

PIANO, Kawai KG-3, 6' 1" grand, SN 530145 (made in Japan circa 1971), polished ebony, includes piano bench and cover, excellent condition, located in Altadena, $12,500/obo. http://home.earthlink.net/~briazen/piano, 626/398-6564.

PLAYHOUSE, Little Tykes, includes phone, sink, sitting area, $50; Little Tykes picnic table, $15; Little Tykes grocery cart, $10; girls' toys, books new sandles and hiking boots, reasonable prices; PURIFIER, Hepa Pir, several settings, $50. 249-6248.

PRINT, professionally framed, Monet's "Artist's Garden at Vetheuil," version w/o child (28 x 39), $50; OIL PAINTING, sea & mtn. scene, carved Polynesian-style black frame w/white highlights, 21 x 17, $30; framed picture, monkeys in tree, antique-look frame, $15. 626/289-2795.

REFRIGERATOR, white side-by-side GE Profile, 23.6 cubic feet, water filter/dispenser, auto icemaker, spill proof shelves, great shape, $175. 389-1001.

ROUTER, Netgear cable/DSL Web safe gateway RP614, Netgear FA311 rev-C1 card, D-Link DFE-530TX+ 10/100Mbps fast Ethernet PCI adapter, 75' Cat V cable, user manuals and software, $20. 626/241-7084, Steve.

SLEEPER SOFA, queen-size, green & off-white checkered, great cond., $200/obo. 249-9093.

TELESCOPE, Orion Short-Tube 80 mm refractor, includes finder scope, 45- and 90-deg. diagonals, plus 10 and 25 mm eyepieces, $100; Orion Paragon field tripod for the Short-Tube-80, like new, $60; makes an excellent starter telescope; pictures at http://webpages.charter.net/bnemati/specials.html. 249-2809.

TROPICAL PLANTS, plumerias, variety of colors and sizes; shell gingers. 626/444-6156.

VERTICAL BLINDS, white, vinyl, 3 Day Blind manuf., new in box, all hardware & instructions, 78" w x 84" long, cost $125, sell for $60. 623-9548.

WATERBED FRAME, oak, mattress, liner, heater, pedestal (no headboard), queen size, $50 for all. 956-0121, Jim.

WOOD PALLETS, 4 small, smooth natural coated finish, 35 x 19 x 2.25 H, wood 3/4" thick, $40 for all; BLINDS, roll-up, 6-ft. vinyl bamboo look for outdoor patio, $5. 626/289-2795.

Vehicles / Accessories

'02 BMW 325i 4-dr. sedan, 2.5 inline-6, 5-sp. manual, power locks/mirrors/windows, CD, iPod adapter, keyless entry & alarm, white on sand leatherette, exc. condition, only 22K miles, free maintenance until 48K miles, $21K. 626/449-0997.

'03 CHEVROLET LS pickup, 3 door, air, pwr. steering/windows/door locks, tilt wheel, cruise cont., premium sound, am/fm stereo, single comp disc player, ABS (4 wheels), bed liner, alloy wheels, 4.6 liter V6, automatic, 2-wheel drive, 29,478 miles, $13K. 626/355-6077, after 5 p.m.

'95 FORD Mustang GT, V8, 122K miles, clean, runs great, silver exterior, black interior, 5 speed, Mach 460 premium sound system, power seat, 4 wheel ABS, dual front airbags, 10 CD changer, a/c, rear spoiler, 16" alloy wheels, $3,995/obo. 626/617-1855.

'49 FORD F3 pickup, includes winch, has recently run, currently licensed but with a non-op tag. JLesh@keyway.net, 626/355-4475.

'93 GMC 2500 pickup, V8, 2WD, long-bed, white, auto, a/c, am/fm, power steering, new tires, clean, runs good. 210K, $2,800/obo. 626/215-0388.

'00 HONDA Shadow VLX 600 motorcycle, 11k/m beautiful clean bike, never dropped and always in garage; Cobra pipes, saddle bags, windshield, very chromy; $2,990. 626/215-4243, Raphael.

'95 LAND ROVER Range Rover SE V8, 4.0 L, auto, 4WD, 138K, tan, leather seats, CD, ps, pw, dual airbags, moonroof, runs great, good condition, $6,300/obo. 626/296-9073 or 818/515-2461.

'00 MERCEDES-BENZ CLK 430 Cabriolet, silver 2-door with gray top/int., AMG package, many extras, heated seats, custom wood/leather steering wheel, custom rear bumper w/dual exhaust, 67K miles, extended warranty up to 100K, excellent condition, must see, $32,000/obo. 634-4332.

'98 NISSAN Quest GXE, 76K miles, a/c, 6-disc CD, moonroof, alloy wheels, roof rack, well maintained, engine & paint in excellent condition, some dents, pwr. seats/door locks, cruise, $7,200/obo. 310/391-2201, Tom.

'91 NISSAN Maxima, white, auto, a/c, all power, 154K mi., good cond., well maintained, recent rebuilt transmission (paid $1,700), $2,800/obo. 970-6980.

'02 TOYOTA Corolla CE, black with gray interior, 62,000 miles, automatic, a/c, CD player, good cond., $7,500. 731-1493.

'94 TOYOTA Camry, 4-dr., gold, auto, a/c, 150K mi., clean, tinted windows, Kenwood premier stereo w/10 CD changer, alarm/keyless entry system, wheel locks, all maintenance records available, $4,200. http://home.earthlink.net/ ~briazen/94camry, 626/398-6564.

'94 TOYOTA Land Cruiser, Alpine stereo, roof rack, tow pkg., running boards, full time 4-whl. drive + more, $9,995/obo. 661/533-3592.

TRANSMISSION OIL, 5 cases Dextron lll/Mercon, for all '85-'98 GM & Ford vehicles and trucks, 12 qts./case, $15/case. 249-6071.

'02 YAMAHA SV17 Road Star Warrior motorcycle; 1670 cc engine; red, exc. cond., approx. 2,300 miles; $7,000/obo. 626/792-7753, David, after 7 p.m.

'94 YAMAHA 750 Virago, 18K miles, new tires, custom seat and backrest, saddlebags, custom handlebars, custom mirrors, steel braided cables, after-mrkt. pipes & air cleaner, sound engine runs great, $3,200. 249-8108, Greg.

Lost & Found

LOST: sunglasses, gray frames with halter, lost between Arroyo parking lot and B-171 on Sept. 14. 957-8346.

FOUND: "Wild Things" DVD on night of Monday, Sept. 12 near motorcycle parking area. 626/355-4447, John.

Free

CAT, nice, quiet, clean tabby; small female with pretty brown and black markings; 1 year old, shots and spayed; a good apartment or condo pet for adults. 626/447-8475.

DINING ROOM TABLE (w/pads) and 4 chairs, 57" long x 42" wide, plus 2 leaves (and pads), each 15"; table is in good condition; chairs in fair cond.; BUFFET, 18-1/2" D, 35" L, 32-1/2" H, vg to excellent cond., wood stain differs from that of table/chairs. 626/441-6536.

PRINTER, Epson 850N inkjet with Ethernet. 957-5382.

RABBITS, babies, currently in foster situation; live in-house, need homes with loving families; well socialized, healthy, active, inquisitive, friendly; adopters must agree to spay or neuter; call for more information, photos, adoption form. 626/864-8047, Laura.

SQUARE DANCING CLASS, a fun, easy way to exercise, reduce stress and make new friends; come as you are, no partner needed; join the Spellbinders of South Pasadena Wed., Sept. 28, 7:30 p.m., War Memorial Bldg., 435 Fair Oaks Ave., S. Pasadena. 248-6062, Elizabeth.

Wanted

CARPOOLER, one, from Diamond Bar/Chino Hills area, leave Diamond Bar at 6:40 a.m. Ext. 4-9329, Shu, or 909/263-5271 (cell).

DIGITAL CAMERA, pocket-sized with 4-megapixel image size or greater for a trip in late October. 626/355-4447, John.

MATH TUTOR, jr. & sr. high school level classes (geometry, pre-algebra, algebra I & II, SAT math, etc.), eves and/or weekends, also looking for English tutors. 888/784-1639, David, please leave msg.

ROOMMATE to share lg. Altadena back house (2,200 sq. ft.); your own bedroom, bathroom, office space (internet ready-cable), and garage parking; share laundry room, kitchen, lots of space, cent. air/heat; non-smoker, clean, no pets, month-to-month lease, $1,100 + 1/2 utilities; applicant must be approved by house owners. 687-8408, Brenda.

ROOMMATE: 2-bd. apt. near Venice beach, no pets or smoking, credit check reqd. by realty mgmt., furnished, except for your bedrm. 626/590-8332, cell, Skye.

SINGER/LYRICS WRITER, 20-26 years of age, influences: Sevendust, 311, Deftones; call for web URL. 626/357-8210.

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

VANPOOL RIDERS, from Fontana w/stops in Rancho Cucamonga & La Verne, save gas, 2005 Ford 14-passenger van, full-time riders (JPL employees) can qualify for a $50/mo. vanpool subsidy and $300 TVS subsidy. Ext. 4-5831, Rhea Clearwater or 4-8343, Mike Taylor.

For Rent

ALTADENA: comprehensively furnished extended-stay sabbatical house, 3 bd., study, boundary Angeles Nat'l Forest, 3 mi. from JPL, trail access, view, fireplace, oak floors, antiques; furniture, beds, dinnerware, utensils, pots/pans, all linens & towels, fine soaps, necessities included; just bring toothbrush & clothes; TV/DVD/VHS, Dish satellite, wireless DSL; garden, fruit trees, patio, garage; private, immaculate; available Oct. 626/798-3235.

ALTADENA, charming, 2 bd., 1 ba. house near Christmas Tree Lane; hardwood floors, fireplace, appliances, whole-house fan, fenced backyard, fruit trees, roses; $1,850, negotiable (incl. water, gardener, trash); see www.alumni. caltech.edu/~chrisc. 626/794-9579, eves.

ARCADIA, studio w/full bathroom, hardwood floors, close to mall/entertainment/ restaurants, includes a small fridge and electric stove, no kitchen, $600. 714/296-0176.

LANCASTER / QUARTZ HILL beauty, 3 bd., 2.5 ba., 1,600 sq.ft., ceramic flooring, fireplace, gazebo near parks/schools, water and gardener paid, $1,465. 661/718-0988.

LONG BEACH, 3 bd., 1.75 ba. house in the desirable, quiet Plaza neighborhood; 2-car garage, front and back yard, no pets/smoking, $1,749. 562/420-2313.

PALMDALE / RANCHO VISTA executive, 4 bd., 3 ba. + bonus room, 3,000 sq. ft., mbl flr, spa, wet bar, 3-car garage, many extras, water and gardener paid, $2,050. 661/718-0988.

PASADENA: seeking roommate to share 2 bd./ 2.5 ba. townhouse w/2-car gar. + lots of storage, great loc. 6 mi./JPL, nr. Caltech + PCC; rm. has private ba., can be fully or partially furn.; washer/dryer, patio, a/c, fireplace, cable modem, WiFi, DirecTV, HD TIVO+ all util. incl. in unit (except long-dist. phone); no pets; $850 + plus 1 mo. deposit; mo.-to-mo. lease approved by landlord. 626/844-9286, Dave.

UPPER GLENDALE house, view, cul-de-sac, unfurnished, large 2 bd., 2 ba., living rm., dining rm., den (which could be 3rd bdrm.), lg. 2-car garage, lg. enclosed patio, stove & dish- washer, new paint & carpet, exc. cond. & area, 6 miles from JPL, $2,600 + security/cleaning deposit $3,000. 626/398-1875.

Real Estate

ESCONDIDO, golfers' paradise timeshare, Lawrence Welk Villa, fixed week #23 with high RC/trading value, Wild Animal Park Zoo & Sea World are close by, spacious 1,600 sq. ft., 2 bd., 2 full ba. with all the amenities, includes a cathedral vaulted ceiling and outside veranda overlooking beautiful 18-hole golf course, $13,000. 249-6071.

Vacation Rentals

BALBOA ISLAND, cute, 2 bd., 1 ba. fully furn. upstairs apt. w/covered deck, just steps from the bay on Little Island, short walk to the main st., includes laundry, sleeps 5, avail. at winter rates of $95/nite. 626/351-9641 or bettyrs@earthlink.net.

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

FLORIDA condo, beautifully furn. 2 bd., 2 ba., 2nd floor, on the surf of New Smyrna Beach, half-hour to Cape Canaveral, 90 min. to Disney World; enjoy all the comforts of home, quiet, relaxing, overlooks beach, BBQ/pool/game room, easy walk to stores and restaurants. 760/439-7821, Darlene, dfhauge@yahoo.com.

GRAND TETON / YELLOWSTONE Nat'l Parks, visit in style, 2 bd. + loft townhome, totally outfitted, stunning Teton view, sleeps 6, cable, microwave, etc., borders Grand Teton. conniematt@sbcglobal.net.

HAWAII, Maui condo, NW coast, oceanfront vw., 25 ft. fr. surf, 1 bd. w/loft, compl. furn. phone, color TV, VCR, microwv., d/w, pool, priv. lanai, slps 4, laundry fac., rate $145/nite/2, $20/nite/ add'l person. 949/348-8047, jackandrandy@cox.net.

HAWAII, Maui Westin Ka'anapali Ocean Resort, 7 nts., Oct. 30-Nov. 6; 5-star luxury on the beach; 1 bd. w/king heavenly bed, liv. rm. w/ queen sofa bed, fully furn. kitchen, 2 TVs, DVD player, whirlpool tub, plush bathrobes, private balcony, wash/dryer, free high-spd internet, lg. pool w/water slide, fitness center; sleeps 4, 900 sq. ft.; view at www.westinkaanapali.com; $140/nt./obo (compare to Westin's $450/nt.). 626/794-9579 or fivestarresorts@earthlink.net.

OCEANSIDE beachfront: lovely 2 bd., 2 ba. single-level deluxe condo w/fireplace & white water ocean views (end unit); sleeps 6, luxurious gated complex on the sand with game rooms, fitness room, pools, BBQs, Jacz.; 10-min. walk to pier or harbor; JPL discount; www. beachvisitors.com. 760/433-4459, owner.

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