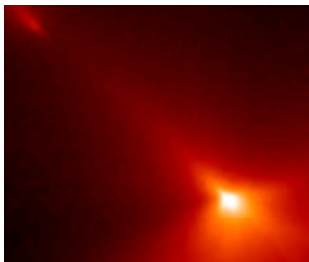


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What are the odds? Ulysses meets Hyakutake

By Jane Platt



The Ulysses spacecraft unexpectedly passed through the tail of Comet Hyakutake, above.

during an unplanned rendezvous, JPL's Ulysses spacecraft found itself gliding through the immense tail of Comet Hyakutake, revealing that comet tails may be much, much longer than previously believed.

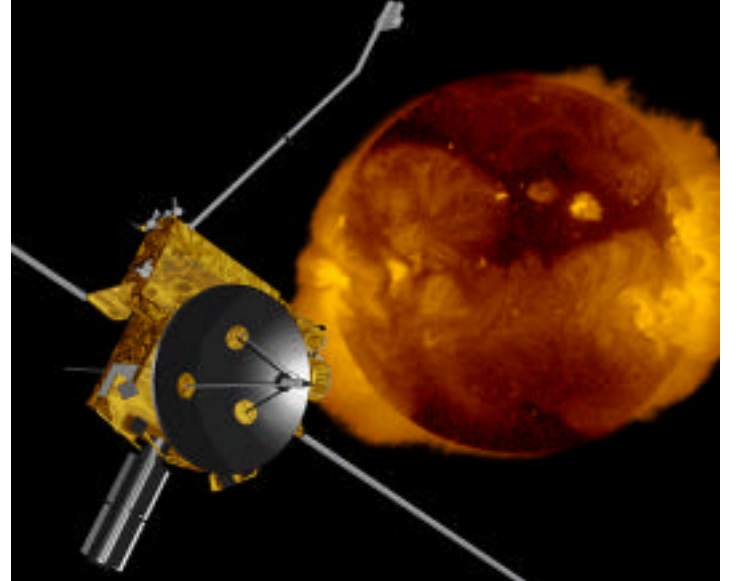
"The odds that Ulysses' flight path would intersect the comet tail were probably less likely than someone breaking the bank at Monte Carlo," said Ulysses Project Scientist Dr. Edward Smith of JPL, the co-investigator for its magnetometer instrument. Before the unexpected encounter, Ulysses was hundreds of millions of kilometers away from Comet Hyakutake and far beyond the visible tail.

"This tail extends half a billion kilometers (more than 300 million miles). That's more than three times the distance from the Earth to the Sun" said Dr. Nathan Schwadron of the University of Michigan, a member of one of two Ulysses teams that made the discovery independently of one another. Findings from both teams appear in the April 6 issue of the journal Nature.

"This makes it the longest comet tail ever recorded," said Dr. Geraint Jones from Imperial College, London, of the Ulysses magnetometer team.

Comet Hyakutake, one of the brightest comets of the 20th century, made a dazzling nighttime appearance in the spring of 1996, when it made a close pass by the Sun. While Ulysses was cruising through space studying the solar wind on May 1, 1996, its data suddenly went wild for a few hours. For example, the solar wind seemed to almost disappear and was replaced by gases not normally found in the solar wind, and the magnetic field in the solar wind was distorted. Since Ulysses scientists were not looking for comets, they did not realize the significance of the data right away.

"The discovery was made quite by accident, a bit like finding a needle in a haystack when you weren't even looking for a needle in the first place," said Dr. George Gloeckler of the University of Maryland, principal investigator of the Ulysses solar-wind ion-composition spectrometer team. The instrument studies the content and electrical charge of ion-



ized gases. While his team detected ions typically found in comets, the magnetometer team observed magnetic field directional changes like those associated with comet tails.

Comets are of great interest, because they may be the frozen leftovers of the birth of our solar system. They could hold clues to the formation of Earth and life, since one theory holds that comets "seeded" Earth and other planets with the building blocks of life.

Comets are made of dirty ice, and as they approach the Sun and heat up, they emit gas and dust, forming gas and dust tails. The gas slows the solar wind and the portion of the magnetic field near the comet. The parts of the magnetic field farther from the comet continue to travel rapidly past it. Magnetic fields can be stretched like rubber bands. The magnetic field is draped around the comet and stretches out behind it in a hairpin shape.

Gavin named to head new directorate; Naderi will lead Mars program



Tom Gavin



Dr. Firouz Naderi

JPL Director Dr. Edward Stone has announced the appointment of Thomas Gavin to the position of director for Space Science Flight Projects (400), and Dr. Firouz Naderi as manager of the newly created Mars Program Office at JPL.

Gavin has been the deputy director for Space and Earth Science Programs since 1997. He received his bachelor of science degree in chemistry from Villanova University in 1961 and joined JPL the following year to work on the Mariner Project. He was the mission assurance manager for both the Voyager and Galileo Projects. In 1990, he was appointed spacecraft system manager for the Cassini mission and remained in that position until the successful launch of the spacecraft in 1997.

Gavin received NASA's Exceptional Service Medal in 1981 for his work on Voyager, NASA's Medal for Outstanding Leadership in 1991 for Galileo, and NASA's Outstanding Leadership Medal in 1999 for Cassini. In 1997, he received the Aviation Week and Space Technology magazine's Laurels Award for outstanding achievement in the field of space.

Naderi had been the manager of NASA's Origins Program since 1996. He joined JPL in 1979 and has served as program manager for space science flight experiments

and project manager for the NASA Scatterometer project. In addition, he was program manager at NASA Headquarters for the Advanced Communications Technology Satellite program and at JPL for the Mobile Satellite program.

Of his new position, Naderi noted, "With a program of this complexity, the challenge is half technical and half sociological. My office will need to make sure the interfaces between JPL, NASA Headquarters and outside industry work extraordinarily smoothly." Within JPL, he stressed the need for cohesion between the Mars program and other organizations, particularly the new Space Science Flight Projects Directorate.

Naderi noted the importance of "shared expectations" with Scott Hubbard, the new Mars Program director at NASA Headquarters. Hubbard will oversee the development and implementation of the long-term strategy for the robotic exploration of Mars, as well as for the program's architecture and management of related funding. Naderi's office will serve as the single point of contact for NASA Headquarters at JPL for all Mars exploration efforts.

A native of Iran, Naderi holds three degrees in electrical engineering: a bachelor's from Iowa State University and a master's and doctorate from USC.

Directorates reorganize; deputies named

Concurrent with the appointments of Gavin and Naderi, three JPL managers have been named deputy directors.

Larry Simmons, program manager for the Space Infrared Telescope Facility (SIRTF), retains that position and has been named deputy director for Space and Earth Science Programs. Simmons will also serve as acting manager of the Origins Program.

Chris Jones, former manager of the Mars Surveyor Program Office, has been named deputy director for Space Science Flight Projects, and Telecommunications and Mission Operations Directorate (TMOD) Program Manager Richard Coffin has been appointed deputy director for TMOD.

In light of the recent announcement that operations management for space science missions will be carried out by TMOD, the following organizations have been transferred from the Space and Earth Science Programs Directorate to TMOD.

- Mars Surveyor Operations Office (707) is renumbered 907.
- Stardust Project Office (755) is renumbered 908.
- Deep Space One Project Office (756) is renumbered 909.

In addition, a number of organizations have been transferred from the Space and Earth Science Programs Directorate into the new Space Science Flight Projects Directorate (400).

- X2000/MDS Integrated First Delivery Project Office (751) is renumbered 460.
- Outer Planets/Solar Probe Project Office (752) is renumbered 470.
- Mars Surveyor 2001 Project Office (754) is renumbered 410.
- Mars Micromissions/Mars Network Project Office (757) is renumbered 440 and renamed Mars TeleSat Project.
- Genesis Project Office (758) is renumbered 480.
- Deep Impact Project Office (759) is renumbered 490.
- Space Infrared Telescope Facility (SIRTF) Project Office (762) is renumbered 450.
- Galaxy Evolution Explorer (GALEX) Project Office (768) is renumbered 406.
- Muses-CN Project Office (7961) is renumbered 405.

News Briefs



Dr. Parvin Kassaie

Educational Affairs manager named

DR. PARVIN KASSAIE has been named manager of JPL's Educational Affairs Office 185, a section of the Office of Communications and Education (180).

Kassaie will oversee the Educator Resource Center, Learning Technologies Project, pre-college and university programs, minority science and engineering initiatives, and a number of other educational and outreach efforts on Lab.

Previously, Kassaie worked for nine years at the UCLA Center for Experiential Education and Service Learning, where her work involved both K-12 and university activities. She has also served as an advisor to government officials involved in statewide California educational issues regarding systemic educational reform.

She said in addition to continuing to focus on issues in California, her other goals include closer collaboration with outreach, and creating new opportunities for researchers in social sciences and humanities to become engaged with JPL.

Kassaie holds a bachelor's degree in sociology and urban studies from Cal State Northridge and master's and doctorate degrees in sociology from USC.

Lab trains teachers to train teachers

JPL trained 33 educators from 22 states to inspire and educate other teachers to share the wonders of the solar system with students during a Solar System Educators Institute on Lab March 26 through 29.

The educators, taking part in the Solar System Educator Fellows program, learned techniques for training other teachers to use current space missions to help kids learn math and science. Back in their home states, each educator will train approximately 200 additional colleagues.

NASA/JPL missions participating in the institute include Cassini, Stardust, Deep Impact, Galileo, the Mars Exploration Program, the Outer Planets/Solar Probe Program, and the Deep Space Network.

Twenty-five additional educators will be selected to take part in another Solar System Educators Institute at JPL Aug. 1-5. The Solar System Educators Institute program is managed by Space Explorers Inc., DePere, Wisc., and the Virginia Space Grant Consortium, Hampton, Va., as an element of NASA's Office of Space Science Education and Public Outreach Program.

Planet Finder contracts awarded

JPL has awarded contracts to four industrial-academic teams to design Terrestrial Planet Finder, an ambitious mission in the Origins Program that will look for possible life-supporting planets around other stars.

The teams, which will spend the next two years developing mission concepts, are led by Ball Aerospace of Boulder, Colo.; Lockheed Martin Space Systems of Sunnyvale; TRW of Redondo Beach; and SVS, Inc. of Albuquerque, N.M. About 75 scientists from 30 universities and research institutions, 16 industrial firms, and two NASA centers are represented on the teams.

The challenge of finding habitable, Earth-like planets "is like trying to locate a firefly next to the beam of a brilliant searchlight," said Terrestrial Planet Finder Project Scientist DR. CHARLES BEICHMAN of JPL.

The solution depends on developing a whole suite of challenging technologies, including those necessary to fly several 3.5 meter (137-inch) telescopes in a formation so precise that their positions will be known to a fraction of a centimeter, even though the space between them will span a few football fields. The mission's success will also depend on the ability to cancel out a star's glare so that a planet 1 million-times fainter can be seen, and will require instruments so sensitive that they can identify the presence of life-sustaining chemicals on a planet up to 50 light years away from Earth.

Terrestrial Planet Finder is planned

for launch in 2012. Over a five-year period, it will take a look at 250 stars to determine which ones may have orbiting, life-sustaining planets.

SRTM astronauts to visit April 20

Members of the astronaut crew that flew onboard Space Shuttle Endeavour for JPL's Shuttle Radar Topography Mission (SRTM) are scheduled to visit the Lab April 20 to present a briefing on the mission and meet JPL staff.

Astronauts DOMINIC GORIE, JANET KAVANDI, KEVIN KREGEL, GERHARD THIELE and JANICE VOSS will show a video presentation from 11 a.m. to noon in von Kármán Auditorium, and will greet JPLers in the mall until 12:30 p.m.

Improvements noted on ELIAS

The Electronic Labwide Information Access System (ELIAS), JPL's internal Web site, is undergoing a redesign effort, some features of which are already in effect.

The site is available at <http://elias.jpl.nasa.gov> or by clicking on the words "Jet Propulsion Laboratory" on the external JPL home page (<http://www.jpl.nasa.gov>).

The new "JPL Basics" section toward the bottom of the home page offers the following features:

- JPL Online Yellow Pages, with search and update capabilities
- JPL Online Phonebook: a direct link to employee phone numbers, e-mail addresses, locations, mail stops, badge numbers and organizations
- Interactive maps of JPL: zoom in on a specific building or area of the Lab; printable maps are available
- Timecard log-in: a feature useful for traveling JPLers
- JPL Conference Rooms: provides room number and capacity, as well as a contact name for reservations
- Integrated Help Services: a portal to the services provided by all of JPL's different groups and divisions, including contact names and phone numbers.

Another new category is a collection of links called "JPL News," which includes recent news and announcements from the Director's Office as well as an online version of This Week and copies of recent e-mailings to all personnel.

The ELIAS redesign effort, led by JAYNE DUTRA of Section 389 under the auspices of JPL's Knowledge Management Project, also includes renovations of the search engine and user interface with the eventual goal of implementing a Labwide portal in the fall.

For more information, call Dutra at ext. 4-6948 or customer service representative CHARLOTTE MARSH at ext. 3-4504, or send an e-mail.

Internship deadline extended

The deadline for applications to the two-year JPL Architect Development Program internship has been extended to Friday, April 21.

Those interested must submit a current resume and a one- or two-page letter of interest, including why you should be considered for the class of 2002. Concurrence by your division manager is required. Send to MARIA RAYGOZA, HR Staffing, mail stop T-1720-C.

For more information or to start the application process, visit the ADP Web site at <http://eis/adp>, or contact BILL CHRISTENSEN at ext. 4-2096.

Cyclists can join Caltech group

JPL staff who bicycle to work are invited to register at Caltech's Cyclo-commuters Web site (<http://www.its.caltech.edu/~cyclocom>).

A random drawing is held monthly for a \$30 gift certificate to a local bike store, and long-distance riders can log in their miles for a chance to win additional prizes every six months.

The group will sponsor Commuter Fair Day on May 19, which will include free bike tune-ups.

For more information, contact Cyclocommuter coordinator LAUREL MARTIN at (626) 395-6868 or laurel@caltech.edu.

Special Events Calendar

Ongoing Support Groups

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

Codependents Anonymous—Meets at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

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

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

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

Saturday, April 15

Battlefield Band—The Scottish band will perform Celtic music using a blend of bagpipes, guitar, cittern, synthesizer, fiddle and vocals. Held at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$25, \$21 and \$17. Call (626) 395-4652.

Sunday, April 16

Chamber Music—The Skampa Quartet and baritone Christopheren Nomura will perform at 3:30 p.m. in Caltech's Beckman Auditorium. Tickets are \$25, \$21, \$17 and \$13. Call (626) 395-4652.

Tuesday, April 18

Help for Caregivers of the Elderly—Adria Emberson of the Huntington Hospital Senior Care Network will discuss how to assess, plan and manage the needs of an aging family member; caregiver responsibilities; family relationships and how to care for yourself while caring for the senior in your life. To be held at 11:45 a.m. in von Kármán Auditorium. The talk is hosted by JPL's Employee Assistance Program, which is also interested in starting a monthly senior caregivers' support group on Lab. Call ext. 4-3680.

Investment Advice—Fidelity representative Jason Rasmussen will hold a workshop on the basics of investing from noon to 1 p.m. in the 167 cafeteria's northeast corner. Included will be a broad overview of the financial markets, basic investment building blocks such as stocks, bonds, mutual funds and annuities, basic terminology and concepts and hands-on exercises. Rasmussen will also be available for one-on-one counseling. To schedule an appointment, contact Fidelity at (800) 642-7131.

Retirement Information—Cindy Wilson of TIAA/CREF will conduct an information meeting for all employees who have completed or will soon complete their eligibility requirement for retirement plan participation, or for new hires eligible to join the retirement plan. Assistance in completing applications and investment option information will be available. To be held at noon in Trailer 1720.

Wednesday, April 19

JPL/Caltech Flying Club—The spring membership meeting will be held at 7:30 p.m. in 269 Lauritsen Hall at Caltech. Greg Feith of the National Transportation Safety Board will give a presentation on accident investigations. The meeting is open to anyone with an interest in aviation including those who want to learn to fly. Call Bob Ferber at ext. 4-3463 or Peter Gluck at ext. 4-9425.

Remote Access—Bill Vlahos of Section 366 will discuss how to get the most out of dial-in and Virtual Private Network access services to the JPL network. The JPL remote access service handles more than 25,000 sessions and 1.5 million online minutes per month for its 2,700 users. Held at noon in von Kármán Auditorium.

Thursday, April 20

JPL Astronomy Club—Meeting at noon in Building 198-109.

"The Importance of Fatherhood in Our Culture"—Rick Kidd, a Sierra Madre-based marriage and family counselor who specializes in the needs of school-age children, is the school counselor at St. Marks Elementary School in Altadena. He will speak at noon in Building 167-111.

Von Kármán Lecture Series—Dr. Michael Shao will describe the Space Interferometry Mission, whose scientific goal is to find new planets that are about the size of Earth and in an orbit that can potentially support life. Held at 7 p.m. in von Kármán Auditorium. Open to the public.

Friday, April 21

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

Von Kármán Lecture Series—Dr. Michael Shao will describe the Space Interferometry Mission, whose scientific goal is to find new planets that are about the size of the Earth and in an orbit that can potentially support life. Held at 7 p.m. in The Forum at Pasadena City College, 1570 E. Colorado Blvd. Open to the public.

Saturday, April 22

Irish Songs—Singer/songwriter Eileen McGann will appear at 8 p.m. in Caltech's Dabney Lounge. Tickets are \$12 for adults, \$4 for children under 12. Call (626) 395-4652.

Monday, April 24

"Women and Investing"—Certified financial planners Sharon Sherbert and Kenneth Marinace will conduct a seminar at noon in the Building 167 conference room. Sponsored by the Director's Advisory Council for Women.

Wednesday, April 26

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

Thursday, April 27

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

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

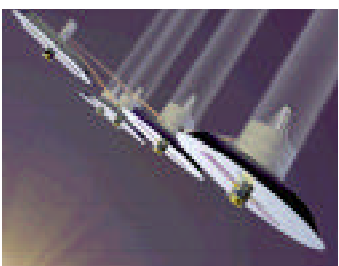
JPL Stories—Retiree Al Hibbs will present "JPL and the Space Program—How it Began and How We (With the Help of the Russians) Began It" at 4 p.m. in the customer services area of the Library, west end of Building 111, room 104. For questions about the story series or participation information, call Teresa Bailey at ext. 4-9233.

Saturday, April 29

Toying With Science—The scientific principles of gravity and leverage, simple machines, human imagination and more will be explored at 2 p.m. in Caltech's Beckman Auditorium. Presented in collaboration with Pasadena's Kidspac Museum. Tickets are \$10 for adults, \$5 for children. For information, call (626) 395-4652.

The challenge of finding habitable, Earth-like planets "is like trying to locate a firefly next to the beam of a brilliant searchlight."

Dr. Charles Beichman
Terrestrial Planet Finder
project scientist



Artist's concept of the Terrestrial Planet Finder

Lab research helps track arctic ozone loss

By Mary Beth Murrill

The colorful appearance of these polar stratospheric clouds over Kiruna, Sweden, on Jan. 27 is due to the small size of their droplets and their high altitude, approximately 21,300 meters (70,000 feet). The small droplets in the clouds result in separation of light of different colors due to refraction of sunlight. Their high altitude allows for full solar illumination for up to 20 minutes following sunset at the ground. These clouds, which have long been called "Mother of Pearl" by Scandinavians, participate in a chain of events that leads to ozone depletion by human-produced chlorine.



A team of JPL and other atmospheric researchers just back from an international science expedition to study atmospheric ozone in the Arctic reports that ozone losses of more than 60 percent occurred in the Arctic stratosphere this winter (1999-2000), one of the coldest winters on record.

The NASA-sponsored SAGE III Ozone Loss and Validation Experiment (SOLVE) was motivated in part by concerns that the increase in the amount of greenhouse gases might lead to a cooling of the polar lower stratosphere, which could lead to more frequent polar stratospheric clouds and enhanced ozone depletion. Data collected by the research team will greatly improve scientific understanding of the role of global temperature change in the destruction of ozone.

The Earth's ozone layer protects Earth's life from the harmful effects of the Sun's ultraviolet radiation. Chemicals used in refrigerants, aerosol propellants and plastic foams were discovered in the 1970s to be destroying Earth's ozone layer. Since that time, production of the most harmful chemicals has been limited or halted in an effort to stop the destruction of the ozone layer.

High-altitude clouds (at about 18 kilometers or 70,000 feet) that exist only at the poles are called "polar

stratospheric clouds." They play a unique role in atmospheric ozone loss. The visually beautiful, opalescent clouds form only at the cold temperatures found at the poles. These clouds help trigger the conversion of chlorine from relatively non-reactive forms into chlorine monoxide, which, in combination with sunlight, destroys ozone.

The buildup of greenhouse gases in the lower atmosphere acts like a blanket that traps heat nearer to Earth's surface and can lead to colder conditions in the upper atmosphere. Long-term temperature records show evidence of cooling of the stratosphere at mid-latitudes. However, computer simulations suggest this cooling mechanism should only have a small effect on the polar stratosphere.

Recently, however, scientists have become concerned that circulation changes in the stratosphere, perhaps related to the build-up of greenhouse gases, may be responsible for the recent spate of cold Arctic winters.

"The polar stratospheric clouds covered a larger area, and persisted for a longer period of time, than for any other Arctic winter during the past 20 years. These conditions heighten our concern regarding possible couplings between climate change and stratospheric ozone depletion," said JPL ozone researcher Dr. Ross Salawitch. Even

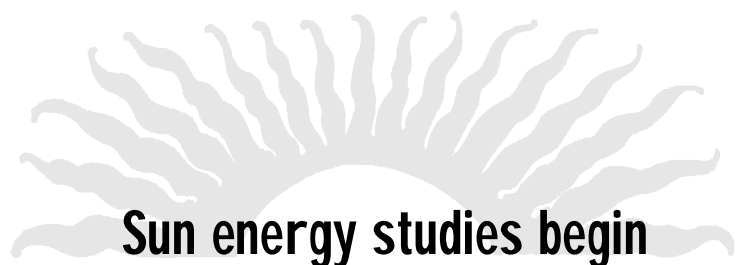
as the amounts of stratospheric chlorine and bromine decline, "the chemical depletion of Arctic ozone would still be prolonged if temperatures in the Arctic continue to decline."

The new findings bolster views that the ozone layer is sensitive to temperature as well as ozone-destroying chemicals.

The U.S. portion of the effort involved a high-altitude balloon from JPL and two aircraft from NASA/Dryden Flight Research Center in California, including a DC-8 and an ER-2—the civilian variant of Lockheed's U2 reconnaissance aircraft. (The flight over Russian territory during the experiment was the first flight over the former USSR by a such an aircraft since U.S. pilot Francis Gary Powers' U-2 was downed during the Cold War.)

The U.S.-sponsored team joined with a European Union-sponsored Third European Stratospheric Experiment on Ozone to obtain measurements of ozone and other atmospheric gases and particles using satellites, airplanes, balloons and ground-based instruments. JPL and Caltech instruments were used on each of the high-altitude balloon and aircraft platforms.

Most of the measurements were made near Kiruna, Sweden with additional measurements made from a network of stations at mid- and high- northern latitudes. Observations obtained from JPL's Microwave Limb Sounder satellite instrument provided a global perspective.



Sun energy studies begin

The Active Cavity Irradiance Monitor Satellite on April 3 began taking raw science measurements of the Sun's total energy output following successful pointing of the spacecraft and its instrument.

The satellite, launched Dec. 20, 1999, is in a Sun-synchronous orbit at an altitude of about 695 kilometers (429 miles). It measures "solar irradiance," or the total amount of the Sun's energy that enters Earth's atmosphere-ocean system. The mission is part of a multi-decade effort to understand variations in the Sun's output and resulting effects on Earth.

"All systems are go and operating within specifications," said Project Manager Ron Zenone of JPL. "We look forward to extending the scientific database on solar measurements."

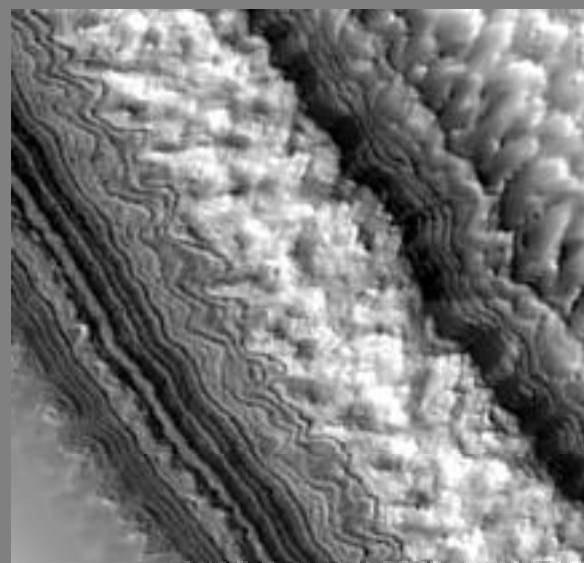
Since its launch from Vandenberg Air Force Base, many in-flight characterization tests of the spacecraft and instrument have been conducted. The

performance of the spacecraft's attitude-control subsystem, which governs its orientation in space, was adjusted through changes to flight software to improve attitude stability.

The program's next milestone is a review of spacecraft operations. The manufacturer of the spacecraft, Orbital Sciences Corp., McLean, Va., is currently operating the satellite. Following a successful "hand-over" review, satellite operations will be taken over by JPL for the five-year mission.

Previous measurements have demonstrated that the total radiant energy from the Sun was not a constant. However, the solar variability was so slight (0.1 percent) that continuous monitoring by state-of-the-art instrumentation is necessary. Researchers theorize that as much as 25 percent of the anticipated global warming of Earth may be solar in origin.

Mars' south polar layered terrain unexplained



New images from JPL's Mars Global Surveyor may help scientists understand what materials make up the exotic, multi-layers of the South Pole. Scientists theorize that the thickness and the composition of the layers in Mars' south polar region could hold a record of climate change in a way that is similar to how years of drought and years of plentiful rain change the width of rings in a tree trunk on Earth. The layers may be made up of frozen carbon dioxide, water ice and fine dusts that have been eroded over time. Mars Global Surveyor images are available at <http://www.msss.com>.

Passings

MALVIN YEATER, former assistant Laboratory director for the Office of Technology and Applications Programs and manager of JPL's All Source Analysis System Development Project, died of a heart attack March 22. He was 68.

A native of Iowa, Yeater joined JPL in 1964 as a development and systems engineer for the Deep Space Network. He progressed to positions of increasing responsibility and in 1987 was named project manager for ASAS, which was sponsored by the Department of Defense. From 1991 to his retirement in 1993, he served as assistant Lab director for TAP.

Yeater is survived by his wife, Gladys, son Andrew and daughter Ann. Services were private. Memorial contributions are requested to the theatre group Fabulous Monsters, Robert Prior, Director, 4401-1/2 Westdale, Los Angeles, 90041.

ROBERT HAGOOD, 53, a senior engineering assistant on long-term disability from Section 382 since 1991, died of complications from multiple sclerosis Jan. 8.

Hagood joined the Lab in 1977. He is survived by his wife, Susan, of Section 312 and cousin Judi (Hagood) Dedmon of Section 644.

Services will occur in space from Vandenberg Air Force Base by Celestis Inc. of Houston. Cabot & Sons of Pasadena handled arrangements.



Malvin Yeater

BED, child's, solid oak, infant to adult, changing table converts to desk, drawers, \$350. 957-8463.

BED SET, twin day bed w/hideaway folding twin bed underneath, cream, ornate, tubular metal head/side/footboard, 4 tubular pillows, bedspread, pillowcases, etc., \$275. 363-1328.

BICYCLES, 2, 12-spd., \$30 & \$50; POOL PUMP, gas w/1.5" fire hose, \$35; LAMP w/shade, Czech. crystal, \$60; ROTO-TILLER, Massport, \$95; ENGINE STAND, prof. qual., \$95; TYPEWRITER, Olympia, elec. wide carriage, \$40; BEDROOM SET, dresser, end tbls, lamps, & dbl. sz. headbd./matt., \$335; CHAIR, cane-back, needs recaning, \$30. 790-7220.

CHAIR & LOVE SEAT, antique, Victorian, ladies, hand-carved circa 1860, velvet, needs some work, \$1,500 firm. 626/355-8409.

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

COMFORTER, Fieldcrest, dust ruffle, pillow sham set, full sz., exc. cond., \$30; STEAM IRON, GE Power Spray, vg cond., \$15; FLOOR LAMP, black base & pole, off-white shade, gd. cond., \$12. 626/577-8107.

COMPUTER, Mac, 7100/66 MHz 540 MB HD, 32 MB RAM, \$14; ZIP DRIVE, Mac, SCSI, \$40; MONITOR, Apple, 15", multiscan, \$50. 790-7220.

DAYBED w/2nd trundle bed below, \$25; DRYER, electric, apt. sz., \$30; WASHING MACHINE, Hotpoint, 15 yrs. old, \$25. ted1110@earthlink.net.

DESK, lg., 59"x30"x30", 2 dr. & 2 file cabinets, \$80. 626/564-8483, Chris.

EXERCISER, Nordik Track, unused, orig. \$900, \$500/obo. 957-3022, eves.

FILING CABINET, lg., 2 dr., oak, 37"Wx23"Dx28"H, \$75. 548-8454, Molly.

FUTON, wooden, bi-fold, w/thick qn.-sz. mattress, exc. cond., \$200. 550-1405.

GLASS INSERTS, 4, leaded table-tops, for coffee & end table, 20"x24" w/14"x18" beveled glass, \$10 ea. 626/303-1927.

LAWNMOWER, Craftsman rotary, \$50. 626/303-1927.

LAWNMOWER, Honda, commercial snapper, 5 hp gas eng., rear bag, \$300/obo. 626/584-3204 day, 909/592-0780 eve/weekend.

MISC. tools: gardening equip., sawing mac., furn., antique stove, refrigerator, stove, misc. clothes, 2 chest of drawers, black leather suit, coat, skirt, jacket, toys, brick-a-brac, etc. 626/794-0455, Oli.

MOVING SALE, sacrificed prices; TV tbl, wht., \$15; bookshelves, black, easy to disassemble, \$20; lamp, desk, \$8; bed & matt., qn. sz., \$40; vacuum cleaner, \$30; table, wht., \$30; chairs, 4, black, \$5 ea.; phone, 9 mo. old, \$10; all VG cond. 626/683-3451.

POOL, Doughboy, 16' dia., great cond., ladder, pump, cover, acces., \$1,500/obo. 249-9534.

PUPPIES, Jack Russell Terrier, long & short coats, white/black & tri colored, M/F, vaccinations & dewormed, exc. line, received best care, \$500-550. 626/796-7941.

PUPPIES, Springador Retrievers, great for whole family, hunting fanatics too, blk., w/ white markings, mother is Springer Spaniel (akc), father is Labrador Retriever (fence jumper), born March 6, ready for Easter, \$30 ea. to cover declaw removal/first shots, health papers incl., in Barstow off I-15, open to delivery. 760/252-2792, leave msg.

SKATEBOARD, Deck, Blind, model: 9 Lives, 1/2 price, \$25; SNAKE, pet, beautiful red-tailed boa, price negotiable to good home. 952-8455.

SEWING MACHINE, older Kenmore in cabinet, gd. cond., \$40. 951-3467.

SOFA, 90"x36", dark green plaid, hrdwd. trim, 3 cushions, 2 pillows, exc. cond., \$200/obo. 626/358-0443.

SOFA, black leather, 85", \$295; LOVE SEAT, 63", black leather, \$195; BUREAU, 5 drwr., rock maple, 50x33x19, \$125; COMFORTER, qn. sz., Sheridan, duvet cover w/match. pillows/shams, \$150; BED SKIRTS, 2, ecur, \$25; TV CART w/2 drawers, \$20; COMPUTER/PRINTER, Mac Powerbook 145B, \$95, Mac Laserwriter 300, \$195. 626/793-3561.

SOFA & LOVE SEAT, white, camel back, like new, \$200; BIRD CAGE, round, on pedestal, \$30. 909/596-9007.

TABLE, kitch., lg., wooden, formica-topped w/butcher-block pattern, useful for lg. family, 55" across top, matching Lazy Susan for kitch. dining, you p/u, \$25. 909/981-7492, Jim or Darlene.

TELEPHONE, cellular, StarTac 7000g, 1.9pcs, in box w/instr., extra batt., \$275. 548-8454, Molly.

TELEPHONE ANSWERING MACHINE, GE, black, single microcass., voice time/day stamp, hardly used, \$20/obo, 626/844-4383.

YARD SALE: Sat., 4/22, 8 a.m.-3 p.m., 236 E. Palm Ave., Monrovia; microwave, gas lawnmower (nds minor rep.), new whitewash pine coffee tbl & 2 side tbls, comp. equip., books, furnishings, no junk.

Vehicles / Accessories

'95 ACURA Legend LS coupe, 2 dr., black, auto, 104K mi., mint cond., black leather, sunroof, heated seats, alloy wheels, CD changer, remote keyless entry, \$17,000/obo.

'93 ACURA Vigor GS sedan, white/black lthr, auto, sunroof, \$10,500/obo. 626/793-3561.

'91 BUICK Century, limited ed.; 130K mi.; gd. cond. a/c, pwr./win./steer./seat/dr. locks,

tilt wheel, cc: am/fm stereo, premium sound, \$2,499. 626/836-5706, Mike.

'79 CADILLAC Coupe de Ville, new/trans./tires, gd. eng., smogged, \$500/obo. 626/966-2904.

'97 CHEVROLET Tahoe 2 dr., 4 w/d, lthr seats, am/fm, cass./CD, pwr./seats/win., tow pkg., new tires. exceptional paint, custom grille/body, 44K mi., \$25,000/obo. 626/914-1237.

'93 CHEVROLET Lumina APV van, green/gray, V6, 3.1L, auto, 7 bucket seats, 5 removable, a/c, rear air, cc, am/fm/tape w/CD jack, pwr./steer./win./locks, tilt whl., ABS 4-whl. braking, privacy glass, very gd. cond., 93K mi., \$7,500. 909/981-7492, Jim or Darlene.

'91 CHEVROLET Corvette, blk/blk, sharp, glass roof, a/c, pwr. steer./win./dr. locks, tilt wheel, cc, am/fm cass., premium sound, ABS, leather, dual pwr. seats, alloy wheels, 122K mi., \$10,490. 909/374-2426.

'84 CHEVROLET Silverado, 3/4 ton pickup, 454 CI eng., rack, AT, PW, a/c, Sony radio, clean, runs gd., \$2,900. 957-8463.

'95 FORD Mustang, 3.8L V6, 5 spd. manual, 52K mi., silver, a/c, pwr. everything, cc, stereo, CD/cass., dual airbags, no wrecks, \$8,500/obo. 249-0038.

'89 FORD Pony Escort, 2 dr., blue, manual, 126K mi., gd. cond., all orig., no accidents, \$1,000/obo. 805/523-7246.

'72 FORD Thunderbird, classic, auto, V8, white leather int., VG cond., \$1,800/obo. 626/359-8840.

'96 HONDA Accord EX, exc. cond., 5-spd., 4 dr., dark green, 64K mi., new tires/brakes, all pwr., sunroof, orig. owner, 6-disk CD w/ prem. sound, \$13,500/obo, 626/836-9254.

'94 HONDA Civic DX coupe, red, air, alarm, tint, 5 spd., exc. cond., 121K mi., \$5,500. 626/445-0052.

'83 HONDA dirt bike, new tires/tubes/fork seals, runs gd., current reg., \$500. 626/744-5378.

'82 HONDA motorcycle, CT110, \$900. 790-7220.

'90 KAWASAKI, Jet Ski JS650-A4 650SX w/trailer, 2-cyl., \$1,200. 661/255-8216.

'86 TIOGA motor home, sleeps 6, roof air, TV antenna, 2 eating areas, clean in & out, under 30K mi., exc. cond., \$13,500/obo. 353-0267.

TIRES, Good Year Wranglers, less than 100 mi., LT 245 / 75R16, \$200. 626/395-6142, Terry.

'00 TOYOTA Corolla LX, 4 dr., forest green, auto, cc, air, pwr./win./locks, daytime running lights, 8K mi., medical emerg. necess. selling this wonderful, new car, \$15,455, or assume lease, \$255/mo. 249-4561.

'96 TOYOTA Celica GT liftback 3 dr., exc. cond., one owner, loaded, auto, a/c, pwr./win./dr./steer., tilt whl., cc, am/fm/cass, 12-CD, 8-sprk. w/amp, ABS, moonroof, rear spoiler, alloy whls., alarm, sports pkg., very clean, low mi., must see, \$14,600. klochko_v@hotmail.com, 989-6152.

'91 TOYOTA pickup, std. bed, 5 spd., 4 cyl., exc. cond., am/fm/cass., bedliner, rebuilt engine still under warr., orig. owner w/maint. records, 217,000 miles, \$3,950/obo. 909/865-8782.

'87 TOYOTA Camry, 4-dr. sedan, dk. grey, new trans/brakes/water pump/timing belt/wheel bearings, more, great cond., retired educator, Santa Monica, 93K mi., \$4,550. 310/393-1951, Nadiamusdoc@juno.com

'87 TOYOTA pickup, unusual, 1-ton cap. compact, std. trans., a/c, bedliner, ~188K mi., gd. body, very gd. int., great engine, \$2,000/obo. 772-7611, Amy or Steve.

'91 VW Jetta, white, 4 dr., auto, Wolfsburg Ed., a/c, upgraded Pioneer speakers, Sony pull-out cass/am/fm, 149K mi., exc. cond., super-clean, \$3,200/obo. 714/903-8888.

'90 VOLKSWAGEN Jetta, 4-dr. sedan, 5 spd., a/c, sunroof, pwr. locks, tilt steer. new tires/batt., metallic green ext., gray int., well maint., 80K mi., \$3,500. 626/577-9105.

Wanted

HOUSE/DOG SITTER, Altadena for vacationing retirees in June/July, 2 Dobermans need walk-ing daily, 4 mi. to JPL. 626/797-0294, Angie.

SNOWBOARD for child about 4'6" tall, boots, about sz. 4 or 5. 952-8455.

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

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

TO RENT, near Pas., 1 or 2 bd. house/guest home/apt.; stable, friendly JPL'r & student; prefer cent. air/heat, patio, closet space, under \$800. 626/796-5046.

TO RENT, small house or townhouse in or near Pasadena, one clean, responsible person plus dog & cat. 353-9404.

Lost & Found

Lost: Silver loop earring w/freshwater pearl, btwn. east lot & Bldg. 168 on 3/28. Ext. 4-1147.

Lost: Diamond earring, in Bldgs. 241, 171 or 202 on 3/29. Ext. 4-4359, 626/357-3904.

Free

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

KITTENS & mom cat rescued from L.A. streets, felv negative, 1 grey female, 1 grey male, 1 black male, calico mom, to loving home, all homes screened & require follow-up visit, donation suggested to local cat rescue group and to cover shots and fixing, avail. May 1. 626/792-8272.

KITTENS, 10 wks. old, black, gray & white, very healthy/playful, mother & father known and healthy. 248-2855, Dave & Kelly.

For Rent

ALTADENA, charming 2 bd., 1 ba. house near Christmas Tree Lane, hrdwd. floors, f/p, refrigerator, stove, washer/dryer, fenced backyard, fruit trees, \$1,400, incl. water/gardener/trash, negotiable. 626/794-9579.

ALTADENA, share charming 2 bd. house in quiet nbhd., Altadena Estate area nr NY Dr./Allen: huge yd, patio, off-st. parking, garage, storage, all privileges, util. pd., \$575. 626/797-3354 or bpeterson@huntington.org.

MONTROSE cottage, 5 min./JPL, \$475. 626/445-0884.

PASADENA, short-term condo lease, 3-12 mos., 1,000 sq. ft., fully furn., 1 bd., gar., patio, laundry, 1 block from Caltech, \$1,095 +\$120 util. 626/285-0730.

SYLMAR, dream rent/option to buy, spacious brand new home, 4 bd., 3 1/2 ba., 11 rms., 2,500 sq. ft., Jacuzzi tub, 2 story, mtn. views, gated community w/pool, \$2,500. 626/584-6526, Fred.

Real Estate

LA CANADA, 4 bd., 2 ba., c/a, LC schools, 1996 remodel, laundry rm., walk-in closets, newly painted, move-in ready, \$435K. 952-2581.

LA CRESCENTA, 4 bd., 4 ba., 2,150 sq. ft. house, upstairs master suite, f/p, c/a, 2-car gar., lemon & plum trees, quiet nbhd., 5 mi./JPL, gd. nearby schools, photos at home.earthlink.net/~lyldar, seek 7/1 closing, \$425K. 957-3022 eves.

LAKE ISABELLA-area weekend cabin, one room with woodburning stove, refrig, electric range, microwave, fully carpeted, electricity, telephone, security shutters, plus 10x12 storage bldg or bunkhouse, on 3/4 acre high above Kelson Creek, panoramic view, \$27,000. (760) 379-7602

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

Vacation Rentals

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

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

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

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

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

HAWAII, W. Maui luxury condo, just N. of Kaanapali bch., ocean-front loc., fully furn. lv. rm., 2 bd., kitch., \$140/day/2. 805/646-0810.

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

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

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

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

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

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

View this and previous issues of Universe online

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

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Notice to Advertisers

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

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

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

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

Letters

Thank you for the plants. Your expression of sympathy brought us comfort. Please accept our heartfelt thanks.

Richey Martin & family

Love begins with a smile, grows with a kiss, ends with a tear. The sudden loss of my younger brother has left me with a heavy heart. Through the kindness of my friends and co-workers at JPL, the burden of loss has been eased. A special thanks to Section 262 for the cards and letters, to Section 265 for the beautiful bouquet, to the ERC for the lovely plant: a living reminder of my brother Rick.

Take a moment each and every day to express your love to family and friends. I loved my brother and didn't tell him often enough.

Cindy Stewart

To all our friends at JPL . . . my family and I thank you for all your good wishes and great send-off at my recent retirement. Your thoughtfulness is truly appreciated.

John Ashlock

Classifieds

For Sale

AIR COMPRESSOR, Dayton Speedaire, industrial duty, 1 hp, exc. cond., \$250. 626/398-0921.

AVIATION EQUIP., all lightly used; headsets, Telex ANR 4000 active noise cancelling, \$225; AvComm & Softcomm passive noise cancelling, \$35/ea.; radio, Sporty's 760 ch., handheld, VOR capability, headset, a/c adapt., \$150; flight case, lg., Jeppesen, 4 binders, \$50; jacks, aircraft, pr., PA-28 or PA-24, \$200. 772-7611, Steve, 10am-7pm only.

CAMERA, Sony Mavica, dig., 10X zoom, new cond., orig. \$499 + tx., sell \$339; REMOTE, new, for all Sony components incl. big screen, \$19; SHARING DEVICE, Belkin, 4 to 1 peripheral w/gold IEEE cable, orig., \$99, sell \$49; CABLE, new, high speed, for ATA66 HD, orig., \$20, sell \$7; CDs, new, HP, recordable, \$2. 366-6134.