**TOPEX gets new lease on life**

*Use of backup altimeter could extend mission for months or years*

By DIANE AINSWORTH

Engineers have given JPL’s TOPEX/Poseidon ocean topography satellite a new lease on life by successfully switching the principal instrument onboard the satellite to operate on its backup unit, extending the spacecraft’s already unprecedented lifetime of monitoring ocean circulation patterns worldwide.

With the switch to a fresh altimeter, the highly productive TOPEX/Poseidon mission, which produced the accurate prediction of the globally destructive El Niño phenomenon of 1997-98, could last for months or years to come. The satellite, launched in August 1992, was originally designed to last three to five years.

Last month, commands were sent to the U.S.-French satellite to turn off its primary radar altimeter, which was showing signs of age, and to activate the backup altimeter. Preliminary data from the satellite analyzed by the TOPEX/Poseidon team at JPL indicated that the backup, or “side-B” instrument, is operating smoothly.

“Barring any unforeseen problems with data acquisition, we will continue to use the spare altimeter to provide global ocean topography data,” said David Hancock III, altimeter instrument scientist at the Wallops Flight Facility in Virginia, whose team is monitoring operational data from the joint NASA-Centre National d’Etudes Spatiales (CNES) satellite.

Dr. Philip Callahan, head of the calibration team at JPL, said his team is calibrating data from the new altimeter to extend TOPEX/Poseidon’s ability to record global ocean changes as subtle as 1 millimeter per year (0.04 inches per year) well into the new millennium.

“This work is an excellent testing bed for cross calibration of TOPEX/Poseidon with its successor, JASON-1, which is scheduled for launch in May 2000,” he said.

From an orbital altitude of 1,336 kilometers (830 miles) above Earth, TOPEX/Poseidon has successfully acquired data on sea-surface height measurements taken by the satellite, is available on the Internet at http://www.jpl.nasa.gov/elnino/.

The world’s oceans are the great reservoirs of heat that influence global climate because they can cool or heat the atmosphere above. This transfer of heat drives weather patterns across both land and sea. La Niña provides a physical link connecting the large, slow changes in the ocean with predictable changes in day-to-day weather.

*See TOPEX, page 6*

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**‘La Niña’ hangs on**

By DIANE AINSWORTH

The cold pool of water in the Pacific known as “La Niña” still persists, although it is slowly weakening, according to scientists studying new data from the U.S.-French TOPEX/Poseidon satellite.

A new image, produced using sea-surface height measurements taken by the satellite, is available on the Internet at http://www.jpl.nasa.gov/elnino/.

Use of a new altimeter on TOPEX/Poseidon could extend the lifespan of the satellite by months or years, in orbit since 1992. TOPEX/Poseidon was originally designed to last three to five years.

The low sea level or cold pool of water along the equator (shown in purple and blue), commonly referred to as La Niña, still dominates the equatorial Pacific Ocean. This La Niña, which first appeared in May through June 1998, still persists, although it is slowly weakening, scientists say. Given its persistence and present strength, the ocean cooling trend is expected to continue to exert a strong influence on global climate systems throughout the spring and into the early summer.

This situation is similar to the 1997-1998 El Niño, which extended into early summer 1998.

“The world’s oceans are the great reservoirs of heat that influence global climate because they can cool or heat the atmosphere above. This transfer of heat drives weather patterns across both land and sea. La Niña provides a physical link connecting the large, slow changes in the ocean with predictable changes in day-to-day weather.”

*See Niña, page 7*
8 JPL instrument proposals selected for funding

By MARK WHALEN

Eight JPL proposals were selected in February for funding by NASA’s Planetary Instrument Definition and Development Program, which supports the advancement of spacecraft-based instrument technology that shows promise for use in scientific investigations on future planetary missions.

JPL-based principal investigators submitted 15 proposals for the program. Overall, a total of 39 proposals from NASA and other institutions were submitted to the program, with 14 selected for funding. The JPL-based investigations were awarded a total of $2.8 million for development. Investigations are for one to three years in duration.

“The goal of this program is to develop instrument concepts that can then be proposed to future NASA planetary exploration missions,” said Dr. James Kaufman, manager of the program at JPL. “The program provides funding to develop technologies up through laboratory breadboarding.” Laboratory breadboards are used to determine the feasibility of instruments and to produce data on the principles of operation. They do not meet any spacecraft-related resource requirements, such as mass, power and size.

“JPL has never experienced such a high success rate with PIDDP proposals,” Kaufman said. “We are extremely pleased with the selection results.”

The JPL proposals selected, and their principal investigators, are:

- A Novel ‘Proton-Transfer-Reaction-Ion Mobility Detector’ for *In-Situ* Detection of Organic Species Relevant to Future Mars Surveyor/Outer Solar System Missions.” Dr. Isik Kanik is principal investigator (PI).
- “Miniature Ground-Penetrating Radar Probe for Planetary Stratigraphy and Subsurface Water-Ice Detection.” Dr. Soon Sam Kim, PI.
- “A Low-Noise, Ultra-Broad-band Heterodyne Sensor for Studies of Planetary Atmospheres and Comets.” Dr. William McGrath is PI.
- “Combined Gamma-Ray, X-Ray and Neutron Spectrometer for Surface Surveying and Sample Selection.” Dr. Albert Metzger, PI.

See PIDDP, page 4

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### Special Events Calendar

<table>
<thead>
<tr>
<th>Event Title</th>
<th>Date</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>Ongoing</strong></td>
<td></td>
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</tr>
<tr>
<td>Alcoholics Anonymous—Meeting</td>
<td></td>
<td>Meeting at 11:30 a.m. Mondays, Tuesdays, Thursdays (women only) and Fridays. For more information, call Occupational Health Services at ext. 4-3319.</td>
</tr>
<tr>
<td>Codependents Anonymous—Meeting</td>
<td></td>
<td>Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.</td>
</tr>
<tr>
<td>Gay, Lesbian and Bisexual Support Group—Meets</td>
<td></td>
<td>Meets the second 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. 0-0664.</td>
</tr>
<tr>
<td>Parent Support Group—Meets</td>
<td></td>
<td>meets the fourth Tuesday of the month at noon. For location, call Jayne Dutra at ext. 4-6948.</td>
</tr>
<tr>
<td>Senior Caregivers Support Group—Meets</td>
<td></td>
<td>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. For more information, call (626) 209-3110.</td>
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<tr>
<td><strong>Monday, March 22</strong></td>
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<tr>
<td>“How to Succeed in Business Without Crashing”</td>
<td></td>
<td>This talk will be given by Bob Severino, president of Dubbs &amp; Severino, a company that turned JPL-developed technology into a cockpit warning system that provides terrain proximity alerts to pilots. Held at noon in the Building 167 cafeteria.</td>
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<tr>
<td><strong>Wednesday, March 24</strong></td>
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<tr>
<td>Computer Help—Jeff Sachs of Section 394 will provide an overview of the benefits of using the AFS distributed file system to manage computer files. Learn how to share files, set up group space, access data, publish web pages, obtain online help, change passwords, create protection groups and more. A 15-minute question-and-answer session will follow. At noon in the Building 167 conference room.</td>
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<tr>
<td><strong>Friday, March 19</strong></td>
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<tr>
<td>JPL Dance Club—Meeting</td>
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<td>Meeting at noon in Building 300-217.</td>
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<tr>
<td>Ladysmith Black Mambazo—A Zulu art form, the group’s high-kicking dance and a cappella singing have gained international renown. To be held at 8 p.m. in Caltech’s Beckman Auditorium.</td>
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<tr>
<td><strong>Monday, March 29</strong></td>
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<tr>
<td>Investment Advice—Fidelity Investments representative Jasson Rasmussen will be available for retirement and investment counseling. Call (800) 642-7131 to schedule an appointment.</td>
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<tr>
<td><strong>Wednesday, March 31</strong></td>
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<tr>
<td>JPL Drama Club—Meeting</td>
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<td>Meeting at noon in Building 301-127.</td>
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<tr>
<td>Russian Language Workshop—Meets from 7 to 9 p.m. on the Caltech campus. Some knowledge or previous study of the language is essential. For location and further information, call Joyce Wolf at ext. 4-7361.</td>
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<tr>
<td><strong>Thursday, April 1</strong></td>
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<tr>
<td>JPL Gun Club—Meeting at noon in Building 183-328.</td>
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<tr>
<td><strong>Friday, April 2</strong></td>
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<td></td>
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<tr>
<td>JPL Dance Club—Meeting at noon in Building 300-217.</td>
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WIRE loss under study

Scientific mission ends when hydrogen designed to cool telescope escapes

By MARK WHALEN

Investigations by NASA and JPL are under way to determine causes leading to the end of the scientific mission of the Wide-Field Infrared Explorer (WIRE).

After a successful launch March 4 from Vandenberg Air Force Base, the spacecraft began to experience attitude control problems during its second pass over the ground station at Poker Flat, Alaska. Ground controllers determined that WIRE was beginning to spin instead of maintaining a stable position in orbit.

By Saturday, March 6, controllers were slowly gaining control of the spacecraft, but the entire supply of frozen hydrogen needed to cool its primary scientific instrument—a JPL-developed, cryogenically cooled infrared telescope—was released into space, ending the spacecraft’s scientific mission of exploring the history of star formation in the universe.

“We are very disappointed at the loss of WIRE’s science program,” said Dr. Ed Weiler, NASA’s associate administrator for space science at NASA Headquarters. “We are establishing a formal anomaly investigation board to find out what happened, which will help us to plan future missions. I’m confident that many of the scientific goals can be accomplished by upcoming missions such as the Space Infrared Telescope Facility (SIRTF), so it will be science delayed rather than science lost.”

At JPL, a review board led by Matt Landano, deputy manager of the Space Science Flight Projects Program Office, has begun to review the portions of the mission’s development for which JPL has responsibility and to support activities being conducted by the Goddard Space Flight Center in Maryland.

“Our team is in the very preliminary stages of its investigation,” Landano said, adding that the mission operations team at Goddard, which built the spacecraft, is analyzing flight data and “trying to develop their best understanding of what happened.”

“We must not rush to judgment,” said Landano, a JPL veteran who investigated anomalies on Galileo and other missions. “The key is for us to be objective, systematic and comprehensive in our investigation, and to try to find the root cause for what took place and to identify actions to preclude future occurrences.”

The eight-member JPL team, which will look into such issues as mission assurance, mechanical devices, cryostatic mechanisms and design, electrical systems, attitude control and dynamics, and test verification, is scheduled to complete its findings by early June.

Information gathered by the JPL and Goddard teams will also be used to support the NASA Headquarters–appointed review board.

Based on preliminary real-time data, spacecraft controllers believed the primary telescope cover was released about three days earlier than planned. As a result, sunlight began to fall on the instrument’s cryostat, a container of frozen hydrogen designed to cool the instrument to minus 260 Celsius (−436 Fahrenheit)—cold enough so that the telescope’s own heat emissions would not mask the infrared light that it would have attempted to detect in space.

The hydrogen then warmed up and vented into space at a much higher rate than it was designed to do, causing the spacecraft to spin. Controllers do not yet know what specifically caused the cover to be released.

As of March 11, controllers regained control of the spacecraft, returning it to three-axis operation.

NEAT surprise: Asteroid hunters find supernova

By JANE PLATT

Astronomers searching for asteroids headed toward Earth have stumbled upon a harmless but fascinating discovery—an exploding star, also known as a supernova. The supernova, named 1999am, is located in a galaxy about 650 million light-years away. (A light-year is the distance light travels in one year, about 9.5 trillion kilometers or 6 trillion miles.) The star was unknown to astronomers until it was captured by the camera on the JPL-managed Near Earth Asteroid Tracking (NEAT) system on Feb 18. The NEAT images show the star as it looked just a few weeks after the ancient explosion took place.

“We were fishing for salmon, and instead we caught a whale,” said Dr. Steven Pravdo, project manager and co-investigator for NEAT. “The project is designed to look for asteroids and other objects that might pose a potential hazard to Earth. This supernova discovery is an added bonus for astronomers in general.”

Supernova 1999am is a “Type Ia supernova,” which means that before it exploded, it was a white dwarf star in orbit with a companion star. Near the end of its life, the white dwarf captured so much material from its companion that it became too massive to support itself, and exploded with as much energy as 100 billion suns. The supernova is now nearly as bright as the galaxy surrounding it, which is known as CGCG 060-009.

NEAT, with asteroid hunter Eleanor Helin as principal investigator, has been in operation since December 1995. It uses a large, sensitive and fully automated charge-coupled device (CCD) camera mounted on a 1-meter-diameter (39-inch) telescope. The telescope is operated by the U.S. Air Force atop Mt. Haleakela on the island of Maui, Hawaii.

Since the middle of 1998, NEAT scientists have posted their data on a web site through a program called SkyMorph, a collaboration between JPL and NASA’s Goddard Space Flight Center in Maryland. While the NEAT project detects Earth-approaching objects by looking for celestial bodies that move over a period of time, the data can be used also to hunt for stationary objects that become brighter or dimmer over time. Thus, the images present a smorgasbord of astronomical options—NEAT scientists pick out asteroids, while other astronomers select various cosmic moonsels through the public SkyMorph web site.

“Through SkyMorph, astronomers may find an array of interesting objects, including supernovae,” said Pravdo, principal investigator for SkyMorph. “In this case, we sent our data directly to the Lawrence Berkeley National Laboratory in Berkeley, Calif. Dr. Greg Aldering and other scientists with their Supernova Cosmology Project immediately found 1999am.”

Pravdo said the Lawrence Berkeley scientists found the supernova by comparing images taken in February with previous NEAT data. They could clearly see a change in brightness, indicating the star had exploded and become a supernova. They further confirmed their finding with additional observations by ground-based telescopes. Feb. 18 marked the first time NEAT scientists forwarded new data directly to the Berkeley lab, and as Pravdo pointed out, “We struck paydirt.”

For information and an image of 1999am, go online to http://huey.jpl.nasa.gov/~spravdo/snanima.htm.

For more information on the NEAT project, go to http://huey.jpl.nasa.gov/~spravdo/leet.html.


We were fishing for salmon, and instead we caught a whale.
—Dr. Steven Pravdo, Near Earth Asteroid Tracking project manager, on unexpected supernova discovery
LightSAR proposals sought

By DIANE AINSWORTH

NASA is seeking proposals for a low-cost, advanced imaging radar technology that will reduce the cost and enhance the performance of Earth observing satellites—opening new opportunities for the U.S. commercial remote-sensing industry.

Managed by JPL, the Light-weight Synthetic Aperture mission, or “LightSAR,” is part of NASA’s long-term effort in the development and productive use of imaging radars. Past NASA radar missions, which have been short in duration, have established the potential of imaging radar to expand scientific knowledge of Earth and the planets.

The satellite’s capability to observe the Earth day and night in all weather is expected to result in numerous scientifically valuable and commercially lucrative applications. For example, LightSAR will have the unique capability to continuously monitor minute changes in the Earth’s surface, down to the one-millimeter level, which will lead to improved understanding of natural hazards such as earthquakes and volcanoes.

The satellite’s advanced capabilities also will greatly help improve governments’ emergency management efforts and may prove useful to industries involved in disaster recovery. Other applications of the satellite will include observing the movements and changing size of glaciers and ice floes as part of long-term Earth climate studies. Forest regrowth and global vegetation maps produced by LightSAR will support NASA’s on-going studies of the Earth’s environment.

LightSAR’s high-resolution imaging capability has significant commercial potential for mapping the Earth’s surface, environmental surveillance, crop monitoring and land management, planning and development. One of the unique features of this NASA program will be to encourage proposers to share the costs of developing and deploying the satellite’s capabilities in return for commercial rights to data.

Besides NASA centers, proposals for mission development and operations using LightSAR are being sought from many organizations, including educational institutions, industry, nonprofit institutions, federally funded research and development centers and other government agencies. The LightSAR announcement of opportunity is available via the Internet at http://www.earth.nasa.gov/nra/current.

Proposals must be submitted by May 10, 1999. Further information about the LightSAR mission is available from Richard Monson, NASA’s associate director for exploratory missions, at (202) 358-3552, or via e-mail to oesresponse@hq.nasa.gov.

On the first day of the mapping phase of Mars Global Surveyor’s mission, the spacecraft’s camera was greeted with this view of “Happy Face Crater” on the east side of Argyre Planitia. The crater is officially known as Galle Crater, and it is about 215 kilometers (134 miles) across.

The Mars Global Surveyor spacecraft successfully began its prime mapping mission at 4 p.m. Pacific time on March 8.

The spacecraft is executing a sequence of commands with its high-gain antenna in a fixed position. During this sequence, Global Surveyor records science data for nine orbits (about 18 hours) when all the instruments are pointed at Mars and then spends three orbits (about six hours) pointed at Earth playing back the data.

During the playback orbits, the flight team can receive data from Global Surveyor only when the spacecraft is in view of Earth. For about half of each orbit, there is no communication with the spacecraft because it is behind Mars and out of view.

Dr. Yu Wang, PI.

Active Pixel Sensor Technologies.

Dr. William Smythe, PI.

Surface Plasmon Tunable Filter and Spectrometer for In-Situ Measurements of Atmospheric and Evolved Gases on Mars, Titan, Venus and Europa.

Dr. Christopher Webster, PI.

“Spectrometer-on-Chip Using Surface Plasmon Tunable Filter and Active Pixel Sensor Technologies.”

Dr. Yu Wang, PI.

“Quantum-Cascade Laser Spectrometer for In-Situ Measurements of Atmospheric and Evolved Gases on Mars, Titan, Venus and Europa.”

In addition, Kaufman said, JPL has a major role in one other selected investigation: “Miniature Geochronology Instrument for Surface Deployment on Mars: Breadboard Development.” Prof. Brian Stewart of the University of Pittsburgh is PI, with Drs. Greg Cardell and Mahadeva Sinha as JPL co-investigators.

Kaufman noted that recent successful JPL instrument developments that started out as PIDDP investigations include the Miniature Integrated Camera Spectrometer (MICAS), now flying on Deep Space 1; components of the Mars Volatiles and Climate Surveyor (MVACS) on Mars Polar Lander, and the Raman spectrometer, set for Mars rovers on the 2003 and 2005 missions.

About a dozen other JPL-developed instruments have received funding through the program, he added.

At JPL, the program is managed by the Planetary Advanced Instruments Office 712.

The 1999 NASA research announcement for the program is available online at http://space-science.nasa.gov/nra/99-oss-01.

Proposals are due Aug. 4.

For more information, contact Kaufman at ext. 3-1228.

Investigators of recently funded PIDDP proposals, from left, top row: Drs. Isik Kanik, William McGrath, Christopher Webster, Jaroslava Wilcox, Greg Cardell and Mahadeva Sinha. Front row: Drs. Soon Sam Kim (left) and Yu Wang.

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Dr. Jaroslava Wilcox, PI.

Instruments Office 712.

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Art students present unique ideas for future inflatables

By JOHN G. WATSON

As NASA shifts toward faster, better, cheaper missions to Mars, the pressure to decrease hardware weight, volume and cost is accelerating. One unique response has been the development of ultra-lightweight inflatable technologies, ranging from antennas and solar arrays to rovers and solar sails, launched folded up like origami and expanded to full-scale size when needed.

A current Art Center College of Design course with the evocative title of “Project X” is devoted exclusively to the development of “out-of-the-box” ideas for inflatable technologies with potential use for future NASA robotic outposts on Mars—ideas that may seem right out of science fiction.

Rules include: laws of physics can’t be broken; there should be a reasonable chance of deployment by 2030; and the simpler, more astonishing, creative, imaginative and unusual, the better.

As their mid-term, students at the Pasadena campus presented their ideas individually and in small groups to JPL’s Mike Sander, Brian Wilcox, Brian Cooper and Art Chmielewski on March 10. Also on hand—serving to make the young students noticeably nervous (as if the presence of savvy JPL engineers hadn’t already served that purpose)—was the Pasadena Star News, which described the projects as “igloo-like shelters, cars propelled by blow-up sails and a robotic roll of what looked like bubble wrap, but could focus the sun’s rays with its individual cells to fuse Martian sand into bricks.”

Other projects included a pod of inflatable probes that would store oxygen and electricity for use by human explorers on subsequent missions and toy rovers whose owners would receive personally tweaked science data directly to their home PCs.

“In the past, some of the most creative ideas for new inflatable technologies have emerged from brainstorming sessions during which entirely new ways of approaching problems have been put on the table,” said Space Inflatable Technology Manager Art Chmielewski, who has provided JPL guidelines for the class since its inception. “Now students with fresh design ideas are adding their perspectives to this creative mix, using their talents to push the limits of imagination in the robotic exploration of Mars.”

Art Center College of Design graduates are leaders in the new design of such familiar consumer products as automobiles, bicycles, furniture and telephones. Art Center is an internationally recognized, independent college offering bachelor or master degrees in advertising, environmental design, film, fine art, graphic design, illustration, photography, product design and transportation design.
News Briefs

Dr. Robert T. Menzies, manager of JPL’s Microwave and Lidar Technology Section 386, has been named division editor of the Optical Society of America’s most widely read journal, Applied Optics.

In this capacity, Menzies will oversee the publication’s Lasers, Photonics and Biomedical Optics section, one of three categories of optics featured each month. The section covers issues such as laser systems, laser materials and design, optoelectronics, laser instrumentation, atmospheric optics and propagation, lidar and remote sensing, meteorological optics and ocean optics.

Menzies has been with JPL since 1970, and has managed Section 386 since 1997. Previously, he supervised the section’s Laser Remote Sensing Group.

The JPL Library now offers ComputerSelect, a new information resource that provides a wealth of information on computer-related products and companies. Hardware, software and applications are all covered.

Profiles of companies and product specifications can be retrieved, as well as articles about those companies and products. Product charts can be created to make comparisons of features such as price, date announced, compatibility and parameters specific to the type of product. Searching for information is flexible and can be done in a variety of ways.

ComputerSelect also has a glossary of computer-related terms and up-to-the-minute news from national news organizations.

To access ComputerSelect, go to the library’s Beacon home page at http://beacon and click on Electronic Abstracts & Indexes, then click on ComputerSelect from the resulting page.

Librarian Barbara Amago said the JPL site license for the system allows for three concurrent users, but the allocation will be increased with high demand.

Employee briefings on ComputerSelect will be included in the activities planned for Tuesday, April 13, during the library’s annual National Library Week festivities. Briefings will be held in Building 111-11 at 11 a.m. and 1:30 p.m. on that day.

For more information, contact the JPL Technical Library reference desk at ext. 4-4200.

Passings

Henry Cox, 72, retired from the former Telecommunications and Data Acquisition Office 440, died of heart failure Jan. 7.

Cox joined the Laboratory in 1977. He served as tracking and data systems mission manager for Pioneer 10, which flew by Jupiter in 1973, and Pioneer 11, which flew by Jupiter in 1974 and Saturn in 1979. He also served in that capacity for the final Voyager encounter in 1989, and continued in that position until his retirement in 1994.

Cox is survived by his wife, Billie, and three children.

Funeral arrangements were private.

Stephen Yager, 80, a retired design engineer in Section 356, died of cancer Feb. 28.

Yager joined JPL in 1956 and retired in 1984. He is survived by his wife, Adele, and daughter Marilyn.

Funeral arrangements were private.

TOPEX

Continued from page 1

heights, produced global maps of winds and waves, and detailed land and ice-sheet topography since 1992. It has recorded billions of time-specific measurements of ocean and topography to an accuracy of approximately 3 centimeters (1.2 inches).

An international team of scientists has used the data to study global climate changes and such phenomena as the El Niño warming pattern in the Pacific Ocean, which occurs about every two to seven years, and a reverse trend, known as La Niña, which seems to follow El Niño winters and cools large expanses of ocean water. (See accompanying story.)

Although the primary altimeter, or “side A,” is still operational, components have started to degrade from wear and tear on the satellite. The operations team—played five rounds, followed by a double-elimination tournament for the top eight teams. Competitors answered questions on biology, chemistry, physics, astronomy, Earth science, computer science and mathematics.

The Troy team and its coach, Kurt Wahl, will go on to the nationals this spring at the 4-H Center near Washington, D.C., all expenses paid.

Members of Troy’s team, along with that of the second- and third-place finishers at the JPL regional—Woodbridge High School of Irvine and Palos Verdes High School of Rolling Hills Estates, respectively—each earned a space robotics model and tickets to the Aquarium of the Pacific in Long Beach and Knott’s Berry Farm in Buena Park.

Troy High takes Science Bowl regional at JPL

Troy High School of Fullerton defeated 23 teams from Los Angeles and Orange counties in regional competition of the National Science Bowl Feb. 20 at JPL, and will go on to represent Southern California in national competition this spring.

Modeled after the “College Bowl” television show of the 1960s, the competition was first organized by the U.S. Department of Energy in 1991.

The competition started with a round-robin event in which every team—represented by four students and one alternate—played five rounds, followed by a double-elimination tournament for the top eight teams. Competitors answered questions on biology, chemistry, physics, astronomy, Earth science, computer science and mathematics.

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Niña
Continued from page 1

highway known as the ‘jet stream,’” said JPL oceanographer Dr. William Patzert.

“It funnels storm tracks to the Pacific Northwest, which has resulted in heavy rainfall and lots of snow in that region so far, as well as the upper Midwest. Much of the Southwest, by contrast, has been shielded from stormy weather and, as a result, has received significantly less precipitation than normal to date.

“This year’s La Niña was in average its intensity, but at its peak, it was associated with a 15- to 20-centimeter deep trough (6 to 8 inches) in the central tropical Pacific,” Patzert said. “The depression was correlated with a 2- to 3-degree Centigrade (about 3.5 to 5.5 degrees Fahrenheit) dip in normal ocean surface temperatures.”

The image also shows that the very large, unusual area of higher or warmer water (shown here in red and white) in the western Pacific Ocean, from the tropics to the Gulf of Alaska, continues to expand. Although the appearance of this feature is not fully understood, it is recognized as influential to overall weather and climate.

The white areas in the image indicate that the sea-surface height is between 14 and 32 centimeters (6 to 13 inches) above normal; in the red areas, sea-surface height is about 10 centimeters (4 inches) above normal. The green areas indicate normal conditions. The purple areas are between 14 to 18 centimeters (6 to 7 inches) below normal, and the blue areas are between 5 to 13 centimeters (2 to 5 inches) below normal.

TOPEX
Continued from page 6

expected to be able to use side B of the altimeter for the next several years, but will be able to switch back to side A if necessary, Hancock said.

The Wallops Flight Facility Observational Science Branch, Wallops Island, Va., which is part of NASA's Goddard Space Flight Center Laboratory for Hydro-spheric Processes, worked with the JPL science and engineering team to provide specifications for using the backup altimeter system. The team, in conjunction with members of Goddard's Applied Engineering and Technology Directorate, Greenbelt, Md., was responsible for designing the fully qualified, backup altimeter, built by the Johns Hopkins Applied Physics Laboratory in Baltimore.

LETTERS

The Vosicky family would like to express their deep appreciation for the kindness expressed by the JPL community at the passing of their father, Gene Vosicky. It is comforting to know that we have so many caring and good friends at JPL.

Gene and Paulette Vosicky

My family and I would like to thank my friends and co-workers at JPL for the beautiful plant and their expression of thoughts and prayers for the beautiful card and baby shirt.

My family and I would like to thank my friends and co-workers at JPL for their kind thoughts and prayers during the recent passing of my mother-in-law. A special thanks to the JPL ERC Club for the lovely plant and their expression of sympathy.

Sonia Mejia

FOR SALE

AUDIO EQUIPMENT: Yamaha pre-amp, Dolby surround sound decoder, many av inputs, univ. remote, exc. cond., $99/obo.

BEDROOM SET: youth platform bed, bookcase, headboard, armoire, desk/w/hutch, all heavy oak, great shape, over $4,000 new, sell $1,400. 626/447-6423.

BEDROOM SET, oak, large dresser (5 shelves), dressing table with 9 shelves and mirror, headboard, end table, TV stand, vg cond., $249/obo for all. 909/527-2279.

BICYCLES (2): specialized 1991 Allez, 23-inch (58.4-cm) cond., $249/obo for all. 909/592-2279.

CHINA SET, 60 pieces for $70/obo. 909/585-0038.

COMPUTER, laptop, Toshiba Satellite Pro, Intel Pentium 90, 1.2GB HD, 16MB RAM, 4x removable CD-ROM, 3.5" removable floppy, color display, Win95 and MS OFFICE 97, includes $50 1.2GB HD, 16MB RAM, 4x removable CD-ROM, 3.5" removable floppy, color display, Win95 and MS OFFICE 97, includes $50

DECORATIVE ITEMS: collectibles, Spanish tall ship in the SF Bay, one of a German tall ship taken by a professional photographer, vg condition; one of a pair of triathlon or standard drop bars, Look pedals, $410 firm; Fuji 12 speed road bike, 26" tires, $75/obo.

ELECTRONICS: used Peavey equipment 2 - T-300 high-freq. projector 12" woofer midrange horn tweeter; 1 - standard pa mixer amp, 4 inputs, $350 firm, 626/305-0886, Shirley.

ELECTRONICS: Cardioglide, $75; miscellaneous equipment, $10-$25. 626/441-1496 or jeanmg_98@yahoo.com.


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ELECTRONICS: cassette player, many a/v inputs, univ. remote, exc. cond., $99/obo. 366-6134.

ELECTRONICS: decoder, many a/v inputs, univ. remote, exc. cond., $99/obo. 366-6134.

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Photos
JPL Photo Lab

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Volume 8, Number 52
March 19, 1999

LA CRESCENTA house, quiet cul-de-sac in highlands, upper Briggs Terrace, 3 bd., 2 ba., 2-car garage, fenced yard, large deck, washer/dryer, new refrigerator, built-in microwave, $1,850 security, 249-3204, Mike or Ann.

PASADENA, share 3-bd., 3-ba. apt. with Caltech post-doc; fully furnished, all utilities/Internet paid, 249-6057, Marc Rayman.

PASADENA townhouse-style apt, nr. PCC, 2 bd., 1½ ba., built-in range & dishwasher, parking, central air, new pool, spa, laundry, dis
card, pwr. space, $725. 790-7062.

PASADENA, roommate wanted to share 2-bd., 2-ba., apt., secure parking, central air, convenient area; non-smoker, no pets; $565. 626/792-9503, Marilyn.

REAL ESTATE

BIG BEAR, new cabin 2 blocks from lake, 2 bd., 2 ba., mud/laun-
dry room, $129.00. 909/585-9026.

IDYLWILD min. home, 2 bd., 1½ ba., located on 0.6 acres, great view; Gardner Valley, large deck, $750. 626/789-1574.

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long term, newly remodeled, w/skylight, patio & 2-car garage; located across the Living Desert, great private, secure resort w/tennis cts., multiple pools & spas and clubhouse facilities; great location, around 2 top resorts. 909/620-1364.

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BIG BEAR LAKE cabin, near lake area, lake, shops, village, for
est, bd. sleeps up to 6, fireplace, TV, VCR, phone, microwave, BBQ & more; all drapes, fully furnished, large fireplace, TV/VCR, $75/night. 249-8451.

BIG BEAR LAKEFRONT lux. townhome, indoor pool/spa, nr. ski
gate, beautiful bd. sleeps up to 14; $275 per night up to $1,250/week for family. 249-8451.

HAWAII, Kona oceanfront condo on Big Island of Hawaii; 1 bd., 1 ba., dock, 150 yards from ocean, very good, fully furnished, all amenities and good restaurants nearby; week of July 9-16 only (timeshare), $500/week. 790-8069.

HAWAII, Mauo condo, NW coast on beach w/ocean views, 25 ft. surf, 1 bd. w/tv, full compr. furn., phone, color TV, VCR, microwave, dishwasher, pool, priv. lanai, sips. 4/15-12/14 rate: $95/night/2, $10/night/add'l person. 949/538-8047.

HAWAII, Oahu, certificate good for 1-2 adults, 4 nights accommodations, airfare not included, expires June 30, 2000. 626/917-0231.

LAKESIDE, 2 bd., 2½ ba., sleeps 6, great loca
tion, all amenities, large sports complex, boats, pool, golf course, fish in 150 yards from door, 2 miles to casinos, JPL dist. rate, book now for summer. 626/355-3886, Rosemary or Ed.

MAIMAMO condo in Chaminon at 17 8, 16, 17; walk to Waimanalo Beach, sleeps up to 17, HVAC, W/D, fridge, freezer, eating
dine, microwave, & extras, flip-wpd. color TV, VCR, FMD, sd. Jaz.; sauc.; gm.; reg. & Indy. rms., walk to shops, lift(s); spec. medike rates, 249-8952.

MAIMAMO condo, studio + loft, 2 bd., fire w/sicult for sale, Juczau, sauc., game rm., color cd. TV/CVCR, full kitchen w/mincer, terrace, view, amen. 714/870-1872.

MAZATLAN, week of 10/11-17, 7 nites, Pueble Bonito resort, 1 bd., sleeps 6, on the beach, partial kitchen, airfare not included, $1,050. 626/917-0231.

OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier or harbor, pool, spa, game rm., sleeps 4. 495/949-6548.

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PABLO, 1 bd., sleeps 4; all in town, fully furnished, 1½ blocks from fishing, $129,000. 909/585-9026.

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