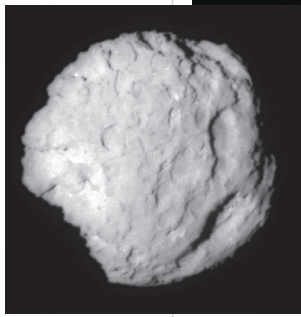
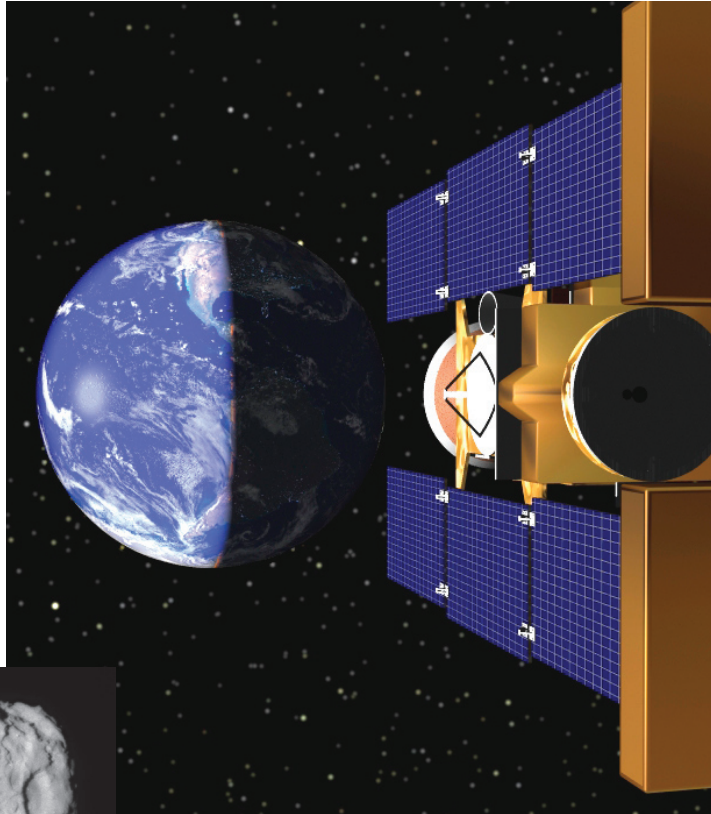


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Stardust is on its way home

By DC Agle



Comet Wild 2, which Stardust flew by on Jan. 2, 2004.

The JPL-managed Stardust mission is nearing Earth

after a 4.63 billion-kilometer (2.88 billion-mile) round-trip journey to return cometary and interstellar dust particles back to Earth. Scientists believe the cargo will help provide answers to fundamental questions about comets and the origins of the solar system.

Ten days before its return to Earth with the first-ever samples from a comet, Stardust successfully performed its 18th flight path adjustment. This second-to-last scheduled maneuver puts the spacecraft on the right path to rendezvous with Earth on Jan. 15 (Universal Time), when it will release its sample return capsule.

At 10 a.m. Pacific Time on Thursday, Jan. 5, Stardust fired all eight of its 1-pound thrusters for a total of 107 seconds, changing the comet sampler's speed by 2.4 meters per second (about 5.4 mph). A final trajectory correction maneuver is scheduled prior to release of the sample return capsule.

"It was a textbook maneuver," said Ed Hirst, Stardust deputy mission manager at JPL. "After sifting through all the post-burn data, I expect we will find ourselves right on the money."

The velocity of the sample return capsule, as it enters Earth's atmosphere at 46,440 kilometers per hour (28,860 mph), will be the fastest of any human-made object on record. It surpasses the record set in May 1969 during the return of the Apollo 10 command module. Stardust will release its sample return capsule at 9:57 p.m. Pacific Time on Saturday, Jan. 14. Four hours later, the capsule will enter Earth's atmosphere 125 kilometers (410,000 feet) over the Pacific Ocean.

Landing will take place at the U.S. Air Force Utah Test and Training Range, southwest of Salt Lake City. The capsule will release a drogue parachute at approximately 32 kilometers (105,000 feet). Once the capsule has descended to about 3 kilometers (10,000 feet), the main parachute will deploy. The capsule is scheduled to land on the range at 2:12 a.m. Pacific Time. When the capsule reaches the ground, it will be traveling at approximately 4.5 meters (14.8 feet) per second, or about 16 kilometers per hour (10 mph).

The landing area for the capsule is about 44 by 76 kilometers (27 by 47 miles), an ample space to allow for aerodynamic uncertainties and winds that might affect the direction the capsule travels in the atmosphere.

After the capsule lands, if conditions allow, a helicopter crew will fly it to the U.S. Army Dugway Proving Ground, Utah, for initial processing. If weather does not allow helicopters to fly, special off-road vehicles will retrieve the capsule and return it to Dugway. Samples will then be moved to a special laboratory at NASA's Johnson Space Center, Houston, where they will be preserved and studied. Plans call for the canister to be opened two days after landing.

"Locked within the cometary particles is unique chemical and physical information that could be the record of the formation of the planets and the materials from which they were made," said Dr. Don Brownlee of the University of Washington, the Stardust principal investigator.

"Comets are the best preserved samples of the initial material that actually made the sun and Earth and planets, and even ourselves," Brownlee said. "So this is a history project. Even though we only went halfway to Jupiter, we're effectively going to the edge of the solar system as it was 4-1/2 billion years ago."

NASA expects most of the collected particles to be no more than a third of a millimeter across. Scientists will slice these particle samples into even smaller pieces for study.

For more information on the mission, visit <http://www.nasa.gov/stardust>.

As Stardust finds its way home, several other key events are in store for JPL as the new year unfolds. Here's a preview of what's to come in 2006.

JPL's next mission to the red planet, the Mars Reconnaissance Orbiter, is on course to reach Mars on March 10. After gradually adjusting the shape of its orbit for half a year in a process called aerobraking, it will begin its primary science phase in November 2006. From the mission's planned science orbit about 300 kilometers (186 miles) above the surface of Mars, the high-resolution camera will be able to discern features as small as 1 meter (1 yard) across.

Launched Aug. 12, 2005, Mars Reconnaissance Orbiter will deliver over the course of its science mission more data about Mars than all previous missions combined. The orbiter's instrument payload will study water distribution—including ice, vapor or liquid—as well as geologic features and minerals. The orbiter will also support future missions to Mars by examining potential landing sites and by providing a high-data-rate relay for communications back to Earth.

Its next scheduled trajectory maneuver, on Feb. 1, and another one 10 days before arrival, will be used, if necessary, for fine tuning. When it reaches Mars it will join several other active missions, including JPL's Mars Exploration Rovers and the orbiters Mars Global Surveyor and Mars Odyssey.

In Earth science, the CloudSat satellite awaits a launch date in 2006. The mission will be the first spacecraft to study clouds on a global basis. The satellite will use an advanced radar to "slice"

through clouds to see their vertical structure, providing a completely new observational capability from space (current weather satellites can only image the uppermost layers of clouds). CloudSat's primary goal is to furnish data needed to evaluate and improve the way clouds are represented in global models, thereby contributing to better predictions of clouds and thus to their poorly understood role in climate change and the cloud-climate feedback. It will join nine other active JPL Earth science missions that have satellites or instruments in orbit.

Another mission that has a pending launch date is Dawn. The first spacecraft ever planned to orbit two different bodies after leaving Earth, Dawn will orbit Vesta and Ceres, two of the largest asteroids in the solar system. Pending a current NASA review, the launch could be no sooner than December.

2006 will be a busy year for the Cassini spacecraft at Saturn. After reaching the ringed planet in 2004 and delivering the European Huygens probe to the surface of Saturn's moon Titan early in 2005, the spacecraft spent many of its early orbits visiting several of Saturn's large, icy moons. During 2006 it will focus on Titan, with a total of 13 targeted flybys. The twin Voyagers and Ulysses also remain active.

Peering into deeper space beyond the solar system, the Spitzer Space Telescope and the Galaxy Evolution Explorer observe at different wavelengths in the infrared and ultraviolet, respectively. Both will note their three-year launch anniversaries during 2006.

For more on JPL's missions, visit <http://www.jpl.nasa.gov/missions>.

Coming up in 2006

News Briefs

New chief technologist named

DR. PAUL DIMOTAKIS has been named JPL's new chief technologist, effective Jan. 30. Dimotakis replaces DR. ERIK ANTONSSON, who will return to Caltech at the end of January to resume his research and teaching activities.

Dimotakis was selected as the result of a search led by a joint JPL/Caltech committee. JPL Director DR. CHARLES ELACHI said that Dimotakis' expertise, experience and prominence in the research and technology community were an outstanding match for the position of JPL's chief technologist.

Dimotakis is a professor of both aeronautics and applied physics at Caltech, where he earned his B.Sc. in physics, M.Sc. in nuclear engineering, and Ph.D. in applied physics. He then stayed on as a member of the Caltech faculty, moving up the ranks to the endowed chair in 1995. His research has focused on superfluidity, turbulent flow phenomena, combustion, hypersonic flow and propulsion, laser diagnostics, high-speed image data acquisition and computational adaptive optics.

His space-related activities began while an undergraduate at Caltech, under former JPL Director DR. ED STONE, with work on the Orbital Geophysical Observatory-C satellite in the 1960s. He has also worked on the space shuttle, Mars Pathfinder, the Spitzer Space Telescope, and the analysis of the Shuttle Columbia failure.



Dr. Paul Dimotakis

Maleki earns two fellow honors

DR. LUTE MALEKI, a senior research scientist and supervisor of the Quantum Sciences and Technology Group, has been elected a fellow of both the American Physical Society and the Optical Society of America.

These two recognitions, added to Maleki's previous election as a fellow of the Institute of Electrical and Electronics Engineers, places him amongst a selected few individuals in technical fields who have been elected a fellow of three professional societies.

The Optical Society of America this fall recognized Maleki for unique contributions to the science and technology of optical generation of microwave references and optical whispering gallery mode microresonators. Only 48 society members were elevated to the rank of 2006 fellow, with the number of fellows being limited to only 10% of total membership.

In November, peers in the American Physical Society's Topical Group on Fundamental Constants recognized Maleki for seminal contributions to the science and technology of frequency standards and their applications to tests of fundamental physics. Election to fellowship is limited to only one half of 1% of the membership.

Maleki's 2000 election to fellow of the Institute of Electrical and Electronics Engineers was for contributions to the science and technology of frequency standards.



Dr. Lute Maleki

Hadaegh named AIAA fellow

DR. FRED HADAEGH, a senior research scientist and technical supervisor for the Guidance and Control Analysis Group, has been elected a



Dr. Fred Hadaegh

fellow of the American Institute of Aeronautics and Astronautics.

Hadaegh received the honor "for advances in the theory, computation and implementation of autonomous navigation, guidance and control."

Hadaegh, who also is the manager of JPL's Distributed Spacecraft Technology Program, joined the Lab in 1984. His research interests are in the areas of system identification, estimation theory and spacecraft control analysis and design. He has published extensively on mathematical modeling of uncertain systems, parameter identifiability, identification and control of large space structures and autonomous control of formation flying space systems.

Im receives fellow designation

For his contributions to spaceborne atmospheric radar remote sensing, DR. EASTWOOD IM, radar instrument manager for the CloudSat project and supervisor of the Atmospheric Radar Science and Engineering Group, has been elected a fellow of the Institute of Electrical and Electronics Engineers.



Dr. Eastwood Im

Im has extensive experience in spaceborne meteorological radar science remote sensing, radar design and advanced technology. He was the first instrument architect of the multi-functional radar for the Cassini mission to Saturn during the pre-project phase (1987-1991), and went on to become the system engineer of that instrument until its launch in 1997.

Im has been a member of NASA's Tropical Rainfall Measuring Mission Science Team, the Earth Observing System Aqua calibration science team, and the precipitation measurement missions science team, focusing on the studies of advanced radar techniques and algorithms for precipitation and cloud parameter retrievals and calibration. Since 1998, he has been the principal investigator of several NASA studies, developing new radar technologies for future spaceborne atmospheric science missions.

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, January 17

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

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

"New Neighbor in the Sky"—Dr. Mike Brown, Caltech professor of planetary astronomy, will speak from noon to 1:30 p.m. in the campus' Beckman Institute Auditorium. For the past seven years, astronomers around the world have been exploring the sky for planets beyond the orbit of Pluto. After a search of about half of the sky and the discovery of dozens of objects almost the size of Pluto, Brown and his team finally detected the first object larger than this much-debated member of our solar system, one that they are willing to call a new planet. This event is free. For more information, e-mail cma.announce@jpl.nasa.gov or call Doris Shimabukuro, (626) 395-3652.

Wednesday, January 18

Investment Advice—TIAA/CREF will offer one-on-one counseling in T1720. For an appointment, visit www.tiaa-cref.org or call (626) 432-6363, ext. 2614.

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.

"The Coming Revolution in Pharmaceuticals: Structures and Function From Theory and Computation"—Dr. William Goddard, professor of chemistry, materials science and applied physics and director of Caltech's Materials and Process Simulation Center, will speak at 8 p.m. in Caltech's Beckman Auditorium. Free admission. For more information, call (626) 395-4652 or visit www.events.caltech.edu.

Thursday, January 19

"Unity and Freedom, the Building Blocks For Tomorrow"—A celebration of the lives of Dr. Martin Luther King Jr. and Rosa Parks will be held from 11 a.m. to 12:30 p.m. in von Kármán Auditorium.

Friday, January 20

Caltech Women's Club—A "Welcoming Coffee" will be offered from 5:30 to 7 p.m. at the Rathskellar in the Athenaeum. Prospective new members are invited. For more information, contact Katie Clark, (626) 403-7163, ktclark@caltech.edu, or Vilia Zmuidzinas, (626) 398-4413, vilia@caltech.edu.

Saturday, January 21

Folk Music—Guitarist Chris Proctor will perform at 8 p.m. in Caltech's Beckman Institute Auditorium. Tickets are \$15 for adults, \$5 for children under 12. For more information, call (626) 395-4652 or visit www.folkmusic.caltech.edu.

Monday, January 23

"Musique Du Monde"—This Jazzlike Notes event, in collaboration with the Pasadena Symphony, will be presented at 8 p.m. in Caltech's Ramo Auditorium. Free admission. For more information, call (626) 395-4652 or visit www.events.caltech.edu.

Tuesday, January 24

TIAA/CREF Enrollment Meeting—This workshop, to be held at noon in T1720-137, is designed to assist employees newly eligible for the Caltech/JPL retirement plan with selection of investment options and the completion of their enrollment forms.

"Your Retirement Income Options"—This workshop will be held in T1720-137 from 10 to 11:30 a.m. and is designed for employees who are within a few years of retirement. This program provides a comprehensive discussion of all of TIAA/CREF's income options.

Wednesday, January 25

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.jplcaltechtostmasters.com.

Thursday, January 26

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.

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

JPL Stories—Pete Theisinger, deputy director of the Mars Exploration Program and former Mars Exploration Rover project manager, will present "MER: A Retrospective from the Top" at 4 p.m. in the Library, Building 111-104. If you have questions about the story series or wish to participate, contact Teresa Bailey at ext. 4-9233.

"Science of Magic and Illusion"—Magician Bob Friedhoffer will deliver this free lecture at 8 p.m. in Caltech's Beckman Auditorium. For more information, call (626) 395-4652 or visit www.events.caltech.edu.

Thu.-Fri., January 26-27

Von Kármán Lecture Series—Join JPL oceanographer and Earth Mission Concepts Group supervisor Dr. Paul Digiacomo for "Observations of an Urban Ocean: The Coastal Waters off Southern California" 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 jpl.nasa.gov/events/lectures/jan06.cfm. For more information, call Public Services at ext. 4-0112.

Saturday, January 28

Great Natural Wonders of the World—This high-definition film screening at 2 p.m. in Caltech's Beckman Auditorium will be followed by a discussion with a Caltech scientist. Admission is \$5 (unreserved seating). For more information, call (626) 395-4652 or visit www.events.caltech.edu.

Monday, January 30

Investment Advice—TIAA/CREF will offer one-on-one counseling in T1720. For an appointment, visit www.tiaa-cref.org or call (626) 432-6363, ext. 2614.

Retiree receives Air Force honors, 60 years later



Photo courtesy of Jarric van der Woude

Col. Scott Grundabl, commanding officer at the Air Force's ROTC detachment at USC, presents honors to Frank Colella.

More than 60 years after his military service ended, former JPL Public Affairs Manager Frank Colella has finally received recognition for his heroics for the U.S. Air Force in World War II.

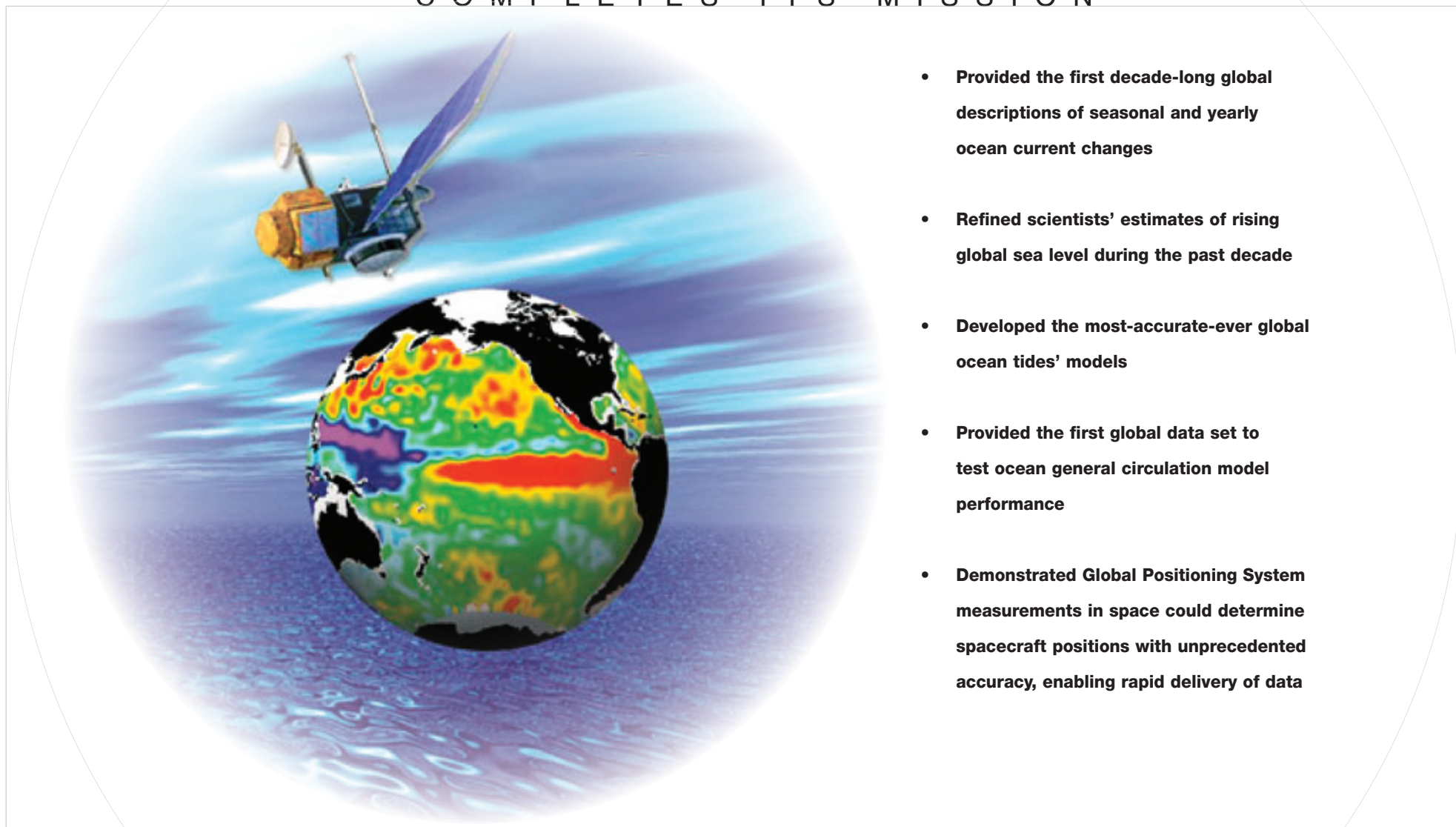
In December ceremonies at his La Cañada home, friends, family and former co-workers saluted Colella as he was presented the Distinguished Flying Cross and two other air medals.

Colella flew 37 missions over German-occupied Europe as part of the 44th Bombardment Group. He was informed of his awards when he left the service in 1944 but procedural snafus caused the long delay. He credited friend Robert Lee Aston, a former Air Force navigator and now an attorney from Georgia, for seeing the paperwork through.

Colella worked at JPL from 1959 to 1988. The ceremonies included presentation of a certification of appreciation from the office of Congressman David Dreier.

Topex/Poseidon

COMPLETES ITS MISSION



- **Provided the first decade-long global descriptions of seasonal and yearly ocean current changes**
- **Refined scientists' estimates of rising global sea level during the past decade**
- **Developed the most-accurate-ever global ocean tides' models**
- **Provided the first global data set to test ocean general circulation model performance**
- **Demonstrated Global Positioning System measurements in space could determine spacecraft positions with unprecedented accuracy, enabling rapid delivery of data**

By Alan Buis and Rosemary Sullivant

After a remarkable 13-year voyage of discovery, Topex/Poseidon, the first great oceanographic research vessel to sail into space, has ended its mission.

A joint mission of NASA and France's space agency, Centre National d'Etudes Spatiales, Topex/Poseidon lost its ability to maneuver and ceased operations after nearly 62,000 orbits of Earth.

The satellite's pitch reaction wheel, which helps keep the spacecraft in its proper orbital orientation, stalled on Oct. 9, and ground controllers concluded the wheel was not functioning. The satellite remains in orbit 1,336 kilometers (830 miles) above the Earth, posing no threat to the planet.

The end of the mission was announced in a NASA statement this month.

Launched in 1992 to make precise measurements of the ocean surface, Topex/Poseidon was watching in 1997 when the largest El Niño in 100 years changed weather patterns around the world. "Topex/Poseidon didn't discover El Niño," said Project Scientist Dr. Lee-Lueng Fu, a JPL oceanographer, "but it did give us our first global perspective on this and other short-term climate events such as La Niña. It allowed us to follow their evolution and showed that these events weren't limited just to the tropics. It also gave us evidence of even longer-lasting phenomena."

Topex/Poseidon data have also helped in hurricane forecasting, ocean and climate research, ship routing, offshore industries, fisheries management, marine mammals' research, modernizing global tide models and ocean debris tracking.

"Topex/Poseidon was built to fly up to five years, but it became history's longest Earth-orbiting radar mission," Fu said. "It provided, on average, more than 98 percent of the science data it was designed to collect in every 10-day measurement cycle, a remarkable achievement."

The mission's most important achievement was to determine the patterns of ocean circulation—how heat stored in the ocean moves from one place to another. Since the

ocean holds most of the Earth's heat from the sun, ocean circulation is a driving force of climate. "Topex/Poseidon has given us the longest and most complete observations of surface circulation in the deep ocean," Fu said. Topex/Poseidon made it possible for the first time to compare computer models of ocean circulation with actual global observations and use the data to improve climate predictions.

Another of the mission's major accomplishments was to map global tides for the first time. "Tides are the most visible changes in the ocean on a daily basis," Fu explained. "They are important for navigation, they have a big role in biological activity and they are the major source of mixing in the ocean. The mixing may be small in scale, but it has a huge effect." Before Topex/Poseidon, tides in the open ocean could only be estimated.

Topex/Poseidon was the first mission to demonstrate that the Global Positioning System could be used to determine a spacecraft's exact location and track it in orbit. Knowing the satellite's precise position, to within 2 centimeters (less than 1 inch) in altitude, was a key component in making accurate ocean-height measurements possible.

The ocean is a different place now than it was when Topex/Poseidon first set sail. The sea is warmer than it was and is getting warmer faster. Global sea level is rising. Heat in the tropics is moving northward more slowly. In some regions, some currents are faster while others are slower than in the past. "The biggest lesson from Topex/Poseidon is that the ocean is changing all the time," Fu said, "and it is changing rapidly."

"Topex/Poseidon was a unique mission that attracted users around the world, including more than 600 scientists in 54 countries," noted Dr. Yves Menard, Topex/Poseidon project scientist at Centre National d'Etudes Spatiales in Toulouse, France.

The mission's data have been the subject of more than 2,100 research publications. Major science and application achievements include:

- Provided the first decade-long global descriptions of seasonal and yearly ocean current changes

- Refined scientists' estimates of rising global sea level during the past decade

- Developed the most-accurate-ever global ocean tides' models

- Provided the first global data set to test ocean general circulation model performance

- Demonstrated Global Positioning System measurements in space could determine spacecraft positions with unprecedented accuracy, enabling rapid delivery of data.

"Topex/Poseidon revolutionized oceanography by giving us the first global ocean observing system," said Massachusetts Institute of Technology oceanographer Dr. Carl Wunsch, one of the mission's architects and early champions. Oceanographer Dr. Walter Munk, from the Scripps Institution of Oceanography, described the mission as "the most successful ocean experiment of all time."

Jason, launched in 2001, now continues the same observations begun by Topex/Poseidon. For the past three years, the two satellites have flown in tandem, providing twice the coverage of the sea surface. This allowed the study of smaller-scale ocean phenomena like coastal tides, ocean eddies and currents. It also improved understanding of how low-frequency ocean waves transmit signals of climate change.

Jason precisely maps the surface height, wind speed and wave height of 95 percent of Earth's ice-free oceans every 10 days. The data provide invaluable input for short-term weather forecasting, long-term climate forecasting and prediction models.

A future mission, the Ocean Surface Topography Mission, is planned for 2008. It will continue providing high-precision sea surface height data to the oceanographic science community. After that, scientists propose to make more detailed measurements of ocean surface topography to study critical issues such as sea-level rise.

For more information, visit <http://sealevel.jpl.nasa.gov> and <http://www.aviso.oceanobs.com>.

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Stardust completes journey home

Scientists say samples
exceed expectations

*Above: Investigators get their first
look at the aerogel grid holding
cometary samples.*

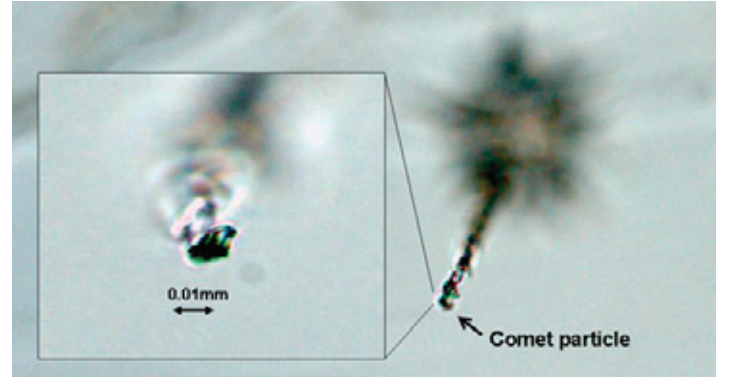


JPL's Stardust sample return mission returned safely to Earth when the capsule carrying cometary and interstellar particles successfully touched down at 2:10 a.m. Pacific time on Jan. 15 in the desert salt flats of the U.S. Air Force Utah Test and Training Range.

Stardust traveled 2.88 billion miles during its seven-year round-trip odyssey to comet Wild 2. Scientists believe these precious samples will help provide answers to fundamental questions about comets and the origins of the solar system.

"Ten years of planning and seven years of flight operations were realized early this morning when we successfully picked up our return capsule off of the desert floor in Utah," said Tom Duxbury, Stardust project manager at JPL. "The Stardust project has delivered to the international science community material that has been unaltered since the formation of our solar system."

Stardust released its sample return capsule at 9:57 p.m. Pacific time on Jan. 14. The capsule entered the atmosphere about four hours later, followed by the deployment drogue and main parachutes five minutes apart. Helicopters then swooped down to pick up the capsule, which was carried to a temporary cleanroom nearby at the U.S. Army Dugway Proving Ground.



Comet particles are shown embedded in Stardust's aerogel collector.

"I have been waiting for this day since the early 1980s when Deputy Principal Investigator Dr. Peter Tsou of JPL and I designed a mission to collect comet dust," said Dr. Don Brownlee, Stardust principal investigator from the University of Washington. "To see the capsule safely back on its home planet is a thrilling accomplishment."

Two days after landing, the capsule's science canister was transferred to Johnson Space Center in Houston. After opening the canister, scientists confirmed that samples from the comet and interstellar dust had indeed been embedded in the capsule's aerogel-laden grid.

Tsou, who invented the technique of intact capture of hypervelocity particles for just such a mission as Stardust, said researchers were ecstatic with the collection of the cometary and solar materials from outer space. "Stardust is the realization of a 25-year dream to capture and return samples from a comet," he said.

"The collection of cometary particles has exceeded our grandest expectations," said Brownlee. "We were absolutely thrilled to see thousands of impacts on the aerogel."

Inside the capsule, a tennis racket-like sample tray holds the particles captured in a gel as the spacecraft flew within 149 miles of comet Wild 2 in January 2004. An opposite side of the tray holds interstellar dust particles caught streaming through the solar system by Stardust during its seven-year journey. The team is analyzing the particle capture cells and removing individual grains of comet and interstellar dust.

Dr. Michael Zolensky, Stardust co-investigator and curator, said the samples would be distributed to more than 150 scientists worldwide for study. He said areas of analysis would include isotopes, bulk composition, mineralogy and petrology, optical and spectroscopic properties, organics, small impactors and interstellar grains.

Rovers' 2-year anniversary marked

JPL celebrated the two-year anniversary of the Opportunity rover's landing on Mars on Jan. 24. This month also marked the first full martian year on the planet for Opportunity and its twin, Spirit. Among the festivities, clockwise from top left:

NASA Administrator Mike Griffin offers a video tribute to the rover team; Congressman David Dreier receives a gift of thanks from Lab Director Dr. Charles Elachi for Dreier's ongoing support; Mars Science Laboratory Project Manager Richard Cook gives a preview of that mission, launching in 2009; and La Cañada-Flintridge Mayor Anthony Portantino (left) presents a city proclamation to former Mars Exploration Rover Project Manager Pete Theisinger. To see the celebration online, visit <http://dailyplanet.jpl.nasa.gov/multimedia.php>.



Photos by Dutch Slager / JPL Photolab



News Briefs



Jonas Zmuidzinas

First joint faculty appointment named

Caltech Professor JONAS ZMUIDZINAS is the first researcher selected to participate in the new Joint Faculty Appointment Program at JPL. Zmuidzinas is teaming with JPL astrophysicists on submillimeter astronomy and detector development. He will reside in the Astrophysics and Space Science Section in the Science Division (32).

"Jonas is one of the world leaders in submillimeter detector development and studies of the interstellar medium," noted JPL Chief Scientist TOM PRINCE. "He is already well-acquainted with JPL through his active collaborations with several JPL scientists and technologists. I can't think of a better person to be the first campus-JPL joint appointment."

Zmuidzinas already has a long association with both Caltech and JPL. "My father was a graduate student at Caltech when I was born," he said. "I was a child when he started working at JPL, and I remember going into his office and trying to make sense of all the squiggles on his chalkboard." Zmuidzinas now has his own office at JPL, but his "squiggles" are recorded on a whiteboard instead of a chalkboard.

"I am quite excited about this joint appointment," he said. "I have been talking to lots of people—and getting the chance to have more personal interactions with my JPL colleagues. This is a good opportunity to expand my knowledge of the people here, and their research. I will be pushing hard on the detector work, trying to make this close connection with campus even stronger," Zmuidzinas said.

The purpose of the Joint Faculty Appointment program is to promote strategic collaboration with universities with the goal of enhancing the research capabilities of both JPL and the university partner. Joint appointments may be made with faculty

members of Southern California universities, such as UCLA, USC and Caltech. These positions are targeted for identified strategic areas in science and technology that will benefit JPL. Appointees will divide their time between JPL and their home universities. While local universities are being targeted at the outset of this program, this does not prohibit future expansion of appointments to out-of-area schools when such appointments make strong strategic sense.

Candidates will generally be selected by search committees appointed by the chief scientist and/or chief technologist. Final candidate selection will then be approved by the director for engineering and science, chief scientist and/or chief technologist, and the Laboratory director. The positions are co-funded by JPL and the partner university. A maximum of 10 Joint Faculty Appointments may be funded at one time by JPL.

Blood drive in February

The next on-Lab blood drive will be held in von Kármán Auditorium on Tuesday, Feb. 7, from 11:15 a.m. to 5:15 p.m. and Wednesday, Feb. 8, from 7 a.m. to 1:15 p.m. Sign up on the confidential Red Cross website at www.givelife.org/index.cfm?hcl=JPL. Enter "JPL" instead of a zip code or sponsor code, then click "search." Advance signup sheets will also be available at JPL Occupational Health Services, Building 310-202, prior to the blood drive. For last-minute signups, or to change your appointment, call the Red Cross at (213) 400-0140.

Everyone who participates in the February blood drive will receive a coupon for Daphne's Greek Café, compliments of the Red Cross.

For more information, visit <http://www.redcross.org/services/biomed/blood/supply/tse.html>.

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.

Friday, January 27

Von Kármán Lecture Series—Join JPL oceanographer Dr. Paul Digiacoia for "Observations of an Urban Ocean: The Coastal Waters off Southern California" at 7 p.m. in Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. For more information, call Public Services at ext. 4-0112.

Saturday, January 28

Great Natural Wonders of the World—This high-definition film will be shown at 2 p.m. in Caltech's Beckman Auditorium. Julie O'Leary, from Caltech's Geophysics Department, will introduce the film and lead a post-screening discussion. Admission is \$5 (unreserved seating). For more information, call (626) 395-4652 or visit www.events.caltech.edu.

Monday, January 30

Investment Advice—TIAA/CREF will offer one-on-one counseling in T1720. For an appointment, visit www.tiaa-cref.org or call (626) 432-6363, ext. 2614.

Wednesday, February 1

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at La Cañada United Methodist Church, 104 Berkshire Place, La Cañada. Call (626) 794-1698 to leave a message for an ARC board member.

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.

"Oppenheimer's Legacy: Science and Government in the Shadow of Nuclear Weapons"—Martin Sherwin, professor of history at Tufts University, will discuss J. Robert Oppenheimer, former Caltech physicist, "father of the atomic bomb," science advisor, opponent of the hydrogen bomb and the most prominent victim of the McCarthy era, in a free lecture at 8 p.m. in Caltech's Beckman Auditorium. Free admission. For more information, call (626) 395-4652 or visit www.events.caltech.edu.

Thursday, February 2

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

Violin Lecture—Violinist Midori will speak at 8 p.m. in Caltech's Beckman Auditorium. Free admission. For more information, call (626) 395-4652 or visit www.events.caltech.edu.

Tuesday, February 7

Credit Union Annual Meeting—Members will gather at 5:30 p.m. in Caltech's Beckman Institute Conference Room.

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

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

Wednesday, February 8

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.jplcaltechtostmasters.com](http://jplcaltechtostmasters.com).

Thursday, February 9

An Evening with Nikki Giovanni—The world-renowned poet, writer, commentator, activist and educator will speak at 7:30 p.m. in Caltech's Beckman Auditorium. Free admission. For more information, call (626) 395-4652 or visit www.events.caltech.edu.

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

Lab ceremony honors MLK, Parks



"Unity and Freedom, the Building Blocks for Tomorrow," presented at JPL on Jan. 19, honored the memory of civil rights leaders Martin Luther King Jr. and Rosa Parks. Former JPL Executive Council member Dr. Jim King, left, was the keynote speaker. Above, the Zenith Dance Coterie is shown performing "Wade in the Water," one of their two dance routines.

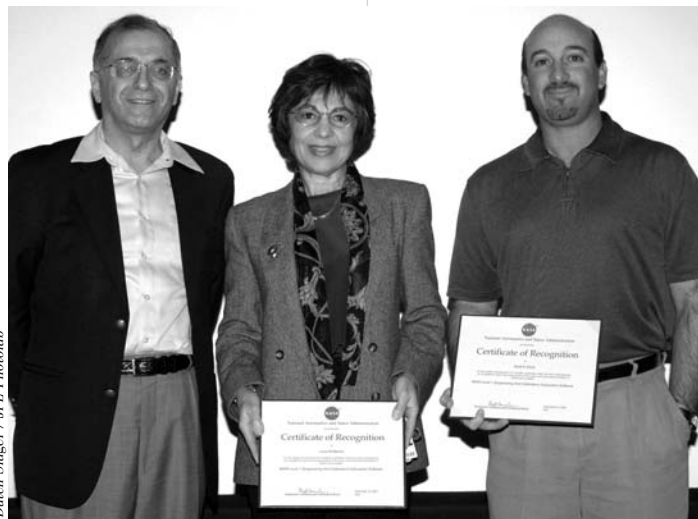
Technical innovators honored

A Jan. 5 ceremony at JPL honored individuals who in 2005 contributed outstanding scientific and technical innovations that sponsored, adopted, supported or were used in support of NASA's mission.

JPL Director Dr. Charles Elachi presented recipients with Board Action Space Act Awards, which are issued by the NASA Inventions and Contributions Board. Two hundred and twenty-five individual JPL employees and contractors received a total of about \$205,500. Although the ceremony is held twice a year, submission for the award is accepted on a rolling basis.

The Board Action Space Act Awards represent one of four NASA Space Act Awards. The three others are NASA Tech Brief Awards (for publication in the NASA Tech Briefs periodical), Software Awards (for software that is mature and delivered to a customer) and NASA Patent Awards (for technology that NASA elects to patent). The Board Action Space Act Awards are the most prestigious, and involve a formal evaluation by the NASA Inventions and Contributions Board to determine the monetary award amount (up to \$100,000 per case).

JPL continues to lead all NASA centers in the total dollars for NASA Space Act Awards by a margin of three to one over the next NASA center. For all of FY '05, JPL innovators and collaborators received a total of \$767,200, which is 45% of the \$1,692,500 distributed to all of the NASA centers combined. This amount consisted of 1,301 individual awards, which is 47% of the 2,789 individual awards given by the NASA Inventions and Contributions Board to all NASA centers combined. Over the past three



JPL Director Dr. Charles Elachi joins Lucia Marino and Scott Gluck, two of the recipients of NASA Space Act Awards.

years, total Board Awards received by JPL innovators have increased from \$307,000 to more than \$393,500.

Many innovations have not been reported in a NASA New Technology Report, so it is never too late to file one. As long as the innovations meet the criteria listed below, JPL technologists are encouraged to complete the Preliminary Space Act Award questionnaires, which are available online at http://ntr/forms/form_1329-preliminary.doc. Evaluators will use this information to determine if it is appropriate to proceed with the formal NASA Space Act Award application.

The Inventions and Contributions Board determines award amounts, which range from \$500 to \$100,000 based on the significance and value to NASA. Awards are given to contributors whose innovations have been published in NASA Tech Briefs (\$350 per author); for software that has been approved for release to qualified users (\$1,000 for a sole author, \$500 each for multiple authors), or inventions that have received approval for patent application by NASA (\$1,000 for a sole inventor, \$500 each for multiple inventors).

The Invention and Contributions Board reviews applications for Board Awards every other month. The next deadline for consideration is Feb. 27. If you meet the criteria listed below, please call Rani Kamarga at ext. 3-7995 for a preliminary questionnaire. For more information, contact Dr. Christopher Jagers, the JPL awards liaison officer for the NASA Space Act Awards, at ext. 3-4904.

Space Act Award criteria:

- The scientific and/or technical innovation has significant value in the conduct of aeronautical and space activities.
- The scientific and/or technical innovation has been used in a NASA program or adopted or sponsored or supported by NASA.
- New technology must be reported online at <http://nbs>.
- For software, a recommendation for a Software Available for Public Release Award must have been received.

LAB HOSTS STATE HEARING ON MATH, SCIENCE EDUCATION

Legislators hear from experts about how to better interest students, improve standards and hire and keep quality teachers

By Mark Whalen

From left: State senators Gloria Romero and Jack Scott, assemblywoman Carol Liu. Below: Kyndall Brown, left, and Sara Munshin, both representing the California Math Council, testify at the hearing.



Photos by Tom Wymme / JPL Photolab

Making science fun and interesting for students, more flexible curriculum policies, and improved teacher recruitment and retention were the key themes discussed in a JPL-hosted joint State Senate-Assembly hearing on the future of math and science education on Jan. 20.

Organized by JPL's Office of Legislative Affairs and Education Office, the event was led by State Senator Jack Scott, chair of the Senate Education Committee, and Assemblywoman Carol Liu, chair of the Assembly Higher Education Committee. JPL lies in the district of both legislators. State Senators Gloria Romero and Tom Torlakson were also in attendance.

Scott, the former president of Pasadena City College, expressed concern about a recent study showing that 11 countries outperformed American fourth-graders in math. He also noted that China is graduating four times as many engineers as the United States. And he said the teacher workforce is getting older, with 97,000 teachers needing to be replaced in the next 10 years.

He called the problem not just one of education, but also of economics. "I think America's competitiveness is at stake," he said.

Angela Diaz, from NASA's Office of Education, began the testimony, noting that "NASA can inspire students in STEM (science, technology, engineering and math) as few organizations can." She added that "California is an ideal partner to help us achieve our goals."

Former astronaut Sally Ride testified that students' interest in math and science drop significantly during the middle- and high-school years, particularly among girls. She said that only 11 percent of engineers and 20 percent of scientists are women.

"We have to make science interesting and cool, and fuel that enthusiasm to help girls through middle school," Ride said. She added the importance of introducing girls to female role models.

Witnesses spoke about how they believe state education policies create obstacles for teachers. "They are told not to teach science in the early grades, particularly in grades K-3," said Dean Gilbert, president of the board of trustees of the California Science Teachers Association. He added that teaching standards ought to focus on students' critical thinking and problem solving, rather than memorizing content.

Gilbert also stressed the need to retain quality teachers, urging the legislature to work to improve science teachers' professional development programs, which he claimed have recently been replaced by an umbrella program to focus on language arts and math.

"We have world-class standards, and we need the legislation to back that up," he said.

Sara Munshin, past president of the California Math Council, said processes for selecting the state's curriculum content review panels "need to be more

open and fair." Liu acknowledged "complaints" about the curriculum commission and said that new legislation has been submitted to limit terms of commission members.

David Marsh, an associate dean of education at USC, urged legislators to update "out of balance" state teaching standards that are focused too much on tests. He added that incentives are needed to help students go into teaching, suggesting scholarships as better options than student loans.

Several educators testified about how California can interest, train and retain more qualified science and math teachers.

Beverly Young, assistant vice chancellor of the California State University system, discussed the Mathematics and Science Teacher Initiative, whose goal is to at least double the production of math and science teachers in the next five years. That would mean 1,500 new teachers in these fields.

To help achieve teacher quality and retention, Young noted a collaboration between the California State University and NASA that offers workshops and courses for CSU faculty, K-12 teachers and community college instructors. The partnership includes a JPL program of in-service professional development that promotes the importance of math and science and motivates teachers to stay in the field, including paid summer internships for math and science teachers.

Dr. France Cordova, former NASA chief scientist and current chancellor of the University of California, Riverside, testified that the University of California's California Teach program has the goal of quadrupling the number of graduates who go on to teach K-12 science and math by 2010, annually providing the state with more than 1,000 additional highly qualified math and science teachers.

"Legislation can help launch a new era of enthusiasm in science among students, through support of the UC and CSU programs, funding to prepare under-represented students and tax incentives for university partners," she told the panel.

The panel heard about an alternate route to teacher recruitment. Layla Avila, representing the nonprofit New Teacher Project, testified that the organization targets mid-career professionals who are inspired to switch careers. The New Teacher Project selects, trains and finds jobs for candidates, and prepares them for state certification.

Avila said the average age of program applicants is 32, about 25 percent of which have already completed a graduate degree. Participants undergo an intensive two-week math immersion program and seven weeks of in-service training.

"There are thousands out there who want to teach," she said, telling the panel that the program recently helped New York City hire 6,000 new teachers in high-need subject areas, half of which teach science and math.

Currently, an Oakland school district is participating in the program. Scott expressed interest in pursuing further study.

Liu called the 3 1/2-hour hearing "informative and thought provoking," adding that the testimony may help shape future legislation." Scott said the panel "will go away from the hearing with a resolve to improve."

High winds blow through Lab

Even the deer found the footing treacherous on Monday, Jan. 23, following heavy winds in the area. Facilities Division Manager Robert Develle said most of the damage resulted from toppled outdoor furniture and debris from broken tree branches. Though the Lab shut down for most of Monday, Develle said it suffered no structural damage and no power outages.



Photo courtesy of David M. Seidel

