

NASA budget tight, but JPL missions proceed



NASA Deputy Administrator Lori Garver addresses JPL staff in the Building 321 auditorium.

By Mark Whalen

The White House announced a Fiscal Year 2012 budget request for NASA on Feb. 14 that would flatten the space agency's spending on science—fully funding JPL missions currently preparing for launch, but leaving questions for flight projects and programs later in the decade.

The proposed budget now goes to Congress for consideration before the

fiscal year begins in October. Congress, however, has yet to approve a final budget for FY11 currently underway, leaving the federal government operating under a continuing resolution that will expire March 18. Due to tighter budget projections, JPL recently announced layoffs of up to 250 employees to bring costs in line with available funding for the year.

NASA Deputy Administrator Lori Garver spoke to JPL staff at an all-hands meeting Feb. 16 to discuss the administration's FY12 budget request. The \$18.7-billion NASA plan for FY12 includes \$5 billion for science, which includes the vast majority of JPL's work. Of that total, JPL is proposed to have a base NASA budget of \$1.195 billion, augmented by awards from competitive programs such as Discovery and New Frontiers, and in technology.

"Despite austere times, the FY12 budget request clearly shows the commitment by the administration to space exploration," said NASA Deputy Administrator Lori Garver, who spoke to JPL employees on Feb. 23. "We recognize that the increases we asked for in the FY11 budget were not able to be sustained in the FY12 budget request; we know tough choices had to be made ... We're doing reasonably well, but there are some challenges."

All of the Lab's scheduled launches through FY12—Aquarius, Juno, Grail,

Mars Science Laboratory and NuSTAR—are fully funded, as is Dawn's scheduled encounter with asteroid Vesta in July. In addition, all flight projects in development remain fully funded in the budget request: Orbiting Carbon Observatory-2, the Soil Moisture Active & Passive mission, Mars '16, a Grace follow-on and the Surface Water and Ocean Topography Mission.

"The FY12 request for NASA science is pretty good, but it's flattened out over the next five years, which eliminates a lot of the growth we were hoping for," noted Richard O'Toole, executive manager of the Office of Legislative Affairs. "The good news is that funding for science is up from the actual FY10 level to \$5 billion, which is what the president originally asked for in FY11 but never got through the system."

JPL was also directed to receive \$93 million in the Space Technology category of the budget, which will go to strategically guided projects aligned with the Lab's expertise in communications, navigation, and entry, descent and landing.

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Stardust-NExT achieves all objectives, provides surprises

By Mark Whalen

JPL's Stardust spacecraft's Feb. 14 flyby of comet Tempel 1 achieved all of its objectives in comparing new images of the comet today to how it looked following a controlled collision by JPL's Deep Impact spacecraft in 2005.

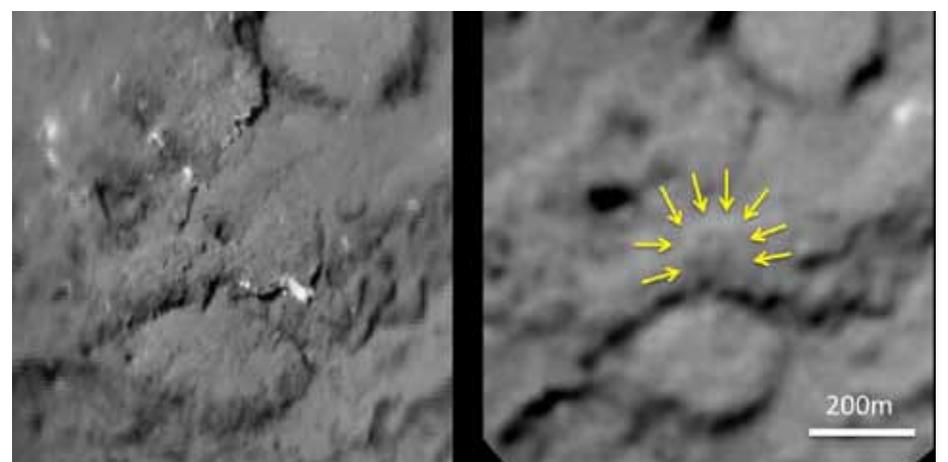
Joe Veverka of Cornell University, principal investigator for Stardust-NExT, the extended investigation of Tempel 1 initiated by Deep Impact, declared the mission "1,000 percent successful."

In addition to observing surface features that changed in areas previously seen by Deep Impact, Stardust-NExT also met its goals to image new terrain and look at the crater generated when the mission propelled an impactor at the comet about six years ago. The new images showed a

scar resulting from that impact and also showed the comet has a fragile and weak nucleus.

A key feature noted is the rate of change of the surface of the nucleus as it passes close to the sun, said JPL's Ken Klaasen, the imaging team leader. "Our images will allow us to quantify that and to identify what kinds of surface structures and materials erode away fastest," he said. "We may also learn more about the nature of the outer layers of the nucleus from the results of the cratering experiment, but that will take a lot of analysis and modeling work."

Klaasen was surprised that the changes on the surface of Tempel 1 were so minimal. "I was somewhat afraid going in that things might have changed so much we couldn't recognize anything that we saw with Deep Impact," he said.



The left-hand image of comet Tempel 1 is a composite made from images obtained by Deep Impact in July 2005. The right-hand image shows the same region as viewed by Stardust Feb. 14.

"But that was certainly not the case. I am also surprised that the evidence of the Deep Impact crater is as subtle as it has turned out to be. The changes seen in the impact location are very muted—like the ejecta all fell back on top of the impact site and blanketed it. We don't see the traditional bowl-shaped crater like we see on the moon. Finally, the previously unseen side of Tempel 1 looks

quite different than the side seen by Deep Impact, with some geologic structures such as protrusions and multi-level layering showing up."

Klaasen also noted the success of the onboard camera, which was designed as a navigation tool for Stardust but for NExT became the primary science instrument. "While the camera was not built to

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Vacation becomes history in the making

By Mark Whalen



Paulett (left) and Kurt Liewer and Michele Judd at the Sphinx.

For several years, JPLers Paulett and Kurt Liewer, along with their good friend Michele Judd, had discussed plans for a visit to Egypt. Their trip to experience the ancient desert land, its culture and its people, proceeded in late January.

So much to see: the Sphinx, the Nile, the Pyramids ... the revolution?

Clearly, the trio got quite a bit more than they bargained for.

"What we didn't know at the time was while we went to study the history of Egypt, we became a part of it," said Judd, managing director of the Keck Institute for Space Studies, a joint JPL/Caltech think tank.

On Jan. 25, the fourth day of the trip, upon returning to Cairo from a visit to the Pyramids, police held up traffic at the bridge to their hotel, claiming a "peaceful demonstration" was underway.

The hotel overlooked Tahrir Square, a key meeting point for demonstrators in Cairo during the recent uprising.

Luckily their experienced tour guide successfully negotiated with police to let the passengers out so they could walk to the hotel. "He told us that if we couldn't immediately get off the bus we wouldn't have been able to get back to our hotel that night," said Judd.

Shortly arriving in their rooms they began to witness the escalating uproar. First it was loud chanting, followed by swarms of people streaming from surrounding streets toward the square. Police responded by firing from a water cannon high into the air, as a warning that more was to come, which it soon did, barreling through the crowd. "Later it was tear gas," said Judd.

Not exactly the evening the Liewers had planned for their 42nd wedding anniversary.

Paulett, manager of the Astrophysics and Space Sciences Section, said the police tried to clear the square shortly after midnight. The next morning, continuing on their scheduled trip to southern Egypt, they thought the turmoil was over.

The trio then spent three days visiting ancient temples and cruising Lake Nasr—with no access to television or Internet. "We were blissfully ignorant, absolutely unaware of what was going on, and we were very happy," said Judd.

However, upon arrival in Aswan, four days into the demonstrations, the group learned that the police had been under attack and had been recalled. Indeed, by this time, demonstrations were also in force in Luxor and Alexandria.

As scheduled, the tour group transferred to a different cruise ship that would take them on to Luxor. "This boat had TV access, so we were watching Al Jazeera, BBC and CNN—we were shocked," said Judd. The group quickly rescheduled a sail on the Nile so they could catch the sunset that night rather than try the sunrise the next morning, and jumped onboard a sailboat. Soon, however, they saw a large group of demonstrators along the banks of the river, getting closer to their moored ship. Then, suddenly a large tear gas cloud filled the air, along with smoke from two fires. The cruise ship unmoored to escape the gas and headed downstream, away from their sailboat headed in the opposite direction. "On the sailboat they told us the trip was over," said Paulett. Immediately, the tour launched rescue boats that brought them back to the cruise ship, where they were soon told all tourist sites were being closed and that they weren't allowed off the boat until they reached Luxor.

But then they were met with another surprise.

"When we got to Luxor they said the tourist sites were opening after all," said Paulett. Their three-day tour, including the Valley of the Kings, was compressed to about seven hours. The group was then evacuated to Jordan via a charter flight arranged by their tour company.

Although the trio never felt in fear for their safety, there were plenty of harrow-

ing moments—and quite a bit of good fortune.

"We had a great travel agency that had all the infrastructure in place," said Judd. For example, when the Internet was unavailable they were able to contact staff all over Egypt, in Jordan and New York.

The evacuation to Jordan gave the group the unexpected benefit of seeing some world-class sites, including the rock city of Petra and ancient Jerash. "In the end we came out well with relatively little stress," said Kurt, a system engineer and instrument builder in the Deep Space Tracking Systems Group.

As events escalated and the eyes of the world turned to Egypt, family members and co-workers became concerned. But they soon learned the trio was safe.

Judd's parents and the Liewers' son were contacted by the tour company, which told them the three were on a charter flight and that everything was taken care of. Also, JPL's Legislative Affairs and Human Resources offices were aware of their whereabouts, as was the office of Congressman Adam Schiff, which offered assistance in case the group couldn't leave the country.

The experiences of Egypt and its treasures will no doubt linger for the trio. But the memories of the people may remain the greatest reward.

"This was the most connected I've ever felt to a country I was touring," said Judd. "Everybody wanted to talk about what was going on in Egypt and why they felt that way. They were very proud of their culture, proud of what they saw as their future, and it made us proud to be a part of that as well." ■

BUDGET *Continued from page 1*

The budget request for technology development doubles last year's level for the agency, to just over \$1 billion, said JPL Director Charles Elachi, who joined Garver in addressing employees. Elachi noted the increased emphasis in that area since Garver and NASA Administrator Charles Bolden came onboard.

"Here at JPL, in directed technology work we will have \$84 million more than last year," said Elachi. "There will also be a significant amount of technology funding that we can compete for, and we

have always done extremely well in the competition process."

"I really feel that JPL programs are aligned with where we are headed with NASA," added Garver. "What could be more innovative than figuring out how we get spacecraft and instruments to the outer planets? That kind of innovation has driven our technology development and it's something we need to keep doing."

Also in the FY12 budget request, for the first time funding was proposed for the construction of a multi-level parking garage on Lab to replace parking capacity that will be lost when the current lease for

the east lot expires in a couple of years. "Every time I go to an all-hands meeting people always ask about parking on Lab, and I always tell them that's a dream and I don't think we'll ever get there," said Elachi. "Finally, we have it in the budget, so that will be a big plus."

Elachi noted that a key issue through the decade for planetary science would be the structure of the Mars program beyond 2016 and challenged JPLers to create a program that is "implementable, affordable and scientifically exciting." Also of critical importance is how to keep U.S. leadership in outer-planet exploration capability.

Citing JPL's Voyager, Galileo and Cassini missions, he noted that such a capability takes a long time to develop and that international partnerships are a proven option.

"Both depend on the decadal survey report due out in March; that will be one factor that NASA has to look at between the recommendations of the science community and the goals of the administration," said Elachi.

For more information on the NASA budget request, visit <http://www.nasa.gov/news/budget>. ■

STARDUST-NEXT *Continued from page 1*

perform at the high level of some of our other planetary cameras, it really captured excellent images of the comet that will allow us to meet all of our science objectives," he said. "The exposure settings were ideal, and the pointing control by the JPL autonav software was excellent with virtually no smear. We didn't miss anything."

Stardust-NEXT Project Manager Tim Larson noted the key contributions of flight team members, several of whom have flown the spacecraft since its launch in 1999. Stardust in 2004 collected pristine samples of comet Wild 2 that were later deposited by parachute to the Utah desert. The spacecraft was retargeted for Tempel 1 in 2007.

"The combination of the Lockheed Martin spacecraft team that really understands the spacecraft, inside and out, combined with a very highly competent navigation and mission design team here at JPL, made it successful," said Larson.

Larson said the success of both Stardust and Deep Impact on their retargeted missions set the bar a bit higher in terms of new science for small additional cost.

"I think it reinforces in everybody's mind that as long as a spacecraft is healthy, its operation is viable and the science it can do is useful, it's definitely worth the investment to keep them going. The payoffs are huge."

For images and other information on Stardust-NEXT, visit <http://stardustnext.jpl.nasa.gov>. ■

Weiler: Science strong despite austere budget

About \$5 billion requested for planetary, Earth science in FY 2012

NASA Science Mission Director, at JPL for the Feb. 14 Stardust-NExT flyby of comet Tempel 1, discusses the agency's challenges and opportunities for the coming year.

By Franklin O'Donnell

Q: THIS MUST BE AN EXCITING PERIOD FOR YOU. IT'S A GREAT YEAR AHEAD FOR NASA SCIENCE, NOT ONLY WITH THE TWO COMET ENCOUNTERS THAT WERE JUST ACCOMPLISHED BUT ALSO NEW LAUNCHES AND MAJOR MISSION ACTIVITIES.

Yes, it's going to probably be the biggest year in planetary science in history. You've got the comet encounter today with Tempel 1, Mercury orbit insertion in March, the Dawn insertion into Vesta orbit in July, Juno launch in August, GRAIL launch in September and Mars Science Laboratory launch in November. I'm not sure we've ever done that many in one year before.

Q: AT THE SAME TIME, THE NASA BUDGET REQUEST FOR FISCAL YEAR 2012 ANNOUNCED THIS WEEK INCLUDES LESS FUNDING FOR SCIENCE THAN HOPED. WHAT ARE YOUR THOUGHTS ON THAT?

We have a trillion-and-a-half-dollar deficit, which both parties in Congress are committed to reducing. Some would like to reduce it faster than others, but everybody agrees we can't maintain this kind of debt forever.

In the federal government, civil service wages have been frozen probably for one or more years, as is true in the private sector too. As for the NASA budget, in 2012 it's basically frozen, and then it stays frozen for the next five years in the president's proposal.

In space science, it's exactly the same thing. It's at about \$5 billion in '12 and then stays at \$5 billion for the next four or five years. The large increases planned in planetary and in Earth science are either not as large or are flat now. That's sad, obviously. But \$5 billion is still the largest Earth and space science budget on Earth, bar none, and by large factors. We ought to be able to do a really good program, if not a really outstanding program, for that kind of money. The fact is, this president has shown support for science, and we have a stable budget. Many agencies' budgets are actually being reduced.

Q: LET'S TALK ABOUT EACH OF THE THEMATIC AREAS WITHIN SCIENCE, STARTING WITH SOLAR SYSTEM EXPLORATION. AT JPL A LOT OF OUR FOCUS FOR FUTURE MISSIONS HAS BEEN ON LOOKING AT A POTENTIAL EUROPA MISSION. HOW ARE THINGS LOOKING FOR THAT IN TERMS OF THE BUDGET SITUATION?

Luckily, we have a National Academy of Sciences once-every-10-years review being

published in a few weeks, and the timing couldn't be better. This review will set the priorities for the planetary program.

We at NASA will not arbitrarily decide on our own what's more important among Europa, Mars, Discovery and so on. We'll leave that up to the scientific community, and eventually the Congress. So we intend, when that decadal report comes out, to work with the National Academy, with the planetary subcommittee of the NASA Advisory Committee. We've got to recognize we can't afford everything.

Q: WE HAVE SIGNIFICANT INTERNATIONAL COLLABORATIONS GOING, BOTH WITH EUROPA AND WITH MARS IN THE LATTER PART OF THE DECADE. DO YOU SEE THAT AS BEING A FACTOR IN MAKING DECISIONS ABOUT MISSIONS?

I think the importance of our excellent working relationship with the European Space Agency, ESA, is critical.

A couple of years ago, David Southwood, my counterpart at ESA, was bemoaning the fact that his Mars mission kept growing, scientists kept putting in more and more mass and instruments, and he just couldn't afford this mission anymore. I was in a similar situation. The community had defined this 2016 Mars science orbiter that was way over the budget that we had available for it.

So David and I kind of reached the same conclusion at the same time. It was like a cathartic moment, because we both enjoy competing with each other all these years. That's always fun, wave the flag. Trouble is, we can't afford to compete anymore because we can't afford the program our community wants.

However, the science community on the east side of the Atlantic tends oftentimes to think very similarly to those on the west side. Since we have fairly similar goals, wouldn't it be a great idea to put all that money together and try to do one really good program? And that's what we agreed to try in August of '08. We both said it may never happen because there are so many political reasons why it won't.

But surprisingly, within a year or so, we went from that concept to signing a letter of agreement to formulate a joint Mars program—something never done before in space science. We didn't just agree with



Richard Hasegawa / JPL Photo Lab

A full transcript of Weiler's interview is available at <http://jplspace>.

ESA on one Mars mission. We also agreed that we would alternate leading the missions, because we can't think of ESA as a secondary partner anymore.

I see that as a model for astronomy, Earth science, whatever, because the economic situation is not unique to America. Ultimately if our research programs are going to be in the forefront, we're going to have to do it with colleagues across the Atlantic and eventually colleagues across the Pacific.

Q: MOVING ON TO EARTH SCIENCE, THERE HAD BEEN EXPECTATIONS OF A FAIRLY SIGNIFICANT POSITIVE BUMP THERE, BUT WITH THE NEW BUDGET REQUEST IS THE OUTLOOK MORE RESTRAINED?

Last year when the president's budget came out, we were looking at an increase of a couple billion dollars over five, six years for Earth science. That was a fantastic budget. This year we didn't get as much. We got increases, so it's still a darn good budget, especially considering that Earth science for the previous decade had gone down each year. We're still going to do the Orbiting Carbon Observatory 2 here at JPL, the soil moisture mission (SMAP) here at JPL, and ICESat 2 at Goddard. We still intend to do those on schedule, and we still intend to get the Global Precipitation Mission off on schedule, Landsat Continuity Mission and Venture Class 2, which is for small missions. The one thing the budget does impact is future missions like DESDynI and CLARREO. They are not canceled, but will slip several years into the future.

One thing I always remind people about: The president proposes a budget and Congress appropriates each year. What Congress does each year, we'll know when they do it. But that's the plan.

Q: NASA IS CURRENTLY OPERATING UNDER A CONTINUING RESOLUTION THAT KEEPS SPENDING TO LAST YEAR'S LEVEL. DO YOU EXPECT CONGRESS TO PASS A FINAL FY11 BUDGET, OR WILL THE CONTINUING RESOLUTION REMAIN IN

EFFECT ALL OF THIS YEAR? AND DOES IT MAKE A DIFFERENCE, GIVEN THE FY12 BUDGET REQUEST JUST ANNOUNCED?

You may have a continuing resolution at various possible levels. Things are changing rapidly in Washington right now because there's a deadline coming. In March, the government stops funding federal workers and we all go on furlough if we don't get a budget. I'm sure nobody in Congress wants to see that happen. So not only can't I predict what's going to happen to the FY12 budget, I can't tell you what's going to happen to the FY11 budget. And anybody who tells you they can I would not use as a source.

Q: LET'S MOVE ON TO ASTRONOMY MISSIONS. THAT'S BEEN A DIFFICULT AREA FOR JPL IN THE PAST YEAR. IS THE FOCUS THERE RIGHT NOW BASICALLY A MATTER OF KEEPING THE JAMES WEBB SPACE TELESCOPE ON TRACK?

Right now it's in a state of flux. Rick Howard is the new Webb program director, reporting directly to the ninth floor at NASA Headquarters. One of the tasks they have is basically doing a budget at an 80 percent confidence level, which has never been done before on a NASA project; they've always been at 70 percent confidence level. But one of the recommendations of the independent committee was that, for projects of this complexity, you should put even more reserve into a program.

That bottom-up estimate and budget re-plan is going to be out sometime this summer. At that point we'll be discussing options with the Congress and with the OMB [Office of Management and Budget] as to how to move forward, because to avoid too much of a launch slip to Webb I'm sure is going to require more money. But the countering force to that is if you need more money and you don't have it, which missions are less important, if there are such missions? And I can't tell you how that's going to come out. ■

News Briefs



Stephen Proia

Proia to lead finance, business operations

Stephen Proia has been named JPL's chief financial officer and director for business operations, effective Feb. 14.

With JPL for more than 20 years, Proia was most recently deputy chief financial officer and deputy director for business operations. He began his career at the Lab in the Acquisition Division, where he was subcontract manager on the Atmospheric Trace Molecule Spectroscopy project. He later managed the Contracts Management Office and the Finance and Contract Management Division.

Proia has 30 years of career experience in all areas of government contracting and finance, and has played a major role in the negotiations of the last three contracts for the management of JPL. He replaces Dale Johnson, who left JPL earlier this year for a position in the private sector.

Lopes book explains volcanoes to non-experts



Drawing on her experience studying volcanoes on Earth and throughout the solar system, Rosaly Lopes, a JPL senior research scientist and supervisor of the Geophysics and Planetary Geosciences Group, is the author of a new paperback that introduces volcanoes and volcanology to non-experts.

"Volcanoes: A Beginners' Guide," from OneWorld Publications in Oxford, United Kingdom, uses famous case studies to explain the science behind volcanoes and explores the complex impact that they have on surrounding communities.

Lopes has investigated volcanoes observed by the Voyager, Galileo and Cassini missions, and in 2006 was honored in the Guinness Book of World Records for having discovered the greatest number of active volcanoes anywhere.

This is her fifth book, all on volcanoes. This volume discusses the latest research on the different types of eruptions, why they occur and where volcanoes can be found—from Earth's ocean floor to the outer solar system. The book is illustrated with numerous photographs, and includes tips on the best and safest spots to view one of Earth's most dramatic spectacles.

For more information, visit http://www.oneworld-publications.com/cgi-bin/cart2/commerce.cgi?pid=515&log_pid=yes.

Passings

Retiree **Gordon Gaines**, 94, died Nov. 2.

Gaines joined JPL in 1965 and retired in 1977. He is survived by daughter Jacqueline, two grandchildren and one great-grandchild.



Sandy Day

Sandra Day, a retired financial analyst for the Deep Space Network, died Nov. 3.

Day worked at the Lab for 31 years, retiring in 2003. She is survived by her husband, Ron Dewegeli, children Debbie and Jason, and four grandchildren.

Retiree **Reginald Lum**, 83, died Dec. 19.

Lum worked at JPL from 1987 to 1992. He is survived by four children. Services were held in Honolulu.

Retiree **Jean Strasen**, 82, died Jan. 1.

Strasen joined the Lab in 1967 and retired in 1994. She is survived by children Robert, Jane, Gretchen and Steve. Cremation services were held in Lancaster.

Retired engineer **Wilbert Bartel**, 87, died Jan. 7.

Bartel worked at the Lab from 1950 to 1981. He built satellite components for many of JPL's early missions.

He is survived by his wife, Marie, children Charles Williams and Alice Berthoff, and one grandchild. Services were held in East Wenatchee, Wash.

Retired mechanical engineer **Merlin Gayman**, 93, died Jan. 11.

Gayman worked for Caltech at the Southern California Cooperative Wind Tunnel from 1945 to 1960 as assistant head of the Mechanical Engineering Department before coming to JPL in 1960.



Merlin Gayman

At JPL, he was responsible for design and development of the Voyager narrow angle camera, for the Viking cameras and for design and development of the Wide Field/Planetary Camera optical system for the Hubble Space Telescope. He retired from the Lab in 1980.

Gayman is survived by daughters Gretchen Robinette, Becky Gayman and Leslie Howland.

Retired engineer **Horace Phillips Jr.**, 92, died Jan. 11.

Phillips joined the Lab in 1962 and retired in 1985. He was a group leader who helped design the hydrostatic bearings that supported large deep-space radio telescopes. He received NASA's Apollo Achievement Award for his work on Apollo 11, the first human moon landing.

He is survived by children John, Elizabeth and Susan, and granddaughter Katherine. Services were held at St. Matthias Episcopal Church in Whittier. The family requests consideration of donations to St. Matthias or to the UC Berkeley College of Engineering.

Albert Brejcha, 71, a retired safety manager, died Jan. 17.

Brejcha joined JPL in 1965 as a Telecommunications Division engineer. He later served in several management positions, including overseeing the Engineering and Mission Assurance Operations Office, Defense and Civil Projects Engineering Office and the Reliability and Safety Division. He retired in 2002.



Al Brejcha

His family asks consideration of donations in his memory to the Dawn Brejcha Foundation, 5694 Mission Center Rd., Suite 602-196, San Diego, CA 92108.

Walter Downhower, 78, who held numerous technical and management positions during his 40-year JPL career, died Jan. 18.



Walt Downhower

Downhower, who joined JPL in 1955, was involved with every JPL mission since Explorer 1, America's first satellite, until his retirement. He held positions ranging from hands-on engineering to system design to flight project management to strategic planning, contributing to projects that included Loki, Sergeant, ReEntry Test Vehicle, Explorer, Pioneer, Ranger, Mariner, Surveyor, Helios and Voyager. He received several awards from both JPL and NASA, including the NASA Exceptional Service Medal in 1983.

Downhower is survived by his wife, Jan, sons Jim and Mike, and six grandchildren.



Bob Chandler

Robert Chandler, 86, supervisor of the Graphics Services Group, died Feb. 10.

Chandler joined JPL in July 1966. During his 44 year-career, he was known throughout the NASA printing community for his knowledge of early hot-metal type to the latest in digital printing techniques. Because of this knowledge, Chandler was the NASA Installation Printing Management Officer for JPL.

In 2007 Chandler received NASA's Exceptional Service Medal.

Chandler is survived by sons Timothy, Craig and Joey; daughter-in-law Caryn; stepchildren Tim and Danielle; four granddaughters, three great-granddaughters and one great-grandson. He was preceded in death by his first wife Betty and second wife Terri.

Services were held Feb. 26 at Presbyterian Church of the Master in Mission Viejo. Chandler's family has requested donations to the American Cancer Society in lieu of flowers.

Letters

My wife and I thank everyone for their kind and thoughtful condolences following the loss of my wife's mother. The flowers are greatly appreciated. My mother-in-law was a missionary in China and was imprisoned three times during the Cultural Revolution. She was a joyous person and was always thankful for the liberty and freedom we all enjoy in the United States.

Christopher Lim

Dear JPL colleagues,
Thank you for your caring and supportive cards and words of sympathy in the loss of my father and Mark W. Thomson's father-in-law. The beautiful plant sent by JPL has brightened our home during this time of grieving.

Kathy and Mark W. Thomson,
Section 355

I would like to thank my colleagues and friends at JPL for their condolences after the recent passing of my dad. The flowers sent by JPL and Section 389 were beautiful and very much appreciated. Thank you for all of the kindness and support during this difficult time.

Paula Pingree

Retirees

The following JPL employees retired in February:

John Mahoney, 45 years, Section 389F; **Patrick Dillon**, 36 years, Section 352; **Michele Sawnor**, 36 years, Section 9220; **Glenn Veeder**, 34 years, Section 3224; **John Davidson**, 32 years, Section 3451; **Dwight Holmes**, 32 years, Section 9021; **James Steppe**, 32 years, Section 335D; **Lee Johnsen**, 28 years, Section 3764; **Anil Kantak**, 28 years, Section 332G; **Roger Bartoo**, 22 years, Section 317H; **Cheryn Roff**, 21 years, Section 2501; **Margaret Ryan**, 21 years, Section 3463; **Sheldon Winnick**, 20 years, Section 2142; **Savio Chau**, 18 years, Section 3451; **David Perz**, 18 years, Section 3880; **David Pass**, 16 years, Section 172J; **Gregory McDowall**, 14 years, Section 333K; **Stephanie Chin**, 11 years, Section 252M.



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