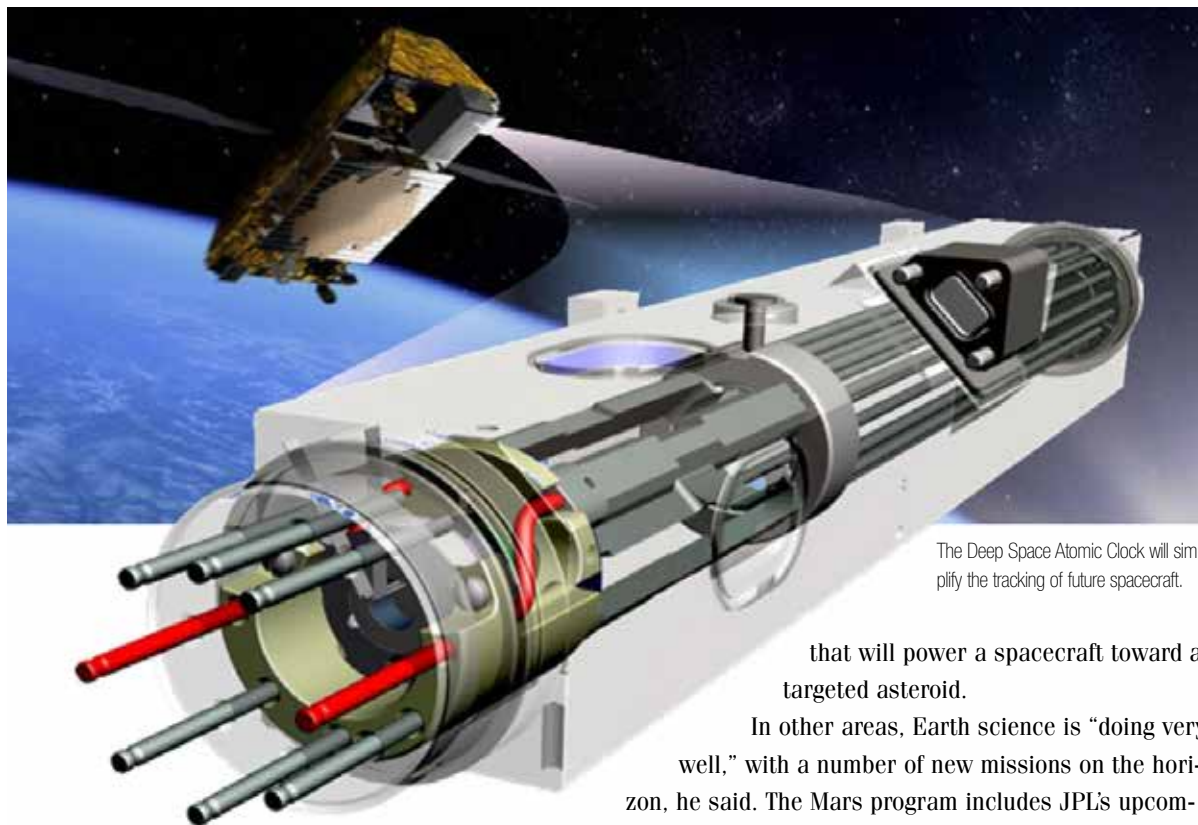


Steady as we go

By Mark Whalen

NASA FY15 budget funds JPL's continuing missions



The Deep Space Atomic Clock will simplify the tracking of future spacecraft.

The White House's budget request for fiscal year 2015 is good for JPL with full funding for currently operating missions. JPL Director Charles Elachi told employees in a State of the Lab address March 6.

The "big event" of the budget rollout was the addition of funding to support studies of a mission to Jupiter's moon Europa, thought to harbor an ocean beneath an icy surface. While Europa funding has been added by Congress in previous years' budgets, this is the first time the administration has included the mission in its budget request.

The most recent planetary science decadal survey by the National Academy of Sciences rated a Europa flagship mission as its No. 2 priority, behind JPL's Mars 2020 next-generation rover.

The Europa support was the highlight of funding for planetary missions, which Elachi termed as being in "pretty good shape" with a budget request of \$1.28 billion. "Considering the environment we're in, NASA is getting very good support from the Administration," Elachi said.

The budget includes funding for work on NASA's proposed asteroid retrieval mission. Under study is the development of the electric propulsion technology

that will power a spacecraft toward a targeted asteroid.

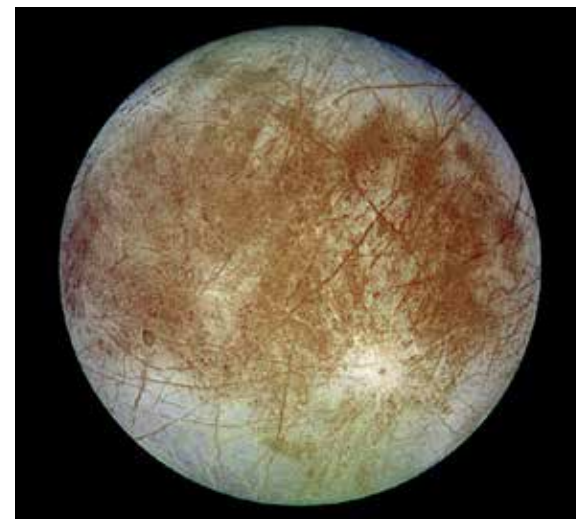
In other areas, Earth science is "doing very well," with a number of new missions on the horizon, he said. The Mars program includes JPL's upcoming InSight lander in 2016 and the Mars 2020 rover. Astrophysics, he said, is "starting to look pretty good" with JPL contributions to two upcoming space telescopes and a chance to compete for a mission under NASA's Small Explorer program later this year.

Elachi noted JPL's increasingly major role in NASA technology development. The budget funds continued work on the Deep Space Atomic Clock, a precisely accurate clock that will simplify tracking of future spacecraft, as well as tests on the Low Density Supersonic Decelerator, designed to land heavier mass on Mars in preparation for future sample return or human missions, Elachi said.

Elachi noted the importance for JPL of non-NASA work, particularly projects for the Department of Defense. "As a national lab, we have a responsibility to keep these as a high priority," he said.

JPL is also funding technology development with internal funds, such as lightweight optics that could revolutionize future space telescopes. Another novel concept is a small helicopter that could be carried along on the Mars 2020 mission.

JPL's Open House will return this year, on Oct. 11-12, Elachi noted. The event will coincide with open houses planned across the nation at other NASA centers.



This is the first time the administration has included a mission Jupiter's moon Europa in its budget request.



A small helicopter is being tested for the Mars 2020 rover mission.

The director said JPL's workforce should remain stable in 2014-15. With the move of Woodbury personnel to Oak Grove, the main lab site will be filled more or less to capacity. "We have appropriate support to maintain 5,000 employees," he said. "Five thousand is a lot of horsepower."

Science riches ahead for Cassini

Solstice mission to take the orbiter to unexplored zones

By Mark Whalen

As Cassini celebrates 10 years in orbit around Saturn, the project has grand plans for the next three years. The spacecraft's propellant will run out in September 2017, but there's still ample opportunity to achieve dramatic new science.

During Cassini's final 22 orbits starting in 2017, it will go where no spacecraft has gone before, diving between Saturn's innermost ring and the top of its atmosphere. The bold plan will allow scientists to measure Saturn's gravity field at unprecedented resolution.

As a grand finale, Cassini will end its long-lived mission later in 2017 with a final plunge into Saturn's atmosphere, a protective measure to ensure the spacecraft doesn't impact one of the planet's moons.

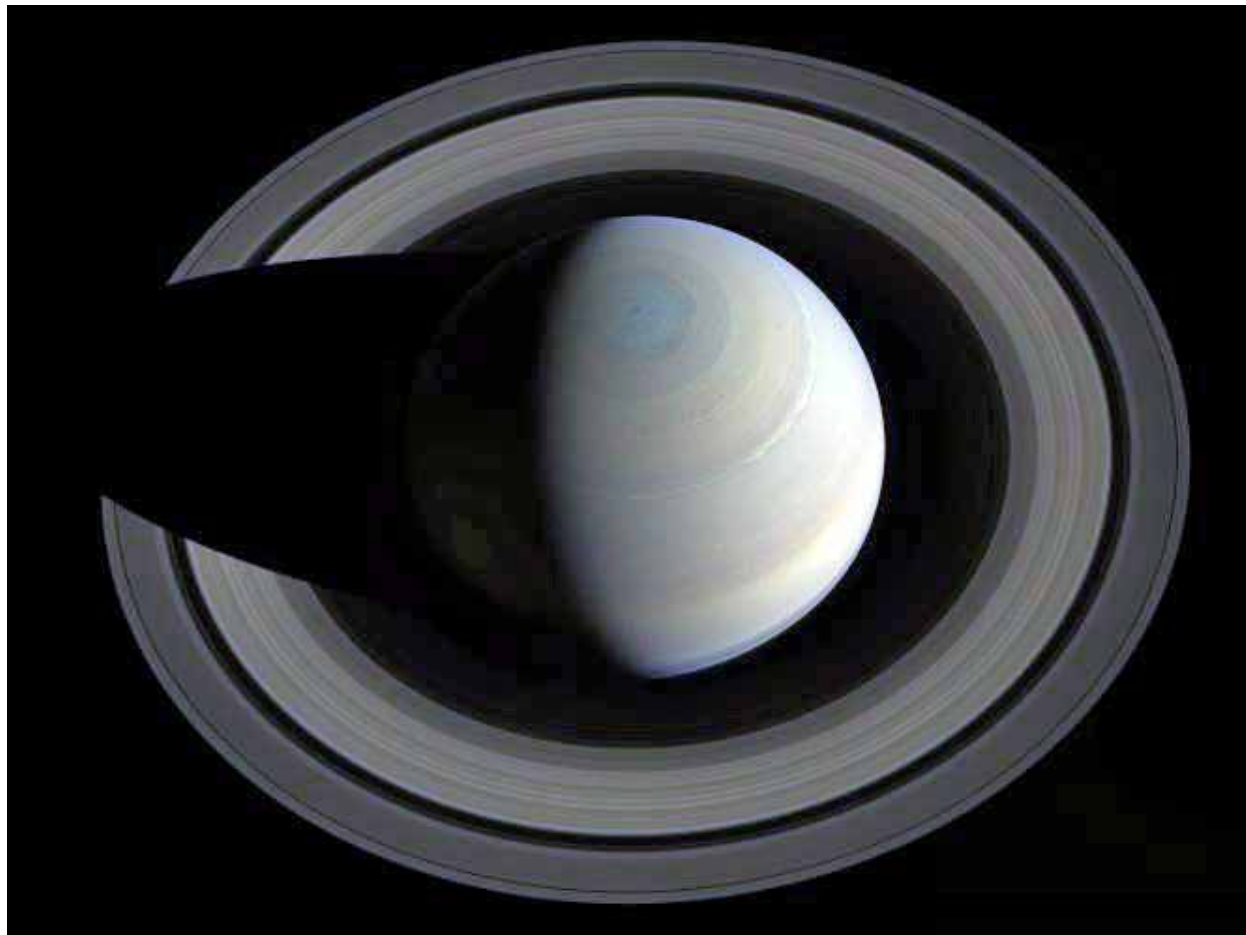
Between now and then, Cassini's team will be making the most of its final years, planning orbits and operations carefully to coax out all the science they can before it runs out of onboard propellant.

A longtime prime science target, Saturn's moon Titan, will be visited repeatedly. Taking advantage of gravity assist maneuvers at Titan means the spacecraft will have to use less fuel to trim its orbits. Team members call the latest extended mission Cassini's "solstice mission," named for Saturn's northern summer solstice that will occur in 2017.

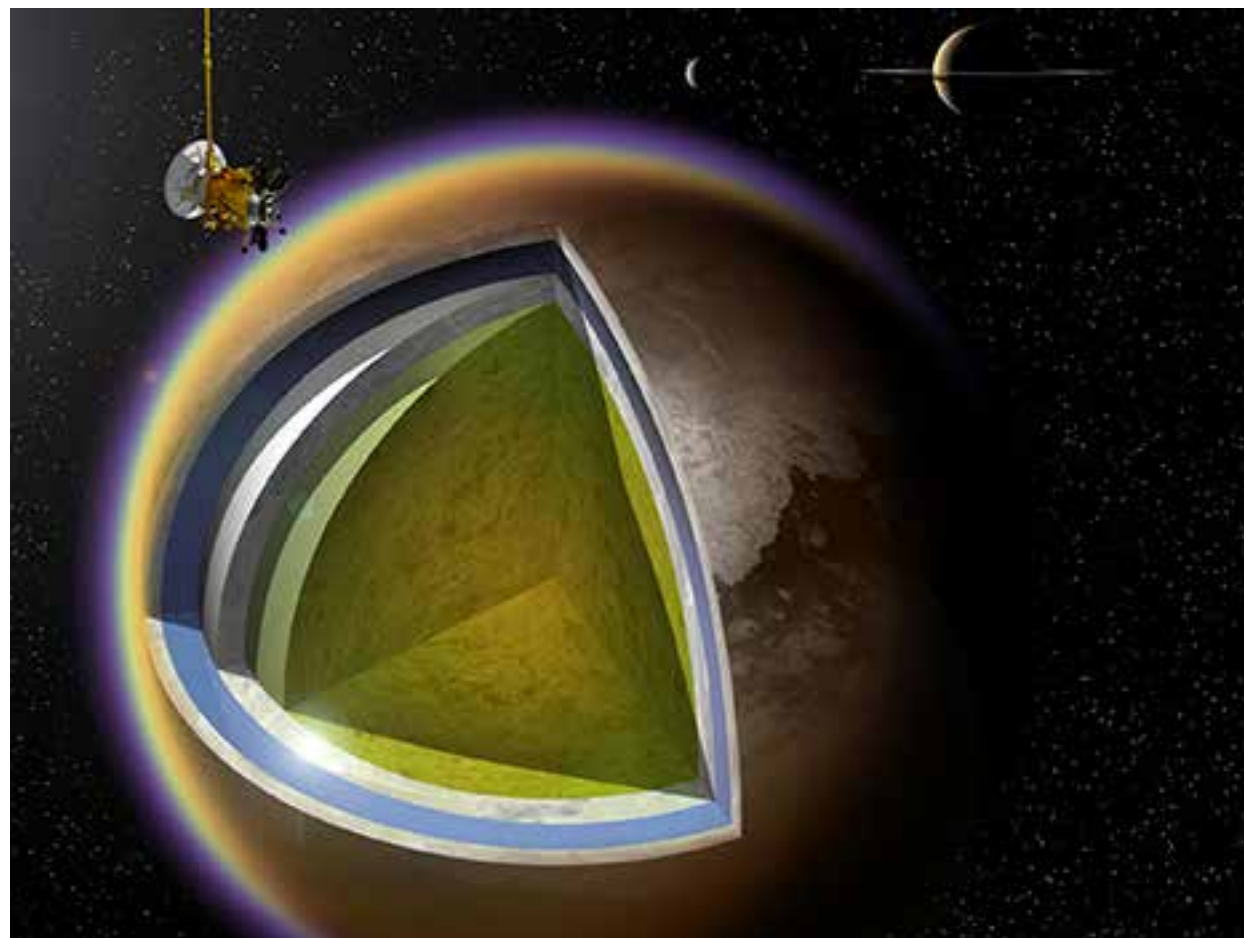
"The main difference between the solstice mission and Cassini's other missions is that we're conserving resources by being more patient, letting Titan do more of the work," said Duane Roth, the navigation team chief. "We now have a more ballistic trajectory; the spacecraft reacts to the gravitational forces and we get the trajectory we want."

Plans are also shaping up for Cassini's observations during the summer solstice. "As the sun rises higher in the sky, we get better views of the north pole," said Project Scientist Linda Spilker. Among other features, her team can further study a planet's north polar hurricane that Cassini discovered last December.

At Titan, scientists are looking forward to tantalizing views of lakes and seas (mostly methane) in the north polar region that approach the size of Lake Michigan or the Caspian Sea, noted Spilker. "We're going to see if their shorelines change towards summer," she said. "If the winds will pick up it might be possible to see waves on those lakes and seas."



A mosaic made from 36 images obtained by Cassini's imaging science subsystem on Oct. 10, 2013.



Artist's concept shows a possible model of Titan's internal structure that incorporates data from JPL's Cassini spacecraft.

The science team will continue probing the evolution of the planet's rings. Over the course of the mission, "the change in our understanding has been tremendous," said Spilker. "Starting with Voyager models, we had basically pictured the rings as individual particles, gently running into each other, following their own trajectories. Now we've found that simple idea is not right at all for certain rings."

Most of the rings' mass—particularly in the A and B rings—are in long, cylindrical clumps, which form, break apart and then repeat the process, Spilker added.

Another prime target is the north polar region of Saturn's moon Enceladus. During three close flybys planned for late 2015, Cassini will have also its final chance to fly through Enceladus' plumes and jets.

"It's amazing when you think about it," said Spacecraft Operations Manager Julie Webster. "We loaded about 3,000 kilograms of propellant for launch; we're now at less than 3 percent of that. That's the nozzle of the gas tank."



Photo courtesy of Scotty Burns

Cate Heneghan, shown just below the wingsuiter at the top of the image, joins fellow flyers at an event above Southern California in 2011.

Jumping for joy

By Mark Whalen

Heneghan seeks tranquility in the sky

Cate Heneghan streaks across the sky, high above Perris Valley, her arms and legs spread like a human version of a flying squirrel. Her top ground speed has been clocked at about 168 mph.

This is the sport of wingsuit flying, and with about 800 flights under her belt Heneghan is a diehard. You might think it's the ultimate adrenaline rush, but the JPL mission designer claims that it brings her peaceful bliss.

For the Earth, Astronomy and Physics Mission Formulation Group, Heneghan does system engineering, proposal management and Team X facilitation. She recently managed implementation and operations for an airborne mission.

But on weekends, Heneghan dons wingsuits. Developed in the late 1990s, they are jumpsuits with fabric between the legs and under the arms that allow the flier to glide toward the ground like a superhero. Like conventional skydivers, wingsuiters jump from airplanes and pull a parachute at the end of their glides to land safely.

For many aficionados, risk is part of the excitement. Is this true for Heneghan?

"To some extent, except I don't see the risks being that high," she says. "I think people outside the sport think it's really risky. There are many safety features and training techniques that lower the risks perceived by non-jumpers."

For example, she noted, "We have two parachutes. The second one automatically fires if something happens and I don't pull my parachute."

Novices must perform a minimum of 200 conventional skydiving jumps before being allowed to fly in a wingsuit, Heneghan says.

But all the work is worth it for Cate. "I can fly for miles and miles," she says. "I get to see so much from up there while moving in three dimensions."

A member of the Earth, Astronomy and Physics Mission Formulation Group, Heneghan holds state, national and

world records for wingsuit formation flying, and has also won speed and distance races in wingsuit skydiving.

Typical vertical speeds of non-wingsuit formations are 120 mph (belly to Earth) and 160 mph (head down), typical vertical speed of a wingsuit formation is 65 mph, Heneghan noted. Horizontal speeds in a wingsuit typically are 80 mph or higher.

Heneghan has hit speeds much faster than most wingsuiters. In 2010 she decisively won a regional distance race, and in 2011 she won the first national race for speed in intermediate suits. She has also appeared in numerous wingsuit formation flights, including a 68-way formation in 2009 and a 100-way formation in 2012.

For a typical dive, wingsuiters jump from planes about 12,500 feet above the ground. They fly two to three minutes before deployment of their parachutes.

The hobby can be expensive, at least at the start. To get established in skydiving, says Heneghan, one must invest about \$7,000—made up of \$3,500 each for the required jumping license and for gear. From there, it's about \$25 per jump.

Heneghan also occasionally dabbles in jumping from hot-air balloons. Enthusiastically.

"Oh, yeah, that is the best! Jumping out of a balloon is amazing," she says. "It's like the feeling of jumping off a cliff. In an airplane, it's noisy and you start with a relative wind, say, 90 mph, so you jump out and immediately feel a 90 mph wind. But when you jump out of a balloon, it's quiet and there's no wind. Then you gradually pick up speed; it's several seconds before you hit terminal velocity."

"Dropzones are the happiest places on Earth," she adds. "I have a friend who visited a dropzone with me, she looked around and said, 'everybody's so happy.' I said, 'yeah, because we're doing something we love.'"



Cate Heneghan (circled) flies in a 24-wingsuiter formation at an event above Chicago in 2010.



News Briefs

Double honors for Nikzad

Senior Research Scientist Shouleh Nikzad was recently elected as a fellow of the American Physical Society for her work on band structure engineering that has produced devices and sensors with unprecedented performance. Society fellowship is bestowed upon less than one half of one percent of the entire membership.

Nikzad also earned a Pioneer in Medicine award from the Society for Brain Mapping and Therapeutics. The society recognized her for leadership and for her work on developing ultraviolet imaging technology for potentially non-invasive tumor delineation and for bringing the camera into clinical trials.



Shouleh Nikzad

Nikzad, who joined JPL in 1992, is technical supervisor for the Advanced Detector Arrays, Systems and Nanoscience Group in Division 38. She was also elected to serve a three-year term as a member of JPL's Senior Research Scientist Council.



Max Coleman

Coleman awarded by geological society

Senior Research Scientist Max Coleman was recently awarded the Prestwich Medal by the Geological Society of London.

The medal is awarded every three years to those "who shall have done well for the advancement of the science of geology."

Coleman has been with JPL since 2000.

Dissertation honors for JPLers



Yuan Wang (left) and Lei Huang (right) are flanked by their JPL mentor, Jonathan Jiang, at awards ceremony.

Caltech Postdoctoral Scholars Yuan Wang and Lei Huang were recently awarded the 2014 Chinese-American Oceanic and Atmospheric Association Springer Excellent Ph.D. Dissertation Award.

Wang won the first prize award for his dissertation on "Aerosol-Cloud Interactions from Urban, Regional, to Global Scales." In addition to the prize award and certificate, Wang's dissertation will be published as a regular book by the Springer Publisher. Huang won the

third prize award for his dissertation "Transport Pathways of Fire Generated Tracers to the Upper Troposphere as Determined by A-Train Satellite Measurements."

Wang, who joined JPL in September 2013, earned a Ph.D. from Texas A&M University in 2013. Huang obtained his Ph.D. from the University of Texas at Austin. The pair received the awards in February during the American Meteorological Society annual conference in Atlanta.



Thom Wynne / JPL Photo Lab

Six named senior research scientist

Newly appointed senior research scientists join JPL Director Charles Elachi (left) and Chief Scientist Dan McCleese (right). From left: Simon Yueh, Jean-Pierre Fleurial, Steven Chesley, Suzanne Smrekar, Erik Ivins, Peter Day.

Passings



Hugh Ferguson

Hugh Ferguson, 94, a retired machinist, died Dec. 7.

Ferguson worked at JPL from 1957 to 1985. He is survived by his wife, Sue, daughter Nancye and grandchildren Loni and Wendy. Ferguson's ashes were scattered at a Jan. 25 memorial in Long Beach.

Joe Godley, 82, a retired mechanical technician, died Dec. 31.

Godley worked at JPL from 1952 to 1996. He is survived by his wife, Barbara, daughters Cheryl Cacapardo and Theresa Godley, granddaughter Moria Sidle and great-grandchildren Reanan and Orion.

A memorial service was held Feb. 15 at Santa Barbara Unity Church.

Earl Collins, 84, a retired mechanical engineer, died Jan. 3.

Collins joined JPL in 1960 and retired in 1991. He is survived by his daughter, Joann Eck.

Services were held at Forest Lawn Hollywood Hills.



Bill Fawcett

Retired spacecraft instruments manager **William Fawcett**, 81, died Jan. 27.

Fawcett worked at JPL from 1961 to 1997. He managed instrument development for the Galileo mission and was involved in similar work for the Mariner missions, Viking and Voyager. He was awarded the NASA Exceptional Service Medal in 1972.

Fawcett is survived by his wife, Jeanette, daughters Barbara Kuntz and Laura Fawcett, granddaughters Ava Kuntz and Collette Kuntz, and brother James Fawcett. A celebration of life was held March 2 in Pasadena. In lieu of flowers, donations may be made in Fawcett's name to the Alzheimer's Association at www.alz.org.



Avron Bryan

Retiree **Avron Bryan**, 85, died Feb. 1. A U.S. Coast Guard officer and Korean

War veteran, Bryan joined JPL in 1962. His 32-year career included service as a Deep Space Network systems engineer and technical manager for ground tracking systems for deep-space missions.

Bryan is survived by his wife, June; son David; daughter Margaret Reiter; grandsons Lewis Rivers III and David Reiter III; and great-grandson Coleson Rivers.

Letters

I would like to thank all the wonderful people at JPL for their kind thoughts and support during the long illness and passing of my sister. It is so reassuring to have so many supporting you in such a difficult time. Thank you also to JPL for the beautiful plant. To Mars Science Lab and the Mars Directorate: it is so nice to have such wonderful friends. Bless you all.

Bobbie Buckmaster

To my friends in Section 312 and around the Laboratory, our sincere thanks for your kind words and thoughts on the passing of my dad. Dad was an enthusiastic gardener, so we're very glad to have this beautiful plant to remember him by in the days ahead.

Scott Burleigh

Dear JPL and Section 333 friends, My daughter, Rosa Irma Franco, "Rosie," an amazing, seemingly strong, healthy 25-year-old single mom, wonderful mother to a 9-year-old boy, was diagnosed with small cell ovarian cancer on Nov. 14, 2013. Sadly, despite all

medical efforts, we lost Rosie on Feb. 8. To each one of you, our most sincere appreciation for your prayers, thoughts, understanding and support during this difficult time. The flower arrangement and plant sent in Rosie's remembrance were beautiful.

The Franco family

I would like to thank my friends, colleagues and JPL for the kind thoughts, prayers and the beautiful plant that I received following the recent passing of my father. This means a lot to me.

Ronald Day

Dear JPL family, Your kind words, thoughts and prayers will forever remain deep in my heart. I am sure my mom is sending all of us her blessings from heaven. My family and I sincerely and deeply appreciate it.

Olivia Tyler

Retirees

The following employees retired in February: **Richard Green**, 51 years, Section 9200; **Nicholas Thomas**, 46 years, Section 7600; **Patricia Corcoran**, 32 years, Section 1620; **Sandra Reyna-Gephart**, 31 years, Section 252E; **Theresa De Greve**, 30 years, Section 5112; **Pedro Abeyta**, 27 years, Section 2724; **Harold Sobel**, 26 years, Section 383D; **Mina Rad**, 17 years, Section 2624; **Avo Demirjian**, 16 years, Section 3460; **Donald Eagles**, 16 years, Section 393L; **Andrew Gerber**, 14 years, Section 8200.



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Universe

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