Steady as we go

NASA FY15 budget funds JPL’s continuing missions

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.

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.”
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.”

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.”
Jumping for joy

Heneghan seeks tranquility in the sky

By Mark Whalen

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?

“Those are 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, Heneghan 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 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!” 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.’”
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.

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.

Ph.D. work on band structure engineering that was recognized by the American Physical Society, a Fellow of the American Physical Society and 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.

Dissertation honors for JPLers

Yuan Wang (left) and Lei Huang (right) are flanked by their JPL mentor, Jonathan Jang, 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.

Six named senior research scientist

Newly appointed senior research scientists join JPL.

Yuan Wang
Lei Huang

Dear JPL and Section 312 friends,

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.

Bobbie Buckmaster

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 232E; Theresa De Grove, 30 years, Section 5112; Pedro Aveyto, 27 years, Section 2724; Harold Sobel, 26 years, Section 381D; Mina Rad, 17 years, Section 2624; Avo Demirjian, 16 years, Section 3460; Donald Eagles, 16 years, Section 392L; Andrew Gerber, 14 years, Section 8200.

Hugh Ferguson, 94, a retired mechan- "Rosie,” an amazing, seemingly strong, 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