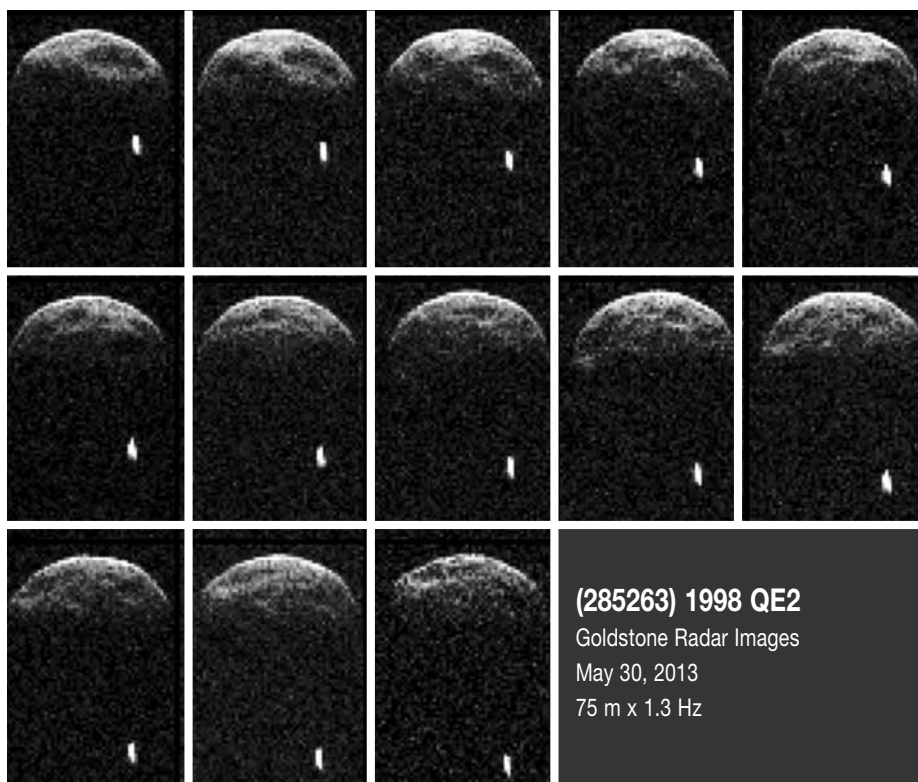


No nail-biter for extra-hefty space rock

By Mark Whalen



JPL astronomers in late May observed a relatively close flyby of Earth by an asteroid so big that it would cause global catastrophe if it hit our planet.

But no worries. The 3.3-kilometer-diameter asteroid 1998 QE2 passed Earth at a comfortable distance and posed no threat. But in the process of observing it, astronomers gained valuable knowledge of this asteroid and also experienced a surprise.

Radar observations led by JPL astronomer Marina Brozovic using the Goldstone Solar System Radar showed that 1998 QE2 is a binary asteroid that has a small moon in orbit around it.

Brozovic said early optical observations indicated a rotation period of 5.3 hours. “Binary near-Earth asteroids usually have a larger component that rotates with a two- to three-hour period, with a rotation period of 5.3 hours, so we didn’t expect to see any satellites,” she said.

“More observations collected over the weekend revealed that the asteroid rotates with a period of about five hours; that is consistent with results from the optical light curves obtained by amateur astronomer Kevin Hill,” added JPL radar astronomer Lance Benner.

“The updated radar observations also show that the larger component is between three and three and a half kilometers in diameter and thus somewhat larger than we previously thought.”

1998 QE2 was discovered almost 15 years ago as part of NASA’s Spaceguard survey, which had the goal of finding 90 percent of the near-Earth asteroids larger than 1 kilometer in size. The asteroid has been carefully tracked over the years, very important in view of how close the object came to Earth, said JPL astronomer Paul Chodas. 1998 QE2 on May 30 flew by at about 15 times farther than the moon is from Earth. “For an asteroid of this size, that’s a close shave,” he said.

Images showed that the satellite—about 600 meters in diameter—appears as “a little speck of light that changes its location with respect to the primary asteroid,” said Brozovic. “The rotation of the primary asteroid is revealed as the rotation of the surface features.”

The presence of a moon helps scientists estimate the mass of the asteroid. As Benner explained: “If you

Continued on page 2

JPL taps Air Force general as new deputy director

U.S. Air Force Lt. Gen. Larry D. James will join JPL as the lab’s next deputy director following Gene Tattini’s retirement later this year, JPL Director Charles Elachi announced.

James will start at JPL in August for a six-week transition period before formally becoming deputy director.

James has extensive experience in space-related activities. After graduat-

ing with distinction from the U.S. Air Force Academy, he received a master’s degree in astronautical engineering from MIT. He trained as an Air Force payload specialist for the space shuttle program and later served in California as vice commander of the Space and Missile Systems Center, where Tattini was commander prior to joining JPL. James has been commander of the 14th Air Force, responsible for all

Department of Defense satellite and launch systems, and he presently serves as Air Force Deputy Chief of Staff for Intelligence, Surveillance and Reconnaissance. He will retire from the Air Force at the end of June after completing a 35-year career. ■



Making space accessible to all

By Mark Whalen



Below: Rachel Zimmerman with her Blissymbol Printer science fair project in 1985, at age 12, at the London & District Science & Technology Fair in London, Ontario, Canada.



Even before her teenage years, Rachel Zimmerman-Brachman developed a strong curiosity and interest in two particular areas: science and working with the disabled. Now she is in a position to merge her passions and can see the day when all disabled students have the same opportunities for science education as everyone.

A member of the Solar System and Technology Education and Public Outreach team, Zimmerman-Brachman in April was named president of Science Education for Students with Disabilities, an organization affiliated with the National Science Teachers Association.

“One of the things I’d like to do is raise awareness that there even is an organization for disabled students to learn science,” said Zimmerman-Brachman. “Just because someone has a physical disability doesn’t mean that they can’t understand what all their classmates

are learning. Especially with more students being mainstreamed now, they should have the same opportunities to take the same classes that their friends do.”

Zimmerman-Brachman sports a background of curiosity and achievement, having worked to help students with disabilities since she was 11 years old. She studied Louis Braille and how he invented his reading system for the blind, as well as Helen Keller and how she was able to communicate even though she couldn’t see or hear.

Upon discovering a book at the public library called “Blissymbolics: Speaking Without Speech” on creating a universal language by using symbols to describe common objects, Zimmerman-Brachman’s interest spiked. She proceeded to develop science fair projects in grades 6 through 8 about Blissymbolics, including the Blissymbol Printer for her grade 7 science fair in 1985. The project consisted of a computer-controlled device that had a screen, a touch tablet with an overlay and a plotter so that students could communicate with people who weren’t with them in the room.

“I wasn’t thinking of going anywhere farther than the science fair; I was just interested for my own curiosity to see if I could program my own computer to recognize symbols on a board,” she said.

But the project raised a lot of attention, winning the science fair at her school in London, Ontario, as well as a regional competition, followed by a silver medal at the Canada-Wide Science Fair.

A few years down the road, when Zimmerman-Brachman was a student at the International Space University in Strasbourg, France, she served a three-month internship at NASA Ames Research Center, where she worked on an agreement with the Tetra Society of North America, a group of engineers who volunteer their time to build custom assistive technology to improve the quality of life for people with physical disabilities. The plan enabled NASA engineers to volunteer their time to work with disabled people in their community.

Zimmerman-Brachman has been with JPL since 2003, supporting outreach for the laboratory’s flight projects and researchers through competitions such as the Science Bowl, Ocean Sciences Bowl and FIRST Robotics, and selecting high-school students for JPL summer internships.

She also visits schools to talk about science. One of her favorites was a classroom visit for second-grade students with autism in September 2012. “The students liked ‘Eyes on the Solar System’ so much, the teacher petitioned for Internet access in her classroom so her students could use the web-based application after I left,” she said. “I love seeing this kind of positive feedback from teachers and their students.”

Another case in point is Kelly Wills, a Wright State University (Ohio) visually impaired student who served three summer internships at JPL starting in 2006. Zimmerman-Brachman recalled that Wills was one of the first students to test use of the camera on an iPhone that used optical character recognition and then read messages out loud.

“On Kelly’s last day of his first summer at JPL, he came to me and said, ‘I hear there’s a museum here.’ There is, but he’s never seen it,” said Zimmerman-Brachman. “He asked if there were models. When I replied yes, he asked if he could touch them. So we got special permission to move the velvet rope so he could feel the models.

“After that, there were fingerprints on the Mars rover model, and I would point that out in every tour I ever gave, and say, ‘I’m proud of those fingerprints, because that was showing a blind student the size, the scale and the materials the rover is made of. And it was really hard for him to picture that in his mind until he could feel it.’”

Zimmerman-Brachman noted that Wills went on to become the head of science and technology for the National Federation of the Blind. “So his internship at JPL made a difference in his life as well,” she said.

The awareness campaign is ongoing for students, teachers and parents.

“There are a lot of special-education teachers who don’t know that they could be teaching science,” said Zimmerman-Brachman, “and science teachers who didn’t know they could teach kids with special needs.

“There are also a lot of parents who don’t know they can advocate for their children who have special needs to make sure they get the science education they deserve,” she added. “They might be just as interested in science as anyone else, but are not being offered the opportunities.” ■

Asteroid *Continued from page 1*



know the mass and the size, then you can estimate the density and constrain the internal structure, which helps us understand the history of the asteroid.”

Chodas said the all the near-Earth asteroid orbits are projected ahead 100 years into the future to see whether there is any chance of an impact. “It’s long on a human timescale, but on a solar-system timescale that’s a blink of an eye,” he said.

Chodas added that asteroids in general are being discovered at about 3,000 a month, including near-

From left: NASA Administrator Charles Bolden, JPL Chief Engineer Brian Muirhead, Solar System Dynamics Group Supervisor Don Yeomans. During a May 23 visit to JPL, Bolden discussed the agency’s asteroid initiative.

Earth objects discovered at a rate of about 80 a month. “The numbers are just exploding,” he said. “We have 600,000 asteroids in our database now for entire list of asteroids.

“Those over 1 kilometer are priority number one for the NEO Office,” he added. “We want to know their orbits and their uncertainties very accurately, to project them into the future. And will they hit Earth?”

NASA Administrator Charles Bolden visited JPL May 23, highlighting the agency’s new asteroid-retrieval mission initiative.

For more information about asteroids and near-Earth objects, visit <http://neo.jpl.nasa.gov/> and <http://www.jpl.nasa.gov/asteroidwatch>. ■



The four paths to JPL's future

What are the most important factors that will dictate whether JPL is successful in the next 10 to 15 years? Members of JPL's Executive Council weighed that question at their recent annual retreat in early May. Facilitated by Jakob van Zyl, the lab's associate director for policy formulation and strategy, the leadership looked at issues in hiring talent, strategic planning, public engagement and ensuring success. Here, van Zyl and Charles Elachi, JPL's director, discuss where those talks took them.

By Franklin O'Donnell

What was the overall thrust of your discussion about JPL's future?

ELACHI: At the retreat, each directorate laid out a 10-year plan, and in all of these we not only looked at missions and technologies, but also what kind of talent we will need to accomplish it. Because, at the end, it's the people who accomplish whatever strategy we have.

We talked about mentoring employees, and also about the areas where we might need to hire new talent, be it experienced or early career hires. We talked as well about the investments we need to make and the technologies that we need.

VAN ZYL: We recognized that there are four key reasons why we think JPL has been successful. As Charles points out, the most important of these is our people. So one of the main initiatives coming out of the retreat is to look even more at how can we maintain the level of the talent we have.

The second thing that has made us successful is strategic planning. Charles had the foresight about a decade ago to realize that we can't be a laboratory that only does planetary work. We had to diversify. As a result, Earth science is one of the largest elements of our work today. One challenge we face is how do we communicate this strategic planning to employees so that they all can share in the vision of where JPL is going.

Another cornerstone of our success is public engagement. The tremendous success we had last year shows that the way that we interact with the public provides a source of inspiration and, frankly, an ad-

venture for the public at large. This is an area where we are facing some challenges now, but we are committed to continue excelling in this area.

Finally, the last cornerstone of our success is the very fact that we have been successful. And we're successful because our employees put in the effort that creates success. This track record gives our sponsors confidence that when they award us work we will deliver.

When the retreat ended, there were 11 action items that came out of it, but they all more or less fall into those four main areas.

What kinds of hires are necessary to make JPL's future healthy?

ELACHI: As we look at the next 10 to 15 years, we see that we have to bring in talent at all different levels. We need to bring in experienced talent, we need strategic hires in critical areas, and we need to bring in talent just graduating from school.

We heard at the retreat that the generation of millennials [young people born between the early 1980s and early 2000s] have a different approach of doing things. They are much more technologically savvy. They use social networks, Facebook and so on, which are areas most people of my generation are not as familiar with. So a key discussion we're having now is how do we engage with our people—how do you mentor, how do you communicate—to make sure that we reach all the generations at JPL.

VAN ZYL: The millennials are the workforce of the future. So one of the actions

we took was to do a survey of our employees, including the millennial folks, the early career hires, and look at what they really value in a workplace. And then see how we can employ all the tools at our disposal to make JPL—and this is a phrase that's often overused, but it is appropriate—an employer of choice. We need to modify how we provide information and provide interactions for our employees. This includes all kinds of aspects from IT to the environments we create in office spaces and collaborative spaces.

I recently read that 40 percent of the jobs that exist now did not even exist 15 years ago. So you have to recognize that the world changes rapidly now, and we can't wait for that future to be here before we start changing the talent pool that we need at the laboratory.

Besides the talent pool, what other strategic changes can JPL employees expect to see?

VAN ZYL: As we look at the kinds of missions in our future, besides the talent we also need to look at what types of facilities we need and how might the work flow through the laboratory. This will allow us to make informed decisions about which portion of the work we should do at JPL versus which portions should be done somewhere else.

There are times when we have a capacity problem at the lab—we can't just take all the work and expand beyond our fences as we might sometimes want. So there is now an emphasis on planning how work flows through the laboratory.

Where do things stand with public engagement?

ELACHI: We recognize that the government's plan to consolidate education across its agencies, as well as NASA's plans to change Education and Public Outreach funding, are major changes. But it's very critical that NASA and JPL continue engaging students in the classroom and the general public outside of it. So the question is how do we work that within these new changes. I'm absolutely committed that we need to have a very vibrant education and public engagement program at JPL. On the technical side of JPL, in the old days all missions were assigned, and then we entered an era where we had to compete for our missions under programs like Discovery, New Frontiers, Explorer. JPL has thrived very well in those competitions. I'm very confident of our abilities in education and public engagement. As long as we are given the opportunity to compete, we will do well.

At your recent all-hands meeting, you [Elachi] said that JPL's success with its recent flight projects is one of its greatest strengths in attracting new business.

ELACHI: No question about it. In the end, people will look at what do you deliver. And having delivered and being successful clearly creates a very positive atmosphere, not only for JPL but all NASA. What we are successful at here at JPL in the end boosts NASA as a total—all of our mission successes reflect positively on NASA as viewed by the country and by Congress. Clearly this will help as NASA is advocating to Congress for missions in this very tight budget environment. ■

News Briefs



Lance Hayashida / Caltech

Bethany Ehlmann

New honors for Curiosity team

JPL's Mars Science Laboratory team in May received two new honors: the National Aeronautic Association's 2013 Robert J. Collier Trophy and the American Institute of Aeronautics and Astronautics Foundation Award for Excellence.

The Collier citation notes the team's "extraordinary achievements of successfully landing Curiosity on Mars, advancing the nation's technological and engineering capabilities, and significantly improving humanity's understanding of ancient Martian habitable environments."

The Foundation Award for Excellence was established in 1998 to recognize unique contributions and extraordinary accomplishments by organizations or individuals. The organization said the team was honored "for significant accomplishment in space exploration, inspiring global fascination with space."

Ehlmann honored by National Geographic

Bethany Ehlmann of the Planetary Science Section has been named one of National Geographic's Emerging Explorers, which honors "uniquely gifted and inspiring young adventurers, scientists, photographers, and storytellers—explorers who are already making a difference early in their careers."

Ehlmann is a participating scientist on Mars Science Laboratory and is also an assistant professor of planetary science at Caltech. She is of 17 worldwide to receive the annual honor. National Geographic awards recipients \$10,000 for research and exploration.

For the full National Geographic article, visit <http://www.nationalgeographic.com/explorers/bios/bethany-ehlmann>.

NASA safety audit June 17–21

As part of a three-year cycle, NASA will conduct an institutional/facility/operational safety audit of JPL from June 17 to 21.

The purpose of the audit is to verify that federal and state regulations and NASA safety and mission assurance requirements are implemented and documented at each NASA center, based on the flowdown of the agency-wide safety and mission-assurance policies and requirements from NASA to JPL into the existing contract.

Auditors from NASA Headquarters' safety and mission assurance staff and other NASA centers' subject matter experts will be reviewing JPL processes, procedures and practices and visiting various buildings on lab to verify and assess safety implementation in several audit areas such as general safety, electrical safety (including lockout

Run/Walk team raises \$5,000



Thom Wynne / JPL Photo Lab

JPL Deputy Director Gene Tattini joins JPLers who participated in the Revlon Run/Walk for Women May 11. Overall, 49 JPL team members raised \$5,000 for the event. JPL has had a team for the past 13 years and over that time has raised \$111,921. Donations for women's cancer research are still accepted through June 14 at the team page: http://do.eifoundation.org/site/TR/RevlonRunWalk/LARRW?team_id=6788&pg=team&fr_id=1100.

tagout/confined space), fire protection, lifting devices and equipment, mishap reporting and investigations, pressure vessels/pressurized systems and emergency preparedness with respect to the Occupational Safety and Health Administration.

In preparation for the audit, staff members are urged to ensure good housekeeping within their work areas, conduct activities in a safe and healthful manner and report existing or

anticipated unsafe and/or unhealthful conditions to their supervisor or to Occupational Safety at ext. 4-4711.

Auditors will be accompanied by JPL subject-matter experts and could visit any area of the laboratory. Personnel should be ready to respond to any safety-related questions the auditors might ask. If you don't know the answer, consult with the subject-matter expert.

For more information, visit <http://safetyfirst.jpl.nasa.gov>.



Richard Hasegawa / JPL Photo Lab

Smartphone app's mysteries solved

Luke Johnson (left), who developed the tour map "An Insider's Guide to the Mysteries and Curiosities of JPL" and its associated smartphone app, joined JPL Director Charles Elachi in recognizing six JPLers who completed all seven of the app's tours.

Front row, from left: Eric Mardin-Cuddy, Herb Breneman, Jim Gerhard, Elachi. Back row, from left: Johnson, Alex Smith, Frank Loaiza, Frank Leader. Not pictured are honorees Casandra Mercury and Michael Mercury.



READ AND SUBMIT CLASSIFIED ADS AT JPL'S ONLINE NEWS SOURCE <http://jplspace>

E-MAIL US AT universe@jpl.nasa.gov

Universe

Editor
Mark Whalen

Design
Audrey Steffan

Production
David Hinkle

Photography
JPL Photo Lab

Universe is published by the Office of Communications and Education of the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109.

Passings

Paul F. Miller, 96, retired from the Reliability Programs Section, died Sept. 1, 2012.

Miller worked at the lab from 1962 to 1981. He is survived by three sons, three granddaughters and seven great-grandchildren.

Hyman Gold, 99, a retired test specialist, died March 17.

Gold worked at the lab from 1956 to 1973. He contributed to numerous JPL missions, including Corporal, Sergeant, Viking and Mariner.

Gold is survived by his daughter, Susan, three grandchildren and three great-grandchildren. Services were held in Tucson, Ariz.

Elaine Susanne Tutt of the Technical Information Section died March 23.

Tutt started at JPL in 1998 and transferred into Section 274 as staff assistant in 2000. She received a B.A. in business management from the University of Redlands in 2003.

She is survived by siblings Colleen Tutt, Judy Ford and David Tutt, niece and nephew Erin O'Sullivan and Patrick Ford,



Susanne Tutt

and grandniece and grandnephew Kathryn and Tommy O'Sullivan. Tutt was predeceased by her husband, David Shields. A celebration of her life was held May 13 and a memorial service took place May 26 at Christ the Shepherd Lutheran Church in Altadena.

Leonard Friedman, 92, a retired software engineer, died April 17.

Friedman worked at JPL from 1972 to 1985. He was software team leader for a testbed that demonstrated the feasibility of a rover capable of exploring 1,000 kilometers on Mars. Later, he headed a research group exploring systems and applications of artificial intelligence to space mission problems.

He is survived by his wife, Gisele.

John Scott-Monck, 76, a retired technical group supervisor, died April 23.

Scott-Monck joined JPL in 1977 in the Space Materials Science and Engineering Section, where he worked on NASA space technology development, internal JPL studies and the Department of Energy's Flat-Plate Solar Array project. In 1987 he was awarded NASA's Exceptional Service Medal for his contributions in development and application of space solar cell and array technology. Later he joined the Thermal and Propulsion Engineering Section where he worked on contamination control for the Hubble Space Telescope's Wide Field/Planetary Camera II. Scott-Monck retired in 1998.

He is survived by daughters Diana

and Laura; sister Jeanne; brother Jim and granddaughter Katherine. A family memorial was held in Long Beach, Calif.

Letters

We are thankful for all the help, prayers and support given to Lupe during her illness. The family wishes to thank you for the many loving kindnesses shown during our bereavement. Your thoughtfulness is deeply appreciated and will always be remembered. Thank you.

Robert Garcia, daughters Lupita and Roberta

Retirees

The following employees retired in May:

Robert Barry, 36 years, Section 393L; **Stuart Kerridge**, 36 years, Section 392D; **Lorna Deady**, 25 years, Section 9000; **Betty Sword**, 20 years, Section 388M; **Nancy Barker**, 10 years, Section 2114.



John Scott-Monck