

Boldly going in 2013

The year's highlights, from new Earth missions to the interstellar threshold

Has 2013 already come and gone? Over the past 12 months, JPL's missions moved steadily along—with a few surprises along the way.

Into the beyond



"Are we there yet?" asked Ed Stone, project scientist of JPL's longest-flying mission. "Yes," he concluded, "we are."

"There" was the outer edge of the solar system, and Stone's pronouncement came at a September news conference when the former JPL director and his science colleagues on the Voyager mission announced that Voyager 1 had passed into the great beyond—interstellar space, past the electromagnetic sheath that encloses the sun and planets.

And there's still more to come. According to Project Manager Suzanne Dodd, the spacecraft and its twin Voyager 2—both launched in 1977—are both in fine shape, and should expect to radio home data about deep space at least through 2020.

Mars and life? Definitely not off the table



Could Mars have supported ancient life? That was the \$64,000 question for the Mars Curiosity rover when it landed in 2012. Only six months later—in February 2013—the rover analyzed a rock sample that produced a clear answer: Yes.

Prospecting in a part of Gale Crater called Yellowknife Bay where water once ran or stood, Curiosity extracted rocky powder that proved to include sulfur,

nitrogen, hydrogen, oxygen, phosphorus and carbon—some of the key chemical ingredients of life. The team looked forward to more as Curiosity rolled toward Mount Sharp, the peak towering over the center of the crater.

Today Earth, tomorrow Jupiter

The Juno spacecraft returned to the planet where it was created, but not for long. In October, the Jupiter-bound orbiter skimmed past Earth at a relatively close 559 kilometers (347 miles) in order to gain enough gravitational energy to send it on to the solar system's largest planet. Despite putting itself in a protective safe mode during the close encounter, Juno accomplished a "near-perfect" trajectory that will deliver it to Jupiter on July 4, 2016.

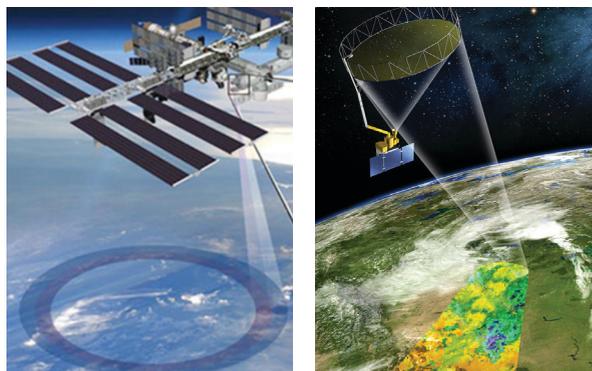


The home fleet

Our home planet may have thought itself well-studied, but wait until it sees the wave of missions the lab is about to unleash. In recent months, many JPLers have been focused on a quartet of new Earth science satellites and instruments due for launch in 2014 and 2015.

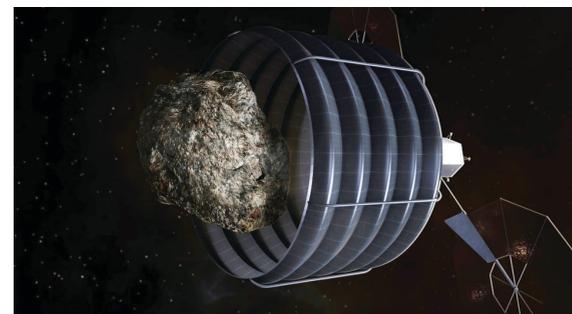
In June, an instrument called RapidScat will be sent to the International Space Station, from whose vantage point it will monitor ocean winds. In summer, the study of atmospheric carbon dioxide will be the target of the satellite Orbiting Carbon Observatory 2.

Soil Moisture Active Passive, a satellite expected to



improve accuracy of weather forecasts and climate change studies, is slated for launch next fall. Jason 3 will keep tabs on ocean surface topography after the satellite launches in early 2015. They all will keep teams busy for years working with new data on Earth.

In search of a likely rock



No need to call Bruce Willis: NASA is on it. When the space agency unveiled its annual budget request in April, it announced an ambitious new initiative to lasso a near-Earth asteroid and nudge it into orbit around Earth's moon, where it can be studied by visiting astronauts. Responsibilities are yet to be assigned, but JPL hopes to play a significant role due to its expertise in robotic missions and asteroid studies.

Eying the invisible



A decade aloft for the Spitzer Space Telescope has revealed it to be nothing short of adaptable. Launched in 2003 on what was planned as a 2-1/2-year mission, the infrared telescope studied comets and asteroids, counted stars, scrutinized planets and galaxies, and discovered soccer-ball-sized carbon spheres in space called buckyballs. Though the coolant that enabled some observations ran out in 2009, Spitzer opened its second decade continuing to illuminate the dark side of the cosmos with its infrared eyes. Among its new goals: getting a closer look at planets orbiting other stars, and studying asteroids closer to home.

Performance coaching: the new face of job feedback

By **Jaime Gonzales**
Manager, Professional Development

Have you ever thought it might be a good idea for your manager to have conversations with you more frequently throughout the year about career guidance? Or have you come out of a performance review discussion wishing the discussion were more forward-looking, or more informal, or timelier? If so, you are like many employees who have expressed dissatisfaction at some point in their career with their companies' coaching and performance management practices.

For JPL, this is about to change. We will be making some changes to the performance contribution and review process and introduce a performance coaching methodology that emphasizes informal conversations on a frequent basis and in real time.

Human Resources has retained the services of the company BlessingWhite to deliver a conversational coaching workshop for managers that emphasizes real-time performance feedback in informal settings and follow-up opportunities to discuss goals, performance progress and career development. The BlessingWhite coaching model balances employees' expectations and their managers' business needs.

These conversations can take place at anytime, anywhere, on a formal or informal basis. The main point is to make sure these conversations are relevant and provide useful coaching or meaningful feedback. Managers often miss a great coaching opportunity when they wait until JPL's designated time of the year for the annual performance discussion.

There are several compelling reasons for making the shift to coaching conversations. The 2012 Employee Engagement survey revealed a strong working relationship between employees and supervisors. The manager effectiveness scores in the survey were very interesting. They showed that many of the factors that contribute to a productive working relationship between managers and employees are already present—trust, communication, listening, openness and feedback. This is a strong foundation for managers to build on to help their employees succeed.

Anticipated shifts in workplace demographics are also a factor in making this change. Data are clear: Over the next decade, there will be a pronounced generational shift in our workplace. This shift will be accompanied by an expectation for more timely feedback and coaching. Industry research and our own JPL survey data indicate that employees increasingly want more direct and real-time feedback about their performance and more clarity about their career development opportunities.

We think it is imperative to get out ahead of this trend and provide our managers critical training in order to meet employees' expectations for feedback and career

guidance. This training will also help managers in attracting, developing and retaining talent, which is a top priority for JPL leadership. JPL has a great brand today, and in order to remain an attractive employer of choice, we must strive to become an employer that takes growing and developing its employees seriously.

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In November, Human Resources kicked off a number of activities to introduce the new coaching program called Helping Others Succeed. First, all employees were invited to participate in a brief anonymous "pulse survey." The survey gives employees the opportunity to assess the various types of performance discussions they have had with their manager over the past six months and provide input to the types of conversations they want going forward. The pulse survey is one way for us to identify what else we can do to support managers and employees with their coaching conversations.

The Executive Council has endorsed a two-phase training program based on the BlessingWhite coaching model. Managers will attend a 90-minute coaching orientation session sponsored by Human Resources. The purpose of this session will be to help managers understand the coaching initiative and learn how it will be integrated

into our performance management practices. Managers will then attend a one-day coaching skills workshop, "Helping Others Succeed," which will be offered December 2013 through March 2014.

Human Resources will also provide optional employee briefings about the new coaching program and provide information to help employees identify actions they can take to make these conversations useful and meaningful. Coaching is a mutual partnership between employees and their managers. All of us have skin in the game when it comes to building stronger working relationships with one another.

This is a significant change for JPL employees. Like most changes, we look for what's in it for me. For managers, the informal approach means they can hold these conversations anytime and anywhere. Informal coaching feedback is not reserved only for a JPL quiet hour with the boss. For employees, the benefit should come from knowing that our coaching philosophy encourages employees to initiate conversations with their manager and seek feedback and coaching not only from their immediate supervisor, but from others who they feel are important to their success too.

We are confident we will build upon our strong working relationships with supervisors to create a coaching culture that provides employees important feedback about their performance and career guidance to help them realize their full potential.

Performance Coaching Key Events

Pulse Survey (November–December 2013)

Employees assess performance discussions over past six months; identify types of future conversations

Management Training (December 2013–March 2014)

Orientation session (90 minutes) and one-day "Helping Others Succeed" coaching skills workshop

Optional Employee Briefings (December 2013–March 2014)

Information about the new coaching program; help employees identify actions to make conversations meaningful

Balloons, balsa wood and duct tape

The annual Invention Challenge is JPL's rite of December

By Mark Whalen

Fifteen years ago, JPL engineer Paul MacNeal's seventh-grade son David came home from school with an extra-credit project to create a balloon-powered car. The pair decided on straw for axles, cutting up paper to make cones for lightweight wheels, and cardboard for a structure to hold the balloons.

"He took it to school and operated it," said MacNeal. "The teacher loved it so much, she took it from him. We never got it back. That got me thinking: I had fun with that, David had fun with that; why don't we let all of JPL have fun with that?"

Later that year—in December 1998—MacNeal took to JPL's mall to host the first-ever Invention Challenge. Also a balloon-car competition, it drew 46 entries with the winning car traveling 110 feet on the power of two balloons.

Since then, the annual competition has become a JPL fixture each December. More than 4,000 Southern California students have competed alongside (and against) JPL employees in contests building things as varied as a device to play a song in C major scale to another to light a match in 20 seconds or less. Over the years, contests have tested competitors' skills to move, launch or toss various items ranging from tennis balls to tissue paper to jellybeans. On Dec. 6, a new field of aspirants will gather on the JPL mall to try to sink a golf ball in a challenging hole-in-one.

Originally a contest primarily for JPLers, students became involved in 2002 when three educational centers in Los Angeles, Orange County and Long Beach partnered

with JPL. As a result, that year the Invention Challenge had 22 student teams.

"That put us on the map," MacNeal said. "Word of mouth was spreading, and we've been growing ever since." Two years ago, the challenge saw its biggest participation level, at 78 teams. Regional, playoff-type competitions precede the JPL event.

For kids, one of the biggest draws "is that if you get a chance to come here, you're competing side-by-side with JPL engineers," said MacNeal, a senior mechanical systems engineer whose day job is working on a Microwave Limb Sounder testbed. "But guess what?," asked MacNeal. "Quite often, the students beat the JPL teams."



JPLers and student competitors alike have created a myriad of contraptions over the 15 years of the Invention Challenge. Among them, top left, are two distinctly different entries from the competition's first year, 1998's balloon car contest. Third from left, Arcadia High School checks its entry in the 2007 contest to play a song. Bottom right, teams prepare to propel bowling balls (2004) or footballs (2011). Bottom left: Magnolia Science Academy Middle School celebrates its first-place finish in 2010's ping-pong ball climb contest.

News Briefs

Lunar laser from Table Mountain observatory successfully demonstrated

JPL has participated in a key demonstration of potential breakthroughs in space communication capabilities.

NASA's Lunar Laser Communication Demonstration, the agency's first attempt to demonstrate two-way communication with lasers instead of radio waves, was conducted with the Lunar Atmosphere and Dust Environment Explorer, or LADEE, which launched to Earth's moon in September for a 100-day mission.

The demonstration was managed by NASA Goddard Space Flight Center. MIT Lincoln Laboratory built the terminal onboard the lunar orbiter and the primary ground station at White Sands, NM.

NASA's Space Communication and Navigation Program Office funded JPL to configure the Optical Communication Telescope Laboratory at Table Mountain observatory near Wrightwood to serve as a backup ground station.

Downlink and uplink at 622 and 20 megabits per second were demonstrated at White Sands, a NASA and world record, according to JPL Project Manager Abhijit Biswas, who added that the Table Mountain photon-counting optical receiver was designed to support 78 megabits per second downlink. By transmitting a modulated multi-beam laser beacon from Table Mountain for link acquisition, 22 successful links were demonstrated between Oct. 18 and Nov. 19, said Biswas.

"Remember using dial-up modems and how long it took to get data to computers?" asked Biswas. "That's a perfect analogy for optical communications vs. state-of-the-art radio frequency communications. Orders of magnitude increases in channel capacity are achievable with optical technology."

Biswas said the success of using the Table Mountain telescope to support the laser demonstration will feed forward to the upcoming Optical Payload for Lasercomm Science, or OPALS, link demonstration from the International Space Station in spring 2014 and another planned NASA long-term laser-relay demonstration to a geostationary spacecraft, scheduled to launch in 2017.

Mars Science Lab flight software named NASA's best for 2013

NASA's Inventions and Contribution Board has selected JPL's Mars Science Laboratory flight software as the winner of the 2013 NASA Software of the Year competition.

The onboard flight software for Mars Science Laboratory, which landed its Curiosity rover on Aug. 5, 2012, successfully controlled the cruise phase; entry, descent and landing phase; and ongoing surface operations.

The flight software team was led by former JPLer Ben Cichy, now at Goddard Space Flight Center, and also included many innovators at JPL and beyond.

For questions about the NASA Software of the Year competition, please contact NASA Space Act Awards Liaison Officer Chris Jagers or IT Chief Technology Officer Tom Soderstrom.



Rosaly Lopes

New Lopes book looks at alien worlds

Rosaly Lopes, manager of the Planetary Science Section and lead scientist for geophysics and planetary geosciences, has co-edited a new book that features contributions from several JPL scientists.

"Alien Seas: Oceans in Space," edited by space artist Michael Carroll and Lopes, discusses current research, past beliefs and new theories of the "seas" of other worlds in our solar system, ranging from seas of sand on Titan, Mars and Earth to seas underneath the frozen surfaces of Enceladus and Europa.

Contributors include JPLers Tim Parker, Bob Pappalardo, Karl Mitchell and Kevin Baines. The foreword is by film director and underwater explorer James Cameron.

Lopes, an expert on volcanism on Earth and the planets, currently studies ice volcanism on Saturn's moon Titan.

JPLers on virtual institute team

Three JPL researchers are co-investigators on one of nine research teams selected by NASA for a new institute that will bring researchers together in a collaborative virtual setting to focus on questions concerning space science and human space exploration.

The teams participating in the Solar System Exploration Research Virtual Institute will address scientific questions about the moon, near-Earth asteroids, the Martian moons Phobos and Deimos, and their near space environments, in cooperation with international partners.

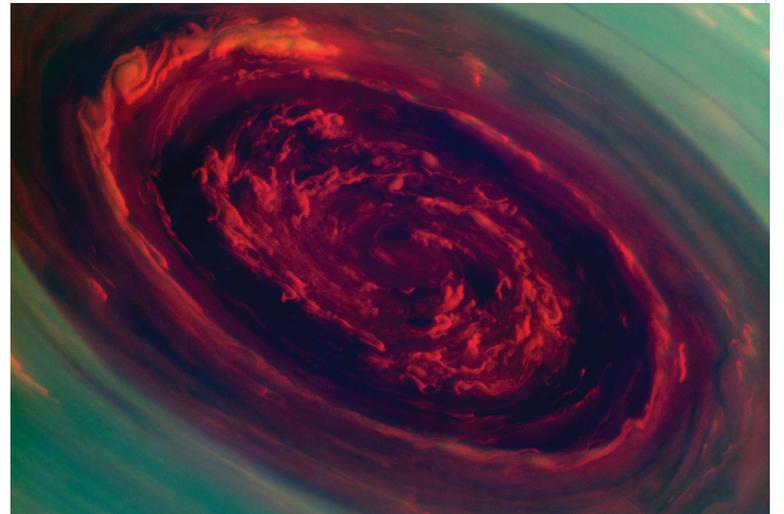
Benjamin Greenhagen is the lead JPL co-investigator for "Volatiles, Regolith and Thermal Investigations Consortium for Exploration and Science," which is led by Ben Bussey of Johns Hopkins University Applied Physics Laboratory in Laurel, Md. JPL's Matthew Siegler and Paul Hayne are also co-investigators.

Based and managed at NASA's Ames Research Center, the institute will support scientific research and complement and extend existing NASA science programs. The institute represents an expansion of NASA's Lunar Science Institute, established at Ames in 2008, to include other solar system destinations.

Institute members include academic institutions, non-profit research institutes, private companies, NASA centers and other government laboratories. The winning teams, which the institute will support for five years at a combined total of about \$12 million per year, were selected from a pool of 32 proposals based on competitive peer-review evaluation.

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

Continued from page 1



View from the top

After years in orbit around Saturn, Cassini is proving it can still deliver surprises. In April, the spacecraft sent home pictures of a massive storm swirling around the planet's north pole. "We did a double-take," said science team member Andy Ingersoll of Caltech,

"because it looks so much like a hurricane on Earth."

But Saturn's version is on steroids: the eye alone of the immense cyclone is about 2,000 kilometers (1,250 miles) wide, 20 times larger than most on Earth. It, and other features such as a pentagon-shaped pattern visible for years near Saturn's north pole, are proving that the higher latitudes at

Letters

I would like to thank my JPL friends and colleagues for their condolences and concerns on the sudden passing of my wife, Avinger. Your support has been more helpful than you know. I also want to thank JPL for the beautiful potted plant.

Robert W. (Bill) Nelson

My family and I would like to thank JPL and all my co-workers for the beautiful plant, kind thoughts and condolences during the recent passing of my grandmother.

Linh Hua

I would very much like to thank my JPL friends and co-workers for the kind thoughts and condolences I received on the recent passing of my wife Carol. I appreciate the support more than words can say. I also want to thank JPL for the beautiful plant.

William A. Imbriale

My family and I would like to pass along our thanks to my JPL colleagues for the outpouring of sympathy following the recent passing of my father. Dad took great interest in the exploits of the laboratory and followed every successful launch and landing event as if he was on the JPL team. He will be dearly missed. We would also like to thank JPL for the beautiful plant sent in his remembrance. Everyone's thoughts and generosity are truly appreciated.

Mike Mangano

Passings

Edward Billmeyer, 87, a retired quality assurance engineer, died Oct. 15.

Billmeyer worked at JPL from 1960 to 1990. He was instrumental in quality-control efforts on connectors and cabling for the Ranger and Voyager projects, and was a cognizant engineer on the Galileo project.

He is survived by his wife, Susan; children Doria, James, Annabelle, Kathleen, Bonnie and Elise; eight grandchildren and one great-grandchild. Services at Rose Hills in Whittier included honors for Billmeyer's World War II U.S. Navy service.

Retirees

The following employees retired in November: **Kerry Erickson**, 44 years, Section 704; **Donald Calkins**, 26 years, Section 173E; **Jesus Gonzalez**, 23 years, Section 393I; **Dean Allen**, 15 years, Section 357E; **Penny Carter-Lockert**, 15 years, Section 1161.



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

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Editor

Mark Whalen

Design

Audrey Steffan
Barbara Insua

Production

David Hinkle

Photography

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