

## JPL awarded InSight mission to view Mars' interior

### Discovery-class mission will launch in 2016

By Mark Whalen

On the heels of the successful landing of Mars Science Laboratory, JPL has gained a new mission to Mars, set to launch in 2016, that will take the first look into the planet's deep interior.

The Interior Exploration Using Seismic Investigations, Geodesy and Heat Transport, or InSight, mission, the 12th selection in NASA's series of Discovery-class missions, will deliver a stationary lander to the Martian surface for a two-year study.

"It's been an amazing couple of weeks," said Principal Investigator Bruce Banerdt of JPL, also the project scientist for the Mars Exploration Rovers mission. "One high after another."

"This selection is excellent for JPL on two fronts," said Laboratory Director Charles Elachi. "It helps us maintain continuity of our Mars flight activities over the next decade and enhances our business base over the years ahead."

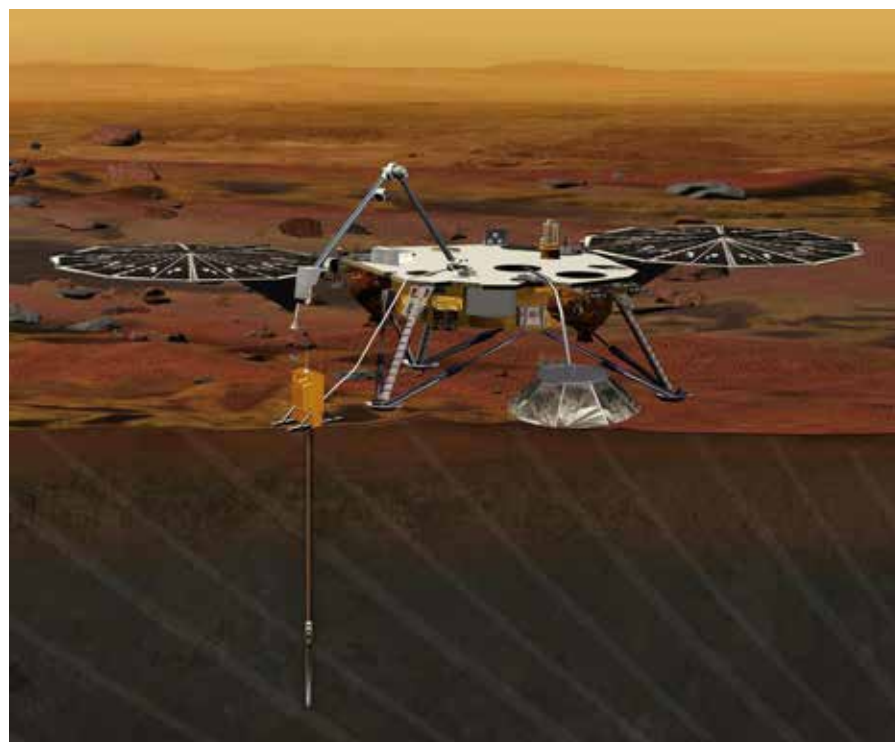
Banerdt said InSight's three instruments will seek to discover an understanding of the basic building blocks of Mars—the interior structure and dynamics, the thickness of the

crust, the composition and size of the core and mantle.

"With this we can compare to our models of planetary formation developed from looking at Earth and its moon, to better understand how the rocky planets formed," he said. "Much of the evidence for early processes in the Earth has been destroyed over the last 4.5 billion years by plate tectonics and convection in the mantle. The moon has preserved its initial structure, but it's so small that a lot its processes don't reflect those on the larger planets."

The InSight spacecraft will very closely resemble JPL's 2008 Mars Phoenix lander, including inheriting Phoenix's system architecture. Key components such as avionics, electronics and software will be updated, said Project Manager Tom Hoffman.

A major difference from the Phoenix mission—which visited Mars' frozen north polar region—will be InSight's landing site, near the equator, with good solar insolation year-round and low rock abundance for safety purposes. "We're using a spacecraft design that's been built and flown before, and we want to



keep it as close as possible to Phoenix, so that we don't have to validate new designs and spend a lot of money reinventing things that already work," said Banerdt.

The Seismic Experiment for Interior Structure, provided by the French Space Agency, will search for marsquakes. The Heat Flow and Physical Properties Package (HP<sup>3</sup>), from the German Space Agency, will dig 5 meters below the surface to measure the amount of heat escaping from the planet's interior. And the Rotation and Interior Structure Experiment, led by JPL, will use the spacecraft communication system to provide precise measurements of

planetary rotation to determine the core structure and composition.

"We do know that all the rocky planets have crusts that are made of different minerals than the deep interior by looking at their compositions from orbiting spectrometers, and from knowing the physics and chemistry of how rocks melt and recrystallize," Banerdt said. "The processes that have happened across the terrestrial planets are reasonably complex, but right now our models are very simple. By going to Mars, will be able to refine those models and make them more like the actual physics that is going on in

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## NASA awards Caltech new contract Deal extends management of Laboratory through September 2017

By Mark Whalen

NASA has awarded Caltech a new five-year contract to manage JPL. The contract extends the agreement between Caltech and NASA for management of JPL beyond its current expiration date of Sept. 30. The new contract runs from Oct. 1 through Sept. 30, 2017.

Subject matter experts throughout the Lab, in each of JPL's disciplines, contributed key input to the development of the new deal, noted Business Operations Director Steve Proia. "Many JPL teams and organizations provided excellent support to the process, which resulted in numerous revisions

and updates to program and project management procedures," he said.

The new contract has developed in a three-step process, said Sue Fawcett, assistant manager of the Finance and Contract Management Division: Negotiating the contract, financial transition and implementation. Fawcett and Katrina Christian, who jointly led the Caltech negotiation team, credit Angel Castillo, the procurement officer in the NASA Management Office, for his leadership in moving the process to a timely and successful conclusion.

The financial transition is on track to be completed by the start of the new contract on Oct. 1. "Our goal is to have a seamless transition," Fawcett said, "so that if you are using a charge number for a project on Friday, Sept. 28, when you come in on Monday there will be no issue."

The implementation phase will include ongoing contact with subject matter experts to assure the implementation of new aspects of the contract. Also, briefings are planned for

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# Summer students make an impact

By Susan Braunheim

Just as the trees begin to lose their leaves as fall approaches, JPL loses a part of its staff, the summer student interns.

Approximately 450 students were here over the summer to participate in the more than 20 summer student research programs through JPL's Education Office. Each student worked with at least one mentor.

Students came from all over the country, large and small colleges and universities, community colleges, high schools and even foreign universities; from as far away as Oxford and as close as Glendale Community College.

Phoebe Sulzen, a junior mechanical engineering major at Cal State Los Angeles, found being a member of the Mars Science Laboratory team an "amazing" experience. "Being a part of a professional work environment reinforced the love I already had for the challenge and excitement that goes with engineering," she said. "I am looking into finding an internship for next summer in a different section so I can get experience in other areas."

Working in the Verification, Validation and Operations Group (314F), Sulzen's internship was through JPL's Summer Minority Internship Program. Sulzen's mentor, Tracy Van Houten of 314F, has mentored about 20 students in her eight years at JPL, including three this

summer on Mars Science Laboratory. She said the time and effort are worth it. "Plus, the students all work so quickly!" she said. "I often assign tasks that I think will take a week and they are done within a day. I really enjoy the vibrancy and freshness all the students bring to the Lab each summer."

Kim Whitehall, who worked in JPL's Graduate Fellowship Program developing metrics for the Regional Climate Model Evaluation System, feels her JPL stint has helped bring together academic theories and practical applications of her knowledge. "Working at JPL allowed me to bridge classroom theories with real-world practicalities," she said. Whitehall is now pursuing a doctorate in atmospheric sciences at Howard University in Washington D.C.

"For many of the students, a JPL internship is their first experience working at the frontier of science, technology or engineering," said Adrian Ponce, manager of the Science, Technology, Engineering and Mathematics (STEM) Higher Education Group (1852) and principal investigator on astrobiology and biodefense research projects. "Their work is a powerful and transformative experience and really motivates them to finish their STEM degrees and pursue those types of careers," Ponce said.

After spending time on Lab, many of the interns want to pursue careers at NASA. This summer JPL had more than 60 interns considered by hiring managers for early-career-hire positions.

Indeed, Brian Schratz, a two-time summer student from 2005 to 2008 in the Graduate Student Research Program, was hired into the Communications System and Operations Group (337H) in 2009 and is currently



Mentor Tracy Van Houten (third from left) with proteges Matthew Stumbo (left), Phoebe Sulzen and Teresa Nguyen.

working with the Mars Science Lab team. "I interned at a few different places, including other NASA centers," he said. "After the first summer at JPL I was hooked. As a full-time JPL employee I'm loving every minute of it."

"For JPL, the benefit comes in unbridled enthusiasm that is injected into the Lab during the summer months," said Ponce. "That enthusiasm is put to good use by our mentor community, which is illustrated by the fact that 10 percent of all the peer-reviewed publications coming from JPL have student interns as co-authors."

"When these interns are hired, they will need little or no orientation and training to begin their careers at JPL, which is another cost-saving benefit of internship programs," noted Parvin Kassaie, manager of JPL's Education Office. "They start with a base of experience, a network of connections and a loyalty to JPL that will continue to benefit the Lab and form the foundations of a successful career," Kassaie said.

For information about JPL's Education Office, visit the Education Gateway at <http://education.jpl.nasa.gov>. For questions about specific programs, contact the Education Office at ext. 4-8252. ■

## INSIGHT *Continued from page 1*

the solar system—and in other solar systems. This is information that will be applicable to exoplanets, as we get more information about the smaller, rockier planets that are circling other stars."

Stereo images from a camera mounted on InSight's robotic arm will create a 3-D map of the workspace for the instruments. The arm will then pick up each instrument, take it off the deck and place it on the ground, providing full sensitivity for the powerful seismometer that will measure extremely small vibrations.

"The seismometer will require things to be still and quiet, because vibrations will have traveled thousands of kilometers and may only have amplitudes of angstroms," said Banerdt. "We believe we'll see marsquakes from anywhere on the planet.

"The radio science precision tracking is similar to what we did with Opportunity, which was stationary for the winter. But we can now do that with a platform that will stay still for a full Martian year and look at an entire

orbital cycle of rotational variations," he added.

Lockheed Martin will build the spacecraft; provide integration, assembly and test of the system; share in operations activities; and provide payload accommodation.

JPL will provide science leadership, project management, systems engineering and mission design. JPL will also lead mission operations and ground data systems as well as systems engineering for entry, descent and landing, in partnership with NASA Ames Research Center and Langley Research Center.

InSight will launch from Cape Canaveral in March 2016, with landing scheduled for September of that year.

At JPL, project staffing is underway. Hoffman expects that by early next year the mission would include about 60 people. "We have a great team at JPL, and have an opportunity to make the team even stronger with people coming off of successful efforts on Juno, Grail, Mars Science Lab and NuStar," he said, adding that more than two dozen former Phoenix team members are expected for the InSight team.

The InSight team also includes deputy principal

investigator Sue Smrekar, deputy project manager Henry Stone and capture lead Leon Alkalai. The science team numbers 28, including seven JPLers. Co-investigators come from the United States (including five from JPL), Austria, Belgium, Canada, France, Germany, Japan, Switzerland and the United Kingdom.

"I think InSight will contribute to understanding Mars in a lot of ways," said Banerdt. "The data we acquire will be complementary to the incredible amount of information we've gotten from Mars exploration. It's really exciting that we're going to be able to burrow down into the planet and find out what's going on, all the way from the top to the bottom. It's really filling one of the last big basic knowledge gaps about Mars."

"I do appreciate the tremendous support we received from throughout JPL," Hoffman said. "I've worked other proposals, some of which have won, some that haven't. We always get good support from the institution, but this time the support has been exceptional on InSight, to a level I haven't seen before. So everybody at JPL should feel like they've contributed in some way to this important win for us." ■

## CONTRACT *Continued from page 1*

JPL personnel, starting with the Executive Council in mid-September.

The new contract is anticipated to impart very little change on most JPLers' daily lives, Fawcett said, but that's due to the diligent efforts of those who made it happen—including staff from flight projects, program directorates, finance, contracts, acquisition, Institutional Business Systems and the Office of the CIO.

The contract has an estimated value of \$8.5 billion over its five-year lifetime.

"This action demonstrates the value that NASA places on our management of the Laboratory, including the great successes of our recent flight projects and our very active programs across space and Earth sciences and technology development," said JPL Director Charles Elachi. "I want to express my thanks to all of the JPL and Campus organizations that were directly involved in this successful contract negotiation, as well as all of the Laboratory personnel whose hard work and dedication

have earned NASA's confidence in us."

"We are very pleased to be continuing our partnership with NASA," added Caltech President Jean-Lou Chameau. "Through this sustained collaboration, we ensure that JPL continues to be a national resource for space exploration, scientific leadership, technology and discovery, as well as an inspiration for young scientists and engineers."

The new prime contract is available on the Finance and Contract Management Division website at [http://cmd.jpl.nasa.gov/cms/cms\\_PrimeContracts.cfm](http://cmd.jpl.nasa.gov/cms/cms_PrimeContracts.cfm). ■



# Celebrating Curiosity



Photo by Stephanie Smith

Fifteen years ago, with the Internet in its infancy, JPL's Mars Pathfinder mission stirred unprecedented online viewership. The travails of the airbag-enabled landing and the Sojourner rover's adventures that followed turned into the biggest World Wide Web event in history to that point.

Today, with the explosive growth of the medium, viewers still can't get enough of Mars, via JPL. Mars Science Laboratory's successful Aug. 5 landing engendered 1.8 billion hits from 210 countries, 36 million webcast streams, and more than 127 million page views from 17 million web visitors.

President Obama congratulated the Mars Science Laboratory team in a phone call from Air Force One Aug. 13. "You guys should be remarkably proud," he said. "Really what makes us best as a species is this curiosity we have—this yearning to discover and know more and push the boundaries of knowledge."

JPLers met the cast and creators of the YouTube video "We're NASA and We Know It" goodnaturedly spoofing the Mars Curiosity team when they visited the Lab Aug. 23. Above, Mars Science Lab Project Manager Pete Theisinger, left, and flight director Bobak Ferdowsi ("Mohawk Man"), right, meet their parody counterparts Steven Hudson (second from left) and David Hudson, the young filmmakers behind the viral video, which has attracted more than 2.2 million Internet views.



New York Magazine posted an online list of the five best NASA scientists from landing night, including the "missing high five," at <http://nymag.com/daily/intel/2012/08/five-best-nasa-scientists.html>.



Official White House Photo by Pete Souza



Dutch Steiger / JPL Photo Lab



Dutch Steiger / JPL Photo Lab

California Gov. Jerry Brown and U.S. Sen. Dianne Feinstein visited JPL on successive days in August and met members of the Curiosity team.

To honor the mission, Brown issued a proclamation making Aug. 22 Space Day in California, almost 40 years after a similar proclamation prior to the launch of the first space shuttle, during his first term as the state's chief executive. "JPL and this mission just demonstrate

anew what the full potential of California is," said Brown in addressing employees in the 321 auditorium. "California always has attracted the bold and imaginative."

"Americans should take such pride in what you've done, and I really look forward to the science that comes from it," said Feinstein. "I think it can be truly amazing, and it can really turn on young people to go into this arena." ■

Gov. Brown takes a 3-D view of Curiosity during his JPL visit. Sen. Feinstein and officials got a closeup look at a working model of Curiosity.



# News Briefs



Photo by Tony Grechus

Neil Armstrong during a visit to JPL in May 2006 for a meeting of the NASA Advisory Council.

## Elachi recalls Armstrong legacy

JPL Director Charles Elachi will never forget Apollo 11's landing on the moon on July 20, 1969.

Watching it from Caltech as a graduate student, Elachi said that astronaut Neil Armstrong's "one small step for man, one giant leap for mankind" proclamation motivated him to pursue a career in space exploration, adding that Armstrong's legacy inspired many others to further the field.

"We are all standing on his shoulders," Elachi said of Armstrong, the first person to walk on the moon, who died Aug. 25. "He really propelled and opened the space frontier both physically and intellectually. The combination of his personal courage—and the fact that he was so humble about it—is unique in a person who is really considered the best of the American spirit."

## QuakeSim a co-winner for NASA Software of the Year

JPL's entry in the 2012 NASA Software of the Year competition, QuakeSim, was selected as a co-winner of the prestigious annual competition.

QuakeSim models the behavior of earthquake faults individually and as part of complex interacting systems using NASA remotely sensed and other earthquake-related data. The results lead to improved earthquake forecasting and a better understanding of earthquake/fault systems. These results can be used for scientific studies, targeted retrofitting of earthquake-vulnerable structures, and disaster response.

The winning JPL QuakeSim team: Andrea Donnellan, Jay Parker, Robert Granat, Charles Norton, Greg Lyzenga, Geoffrey Fox (Indiana University), Marlon Pierce (Indiana University), John Rundle (UC Davis), Dennis McLeod (USC) and Lisa Grant Ludwig (UC Irvine).

For any questions about the NASA Software of the Year award, please contact Chris Jagers, ext. 3-4904, or Tom Soderstrom, 4-5896.



Amy Braverman

## Braverman earns fellow title

Amy Braverman, a senior statistician in JPL's Science Data Understanding Group, has been named a fellow of the American Statistical Association.

Braverman was one of 48 recently elected to fellowship by the association and honored for outstanding professional contributions to and leadership in the field of statistical science. Braverman was cited "For contributions to environmental statistics, particularly in the interface between massive-data reduction and remote sensing; and for service to the statistics community in climate research and policy."

Braverman earned a bachelor's degree in economics from Swarthmore

College in 1982, a master's in mathematics and a doctorate in statistics from UCLA in 1992 and 1999, respectively. She was a Caltech postdoctoral scholar at JPL until 2001, and since 2008 has been an adjunct associate professor of statistics at UCLA in addition to her role at JPL.

## Poster honors for postdoc researchers

Five JPLers have been recognized for presenting the top poster highlighting postdoctoral scholars' work over the past year.

On July 25, the Office of the Chief Scientist and Chief Technologist, University Research Affairs and the Science Division hosted the annual Postdoc Research Day, which had more than 50 participants.

Poster authors each received an engraved plaque and an opportunity to summarize their research at an awards ceremony held Aug. 8. A panel of judges selected the top poster in each of five categories.

The award recipients, with work organization, category, poster title and adviser:

Ali Behrangi (3243), Earth Science (broad Earth surface emphasis): "What Does CloudSat Reveal About Ocean Rainfall Measurements?," Bjorn Lambriksen, adviser.

Morgan Cable (389K), Planetary Science and Life Detection: "Non-Aqueous Microchip Capillary Electrophoresis Analysis of Primary Amines: Applications for In Situ Analysis on Titan," Peter Willis, adviser.

Thomas Flury (3284), Earth Science (broad atmosphere emphasis): "Is the Amount of Water Constant in the Tropical Tropopause Layer?," Nathaniel Livesey, adviser.

Alina Kiessling (3267), Astrophysics and Space Science: "Sunglass: A New Weak-Lensing Simulation Pipeline," James Bartlett, adviser.

Jose Siles (389A); Technology, Instrumentation and Engineering: "Compact Power-Combined Multiplied Sources to Enable Terahertz Multi-Pixel Heterodyne Spectroscopy," Inran Mehdi, adviser.



From left: Ali Behrangi, Jose Siles, Thomas Flury, Alina Kiessling, Morgan Cable.

## Passings

**Arthur Seder**, 91, retired supervisor of JPL's Vehicle Operations Group, died April 22.

Seder worked at the Lab from 1966 to 1985. One of his responsibilities was oversight of logistics of moving spacecraft and their components from the Lab to launch sites.

He is survived by his wife, Erma, son Larry, grandsons Scott and Derek and many nieces and nephews. Services were held April 29 in Roseville, Calif. and interment was May 7 at the Sacramento Valley Veterans Cemetery in Dixon, Calif.

**Robert Latham**, 84, a retired Deep Space Network engineer, died April 26.

Latham joined JPL in 1958 and retired in 1993. His work in the Deep Space Network Operations Office included serving as liaison to the network's complexes in Canberra, Australia and Madrid, Spain.

Latham is survived by his wife, Barbara, son Chris, daughter Linda and brother Malcolm. Funeral services were held May 5 in Cathedral City, Calif. Veterans' interment was held at Riverside National Cemetery.

**Evelyn "Lyn" Smith Sheets**, a retired administrative secretary in the Subcontract Review Office of the Procurement Division, died June 25.

Sheets worked at JPL from 1966 to

1979. She is survived by sons David, Thomas and Kris, and their families.

**Walter Victor**, 89, former JPL assistant laboratory director for the Office of Planning and Review and a key player in the development of the Deep Space Network, died July 25.



Walter Victor

Victor joined JPL in 1953 as a radio guidance engineer for guided missiles. He participated in the design of electronic instrumentation and communications systems for America's first Earth satellites, including Explorer I and the early Pioneer lunar probes in the late 1950s.

His JPL career also included service as a technical group supervisor, Communications Systems Research Section manager and Telecommunications Division manager. He was elected into the National Academy of Engineering and was also named a fellow of the Institute of Electrical and Electronics Engineers in 1974 for his contributions to the

design of radio systems for space communications and tracking. In 1963, he was co-recipient of the NASA Space Act Award for his work on a deep-space communication system.

Victor is survived by his children, Trudy Victor Elardo, Daryl Victor and Walter Victor; five grandchildren and four great-grandchildren.

**Leonard (Pete) Piasecki**, a retired engineer and propulsion-development manager, died July 30.

Piasecki joined JPL in 1953 as a research engineer. He later served as chief of the Solid Propellant Rockets

Section—which developed the upper stages of launch vehicles used to lift off the first successful U.S. Earth-orbiting satellite and the first U.S. lunar probe—and was appointed deputy chief of the Propulsion Division in 1963. He also managed JPL's Technology Applications Program. He retired in 1985.

Predeceased by his wife, Irma, Piasecki is survived by children John, Thomas, Mary, Michael and Anne; and grandchildren Adam, Jason and Amanda. Services were private. Cards to the family may be sent to Mary Piasecki Bagley, 18739 Romar St., Northridge, CA 91324.

## Letters

I would like to express my sincere gratitude to my co-workers in sections 333 and 334 for all their understanding during my mom's illness and for the flowers, cards and attendance at the services for my mom on her recent passing. I am truly blessed for having the opportunity to work with each of you. I would also like to thank the ERC for the wonderful plant. Sincerely,

Gerry Walsh

Thank you to my co-workers for your condolences and kind words and the ERC for the beautiful plant I received on the passing of my brother.

Laura Hollis

I would like to thank my JPL friends and co-workers for your kind thoughts, prayers, lovely flowers and cards during this recent difficult time when my mother, Gail Adams, passed away. I would also like to thank Division 25 and JPL for the beautiful plants. Sincerely,

Teresa Bingham

## Retirees

The following employees retired in August: **Michael Devirian**, 47 years, Section 730; **Robyn Lutz**, 29 years, Section 313A; **Ann Schofield-Osaki**, 22 years, Section 1131; **Nancy Marmor**, 16 years, Section 740; **Harrel Crenshaw**, 11 years, Section 502.

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# Universe

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