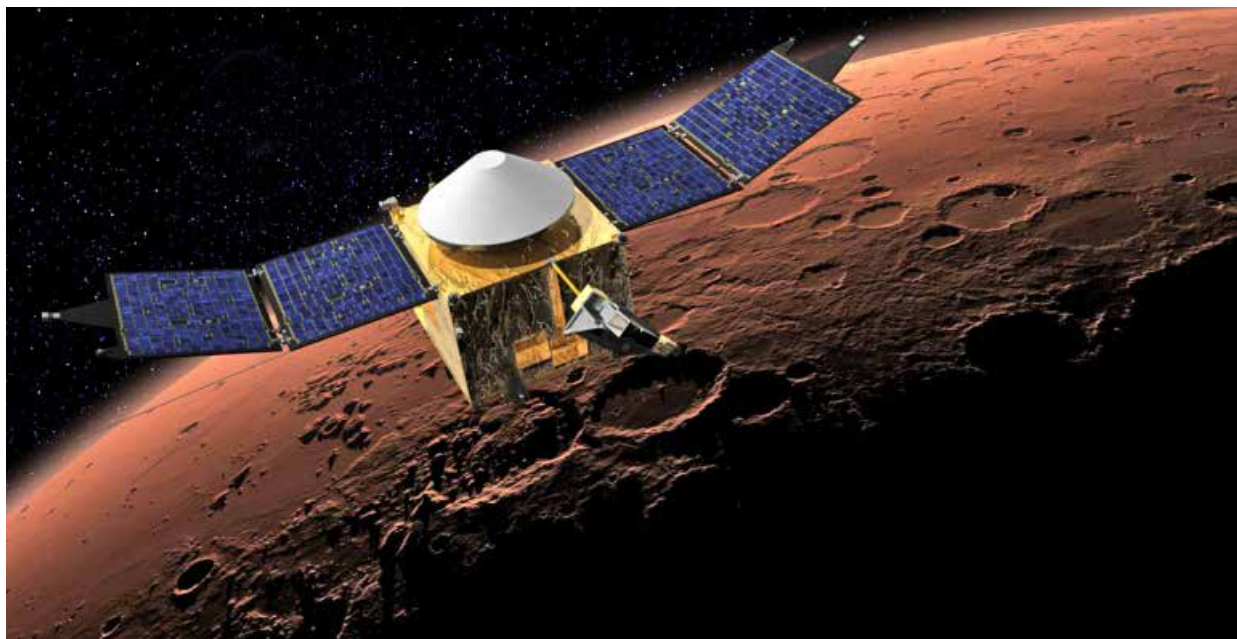


Back to the Red Planet

JPL dons supporting roles for NASA, international Mars orbiters



MAVEN's looping orbit will take it into Mars' upper atmosphere to help understand how the planet lost nearly all of the atmosphere.



JPL's Electra relay radio.

JPL is going back to Mars in November—not with missions managed by the lab itself, but in support roles helping NASA and international partners deliver a pair of orbiters to the Red Planet.

Nov. 18 is the launch date for NASA's latest Mars orbiter, MAVEN, designed to study the planet's atmosphere to help answer why it lost virtually all of its atmosphere billions of years ago. Led by principal investigator Bruce Jakosky of the University of Colorado Boulder, MAVEN is managed by NASA's Goddard Space Flight Center.

On Nov. 5, the country of India plans to launch its first mission to Mars, an orbiter named Mangalyaan. JPL is providing tracking and communication via the Deep Space Network as well as navigation support.

For NASA's MAVEN mission, the lab is wearing several hats. JPL will navigate the orbiter throughout its interplanetary transfer and science mission at Mars, and provide tracking and communications through the Deep Space Network. MAVEN also carries Electra, a radio system designed and built by JPL that allows the orbiter to serve as a relay for Mars rovers and landers.

On the science side, Richard Zurek, chief scientist of the Mars program office at JPL and an authority on the Martian atmosphere, is a co-investigator on the MAVEN

science team, leading the team for MAVEN's accelerometer science. In its role managing NASA's Mars Exploration Program, JPL also provides general oversight of the mission. MAVEN was built and will be flown by Lockheed Martin in Denver.

MAVEN's orbit at Mars will be highly elliptical, bringing it into the planet's upper atmosphere on every orbit to sample gases and ions directly. According to Stuart Demcak, MAVEN navigation lead at JPL, "The resulting atmospheric perturbations on the spacecraft, combined with the requirement for accurate navigation in order to meet science objectives, presents a unique challenge" to his team.

MAVEN will be the second Mars orbiter to carry the Electra relay radio, which has worked highly successfully on Mars Reconnaissance Orbiter during its seven years at the Red Planet as a relay for surface missions like the Mars Exploration Rovers, Mars Phoenix lander and the Mars Curiosity rover. Because of that success, the Mars Exploration Program set a policy requiring NASA's future Mars orbiters to include an Electra payload, said Kris Bruvold, JPL's technical lead for the system.

Bruvold said the radio system is "software-defined," allowing ground controllers to reprogram it extensively

during flight. JPL's MAVEN Electra operations facility is housed in Building 264, noted Neil Chamberlain of the Spacecraft Antennas Group, who will lead Electra operations after launch.

During MAVEN's development, substantial support was provided by JPL's Flight Hardware Logistics Program, and some other smaller tasks for MAVEN were managed by JPL's Solar System Exploration Directorate. During the mission, selected support will be provided by Multi-mission Ground Systems and Services Program. All told, several dozen JPL staffers, peaking at about 25 full-time equivalents, have worked on MAVEN to date.

MAVEN—short for Mars Atmosphere and Volatile Evolution—has a 20-day launch period ending Dec. 7, with a contingency period with some mission impacts extending through Dec. 23. For a Nov. 18 launch, the orbiter will reach Mars on Sept. 22, 2014.

India's Mangalyaan orbiter—also known as Mars Orbiter Mission, or "Mom"—is also planned to arrive at the Red Planet in September following a Nov. 5 liftoff from the launch site on the Bay of Bengal on India's east coast. That orbiter's design is based on Chandrayaan 1, India's 2008 orbiter at Earth's moon that carried JPL's Moon Mineralogy Mapper instrument.

JPLers' support helps community find a way home

By Susan Braunheim

During the annual United Way campaign many JPLers are encouraged to pledge their support for the organization's "Creating Pathways out of Poverty" plan. With this support, the United Way provides assistance for many local charities.

Door of Hope is one of 200 local charitable organizations in the greater Los Angeles area sustained with help from the United Way. It specializes in transitional housing and works with homeless families to help them rapidly rebuild their lives.

On many RDO Fridays, JPL volunteers can be found hammering, sanding and painting in Pasadena. JPLers became involved with Door of Hope in March when the organization acquired a somewhat dilapidated house in the area. The house had been vacant for many years and was



Los Angeles County is the homeless capital of the nation. This is the seventh year of the United Way's 10-year "Creating Pathways out of Poverty" plan to target areas such as helping the homeless and increasing graduation rates.

in need of several repairs before it could be considered a "home." JPLers have volunteered more than 700 person-hours cleaning, repairing and restoring it to get it move-in ready. Eventually, this house will be used to provide support and transitional housing to homeless families.

The last of these repairs were to be made on Friday, Nov. 1, after which they plan to start furnishing the home. Thanks in part to JPL volunteers and United Way, Door of Hope will be ready to begin using the home soon after.

Door of Hope's long-term vision has been to equip homeless families with aid and necessary skills to lead them down the road to self-sufficiency. Their program includes money management, life skills and parenting classes, individual and marital counseling and job training. The program also provides transitional housing.

Jason Dawson, JPL resource analyst and chair of JPL's Employee Involvement Committee's Community Outreach and Volunteerism subcommittee, spearheaded the undertaking.

"Door of Hope is doing great work for our community. They needed help and we have stepped up to help turn a run-down house into a home that will reverse the course of homelessness for many families with children for years to come," Dawson said.

"JPL's relationship with United Way created the connection for us and Door of Hope," Dawson said. "When United Way heard that we had formed the Community Outreach and Volunteerism Subcommittee and they pointed us in Door of Hope's direction."

"The subcommittee's mission is to make getting involved as easy as possible. The Door of Hope project is the first project of many to come. We plan to volunteer with and reach out to a diverse set of local organizations to create opportunities for all JPLers to give back," Dawson said.

Los Angeles County is the homeless capital of the nation. This is the seventh year of the United Way's 10-year "Creating Pathways out of Poverty" plan to target areas such as helping the homeless and increasing graduation rates.

Last year the United Way of Greater Los



Above are JPLers who donated their time this year to refurbish a house in Pasadena for Door of Hope. Rear row from left: Paul Hayne, Gorang Gahndi, Kevin Clark, Brandon Brown, Pam Woncik; middle row from left: Taylor Hart, Jennifer Hasenoehrl, Karla Clark, Anthony Bruneau, Dave Santos; front row from left: Monica Garcia, Nar Nazari, Deanna Smith, Peter Bruneau, Jason Dawson.



Angeles reported that chronic homelessness had been reduced by 31%; more than 24,000 students have received after-school support in math and English, with more than half improving their performance; and more than \$40 million in tax refunds have been brought into the local economy and to low-income working families through financial education and tax-preparation assistance.

Human Resources generalist Nancy Kapell is JPL's United Way campaign coordinator. She says "The JPL community has always been generous to those less fortunate in our local community by giving their time, food donations, and pledges during the United Way Campaign."

Last year the lab raised almost \$486,000 during the campaign.

This year's United Way campaign officially kicks off Monday, Nov. 4 and it is just one of the many ways JPL can make a difference.

For more information on Door of Hope, go to <http://www.doorofhope.us/>.

For more information on JPL's United Way Drive or to donate, go to <https://gateway.jpl.nasa.gov/sites/EmployeeInvolvement/UW/jplcares/index.html>.



Macie Roberts' computing group circa 1955. Roberts is standing on the far right, conferring with one of the other women. Barbara Paulson is on the telephone (standing, back left). Helen Ling is at the second desk in the left row.

'Computers' reunite

Women whose calculations aided JPL's missions of the early days meet again

By Mark Whalen

It would be wrong to say there were no computers at JPL 60 years ago. The computers of the 1940s, '50s and '60s, it turns out, were not machines, but people.

It was the literal meaning for the term: A person who computes. At JPL, it meant a critical job for a group of young women who contributed mightily to the Laboratory's early success and helped fuel its growth.

Using simple pencil and paper—along with breadbox-sized adding machines for basic arithmetic—about 30 of the women hand-plotted calculations for all of JPL's launches and encounters, providing critical information on spacecraft trajectory, navigation and telecommunications.

Susan Finley, today a subsystem engineer in the Processor Systems Development Group, picked a great time to join JPL—in 1958, two days before the launch of Explorer 1, the United States' first satellite. Fresh off a similar job with the thermodynamics group at Convair in Pomona, Finley “jumped right into it.”

“I decided the traffic was too dangerous driving all the way to Pomona,” said Finley. “After I got married and my

husband graduated from Caltech, he said, ‘Caltech has some lab up at the top of the Arroyo; why not go up there and apply?’ So I applied and got the job immediately.” Including a couple of leaves in the 1960s, she has been at JPL ever since.

Barbara Paulson also worked the Explorer 1 launch, Jan. 31, 1958, and recalls “a very exciting night” in Building 111 with JPL Director William Pickering and Caltech President Lee DuBridge anxiously awaiting results nearby.

When she joined JPL in September 1948, Paulson was one of eight computers who supported engineering teams responsible for liquid propellant and spacecraft design. The group outgrew its initial home in Building 11 at JPL's east end, eventually to occupy several other buildings, and Paulson took over as group supervisor in 1959.

Much of the computers' work was done before spacecraft launched, calculating mission needs for power and propellant, or the number of instruments a spacecraft could carry.

“Engineers would bring an assignment with a set of equations to the supervisor; she in turn doled out the

work for the girls to do,” said Finley. “We had lined tablets that were 18” wide. Across the top we would put the steps in the equation, and down the side we would calculate the answers. Then the people who did the task plotted those on graph paper.”

There was an element of trust toward the computers. Even for very critical calculations, Finley said, supervisors did not give assignments to two people to compare answers.

“The engineers were responsible for checking,” she said. “I remember once in 1970 or '71, I found a mistake in units that the engineer had made before I did everything,” she said. “But I don't remember ever having people coming back and saying, ‘This is wrong.’”

Finley appreciates that the women earned respect and were recognized for their important work. “We were treated equally,” she said. “We were all a team, just doing different jobs.”

Currently also a test engineer for ground receivers of the Deep Space Network, Finley doesn't pine for the old days, when there was less technology. “We get a lot more done today, of course, but there's a lot more to keep track of.”

Finley has been doing rather well in that regard, having garnered nine NASA Group Achievement awards in October.

Paulson recalled cherishing the group's camaraderie, which included regular lunches at Caltech's Athenaeum. “We really enjoyed working with each other,” she said. “We were very close and it's remained that way ever since.”

Indeed, as 15 of the “computers” gathered in October for a meet and greet at the JPL Library, Paulson also ran into a colleague she hadn't seen for 60 years. The event was organized by independent researcher Nathalia Holt, who was on hand to interview the women for an upcoming book.



Thom Wynne / JPL Photo Lab

“Computers” today: Standing, from left, Nancy Key, Sylvia Miller, Janet Davis, Lydia Shen, Georgia Devornichenko, Sue Finley, Margie Brunn, Kathryn Thuleen. Seated, from left, Victoria Wang, Virginia Anderson, Marie Crowley, Helen Ling, Barbara Paulson, Caroline Norman.

News Briefs



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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.

Waliser named meteorology fellow

Duane Waliser, chief scientist of the Earth Science and Technology Directorate, has been named a fellow of the American Meteorological Society.

With JPL since 2004, Waliser is also a visiting associate in the Geological and Planetary Sciences Division at Caltech and an adjunct professor in the Atmospheric and Oceanic Sciences Department at UCLA. His principal research interests lie in climate dynamics and in global atmosphere-ocean modeling, prediction and predictability.

Waliser was named a JPL senior research scientist in 2007 and garnered a NASA Exceptional Achievement Medal in 2010. He earned a master's in physics from UC San Diego, followed by a Ph.D. in physical oceanography at that college's Scripps Institution of Oceanography.

Komjathy work cited by GPS World

JPL senior research scientist Attila Komjathy of the Ionospheric and Atmospheric Remote Sensing Group has received a GPS World 2013 Leadership Award.

At a September meeting of the Institute of Navigation in Nashville, Tenn., the magazine named Komjathy a winner in the services category, citing his work in introducing GPS remote sensing for detecting tsunamis, nuclear blasts and meteor explosions.

Other leadership awards were bestowed in satellites, signals and products categories, as voted by international industry experts.

A 12-year JPL veteran, Komjathy earned a Ph.D. from the Department of Geodesy and Geomatics Engineering of the University of New Brunswick, Canada, and is a recipient of the Canadian Governor General's Gold Medal for Academic Excellence. In 2008, GPS World named Komjathy among the "50+ Leaders to Watch."

Chattopadhyay gets microwave honor

Goutam Chattopadhyay of the Submillimeter-Wave Advanced Technology Group of the Instrument Electronics and Sensors Section (389) has been selected as a Distinguished Microwave Lecturer by the Institute of Electrical and Electronics Engineers' Microwave Theory and Techniques Society.

The society each year selects recognized experts in various fields from among its worldwide membership to be in its Distinguished Lecturers Program.

Chattopadhyay's three-year term begins next year. He will deliver a number



Goutam Chattopadhyay

of talks through the year, starting with the society's winter technical meeting in January. He also will contribute an article to Microwave magazine.

JPL, India to collaborate on Earth radar mission



Above: In India, Kiran Kumar, director of India's Space Applications Centre, signs collaborative agreement as JPL's Al Bhanji (standing at left) and Keyur Patel flank him.

JPL recently signed a technology assistance agreement with the Indian Space Agency to develop a dual-frequency radar Earth-orbiting mission to launch in 2020.

JPL will provide an L-band synthetic aperture radar payload, to go along with an S-band synthetic aperture radar provided by the Indian Space Research Organisation. Other hardware from JPL will be a reflector boom assembly and feed structure.

The JPL project manager is Yunjin Kim; project scientist is Paul Rosen.

The mission's science goals include assessing biomass disturbance and the effects of changing climate on habitats and carbon dioxide; ice velocity and thickness, response of ice sheets to climate change and sea level rise; and studying solid Earth factors such as surface deformation, hazard response and water resource management.



Reed Wilcox of the Project Support Office and JPL Director Charles Elachi sign at JPL. Standing are Earth Science and Technology Deputy Director Jim Graf and Earth Science and Technology Director Diane Evans.

Chattopadhyay is a principal engineer at JPL and a visiting associate at the Division of Physics, Mathematics and Astronomy at Caltech. He received his Ph.D. in electrical engineering from Caltech in 2000. He is a fellow of the Institute of Electrical and Electronics Engineers.



Bonnie Buratti

Buratti named vice chair of astronomical society division

Bonnie Buratti, supervisor of the Asteroids, Comets and Satellites Group, has been named vice chair of the Division for Planetary Sciences of the American Astronomical Society.

After an initial year as vice chair, Buratti will move into the chair role. The previous chair was JPL volcanologist Rosaly Lopes.

With JPL since 1985, Buratti has won a NASA Exceptional Achievement Award (2006) as well as group awards for her work on Cassini, Voyager, Dawn and Deep Space 1.

Letters

My family and I would like to thank JPL for the beautiful plant sent to commemorate the passing of my father-in-law, Dr. Robert M. Bowman. Dad completed his Ph.D. in aeronautics and nuclear engineering at Caltech in 1966, was a lifelong friend of John Casani and authored multiple "friend of NASA" papers in support of RTGs and gravity-assisted space travel. During part of his 22 years in the Air Force, Lt. Col. Bowman was director of advanced space programs development for the Air Force Space Division. He will be interred at Arlington National Cemetery on Nov. 14. Our family is proud of him and appreciates our JPL family for remembering him as we continue carrying on his legacy.

Matt Scholz

We would like to thank our many JPL friends and co-workers for the kind thoughts and condolences that we received on the recent passing of Arnold's mother. We appreciate the support more than words can say. We would also like to thank JPL for the beautiful plant.

Paula Brown and Arnold Silva

Correction

A news brief in the October issue of Universe incorrectly stated that Bill Patzert had been named a fellow of the American Meteorological Society. In fact, the honor went to JPL researcher Duane Waliser. Universe regrets the error.

Passings

Gerald Copeland, retired assistant laboratory director for administrative divisions, died Aug. 25.

Copeland joined JPL in 1968. In 1972 he was named assistant laboratory director for administrative divisions. He also led the Financial Management Division.

In 1982, Copeland received the NASA Exceptional Service Medal. He retired in 1999.

Copeland is survived by his wife, Heather; children Chris, John, Patrick and Colleen; and five grandchildren. Services were held at Mission San Luis Rey in Oceanside, Calif.

Harold "Norm" Riise, 98, a retired engineer, died Oct. 14.

A former U.S. Navy aviator, Riise joined JPL in 1946 and worked on numerous aspects of all of JPL's early robotic space probes. Among his contributions were the nozzle design for the first supersonic wind tunnel and the lighting system for the Solar Simulator. He retired in 1976.

Riise is survived by sons Douglas and John, daughter-in-law Katie and grandchildren Nicolette and Haley.

Retirees

The following employees retired in October: **James Jordan**, 48 years, Section 6100; **John Joines**, 25 years, Section 2220; **Richard Alvidrez**, 22 years, Section 1854; **Allan Johnston**, 21 years, Section 5140; **Laurin Latimer**, 14 years, Section 349J.