

Featured Stories



A look ahead at 2019

Expected launches include OCO-3 and Deep Space Atomic Clock; Mars 2020 will move into final assembly and testing, including integration of Mars Helicopter; and InSight will begin to reveal the secrets of Mars.

The new year opens with a probe grappled onto the surface of Mars and ready to unlock the planet's inner workings, two missions approaching the launch pad, and a thickening swarm of assembly in the high bay as Mars 2020 heads toward completion.

The Lab as a whole will follow the direction set by 2018's Strategic Implementation Plan, which calls on JPL to pursue a diverse and bold portfolio of science missions; to create the Laboratory of the future, defined by a talented and inclusive workforce, rapid information sharing, and a culture of innovation; and to strengthen our end-to-end capability while accelerating technology infusion into our missions.

Initial efforts include a stronger focus on inclusion in recruitment of interns, early career hires and other areas, creation of a digital transformation office to streamline the Lab's processes, and a major new grant program, JPL Next, to fund radically new systems.

Earth Science

The Earth Science and Technology directorate is preparing for a planned March 16 launch of the Orbiting Carbon Observatory 3 (OCO-3), the next in a series of missions to explore important questions about the distribution of carbon dioxide on Earth as it relates to growing urban populations and changing patterns of fossil fuel combustion. NASA developed and assembled the instrument using spare materials from OCO-2 and will host the instrument on the Japanese Experiment Module-Exposed Facility aboard the International Space Station.

Other upcoming Earth Science highlights include delivery of key hardware for the SWOT and NISAR missions. The directorate plans a busy year of airborne campaigns supporting long-term ecosystem research, including investigations of the vegetation growing season in mid-America, studies of snow accumulation in the western United States, mapping of topographic changes in coastal Greenland glaciers, observations of boreal forests and permafrost in Northern Canada and Alaska, and studies of monsoon processes in the Philippines.

An existing instrument, DopplerScatt, will fly with a powerful new use in 2019 after its validation last year for simultaneously measuring surface current and wind velocities.

Mars Exploration

After the successful testing of a strengthened parachute design and the delivery of two key instruments in 2018, the Mars Exploration Directorate has big plans in 2019 for the Mars 2020 mission. Environmental testing in the spacecraft's cruise configuration and rover configuration are planned this year.

Key instruments scheduled for delivery in 2019 include Mastcam-Z, a mast-mounted dual camera system that can zoom in on objects, focus, and take 3D pictures and panoramas of various sizes. The engineering qualification model is currently at Arizona State University for testing.

The Planetary Instrument for X-Ray Lithochemistry (PIXL) is also scheduled for delivery for the Mars 2020 rover. The instrument will be the first on Mars to conduct petrology, using an x-ray spectrometer to identify elements at sub-millimeter scales, and a micro-context camera to take up-close high-resolution images to help determine rocks' origins by studying their texture and composition.

Also slated for delivery is Mars 2020's arm-mounted SHERLOC (Scanning Habitable Environments with Raman and Luminescence for Organics and Chemicals), which will enable the rover to identify the most promising surface samples to cache for potential pickup by a later mission, which would return it to Earth for study.

For the Mars Curiosity rover, 2019 marks the beginning of exploration of the clay-bearing unit south of the Vera Rubin Ridge. The goal is to better understand the geologic context of the area and determine whether the area contains detectable organic molecules, organic carbon, and/or inorganic sulfides that may have aided in organic preservation.

Interplanetary Network

As more spacecraft embark on increasingly complex missions, the need to juggle and process humongous volumes of data is jumping dramatically. The Interplanetary Network Directorate is tackling this challenge on several fronts in 2019.

The Advanced Multi-Mission Operations System (AMMOS) will deliver the first phase of the Reference Mission System (RMS). This baseline ground system will enable flight project operations with people, processes, procedures, hardware, software and facilities.

Deep Space Network will improve efficiency this year with “Three Links per Operator,” and will boost data return from future deep-space missions by adding software-defined receivers.

When the potentially hazardous binary asteroid 1999 KW4 cruises safely past Earth in May, Goldstone radar will track it with delay-Doppler technology. The technology has improved significantly since the asteroid’s last close flyby in 2001, so the new images may be impressive.

JPL has a keen interest in the World Radio Conference 2019 in November. The event, held by the International Telecommunication Union, may change the Radio Regulations, an international treaty governing the radio-frequency spectrum. Proposed allocations to 5G mobile phone service and high-altitude platform systems in several frequency bands used by JPL can potentially cause radio frequency interference to Deep Space Network missions. The Lab is working to ensure that any regulatory changes include wording to protect these missions.

Astronomy and Physics

JPL’s quest to continue peeling back cosmic layers of mystery and darkness will advance further in 2019.

The Astronomy and Physics Directorate will complete delivery of the sensor chip system for the Euclid Near Infrared Spectrometer and Photometer (Euclid). This European Space Agency mission—planned for launch in 2020—has significant NASA participation. JPL manages the development and implementation of the detector systems, and is providing 16 advanced infrared detectors and four spare detectors for one of two onboard instruments.

Euclid will study dark matter and dark energy—critical, but invisible phenomena that scientists believe make up most of our universe.

Future spacecraft may benefit from Deep Space Atomic Clock, which launches midway through 2019. The instrument is a technology demonstration of a small but mighty and extremely stable atomic timekeeper. The clock will be 50 times more accurate than today’s best navigation clocks.

By using this leap in accuracy, future space missions will navigate and maneuver more precisely, and will adjust more quickly and efficiently when unexpected situations pop up. The technologies may eventually help Earthlings know their exact whereabouts by improving GPS clock stability—a potential boon to GPS users everywhere on our planet.

Solar System

Our solar system has a busy year ahead. InSight is getting down to business after a triumphant landing on Nov. 26. The spacecraft has already deployed its robotic arm and placed a seismometer on the surface, which will allow scientists to peer into the planet’s interior and study marsquakes. By analyzing how seismic waves pass through the layers of the planet, scientists can deduce the depth and composition of these layers.

Meanwhile, the Rotation and Interior Structure Experiment (RISE) has already begun using InSight’s radio connection with Earth to collect preliminary data on the planet’s core. Scientists estimate they might have some results starting in about a year.

Mars 2020 will onboard a few travel companions in 2019, including Mars Helicopter, which will be integrated along with other instruments.

Juno will continue delivering spectacular results from Jupiter. On Feb. 12, the spacecraft will soar over the planet's Great Red Spot to try to detect a gravity signature from the ancient storm. An April 6 pass will be the "cross track"—where the spacecraft will be in a unique attitude for the microwave radiometer to collect data in a different way that will help create a 3D image of the planet's deep atmosphere.

Europa Clipper is one step closer to visiting Jupiter's icy moon Europa. Preliminary Design Review season is behind the mission and the project is now poised to move into implementation phase in late spring of 2019.

At the edge of our solar system, Psyche—a mission to explore a metal asteroid orbiting the Sun between Mars and Jupiter—will have its Project Design Review in March to evaluate the project's readiness to proceed with design and build of the flight hardware.



(Left) The iconic Pillars of Creation photograph taken by the Hubble Space Telescope in 1995 (Right) The shark logo used during the early team planning of WFPC2

After 25 years, Hubble repair still astonishes

Twenty-five years ago in January, at a meeting of the American Astronomical Society near Washington, the visible universe expanded by a thousand.

Before the fuzzy Hubble Space Telescope came into focus, thanks to a risky and intense repair effort, the public's concept of the cosmos had been fairly simple: stars, galaxies, pulsars and quasars, thousands of

dots and ellipses.

Here was the universe after Hubble: swaths of the sky that before had been black, now wallpapered with galaxies; young stars swaddled in the matter that fed their formation; constellations devouring one another; backlit strands and whorls of stardust that retired the term “empty space.”

“It was just amazing what we saw in those first images,” said JPL astrophysicist John Trauger of the immediate discoveries. “You didn’t have to analyze anything, you just looked at them. In the Orion nebula we saw these little edge-on solar systems just forming. We had never seen these things before.”



John Trauger

The release of those first images overwhelmed the astronomers at AAS. “It was a big audience, and there was a standing ovation,” said Trauger. “You just don’t see that.”

A lousy time to skip peer review

The world had never seen anything like this the first time around, but for very different reasons.

When Hubble launched in May of 1990, the world’s media clamored for a first look through the most powerful telescope ever made. Scientific results normally undergo analysis and review before publication, but the public’s curiosity was irresistible.

“The very first picture was created, in real time, and handed...to the New York Times, the L.A. Times, and everybody, and within 10 minutes the lights went out. The press event was finished,” Trauger recalled.

Hubble’s first image hit the news on May 20, 1990. It was a side by side comparison of a region of sky captured with Hubble and with a 100-inch terrestrial telescope in Chile. The Hubble photo was sharper – barely.

As intended, the first image was taken “to assist in focusing the telescope.” Trauger remembers one of his team members saying, right away, “There’s something funny here.”

To a few optical experts reviewing the image in the following weeks, the problem went deeper than a

focusing issue.

Lucky number 8

A manufacturing defect in Hubble's mirror was microscopic, but enough to throw all its images out of focus. The problem was called spherical aberration, and with it NASA caught a reputational aberration.

One of the most vaunted projects in the agency's history, a telescope that would rise above the blur of the atmosphere and finally reveal the universe, was itself blurry.

At least the defect was a perfect example of spherical aberration. In theory, if one could manufacture and install small relay mirrors shaped to reverse the symmetrical flaw of the main mirror, a true image would arrive at the camera.

In practice, the fix would take years of work by a large team at JPL, and an exacting repair job by astronauts wearing gloves barely more dexterous than baseball mitts.

Trauger, who was already heading the team making a spare camera for Hubble, served as principal investigator. The spare, named WFPC2 for Wide Field and Planetary Camera 2, went from replacement part to the carrier of NASA's hopes.

Larry Simmons, then JPL's manager for programs in astronomy and physics and microgravity, found himself in charge of the project.



Larry Simmons

"There was a huge amount of pressure to make Hubble whole, so to speak," Simmons said. "It turned out that a servicing mission had been scheduled for December of 1993. We were told we basically have to get it done and delivered by the fall or winter of 1992. So we had a couple years, but that's all. Everything we had to do had to be done pretty quickly."

Of the many ways Simmons kept the project on track, he lists a perennially unpopular tactic -- meetings -- as one of his most effective tools.

"I required [the team leaders] to come to a meeting with me every morning at 8 o'clock. At first everybody thought I must have misspoke, that couldn't possibly be. We couldn't meet every day at 8 o'clock, we would never get any work done. But we did and for probably the first two years we met everyday, at 8 o'clock."

Call it superstition or hard-won faith in project management, but once WFPC2 started to come together, no one was quite ready to say that the daily meetings had nothing to do with it.

"One of the things I found personally humorous was, when we finally reached the point that we pretty much had things under control, I said to them, 'Well, if you want we can stop having the 8 o'clock meetings,' and everybody said, 'Oh no, we have to have the 8 o'clock meetings until we deliver this thing.'"

Faster, better, scarier

Dave Gallagher, now the Lab's associate director for strategic integration, had been at JPL barely more than a year when he was yanked into the WFPC2 repair project as integration and test manager. As a contractor, he had written much of the code used to control the original camera on Hubble.



Dave Gallagher

"Larry Simmons took a chance on me," he said.

And so it was that Gallagher found himself next to Dan Goldin, the NASA administrator who had just delivered his now famous "better, faster, cheaper" speech in von Karman auditorium, and who had exhorted JPLers to take more risks and not be afraid to fail.

"He gave this big speech telling JPLers look, we need to take more risk, it's okay to fail, and then I took him over in high bay 2 to see WFPC2. And we're walking out of the clean room and into the gowning room and he says, 'You know all that stuff about, it's okay to fail? It's not okay. The future of the agency is resting on you guys, so you better not screw it up.'"

"I was maybe 30, pretty young and pretty new and green in my job. I was terrified," Gallagher recalled.

Gallagher's team carried out a marathon thermal vacuum test lasting nearly six weeks in a customized chamber across from B144. The delivery deadline was looming, and Trauger, the PI, still was not 100 percent satisfied.

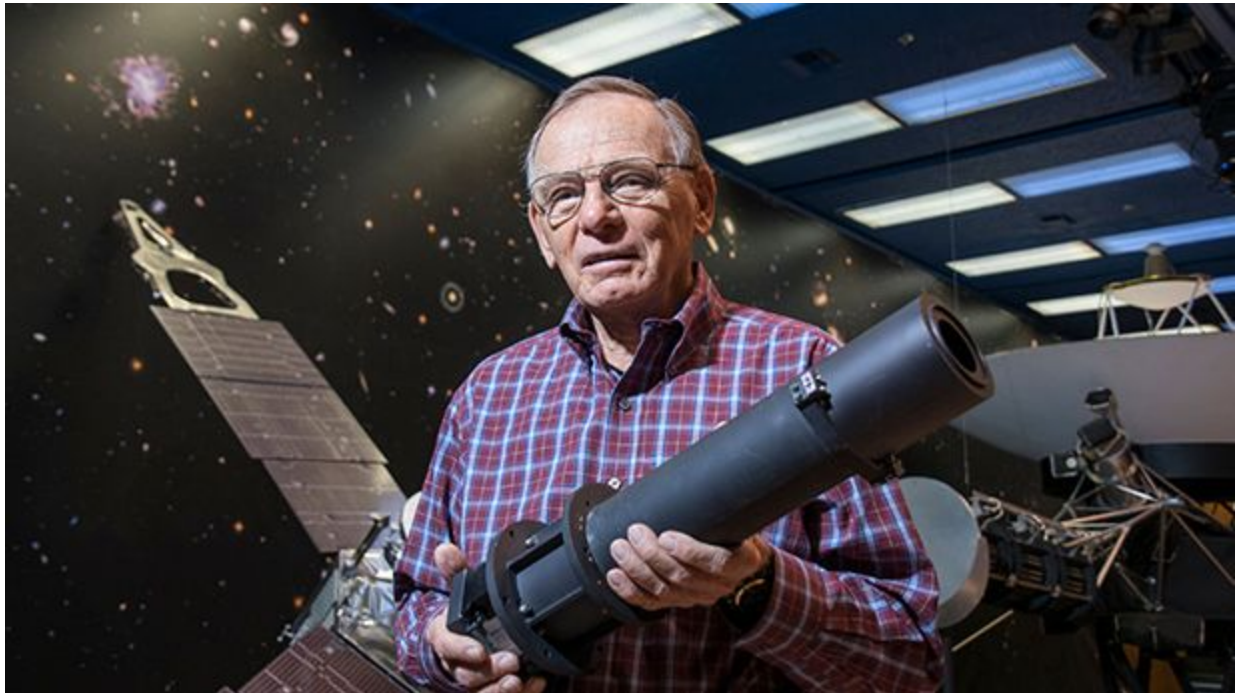
"Every afternoon we would have a shift-change meeting, and John would come up with yet another test that we should run," Gallagher said.

"Finally on the last day I said, 'John, I bet you can't think of any more tests to run.' And he actually could not think of any more tests to run, and that's where we ended the thermal vac tests.

"I needed to get this thing done, and he wanted it to be perfect, so somewhere between the two of us we ended up doing a good job."

"I know how to do it'

Soon after Hubble launched in 1990, optical expert Steven Macenka was on vacation in his hometown of Bratislava, in Slovakia, when he called work to see if anything was up.



Steven Macenka

Yes, he learned, Hubble is up, and it needs glasses.

On his return, Macenka built the team responsible for the core of the project: the optics that would reverse the main mirror's defect and bounce a focused image to WFPC2. He and his group procured and tested the optics, and oversaw the alignment and calibration of the camera. The latter required some iteration.

"It was challenging because of the early team-building efforts, and we eventually decided to bring the alignment and testing in-house," he recalled.

Once that part of the job was at JPL, Macenka relied heavily on James McGuire and Jeff Oseas on the mirror alignment and testing team. He also credited Bob Korechoff, who led the JPL team that investigated the aberration.

"I still remember sitting down at home with dinner over a glass of wine, I talked to my wife and I explained

to her what the challenges were, but I also remember making the statement, 'Give me a couple of competent young engineers and flight technicians, and I know how to do it.'

"That may sound like boasting or over-confident, but this is the way I felt about it at that time, and we pulled it off."

Many team members pulled it off – close to 100 at the peak of the project – with standout contributions not only from Simmons, Trauger, Gallagher and Macenka, but from heroes of the science team such as Jim Fanson, who invented a mechanism to make extremely fine adjustments in the position of the optical systems, and from the astronauts who made a record-breaking five spacewalks over 11 days to install WFPC2, a 600-pound spare part shaped like a grand piano.

Don't strip the bolt

Anyone who has worked on cars or machinery knows that a whole repair job can come down to the proper turning of one fastener. Strip, overtighten or misthread the thing, and you start over – unless you're in space on a one-chance mission.

The Hubble project was unique for a center specialized in robotic exploration. At the end of the job, a person had to plug it in.



Shipping day for WFPC2

The connections between WFPC2 and the rest of Hubble had to be made by feel, the way drawers slide into dressers and drop into place. The blind connectors had to catch perfectly, and that wasn't all. The parts had to be tightened for the mirrors to be positioned properly, and for Hubble to achieve the focus that was the whole point of the three-year project.

"There were so many things that had to happen right," remembered Simmons. "You have to appreciate that it's like putting film at the back of your camera, and it has to be at the right place or the picture will be out of focus. By the way, this thing weighs 600-plus pounds.

"So when they put it into the Hubble, the way it was to be seated is there was basically a lead screw that the astronauts had to turn a wrench in order to get it to the right place. And it turns out that the number

was 22. The wrench had to be rotated 22 times for it to be firmly seated where it needed to be.

“And when they started turning, and all of us were counting, when they got to 22 and it wouldn’t go anymore, we were all very happy.”

Simmons doesn’t remember the moment he saw the first corrected image. His lucky numbers had come in. He knew he held the winning ticket.

WFPC2 returned images to Earth for more than 15 years before its replacement by a new camera in 2009. The astronauts on that mission brought home WFPC2 for a victory lap that included a stop at JPL. The camera that saved Hubble finally came to rest at the National Air and Space Museum, where it remains today.

The camera’s iconic images, including the “Pillars of Creation” view of the Eagle Nebula, and the galaxy-splattered Hubble Deep Field, transcended science to become timeless symbols of the limitless universe.



Goodbye and thanks, 2018

The successful launch and orbits of Explorer I in 1958 inspired Congress to form a space agency, and 60 years later JPL kept breaking new ground with Martian seismometers, quantum-scale laboratories and even an Emmy Award.

2018 brought a slew of successes for JPL and NASA, including the safe journey of InSight and the twin MarCO CubeSats to the Red Planet, the launch of GRACE-FO and several other Earth missions, the arrival of Cold Atom Lab at the International Space Station, and an Emmy Award for the Lab’s live interactive broadcast of the Cassini Grand Finale.

JPL unveiled a new strategic plan in 2018 that will guide the Lab for a decade. The Lab celebrated Voyager 2's passage into interstellar space, and bid a bittersweet goodbye to the Dawn and Kepler missions.

Newly appointed NASA Administrator Jim Bridenstine spent a day at JPL in late summer. He toured the Lab and held a town hall where he praised the signing of a new prime contract along with JPL's historic and ongoing contributions to space exploration.

Astronomy & Physics

The Astronomy & Physics directorate celebrated the arrival at the International Space Station of the Cold Atom Laboratory, which is now producing clouds of ultracold atoms known as Bose-Einstein condensates. The project will help scientists make precision measurements of gravity, investigate fundamental problems in quantum physics and explore the wavelike nature of matter.

Late in 2018 Voyager 2 became the second human-made object to reach interstellar space, six years after its twin and more than 40 years after its launch. The Voyager story has inspired generations of scientists and engineers and humanity as a whole. Each spacecraft carries a Golden Record of Earth sounds, pictures and messages. Since the spacecraft could last billions of years, the records one day may become the only traces of human civilization.

The Deep Space Optical Communication (DSOC) project, which seeks to improve communications performance 10 to 100 times over the current state of the art through laser technology, moved to Astronomy & Physics in 2018 and passed its preliminary design review. And the NASA Exoplanet Science Institute, jointly operated by JPL and Caltech, received a Special Congressional Recognition for Outstanding Service to the (science) Community.

And after nine years in deep space collecting data that indicate our sky to be filled with billions of hidden planets - more planets even than stars - NASA's Kepler space telescope ran out of fuel. Kepler leaves a legacy of more than 2,600 planet discoveries outside our solar system.

Earth Science & Technology

The Earth Science & Technology directorate took over Science magazine for a special issue on results from the Orbiting Carbon Observatory-2. The first 28 months of data from OCO-2 led researchers to conclude that Earth's hotter and drier tropics were responsible for the largest annual increases in atmospheric carbon dioxide concentrations in at least the past 2,000 years.

Earth Science launched GRACE-FO, ECOSTRESS, and three Earth-observing CubeSats: RainCube, TEMPEST-D, and CubeRRT.

The directorate supported NASA's Earth Science Disasters Program in analyzing damage from hurricanes, wildfires and the Kilauea eruption. Airborne instruments such as the Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR) and the Glacier and Ice Surface Topography Interferometer (GLISTIN) – also used to study the surface topography of Kilauea's East Rift Zone – provided real-time data for analysis by the Advanced Rapid Imaging and Analysis (ARIA) team, a joint project of JPL and Caltech.

Another instrument, DopplerScatt, gained a powerful new use in 2018 when it was validated as capable of simultaneously measuring surface current and wind velocities.

NASA in 2018 selected three Earth-observing proposals on which JPL is a key participant: Delta-X, the Polar Radiant Energy in the Far Infrared Experiment and Earth Surface Mineral Dust Source Investigation.

In non-NASA work, the most sensitive high-frequency instrument ever flown, developed at JPL, was launched for a DoD sponsor, and a JPL-designed cubesat GNSS Radio Occultation (RO) receiver was

launched and demonstrated in 2018 as a geolocation transfer technology.

Mars Exploration

For the Mars Exploration directorate, 2018 was all about 2020.

The Mars 2020 mission built momentum towards launch with delivery of the rover chassis and flight back shell to ATLO, as well as delivery of two key instruments: the Radar Imager for Mars' Subsurface Experiment (RIMFAX), which will use radar waves to probe the composition of the planet below the surface, and the Mars Environmental Dynamics Analyzer (MEDA) which will take weather measurements including wind speed and direction, temperature and humidity, and the amount and size of dust particles in the Martian atmosphere.

The third flight test from JPL's Advanced Supersonic Parachute Inflation Research Experiment (ASPIRE) project confirmed the viability of a strengthened parachute design for the Mars 2020 payload, the heaviest yet to be sent to the Red Planet. The upper atmosphere test on Sept. 7 broke a world record as the 180-pound parachute inflated in less than four-tenths of a second.

And in November, NASA made the long-awaited announcement of the landing site for Mars 2020: Jezero Crater, an ancient river delta that could have preserved ancient organic molecules and other potential signs of microbial life from water and sediments that flowed billions of years ago.

Site selection took five years, with more than 60 locations analyzed and debated by the mission team and the planetary science community. Since the Mars 2020 rover will collect rock and soil samples and store them on the planet's surface for possible return to Earth by a future mission, Jezero Crater will be the face of Mars exploration for years to come.

"The landing site in Jezero Crater offers geologically rich terrain, with landforms reaching as far back as 3.6 billion years old, that could potentially answer important questions in planetary evolution and astrobiology," said Thomas Zurbuchen, associate administrator for NASA's Science Mission Directorate. "Getting samples from this unique area will revolutionize how we think about Mars and its ability to harbor life."

In 2018 the Mars Exploration directorate also provided critical EDL communication and surface relay for InSight, a Solar System mission, and restored the drilling capability of Mars Science Laboratory.

Interplanetary Network Directorate

The Interplanetary Network Directorate celebrated one year of successful Follow the Sun Operations (FtSO) by the Deep Space Network. FtSO enabled significant launches (TESS, InSight, MarCO, Parker Solar Probe) and InSight EDL with improved efficiency and reliability by remotely controlling DSN antennas from whichever site was in prime daylight shift.

The directorate enabled the first deep space CubeSat mission (MarCO) through a long-term strategy of supporting nanosat class missions by optimizing processes for working with smaller, more agile mission teams.

☒☒ The Advanced Multi-Mission Operations System, or AMMOS, completed the primary implementation of the AMMOS Instrument Toolkit (AIT) a software ground data system. The AIT has emerged as the default ground data system for instruments and CubeSat projects and is being incorporated into the NASA Operational Simulator for Small Satellites.

☒☒ In June, the Goldstone Solar System Radar (GSSR), Arecibo Observatory, and Green Bank Observatory

conducted observations of the near-Earth object 2017 YE5, only the fourth binary asteroid discovered. And in August, the International Astronomical Union (IAU) adopted the X/Ka radio reference frame as part of the new multi-wavelength standard for celestial reference frames, which will result in significant improvements to deep space mission navigation. The directorate helped to fill a gap in quasar catalog reference sources in the southern hemisphere by developing a portable radio science receiver and sending it to the European Space Agency's Malargüe station in Argentina.

Solar System Exploration

The Solar System Exploration directorate was the toast of JPL, the nation and the world on Nov. 26 with the flawless landing of InSight on Mars after a six-month journey that began with the first launch of an interplanetary mission from the west coast. Millions followed the live-streamed broadcast online and at dozens of locations around the country.

InSight's landing starts a two-year mission to study the deep interior of Mars and learn how it formed, and with it, Earth and other rocky planets. The mission was decades in the planning, and a signal example of international cooperation among NASA and other space agencies.

The directorate's two MarCO spacecraft also succeeded spectacularly as they returned key data from InSight's entry, descent and landing.

2018 marked the end of NASA's Dawn mission after 11 years of groundbreaking planetary science, breathtaking imagery, and unprecedented feats of spacecraft engineering. The mission was extended several times, and the spacecraft outperformed scientists' expectations in its exploration of Ceres and Vesta, two planetary bodies that make up nearly half the mass of the main asteroid belt.

The Europa Clipper team successfully completed their technical preliminary design review, with the exception of the solar array and REASON instruments, and scientists revised a lander design for potential missions to Europa or other outer moons, reducing mass and cost by simplifying science requirements and eliminating a dedicated communications relay.



Security officer Ray Reyna with the coffee machine purchased by the Science Division last winter.

Security officers get a gift from their ‘five-second friends’

Security officer Dan Connolly has worked the gates at JPL for the past 15 years and is often one of the first faces JPLers see when they come in to work. He calls the Lab’s employees his “five-second friends.”

“We might not get a lot of time to talk, but we do get to know them,” Connolly said. Over the years, one of the friendlier faces passing by has been optical engineer Sona Hosseini (3224).

“When I drive by, it’s almost impossible for me to not chat with the guards,” Hosseini said. “I have to bug them, or make some joke with them.”

Late last year, Hosseini was working late on an astrophysics technology proposal, burning the midnight oil to meet a deadline. One cold night in December, as she was leaving through the West Gate, Hosseini started talking with the officers.

“They were renovating the gate then, and I joked that they should put a café in for the guards as well,” Hosseini said. “One of the officers thought I said ‘coffee’ and started telling me that they take turns making runs down to Starbucks or Chevron to get their caffeine fix.”

Hosseini was shocked. “I couldn’t believe they didn’t have a coffee machine there,” she said. The officers explained that having a coffee machine could actually be a safety issue, since brewing the coffee and cleaning the equipment could be a distraction from monitoring the gate.

“So now I’m heading home and I should be thinking about wrapping up my proposal, but all I’m thinking is if I should just give the guards my Nespresso machine from home,” Hosseini said.

But less caffeinated heads prevailed. Hosseini slept on it, submitted her proposal, and the next day emailed her section and division managers to ask about donating a coffee maker to the security officers. Rosaly Lopes (3220), Hosseini’s manager at the time, supported the idea and set up a donation envelope for the Science Division to give funds toward a new coffee machine.

So, the team decided to purchase a Keurig coffee machine, which brews individual cups of coffee at a fraction of the time it takes in a traditional coffee maker, with minimal cleanup required. Protective Services Division Manager Randy Aden approved the donation.

"We ended up raising enough to buy the machine, along with a three months' supply of coffee pods, sugar, creamer and chocolate," Hosseini said.

Since it was right before the Christmas holiday, the team wrapped the gifts and delivered them to Protective Services in Building 310.

"We get there, and there are 20 or 30 officers standing in a room, and the security chief introduced us, and I think they were a bit confused at first as to why JPL scientists were in their conference room with presents," Hosseini said. "I joked that we were giving them some science books for their kids, but then I told them it was a coffee maker, and their faces just lit up."

Lopes and Hosseini shook hands with every officer in the room, and they were then treated to a tour of the Emergency Services Facility.

Afternoon Shift Captain Robert Baranowski said the gesture was one he won't forget.

"We've gotten cookies and candy before from JPLers around the holidays, but this was really an especially thoughtful gift," Baranowski said. "A nice reusable coffee maker like that is great because it's something that can be used by officers on all shifts, 24/7."

Months later, the machine remains in demand at the West Gate shack, and officers now bring in their own K-cup pods with their favorite coffee blends. The officers ended up giving Hosseini an honorary NASA Protective Services badge to show their appreciation for the gift.

Even before the Keurig showed up, Officer Connolly credited Hosseini with having a positive impact on his job. "I'm not knocking it, but it can get a little monotonous out here," Connolly said, while working JPL's Main Gate. "She is one of those people that just makes my job so much easier. She is ready [with her badge], and has a smile on her face every day. I'm terrible with names, but she took the time to remember mine, and it's neat to get the reminder that the people of JPL appreciate us."

Back in her office, Hosseini held the badge and thought about what made her spring into action so quickly back on that cold winter day. "I was born in Iran, grew up in the U.S., and went back to Iran for college before coming back to the states for my Ph.D.," Hosseini said. "And I'm a night person, so I end up spending a lot of nights working late here on-Lab. I can do that because it's a safe place. You can't put a price on safety. So, if you're putting all of these missions into space, because someone built the screw and someone assembled it, well someone kept it safe, too. And these officers do that. If they're keeping this place safe for our work, I can take a bit of time out of my day to show my appreciation, and let them know they're part of the team."

Events



Join the Caltech Management Association for events and field trips

The Caltech Management Association (CMA) is conducting its fiscal year 2019 membership drive. Membership is open to all Caltech campus and JPL employees (including retirees) and to all contractor (affiliate) personnel.

Annual dues of \$20 support the planning, organizing, and delivery of high-quality programs and events. To become a member, follow the instructions at <https://cma.sites.caltech.edu/become-member>. If you have questions, contact Laurice Balian at Laurice.Balian@caltech.edu.

Founded over 50 years ago, CMA is a forum that brings together members from campus and JPL for programs, events, and excursions that aim to inspire interdisciplinary collaboration and partnership within the campus and JPL communities. It also celebrates innovative thinking and leadership across areas as diverse as research and development, Hollywood, the music industry, government, professional sports, and the arts. CMA activities provide thought-provoking commentary and showcase the latest developments and innovations in a wide range of fields.

Members enjoy the following benefits:

- Access to free events and speakers addressing management, leadership, scientific, and technological issues
- Special members-only events, including tours and field trips, such as A Night of Viewing through the Mount Wilson Telescopes
- Preferred seating
- A 10% discount at the Caltech store (excluding tickets, tokens, textbooks, and film)

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Previous CMA talks have included:

- Celebrating 40 Years of the Voyagers' Golden Record: A Panel Discussion— Jason Bentley, Ann Druyan, Reggie Watts, Lynda Obst, David Pescovitz, and Ed Stone
- From Explorer 1 to Musical Jackets, Space Broadcasts, 3D Vinyls, and Augmented Reality—Beyoncé
- News Literacy in the Post-Fact Era—Megan Garvey
- Planet Nine from Outer Space—Konstantin Batygin
- The Hidden Dimensions of Architecture and Engineering Design—Frank Gehry, Robert Manning, and Raul Polit-Casillas

Join CMA today and participate in activities that connect and enrich the Caltech and JPL communities.



Volunteer Event: Altadena homeless count

Tuesday, Jan. 22

7 - 11 p.m.

Loma Alta Park

3330 N. Lincoln Avenue

Altadena

Every January, thousands of volunteers embark on a three-day mission to count our homeless neighbors across Los Angeles. This year, JPLers can participate in Altadena's count. The data collected help direct resources where they are needed most.

There are four components to the count. Demographic surveys, shelter/institutional count, youth count and street count. Volunteers are needed with the street count – a

safe, visual-only tally of everyone without shelter.

Street Count Volunteers serve as counters, drivers and navigators. The roles are assigned when volunteers report to their deployment sites (Altadena) on the night of the count. After receiving training and materials, volunteers are deployed in groups of 2-4 to count specific blocks in an area. Each position is outside counting for up to four hours.

This annual census of our homeless neighbors ensures that policy solutions are informed by accurate, up-to-date data.

Sign up today by visiting <https://www.theycountwillyou.org/volunteer> and search for Altadena Count.

Questions? Email unitedway@jpl.nasa.gov.



Innovative 3D manufacturing for aerospace applications

Monday, Jan. 14

11 a.m. – noon

von Kármán Auditorium and JPL UStream for flex and remote communities

The Learn, Experience and Participate (LEAP) Innovation series welcomes Greg Morris, the Additive Manufacturing (AM) pioneer whose work helped spark a revolution in metal 3D printing, and Dave Chapin from GE Additive to JPL for a special session.

Morris and Chapin will walk through GE/Morris Technologies' journey from R&D through their disruptive epiphany to full rate production. They will highlight examples of how

utilizing Additive today has transformed their product design approach while providing increased product value, and how the company is partnering with customers to help them accelerate their additive journey to production. They will also share their thoughts on the future of additive manufacturing, the new challenges to overcome and what AM can offer to special niche space hardware developers like JPL.

Flex and remote workers are invited to view the live broadcast via JPL UStream.

The talk is hosted by the Mechanical Fabrication and Test Section (357).

About Greg Morris: Greg's journey with Additive started in 1994 with the formation of Morris Technologies, a company founded by Greg, his brother Wendell and mutual friend Bill Noack. In 2003, Morris Technologies introduced additive metals to the North American market. The metals technology became their primary niche and in 2007 they formed a sister company, Rapid Quality Manufacturing to focus on production using additive metals. In late 2012, GE Aviation acquired both Morris Technologies and sister company Rapid Quality Manufacturing. In his initial roles, Greg was one of the leaders of additive technologies within GE Aviation. With the formation of GE Additive in late 2016, he moved into an advisory role focused on the broader Additive strategy and supporting the organization with special projects. Since May of 2018, Greg has been retired from GE and is currently active advising, consulting and enjoying spending more time with his family. Greg has presented at numerous national and international events and has authored various articles for industry publications.

About David Chapin: Dave Chapin has the privilege to lead GE Additive's AddWorks design consulting team. His team works daily to drive the additive epiphany with customers. A 15-year GE veteran, Dave has focused on bringing new technology and innovation to commercial products spanning roles at Global Research, Environmental Services, Aviation and Additive. Prior to joining GE Additive, Dave most recently spent 5 years developing additive aerospace parts for production. Dave's AddWorks design team brings its additive expertise, disruptive design process, along with GE's deep additive technology expertise to partner with clients and accelerate their additive journey. Dave graduated from Union College with his BSME and from Georgia Tech with his MSME. He resides in Cincinnati, OH with his family.

JPL Classifieds

Ads submitted Jan. 7

Submit an ad to: universe@jpl.nasa.gov

For Sale

2000 Lexus RX300 SUV, 184k miles. Purchased CPO in 2001. Powertrain, suspension, brakes, chassis all well-maintained and in great condition. Window motors and driver's door power lock don't work great. Cosmetically OK, except for some peeling clearcoat on the rear, and a tear in the leather of the driver's seat. Asking \$4,000. Please text 315-420-9620 if interested.

Large roll-top desk in good shape; \$400 OBO. Sofa - floral pattern in good shape, 84" wide; \$200 OBO. Sofa bed - blue, also in good condition, 82" wide; \$150 OBO.

Entertainment center with drawers and glass doors, excellent condition, 56" W x 50" H x 17" D; \$150 OBO. Please leave message at 626-914-7853. Located in Glendora.

Ikea Bjursta extendable dining table with eight chairs in very nice condition for sale. Dark brown, 37 1/2" wide x 69" long x 29.5" tall. Extends with two included table leafs to 102 1/2" long. \$200. Pick up in Temple City. Contact James at jwincentsen@yahoo.com.

Sony Bravia, 40" flat screen, 1080p LCD HCTV KDL-40S5100 with remote; 3x HDMI, VGA, optical digital output, off-the-air digital tuner. \$100. Please text 818-458-0524.

Contemporary glass and iron framework dining set (clear rectangular glass table with 6 large chairs). GREAT condition – clean, not rusted/bent, no chips in glass. Send a message to 818-570-6964 with any questions or for photos. Buyer will be responsible for transporting the items (located in Lancaster). \$969/OBO.

Beautiful teal couch with chaise, \$450. Only

selling because it will not fit through the awkward doorway of my new apartment. The chaise can be put on either side. Material is soft, velour type. Purchased for \$900 in December 2016. Text 626-319-6763 for photo and questions.

Speakers: 70's vintage Alec-Lansing "Voice of the Theater" speakers in custom built cabinets. 15" woofers, 8.5" x 18.5" cones. Overall dimensions: 26" (w) x 18" (d) x 31.5" (h). \$1,000 OBO for the pair. For photos or questions contact Thom: tawynne2@gmail.com.

Wanted

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present, for personal use (see <http://www.youtube.com/watch?v=S7PvjGp7mCU>). mrayman@alumni.princeton.edu, 818-790-8523, Marc Rayman

For Rent

MONROVIA: \$900/mo. Cozy, newly renovated home in the heart of Monrovia. We are looking for a roommate for the extra room in the house! The house is a 3-bedroom, 2.5-bathroom house, in a quiet neighborhood with easy parking. Fully furnished home, including new fridge, stove, and washer/dryer. No Pets. No Smoking. Minimum 6-month lease. Call 626-607-3992 or email camilee128@gmail.com.

TUJUNGA: \$1,800/mo. 1 bed, 1 bath guest unit in private residence. 950 sq. feet. Kitchen with fridge, stove, microwave, separate central AC/heat, pool access, patio. Beautiful views of San Fernando valley in hilltop quiet neighborhood. Cats okay, no dogs. No washer/dryer hookups. Includes parking space in gated driveway. Utilities

included. Call 626-379-5976 or email sugi@allegromedia.com.

Vacation Rentals

MAMMOTH, Snowcreek, 2 bd., 2 ba. + loft, sleeps 6-8, fully equip'd kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/mtn. vw., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL discount, no pets. 626-798-9222, 626-840-3749 or valeriee@caltech.edu

MAMMOTH, Snowcreek, beautiful updated condo, 2 bd., 2 ba. + loft (sleeps 6-8), great location by pond/meadow, new appliances, TVs, DVD players, free wireless Internet and washer/dryer, no pets. 818-952-2696 or BigMtnPrettySky@gmail.com

MAMMOTH, remodeled 2 bed/2 bath + loft, short walk to Canyon Lodge; Courchevel 6 features full kitchen, cable/Internet TV, DVD, Blu-Ray, wireless hi-speed Internet, 2-car garage, Jacuzzis, grill, pool; no pets. <http://Courchevel6.com>

JPL Family News

Retirees

The following JPL employees recently announced their retirements:

William Bertch, 14 years, Section 3101; Yunjin Kim, 30 years, Section 8650; Cheryl Ortenburger, 16 years, Section 1193; Leslie White, 36 years, Section 335J

Passings

Daryal T. Gant, 84, died Nov. 6, 2018. He worked at JPL for 36 years, 4 months, most recently in 6000 Mars Exploration. He served as executive director of business affairs and division director of acquisitions. He is survived by his wife, Mary, daughter Brenda Hughes (husband Jeff) and four grandchildren: Summer Gant Asiya, Omar, Mustapha Khawaja; daughter Tracey (husband Bryan Van Vliet), and two grandsons Alexander, Zachary Gant Van Vliet.