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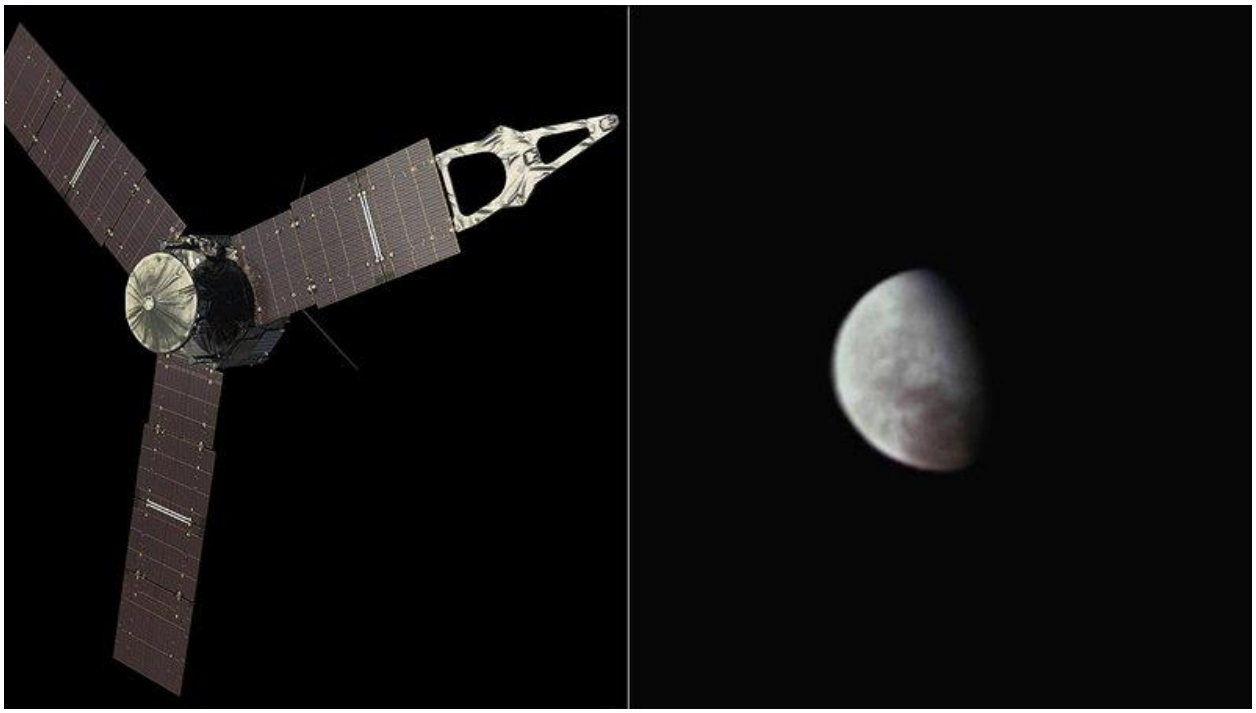


Juno will perform a close flyby of Europa on Sept. 29. The spacecraft's JunoCam imager snapped this photo of the moon on Oct. 21, 2021. Image Credit: NASA/JPL-Caltech

Juno Team Welcomes an Icy Passerby

By Taylor Hill

Some things just get better with age.

Six years ago, the Juno spacecraft began circling Jupiter, bettering our understanding of the massive planet while producing breathtaking images with every orbit. Over its prime mission, the spacecraft's suite of instruments probed the inner workings of the planet, revealing details about its atmosphere, internal structure, lightning-filled clouds, new cyclonic storms, a 3D view of the Great Red Spot, and more—with no hint of slowing down.

The Juno team now is hoping to capitalize on that momentum, expanding the mission's science goals to include studying the overall Jovian system, the planet's rings, and guiding the spacecraft on 42 additional orbits that include close fly-bys of three of Jupiter's moons—including Europa. On Sept. 29, Juno is slated to pass a little over 200 miles above Europa's surface—the closest pass since Galileo last flew past in January 2000—with plans to return images and science data on a body considered one of the most promising currently habitable environments in our solar system.

With Europa Clipper currently in High Bay 1 and expected to launch in 2024, many on Lab eagerly await the findings. In a preview talk for JPLers, Juno Co-Investigator Candice Hansen from the Planetary Science Institute outlined what to expect from the Europa flyby, and how the spacecraft's recent successful pass of the Galilean moon Ganymede bodes well for the upcoming observations.

"We've taken a modern payload—one that wasn't even designed for Galilean moon exploration, it was designed for Jupiter—but our Ganymede results show that these are great instruments," Hansen said. "We were blown away by the richness of the datasets this spacecraft could acquire, so we expect a lot of really exciting science results to come out of this Europa flyby, too."

The plan on Sept. 29 is for a fast flyby—since the spacecraft will be traveling at a relative velocity of nearly 15 miles per second—with about a one-minute window for the spacecraft's high resolution camera, JunoCam, to produce around three to five wide-field views. Meanwhile, its navigation camera, known as the stellar reference unit (SRU), will be tasked with taking a single, very high-resolution picture of a small patch of Europa's nightside, lit only by the scattered light from Jupiter's cloud tops.

Not to let the cameras do all the work, a suite of science instruments will allow the team to probe Europa's interior, map the surface at high resolution with a range of wavelengths from microwave to ultraviolet, and sense how Europa interacts with the Jovian environment.

With the flyby date approaching, we check in with Juno team members Steve Levin, Heidi Becker and Paul Stumpf to get details on what to expect, and how this historic mission continues to gather meaningful science observations and data to be utilized by the next generation of NASA's planetary exploration efforts.

Steve Levin is the Juno Project Scientist, and lead co-investigator for Juno's Microwave Radiometer (MWR) that will glean insights into Europa's ice shell depth and structural integrity.

Can you talk about how this extended mission became possible, and how it goes beyond Juno's primary objectives?

Levin: Juno achieved a lot in its prime mission, even more than our ambitious goals. Part of that success was the discovery of some big scientific puzzles. Juno discovered that Jupiter's deep atmosphere and global dynamics are very different than previously thought, and we'd like to know how that all works. Gravity measurements show a surprisingly complex deep interior of the giant planet. The magnetic field is more complex than expected, and is changing with time, literally blown around by the wind.

Scientific discoveries always raise new questions, and Juno's orbit and capabilities provide an excellent opportunity to follow up, to answer some of the new questions.

How was the decision made to go on these flybys of Jupiter's moons?

Levin: In large part, Jupiter itself made it possible for our extended mission to fly past Ganymede, Europa, and Io. Because the giant planet is rotating so fast (every 10 hours!), it is flattened at the poles and bulges out at the equator. This non-spherical shape causes Juno's polar orbit to gradually rotate from closest approach near the equator, at the beginning of prime mission, to closest approach near the North Pole, where it will end up at the end of the extended mission in 2025. With every orbit, Juno approaches the planet from a little further south, crossing the equatorial plane, where the moons are, a little bit closer to the planet on the way in. It was inevitable that Juno would cross the orbit of Ganymede, followed by Europa, followed by Io. But I don't want to imply that the satellite flybys themselves were easy to arrange. We worked to make the flybys happen. The science team realized that flybys would enable great science, and asked the navigation team about it.

The navigation team figured out how to adjust the timing so that each moon would be nearby when we crossed its orbit, and determined how to do it safely within the fuel budget. The science team studied how to get the best science, and worked with the navigators to aim for particular distances and viewing geometries. We are using gravity from each flyby to adjust the orbit, helping to adjust the orbital period and to set up the next flyby. The details of each flyby are carefully adjusted to get the best science while meeting the navigation and fuel requirements. A lot of people did a lot of good work.

Can you talk about what type of findings you expect to see from Juno's microwave radiometer (MWR) and how it may help us better understand the moon's ice shell properties?

Levin: For the first time ever, MWR will give us a look beneath the surface of Europa's fascinating ice shell. MWR's six different channels penetrate to different depths, receiving thermal radiation from as deep as several kilometers below the surface.

It will be a brand-new and complex data set to interpret, but MWR has the potential to help answer some pretty important questions: We know there's liquid water beneath the ice, but how thick is the ice shell? Are there salts and minerals dissolved in the water/ice? Do geysers of liquid water occasionally spray out into space? Are there cracks in the ice, and if so how many and how deep are they? Until we see the data, we don't know how much light MWR will shed on these questions, or what new questions will arise. This is exploration, and that's what makes it so exciting.

How do you think Juno's findings can support what Europa Clipper may observe in its planned orbit?

Levin: First of all, Juno's orbit is finally taking it into the territory where Europa Clipper will travel, so the radiation experienced by Juno should give us insight into what's in store for Clipper. Clipper has a whole suite of instruments designed to study Europa, but Juno was designed to study Jupiter, so many of Juno's observations will be complementary to what Clipper has planned. The combination should be even more powerful than either data set alone. And of course, if we can learn a little about the ice shell before Clipper arrives, we may discover a reason to change the observing strategy a little, or tweak the orbit. We won't know until we see the data.

Heidi Becker is lead co-investigator of Juno's Stellar Reference Unit (SRU) camera, which is being harnessed to snap a low-light image of Europa to capture features of the planet's surface at high resolution.

What is special about the Stellar Reference Unit (SRU)?

Becker: It's important to remember that the SRU was not originally intended to be a scientific imager. It's an engineering camera whose primary job is to support the spacecraft's on-board attitude determination. But during our prime mission, we deliberately took advantage of the instrument's capabilities as a high resolution low-light camera every chance we got. SRU images of Jupiter's dark side led to the discovery of a new type of Jovian lightning ("shallow lightning" unlike anything created on Earth. And we used SRU to take unprecedented images of Jupiter's faint dust ring from inside the ring looking out.

But because the spacecraft system was designed to use the SRU as an engineering camera that returns only star measurement data–not full frame images, the SRU can only take one image about every 15 minutes. We'll only have about a 30-second window where the camera can view Europa under a low-light condition without being blinded by Europa's lit side, so it's a one-shot opportunity for the Europa flyby. We'll be threading the needle.

What type of findings do you expect to see from Juno's SRU in terms of the flyby?

Becker: With the success we saw in our Ganymede flyby, we think we can potentially achieve a resolution of 300 meters per pixel during the Europa flyby, which is about twice as good as the imagery of that portion of Europa we currently have. I call the SRU the "Ansel Adams" version of JunoCam, because the images are very high quality and in black and white. And because the SRU images are collected in such low light, it really brings out an enormous amount of contrast, shadowing, and surface detail. It might sound counter-intuitive, but think about looking at a surface that's very brightly lit from overhead. Without any contrast, it can really wash out the features and you lose an incredible amount of detail. But capturing images of a surface gently bathed in light at a glancing angle lets you see the textures, surface features and craters that other imagers can miss.

Hopefully our findings will be able to add to our knowledge about the surface. The SRU's Ganymede flyby images allowed us to redo the map for the portion we were able to image–it would be wonderful if we were able to make that kind of contribution for Europa.

How do you think Juno displays JPL's capabilities to bring these types of mission observations to light?

Whether it's future JPL missions, or any spacecraft or agency, we hope that what Juno has been able to accomplish as a team will inspire others to look at their entire spacecraft as a set of science gathering assets, and see the possibilities–not pigeonhole their instruments into only one purpose.

In so many ways, Juno represents a great lesson learned for what can be done. It's not easy using the SRU the way we do, and much of that is because we didn't foresee it being the scientific instrument that it's become. It's always hard when a team has gone all the way through development–and launch–with a particular set of instrument and system requirements and then is told we want this camera to do something extra . Anything unplanned can be seen as a risk. But the earlier you have the foresight, the earlier you can get teams working together on a solution. That's our hope. That other teams follow in our footsteps and see the precious opportunities that this type of adjustment can bring, and bring back as many discoveries as we possibly can. Even if it's just a pretty picture that inspires the public. That's part of our mission too—to inspire

Ryan Park has worked on Juno since 2009 as a Gravity Science Instrument (GRAV) team member, and became a Juno Science co-investigator and the GRAV Lead in 2021.

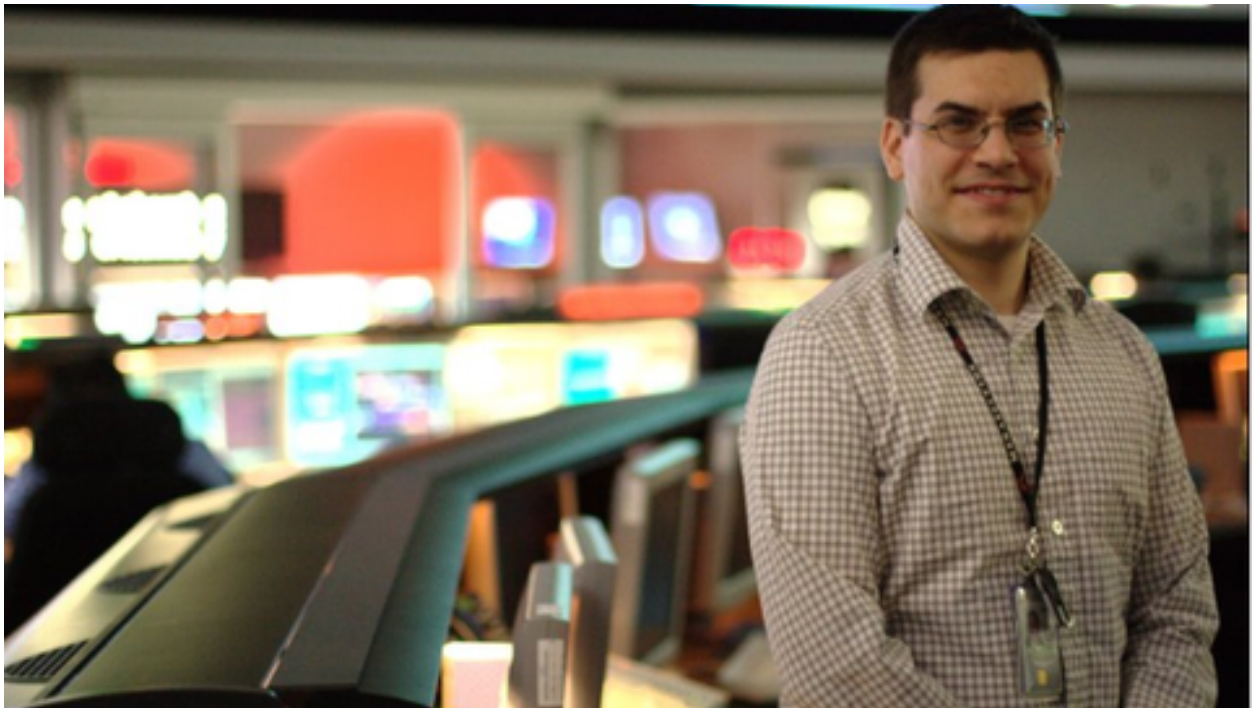
GRAV revealed Jupiter's deep structure by mapping the planet's gravity field and magnetic field. Can you talk about what type of findings you expect to see from GRAV in terms of the Europa flyby?

Using Juno's Deep Space Network Doppler data, we expect to improve the accuracy of Europa's hydrostaticity, a finding important for clarifying the moon's interior structure. Also, using Juno's DSN range data, we expect to improve the accuracy of predicting Europa's orbit, as well as other Galilean satellites, and be ready for Juno's upcoming Io flybys and Europa Clipper's Europa tour. Lastly, the radio occultation experiment (which is part of GRAV) will measure Europa's ionosphere density profiles to investigate exosphere and magnetospheric interactions.

How do you expect that Juno's findings can shed light on what Europa Clipper may be observing in its planned orbit?

We will be comparing the Juno data against the Galileo data and look for consistencies and differences. Much of the Europa Clipper's planning has been based on Galileo results. In terms of what we expect to see from the Juno data, I do not expect any substantial difference compared to the Galileo result, but the outcome from Juno analysis would provide renewed support for the current Clipper's plans.

Paul Stumpf is the Juno navigation team lead, tasked with considering what was possible in the trajectory design for the spacecraft following the prime mission.



Can you talk about how a propulsion issue—which led to navigational decisions made back at the beginning of the mission—have allowed these continued observations to be possible?

A propulsion issue at the beginning of the prime mission prevented us from reducing our orbit period to a 14-day orbit as planned, and thus, we remained in 53-day orbits. Consequently, remaining in 53-day orbits gave us the opportunity to create an extended mission plan with satellite flybys to Ganymede, Europa, and Io.

If our original plan of reducing our orbit to 14-day orbits took place, we would not have a trajectory capable of achieving a satellite flyby. In addition, the satellite flybys would not have been possible without being granted an extended mission.

How was the decision made in terms of navigation and planning/preparing for this flyby?

The Europa flyby was years in the making. In 2019, the navigation team was tasked with investigating what was possible in the trajectory design space after the prime mission ended. The science team asked if satellite flybys would be possible. The trajectory design team went to work and discovered that, thanks to the 53-day orbits we were in, yes, we could do a satellite flyby.

When this analysis was reported to the Science Team, everyone was excited by the possibilities. We never thought that we could obtain satellite science. Now that the navigation team determined it was possible to achieve a flyby, the next step was to get requirements from the science team. The science team provided guidance about what would be valuable to achieve in the extended mission. With the guidance, the intricate design of the extended mission was further refined. This step required the examination of multiple scenarios and fitting everything together like a puzzle. The final reference trajectory was able to include four close flybys: one of Ganymede, one of Europa, and two of Io. This Europa flyby was set up last year with the Ganymede flyby on June 7, 2021 and subsequent maneuvers post-Ganymede. The Europa flyby sets us up for Juno's two close flybys of Io in late 2023 and early 2024 as well.

How do you think Juno displays JPL's capabilities to bring these types of observations to light?

It's the JPL workforce [that] makes JPL the premier organization it is today. The Juno mission exemplifies the characteristics of JPLers. The mission required teamwork, organization, dedication, passion, and an incredible amount of time and effort. Having the opportunity to add a scientific observation like this Europa flyby is what we strive for at JPL—to "Dare Mighty Things" and make them a reality.

JPL Scientist and Systems Engineer Kimberley Miner.

The Climate Scientist Who Could

By Celeste Hoang

Kimberley Miner—accomplished scientist and systems engineer who has studied Earth's convulsing climate from Antarctica to Mt. Everest—first had to accept that the planet she loves so deeply did not love her back.

At first glance, Miner's career seemed to turn on fairly common academic serendipity. After earning her master's of public administration in environmental science at Columbia University, she had a chance encounter on campus with climate scientist Aaron Putnam. She found herself mesmerized as he detailed his research, pulling up Google Earth maps and charting out the hiking trail in Mongolia he was planning to take to collect rock samples and track climate history through geochronology.

"I thought, 'Man, I want to hike for a living, and explore mysteries, and be in nature,'" Miner recalls.

That thought led her to a Ph.D. and the career of her dreams. But the real turning point came years earlier, when the very same thought led her to the California wilderness, where she fought brush fires, ran from

rabid dogs, and endured a rare and devastating illness that proved for Miner that nature shows no favor to her friends.

Nurtured By Nature

Miner always felt a deep connection with Earth—one she couldn't replicate with her childhood peers.

"I never understood social interactions the way I understood environmental interactions," she says. "I've always had such an affinity for our planet. I always said I would never be an astronaut because I would never want to leave this planet."

Born and raised in Colorado, Miner grew up at the base of the Boulder foothills in an idyllic environment that would be the envy of anyone struggling with today's myriad digital distractions. She read science fiction and fantasy under an aspen tree, while admiring the ladybugs that crawled on her as she spent hours in the grass. Her mother tended to a big garden, including a raspberry patch, and yes, there was even a tree swing. The best part: Thanks to gigantic boulders in the backyard, rock climbing became a part of her everyday life from a very young age.

Miner also loved mythical stories with powerful main characters, devouring A Wrinkle in Time, as well as history books on local spirits and stories of the land. When she acted out in high school, her rebellions usually took the form of solo adventures in nature: sneaking out of the window to go camping by herself in the dead of night, or free-climbing in Boulder Canyon.

After high school, Miner took a gap year, working for the National Park Service in Arkansas at Buffalo National River, where she learned how to build houses, install drywall and wire electricity. During the summer, she was invited to attend wilderness firefighter training three hours down the road in Hot Springs. Later, she became a full-time firefighter at the Round Valley Indian Reservation in northern Mendocino County, California.

Nature seemed to love and support her at every turn—until it didn't.

Redirections

About a month into her stay at Round Valley Reservation, Miner woke one day in May and headed out on her usual morning run. Passing through the reservation grounds, she was attacked by a pack of unleashed dogs, one of whom lunged toward her and bit her. She was immediately taken to the hospital and administered the rabies vaccine—but days later, Miner came down with a 104-degree fever and suddenly couldn't feel the left side of her face.

The cause: Lyme Disease—which Miner didn't realize had been dormant in her system from hiking the Appalachian Trail the month before—was triggered by the rabies vaccine, resulting in Bell's Palsy, a condition of partial facial paralysis that is supposed to be temporary. Nearly 20 years later, it has yet to resolve itself in Miner's case.

The experience was painful and the lesson was swift.

"I had a lot of time being like, 'I love nature, I spend tons of time outside, so why did the land do this to me?'" Miner recalls.

Her aunt, who came to take care of her, explained the pain by using the ocean as an analogy: "'You can love the ocean, but the ocean doesn't love you,' she told me. 'It's big and dynamic, and you're just this tiny person.' It was a really momentous time for me to realize that humans are not above nature. Nature's the boss."

Miner at the top of Junfraujach glacier in Switzerland.

Even so, Miner refused to let her condition dictate where her life was headed. She focused on her recovery, which included five months of bedrest, a special diet, and “all types of therapies.”

By September, she was out of her wheelchair most of the time and in college at the University of California, Santa Cruz. There, Miner zeroed in on her familiar strengths, initially eyeing linguistics until the UC budget slashed half the offered language courses.

She then turned her attention to ecology, and the university’s impressive gardening program, which let students live together as real members of farming communities learning hands-on, field-based work.

“I was genuinely going to be a farmer. That was way more fun to me than sitting in a classroom,” Miner says. “I could go outside, watch the birds, pick strawberries. And I kept bees.”

But the gravitational pull of the planet was strong—literally and figuratively—for Miner, who couldn’t shake the feeling that studying our climate was her true calling. By the end of freshman year, she decided to leave the earth for the Earth.

Kayaking outside Washington, D.C., on an inlet of the Potomac River.

If You Can See It, You Can Be It

A master's and that chance encounter with a climate scientist later, Miner moved across the country, enrolled at the University of Maine, and got her Ph.D. from the Earth and Climate Science School. After graduation, she worked on climate risk assessment for the federal government before finding her way to JPL in the spring of 2020, just as the pandemic was tightening its grip on the country—but not on her plans.

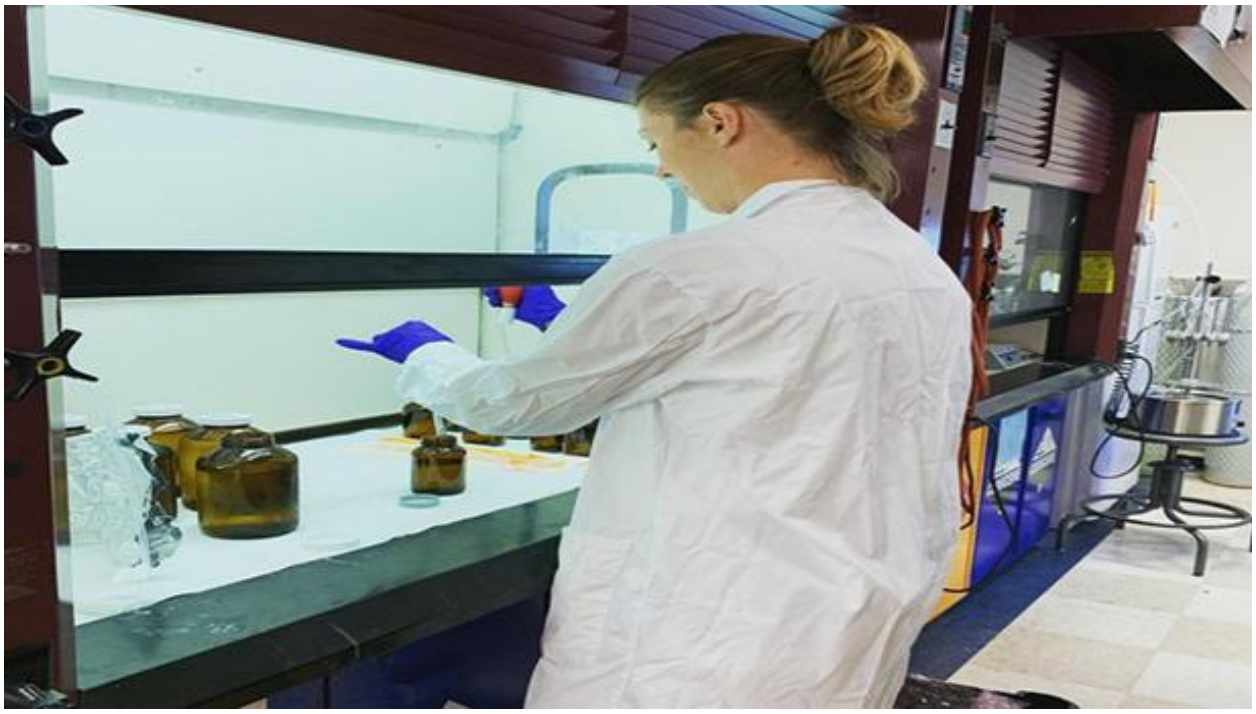
Over the past two years, she has worked on an arctic methane challenge with Principal Scientist Charles Miller; is leading one satellite mission proposal while working on the Earth System Observatory's Surface Biology and Geology mission; and has first-authored two *Nature* papers—one on biogeochemical threats coming out of permafrost, including nuclear waste, oil, and mercury, and the other on the potential for carbon release from the permafrost.

Currently, Miner is working on a yet-to-be-published study using JPL's Mars rovers to search for microbes in the Earth's permafrost, the same way the rovers look for permafrost microbes on the Red Planet.

"There's a moment where you realize you work at NASA and it's been dawning on me," she says. "It's a really big deal and this is the life dream."

Off Lab, Miner has traveled to the American and Canadian Arctic, Switzerland, Tibet, Antarctica, and Nepal to research and forecast climate risks. When her work isn't taking her to extreme corners of the globe, Miner sets her sights closer to home: doing outreach to make sure that the next generation of young girls will never doubt their abilities to pursue a career in STEM.

"I read a lot about how math was taught to girls in the 80s and 90s and how it creates this disadvantaged mindset," she says. "When I do outreach now, I always say that everything is science. You just need to realize you've been doing STEM your whole life…I just want to share science with younger generations. If she can see it, she can be it."



Miner pipetting glacier meltwater from the top of Mt. Everest into a sample bottle.

As a AAAS IF/THEN Ambassador for the past three years, Miner is one of 120 women selected from around the U.S. to be a role model for girls in STEM. As part of her duties, she does outreach via television appearances, YouTube, podcast interviews, social media takeovers, and in-person events.

As her career and visibility grows, Miner acknowledges that she has "never accepted" that her facial paralysis won't resolve itself someday, but chooses not to let self-conscious thoughts stop her.

"I know that what I'm doing is more important than me," she says. "Having that purpose-driven life where you put all your own insecurities aside has become a really big theme for me."

Miner also knows that everyone has their own challenges.

"When I talk to students, they're coming to the table with their own struggles that life has given them," she says. "I try to be mindful. [What I've gone through] has given me more empathy and the ability to connect with people around what's real and what's happening with them."

At the beginning of March, Miner traveled to the Smithsonian Museum in Washington, D.C., to speak to thousands of kids who had come out to the National Mall to learn more about STEM—and see the life-sized statues commissioned of the 120 women—many of whom dream of working at NASA one day and studying climate science just like her.

Part of that dream, of course, requires an understanding of the climate nightmare the Earth is potentially poised for—and that is exactly what keeps Miner focused and motivated on her work and sharing it with others.

"I am deeply, deeply concerned about where all the ecosystems are heading," she says. "I want to do my absolute best every day, all day, to help save everything possible, and raise awareness of what's going on so more people will want to live a little bit closer to the plants and animals that also live here with us. That's what keeps me going."

Chances are, many of the thousands of kids she's interacted with over the years will be going on that ride right alongside her.

A Return to Touring Our Universe

By Taylor Hill

What was once routine has almost started to feel normal again.

We don't mean indoor dining. For JPL's New Employee Orientation team and the Public Services Office, the past few months have been a welcome return to doing what they do best: showcasing the Lab's rich history, iconic high bays, unique buildings, and inspiring people.

Since the spring, JPL's new hires—and anybody hired during the pandemic—have been invited to participate in on-site tours once again. And they're showing up by the dozen every week.

On May 9, 2022, two brand-new JPLers—Jonathan Guerra and Seongsu Jeong—became the first new hires since the pandemic began to step foot on Lab for orientation. After their onboarding, they got a guided tour of the von Karman Auditorium and Museum, the Machine Shop in Building 179, High Bay 1, and the Space Flight Operations Facility (SFOF), also known as Mission Control.

Guerra, who works in JPL's Additive Manufacturing Center, said being able to come on Lab and meet his team in person on his first day helped him feel part of Section 357 immediately, while the tour gave him a sense of belonging at JPL as a whole.

"The onboarding for me really brings the 'wow' factor, where you really see the rich history of this place," Guerra said. "Hearing about the early days of blowing up rockets, to seeing where we are now, it just immediately made me feel like I was somewhere special."

Since then, the Mission Control tour has been averaging about 15 to 20 new hires each Monday, in addition to about 15 sessions for interns over the summer.

At the Center of the Universe—the floor of Mission Control—Space Flight Operations Manager Jim McClure is happy to be back in person, telling stories to new hires and interns instead of imposing COVID precautions on JPLers working in the control room.

McClure became a part of JPL's orientation tour about six or seven years ago, when he first noticed HR representatives taking one or two new hires into the dark room viewing gallery area every day. McClure suggested taking them onto the actual dark room floor instead for a more up-close and personal experience—one that's now officially tied into the onboarding program.

"It's been great to be back on track with getting new hires to see that side of JPL," McClure said. "It's an overpowering feeling being on that floor and I think it also makes them feel welcome, and more a part of JPL—even if their job isn't building spacecraft or working on missions."

While Deputy Director Larry James often joins McClure in the SFOF tour portion, Director Laurie Leshin came down to greet the new hires on her first full day at JPL on May 16.

"It was great to see the excitement she had right at the start. That was a special treat for that group," McClure said.

Pandemic Hires Get Their Tours, Too

Not to leave anyone out, the JPL Public Services Office (PSO) also has been offering tours on Tuesdays and Wednesdays for JPLers hired during the pandemic, since they most likely only received a virtual tour when they were initially onboarded.

Jordan Ticktin, whose JPL start date was March 30, 2020, immediately signed up.

"It wasn't that I'd never stepped foot on JPL before, it was just that I missed it," Ticktin said.

While working on his undergraduate and master's degrees, Ticktin had interned at JPL for four summers, working in the Quality Assurance Office's Training, Tools, and Technology group. When he received a full-time job offer in 2020, he was preparing to move down from San Luis Obispo to Pasadena before mandatory telework kicked in.

"I'm in the Quality Assurance group facilitating the Hardware Review and Certification Records (HRCR). Since my work was all possible from a computer, I was one of the few members of my Quality Assurance team that stayed full-time telework through the pandemic," Ticktin said.

Instead of moving to a city in lockdown, Ticktin moved to Anchorage, Alaska for a year-and-a-half. He worked full-time for JPL, reviewing Europa Clipper parts by day, and searched out aurora borealis at night.

"I'm really glad that I went, and I loved living there, but I really wanted to come back to Lab," Ticktin said. "I had been basically facilitating reviews for nearly every piece of hardware on Europa Clipper, but I'd been doing it remotely. I hadn't seen my group, the Europa project team, or even any of the actual pieces of hardware."

On May 31, Ticktin joined the PSO tour along with approximately 20 other pandemic-era hires, and got the the full JPL experience he had long waited for: walking through von Karman, seeing NISAR in the Spacecraft Assembly Facility, and sitting in JPL's Mission Support Area in Mission Control.

“Wow, the professional tour guides in PSO are so good,” Ticktin said. “I had my phone out taking notes and getting down all the details so I could use it later on tours I’ll give to friends and family.”

For Ticktin, the tour was an unforgettable experience that helped him feel connected to JPL once again.

“It was a big deal for me. There was a lot of uncertainty with moving back down from Alaska, and feeling glad I moved back was important,” Ticktin said.

From No Onboarding, to Virtual, to Hybrid

For Nancy Kapell in Human Resources, the pandemic meant a complete overhaul of her position at JPL, and the team that makes up the New Employee Orientation (NEO) group.

“March 16, 2020 was our last in-person orientation—and it was an abbreviated one at that,” Kapell said. “We got them through badging, and that was about it. The next day was the start of mandatory telework.”

For the past two-plus years, the NEO had to rethink how to onboard incoming JPLers. They conducted virtual tours to highlight the mission and culture of JPL—making sure all legal HR and ITSD requirements were met—all without actually bringing any new hires on Lab.

“Apart from badging, which has to be done on site at a NASA center, we were doing it all virtually,” Kapell said. “We thought we’d be doing it that way for two weeks, and it ended up being two-and-a-half years.”

While a return to on-site tours is a welcome one for Kapell and the NEO team, some of the onboarding tour components will remain virtual indefinitely.

“We’ve decided to keep the benefits orientation portion virtual, as it is easier for remote teleworkers to participate,” Kapell said. “[This] also allows for family members to sit in on the presentations from home as well, and learn about the health and retirement benefits, too.”

Throughout the past two-plus years of upheaval and transition in the onboarding process, Kapell noted it was only possible due to the teamwork of the Public Services Office, the Space Flight Operations Facility team, the Machine Shop team, Protective Services Division, and more.

“It was a whole team of people just waiting for the day to get back on Lab and be able to welcome new people with open arms, and make sure that as they’re coming in,” Kapell said. “They feel that this is a family, and they are welcome in our Universe.”

Building 350 under construction.

JPL's Newest Building Hits High Point

By Taylor Hill

JPL's future Flight Electronic Integration Facility, or Building 350, reached its final height toward the end of summer, as the last beams that compose the main structure were put in place–a milestone known as "topping out."

In building construction, a topping out ceremony honors the accomplishments of the construction crew, traditionally marking the highest point a building will reach.

B350 is the first significant addition to Lab (apart from our beloved parking structure) since Building 321, which opened in 2009. Once complete, the building will house much of the Electronic Manufacturing, Packaging & Tech Services Section (356). Testing labs and outdated facilities scattered around Lab will be centralized in a state-of-the-art showcase for JPL's technological innovations.

The progress to date keeps the 86,000-square-foot project on track to reach its January 2024 completion date. Now, work can move forward on the glass curtain wall system and wall paneling, to be followed by outfitting the interior of the structure.

"We're about halfway through the project, and the celebration was really a time for the construction workers and contractors to enjoy reaching that milestone," said Facilities Project Administrator Benjamin Tom.

The topping out celebration was held on Aug. 25 next to the construction site along Mariner Road in front of the In-Situ Instruments Laboratory (B317). Workers were treated to barbecue, refreshments, and a raffle with prizes including a flatscreen TV.

Tom says the team is averaging about 100 contractors on site each day, with a plan to ramp up to 175 workers per day by December.

“We have had about 100,000 hours of labor so far on the project,” Tom said.

Some facts about the building construction include:

- 8,500 cubic yards of concrete have been poured (one truck load is approximately 10 cubic yards)
- 1,000 tons of rebar have been installed
- The walking bridge to be installed weighs 35,000 lbs. before utilities installation and will weigh 55,000 pounds at the time of placement
- The building is targeting LEED Gold certification

The next big event for the construction crew comes Sept. 23, when two cranes will take the walking bridge assembled in JPL’s West Lot, and set it in place as a connector for B350’s north entrance to Explorer Road.

Edna Villareal is the section manager for the Business Administration Section in the Communications, Tracking & Radar Division (330).

Edna Villareal Charts Her Own Course

By Celeste Hoang

Growing up on a farm in a small town in northern New Mexico, Edna Villareal spent more time peering into the soil than up at the stars.

One of five siblings raised in Española, Villareal was brought up within a predominantly Hispanic population surrounded by a large Native American community. It was a place "full of color," she describes, one that was always brimming with mouthwatering food and vibrant local culture and entertainment.

There, Villareal's family farming roots ran deep, with plenty of cows, chickens, sheep, and vegetable gardens to care for. A career at NASA or in aerospace was not only the last thing on her mind, it never even entered her consciousness in those early years.

"It was a very simple childhood," Villareal recalls. "It's a small town—we didn't have a lot of resources or opportunities for exposure to things outside of our little bubble."

Española wasn't too little for JPL's recruiters, however. When Villareal made her way to college at New Mexico State University in Las Cruces, she was drawn to a Human Resources management major. She hoped to use her degree to place people into meaningful jobs, and help them secure fair and equitable wages during the hiring process.

In her last year of college, she noticed JPL's booth at the career fair. It would be the beginning of a decades-long career at the Lab that started in Human Resources and saw Villareal eventually weave her way into 25 years of business management within the Engineering & Science Directorate (ESD). At every turn, Villareal listened to her intuition and chased her curiosities—leading her to move beyond HR, earn her M.B.A., and pursue the kinds of leadership roles on Lab that once seemed as distant as the stars.

Now, in her 34th year, Villareal is the section manager for the Business Administration Section in the Communications, Tracking & Radar Division (330). For Hispanic Heritage Month, we sat down with Villareal to discuss her path to JPL, how she navigated her own career twists and turns, and the rewards and realities of being a female Hispanic leader at the Lab.

On what drew her to major in Human Resources management in college:

It's a very interesting discipline that offers different career paths like recruiting, compensation, training, and employee relations. These paths all offer an opportunity to help people, and that was the draw.

On saying no to JPL at first, then saying yes:

I attended a career fair on campus at New Mexico State University the spring of my senior year. JPL was there, and I talked to the recruiter at the booth and indicated my interest in potentially coming out as a co-op student—a JPL program where students can take off a semester of school and come here and work full-time for six months and receive academic credit.

Lo and behold, I got a co-op offer to work in Acquisition. While I was absolutely thrilled and so tempted to accept, I did a cost/benefit analysis and determined it would not be a good decision to accept the job because the cost of living was far too expensive. Reluctantly, I declined. When they returned to campus in the fall, I got on the interview schedule, went through the process, came out to L.A. for an on-Lab interview, and received an offer for a full-time position as a Personnel Representative in HR. I was in seventh heaven.

What were some highlights during the early years of your first JPL role?

When I first started at JPL, I was responsible for coordinating the summer employment program. I got to talk to a lot of students and years later, people that I hired into the Academic Part-time (APX), Co-op, or Summer Program [who are now full-time employees at JPL] would be like, 'Oh my gosh, I remember you. You were so nice to me and you helped me.' That meant so much. I can't even explain how incredible that

made me feel to know I had such a positive impact on someone's career and life. I was in HR for four-and-a-half years, so I was helping several hundred students each summer.

Another highlight was meeting a lot of the group supervisors and section managers across ESD. They were great to work with, and looking back, I didn't realize at the time that I was interacting with the future leaders of JPL. Many of these individuals went on to become division managers, project managers, directors for, etc.

Being a recruiter also provided the opportunity to travel to different college campuses and attend conferences, so traveling became a big part of my work life. I had never traveled before—I couldn't afford to—and having that ability was incredible. I remember going to a conference in New York City and I was there for several days. One night after work, we went to see *Phantom of the Opera* on Broadway.

Villareal, far right, poses with JPL's Recruitment and Employee Relations team in front of the Visitor's Center in 1990.

What first sparked your interest in moving out of HR and into business management?

I was interfacing with a lot of supervisors and managers throughout ESD since I was supporting them with the recruitment and placement of students in their organizations. They were great to work with, and I started wondering what it would be like to work more directly with these people—the brilliant minds accomplishing all these amazing feats—so I began to research different job opportunities. At the same time, I had enrolled in my MBA program and wanted to better utilize my skills. The combination of curiosity and an advanced degree solidified my decision to pursue another career outside HR.

Why did you want to pursue an MBA in the first place?

I started hanging out with a lot of JPL engineers and everybody has a master's or Ph.D. (laughs). I thought, 'I need to go back to school. I need to prove that I am worthy of being a JPLer and can pursue higher education.' And the fact that JPL paid for it—it would have been crazy not to take advantage of tuition reimbursement.

On making the official move to ESD—and making her mark:

I tossed my resume into the pool of applicants for an administrator position, interviewed, and was selected. I then transferred to Section 335, Tracking Systems and Applications. When I came to ESD, I worked really hard to learn everything about the job, and understand not just my administrative responsibilities, but my organization. What were they doing, why were they doing it, and how can I contribute to their success? I just tried to be a sponge and learn as much as possible. In that respect, I demonstrated to the manager at the time that I was sincerely dedicated to my job and to the organization. The opportunity to become a manager came later.

Can you break down what your section is responsible for? How does business administration lay the foundation for ESD's work?

We're responsible for the business operations of our organizations, and supporting the technical staff with essentially everything that's not technical: recruiting, compensation, awards, facilities, safety, finance, procurement/acquisitions, travel and other business activities. Providing all these services for the technical staff allows more time to focus on their critical work.

On playing the section's crucial supporting characters:

I consider my team to be 'enablers.' We enable the technical staff to focus on their work while we take care of all the 'administrivia' that they dislike (laughs). A couple of weeks ago, one of the deputy section managers complimented the business team, saying, 'We would be lost without them.' You often hear the phrase 'a well-oiled machine' to describe an organization that's operating smoothly. I consider the business teams to be the oil in the machine.

You've been in management at JPL for 25 years. What does it mean to you to be a Hispanic woman in a leadership role?

When I first became a manager, there were very few Hispanic females in leadership positions. Things have improved over the years, and I hope I set an example 25 years ago that with hard work, education, and dedication, we can achieve our goals.

On cultural identity and breaking through career barriers:

I will admit that I have not encountered some of the challenges that others have, and I feel fortunate. I'm 100% Hispanic, however, a lot of people do not think I am because of my green eyes and light skin. Years ago, a colleague said to me, 'You are so lucky you don't look Hispanic.' The comment really struck me, as it came from a gentleman who is Mexican with dark hair, dark eyes, and dark skin. I will never know what prompted that comment, but it breaks my heart to think that he probably had some unpleasant experiences being an ethnic minority.

What's your advice for others looking to change lanes or switch careers, especially within JPL?

I would advise people to get out of their comfort zone. As difficult as change can be, it can also be very rewarding and provide a great growth opportunity. There are a lot of opportunities on Lab, and we shouldn't just focus on, 'What is my next promotion?' Rather, ask yourself, 'What can I do or where can I go within JPL to enhance my skills?' Gaining more knowledge, adding to your skillset, and pursuing those different opportunities can be invaluable.

On a practical note, for anyone considering pursuing an advanced degree—go for it. There is no deadline per se on getting that degree. When I was in HR, one of my colleagues was pursuing her Bachelor's degree. It took her 10 years to complete the program, but she did, and she was so proud, and we were all

very proud of her, too. Even if you just take one class a quarter or semester, just continue to hammer away. You'll get there.

Answers have been edited for length and clarity.

Events

James Webb Space Telescope: Mechanical Systems Lessons Learned

Thursday, Oct. 13
11 a.m. to noon
RSVP for the Zoom link

Sandra Irish, mechanical systems lead structures engineer for the James Webb Space Telescope (JWST) for over 16 years, will discuss some of the unique challenges and lessons learned from working through the mechanical design and testing on the program.

The James Webb Space Telescope successfully launched on an Ariane 5 rocket on Dec. 25, 2021, and has since captured outstanding images of the birth of stars, composition of exoplanets, and new galaxies. It took many years of engineering design and testing in order to obtain this scientific success. The engineers ultimately got it right putting a six-meter deployable cryogenic telescope in orbit around L2 and it's working well—however, could they have done it better? What was learned through the many years of design changes and testing?

Von Karman Lecture: Near Earth Objects and Opportunities for Discoveries

Thursday, Oct. 13
7 p.m. to 8:30 p.m.
Watch on YouTube

Comets and asteroids offer clues to the chemical mixture from which the planets formed some 4.6 billion years ago. If we wish to know the composition of the primordial mixture from which the planets formed, then we must determine the chemical constituents of the leftover debris from this formation process: the comets and asteroids. This talk will discuss with how Near Earth Objects are opportunities for discovery.

Speaker: Dr. Davide Farnocchia, Navigation Engineer
Host: Marc Razze, Public Services Office
Co-host: Brian White, Public Services Office

JPL Family News

Retirees

The following JPL employees recently announced their retirements

40+ Years:

Timothy O'Donnell, Section 3500, 46 years

30+ Years:

Gail Woodward, Section 347N, 38 years

20+ Years:

Christian M. Ho, Section 332G, 27 years

Passings

Passings must be submitted through Human Resources, which coordinates with the family of the deceased.

Carl Clinton Day died on Sept. 4, 2022 at the age of 86. Day worked at JPL for 26 years in Security. He was an employee from 1984-1998 and an affiliate from 1998-2010.

He is survived by his wife, Alberta E. Day.

Sayuri Harami died on Aug. 31, 2022 at the age of 97.

Harami worked at JPL from 1964 to 1987, where she was hired as a "math assistant" by the Space Science Division. She worked on unmanned space projects like Voyager, Viking, Mariner, Pioneer, and others. Later, Harami wrote software code for chromosomal analysis. She retired from JPL as an engineer in 1987.

Harami is survived by her children, sons Kei and Chiaki Harami; and daughter Eureka Hoerter; and granddaughter Alison Matsunaga.

JPL Awards & Honors

JPLers often Dare Mighty Things, and nearly as often earn awards or professional designations. JPL Space will periodically feature a roundup of recent honorees. Please join us in congratulating your accomplished colleagues.

Dr. Bonnie J. Buratti
2022 Gerard P. Kuiper Prize

The Division for Planetary Sciences (DPS) of the American Astronomical Society (AAS) awards the 2022 Gerard P. Kuiper Prize for outstanding contributions to the field of planetary science.

"for her distinguished achievements in the understanding of planetary and small body surfaces through photometry, her career-spanning leadership in the planetary science community, and the legacy she has created through mentoring early career scientists." **Full story**

Dr. Sona Hosseini
Nancy Grace Roman Technology Fellowship in Astrophysics

The program gives early career researchers the opportunity to develop the skills necessary to lead astrophysics flight instrumentation development projects and become principal investigators of future astrophysics missions. It also allows the fellows to develop innovative technologies that have the potential to enable major scientific breakthroughs, and to foster new talent by putting early-career instrument builders on a trajectory towards long-term positions. **Full story**

Elizabeth Córdoba
Georgia Tech Alumni 40 Under 40

This annual program showcases how Tech graduates impact every industry worldwide and work to improve the way we live through their diligence and expertise from an early age. **Full story**

Alyssa Liu
WE22 Outstanding Collegiate Member Award

Presented to SWE collegiate member with SWE collegiate involvement who has made an outstanding contribution to SWE, other engineering organizations (including but not limited to SWE's partner organizations), their community and campus. **Full story**