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## Featured Stories



*Susan Christensen sewing masks for JPLers at her home. Image Credit: Mike and Susan Christensen*

## A Tale of Two Stitches: The Journey of Cloth Masks From Quilters to JPLers

By: Celeste Hoang

When a quilting group from south Orange County toured JPL last year, they left in awe of the great talent on Lab.

Never did they think that one year later, JPLers would be turning to them for their special skills.

As the Lab moved to mandatory telework on March 17 during the COVID-19 pandemic, essential employees—those on missions such as Mars 2020 and in such areas as safety, security and facilities—continued work on Lab. Personal protective equipment became a requirement for all on-Lab JPLers, but a critical issue for one group in particular: the Mars 2020 clean room team could not afford to deplete their store of certified paper masks by using them outside the clean room. They needed a whole other supply of masks.

“We looked at the inventory, and we saw that the number of paper masks we had wouldn’t last us through the Mars 2020 project if we didn’t do something,” recalls Mike Christensen, section manager for Safety and Mission Success. “How do you do clean room work if you don’t have clean room-certified masks? How do we preserve those masks while protecting others?”

Christensen—a certified industrial hygienist who specializes in personal protective equipment—began researching reusable cloth masks following CDC guidelines, which call for two layers of cotton. One source that came to mind? One hundred percent quilting cotton fabric—something he was familiar with thanks to his wife, Susan, a longtime avid quilter.

“I said to her, ‘What do you think about making masks?’,” Christensen said. “She immediately went and made one.”

That first mask set off a chain of events. The Christensens knew they would need about 1,000 cloth masks , but they couldn’t do it alone.

“I like sewing and I just wanted to help,” says Susan, who herself has sewn nearly 200 masks. “I started sewing with scraps at my house, and it was obvious that was going to be depleted very fast.”

But she knew exactly who to reach out to for help: Her friend, LeAnn Goettel—and wife of Director for Business Operations Marc Goettel—was a fellow quilter with a large network of quilting friends.

“The call went out that JPL needs our help because the Mars 2020 rover might be held up,” says LeAnn, who extended the request to about 50 women across three quilting networks—including the women who toured Lab last year.

“They were blown away by what JPL does. They all knew what the rover was about and said, ‘Whatever we can do to help JPL, we’ll do it.’”



*Mike Christensen, section manager for Safety and Mission Success, wearing a cloth mask sewn by his wife, Susan. Image Credit: Mike and Susan Christensen*

## A Case for Cloth

Guidance and debate over the use and effectiveness of face masks have oscillated since the early stages of social distancing orders. While N95 masks are reserved for healthcare workers, CDC guidelines have shifted to recommend that other individuals wear cloth face coverings. Los Angeles County has since issued public guidance to do so.

“My expertise is in identifying and quantifying hazards in the environment and then figuring out which controls work best,” says Christensen. “That’s important to understand because the decision I made to use cloth masks [at JPL], which others are doing too, was a tough one.”

In coordination with Lab leadership, Christensen started “Stop the Shed to Stop the Spread,” a plan to ensure all on-Lab personnel wear face coverings during their shifts. Along with Chief Engineer of the Planetary Science Directorate Howard Eisen, the two provided training courses to all essential employees to ensure they understood the role of cloth masks—both their benefits and their limitations—in minimizing risk.

“The value in cloth masks is that they’re imperfect in every way but they help to reduce the shedding from a potentially infected individual into the shared area of non-infected people,” explains Christensen, who emphasizes that the key is making sure both social distancing and cloth masks go hand-in-hand; simply wearing a mask doesn’t make you safer. “Social distancing is still critical, but we’re asking people to add another layer of protection.”

The next step, of course, was where and how to provide that layer of protection.

## Sewing Superstars

“Susan called me and said she was in a pickle,” recalls LeAnn. “And I said, ‘Heck, how can I help?’ So I started thinking of different people locally here and then I thought, I’m going to my quilting friends.”

Prior to settling down in Altadena to be closer to JPL, the Goettels resided in Laguna Niguel for two decades, where LeAnn was an active member of Orange County’s Beach Cities Quilting Guild. Even after the move, she maintained her membership and her close ties to the women; Marc personally hosted their JPL tour.

“Susan is the brains behind the operations and I’m the delegator calling in the favors,” she says. “I put out the call via email and said, ‘JPL needs us. Can I recruit you?’ I’ve been quilting with those women for 20 years. You have deep friendships.”

Following guidance from the Christensens, Goettel shared patterns and designs—specifically those that could also fit over N95s—that her network of quilters could follow. The instructions were simple and careful: Sew a batch of masks, mail them to LeAnn in boxes marked “Masks,” and she would deliver them—unopened—to the Christensens’ front steps for distribution at JPL.

As of mid-April, LeAnn estimates the quilters have sewn about 350 cloth masks for JPLers, about a third of the way there.

“They send them to me and I tell them, ‘Keep sewing. The job’s not done yet,’” LeAnn says. “These are all designed to help JPL workers and to keep them safe.”

She adds that the women—who are all working on donated time and donated talent—see the project as an opportunity to support JPL in their own small way.

“People are doing this because they want to give back. For my quilting friends, it’s a great way to say thank you to JPL,” she says. “They enjoyed a wonderful tour but more importantly, we’re stoked over

science in action. The rover is quite impressive and so it was easy to reach out and say, 'The rover needs our help.' I was overwhelmed at their response."

### **Planetary Protection's Special Touch**

The journey of a cloth mask making its way into the hands of a JPLer is a complex one. After they're sewn and delivered to the Christensens' home, Mike brings them to JPL for one more critical stop: Planetary Protection for sterilization.

A few times a week, Planetary Protection Engineer Sarah Yearicks picks up the masks dropped off by Mike and takes them to Building 244, where she works alone to sterilize each and every mask inside an autoclave, an instrument that uses steam and high heat to disinfect instruments and tools from microbial contamination.

"It wasn't a big leap for me to get tapped on the shoulder to sterilize the cloth masks," says Yearicks, whose job is to verify and validate flight hardware cleanliness for Mars 2020 and Europa Clipper. "As planetary engineers, we're really familiar with working aseptically and not contributing contamination to our samples. We use the autoclave daily in our laboratory—it's second nature, like breathing. In every step of our procedure, we use sterile tools."

Yearicks' process for the masks is not much different. She lays out each mask—she estimates about 80 to 160 masks are left for her after each drop-off—and seals them into individual autoclave pouches inside a biological safety cabinet. The cabinet—a one-person, enclosed, ventilated working surface that protects laboratory personnel and the environment from materials that may be contaminated with pathogens—is designed so that only Yearicks' hands can be in the workspace.

The masks are then steam-sterilized at 250 degrees Fahrenheit (121 degrees Celsius) for 15 minutes in the autoclave.



*Cloth masks being sterilized in autoclave pouches by Planetary Protection Engineer Sarah Yearicks. Image Credit: Sarah Yearicks*

"It looks like an oven," she says. "You pull the door down, load up the articles for autoclaving, close the door, and start the instrument. I can run up to about 200 to 300 masks in a given autoclave cycle run."

Yearicks' monitors cycle indicators and follows steps to validate that each run is successful in sterilizing the masks. After she autoclaves the pouches, she places each one in a secondary bag for added protection from dust and contamination, and delivers them back to Mike and Eisen for distribution.

"The only person who's going to touch the sterile mask is the person wearing it," she says.

In the delivery process, sterilization is a final key step.

"If these masks came to us and we couldn't have them sterilized, that would put the quilting [operations] at risk," Mike says. "We wanted to make sure these are sterile and safe as we hand them off."

### **The Goodness of People**

The quilters' efforts mean that not only are JPLers safer, but that clean room work on Mars 2020 has a longer shelf life.

"Every time we give a cloth mask away, that means that we don't have to use a paper mask that's used in a clean room," Mike says. "One cloth mask, based on our calculations, saves 60 clean room masks."

The contribution to JPL is an effort from many people in large and small ways. Outside of the individuals mentioned in this story are even more volunteers doing what they can. One JPLer's college-aged daughter is cutting fabric and dropping it off at the Christensens' home; a handful of volunteers in Pasadena and Alhambra have also delivered hand-sewn masks.

For those directly involved, it's the ability to help—and the opportunity to witness others' generosity—that means the most.

"My grandmother was a seamstress, so it's near and dear to me that we have the quilters out there doing this," Yearicks says. "It's exciting to see it come to fruition and see someone wearing one of the cloth masks when I'm walking around on Lab. It's an honor to be a part of this."

And as strange and uncertain a time as it is, the project has been a source of joy for those involved.

"Like everything else we're seeing right now, it's the goodness of people," says LeAnn. "For some people, this is a very dark time and this helps them see the light at the end of the tunnel. You forget about yourself. Anytime we can serve one another, life gets better."

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*Protective Services Officer Marvin Calderon. Image Credit: Dan Goods*

## **They Keep the Lights and the Gloves On**

By: Taylor Hill and Jane Platt

For Protective Services Chief Ben Palmer, the past month has led to a major shift in the day-to-day tasks he'd grown accustomed to in his 22 years on the job.

"A large part of our work was dedicated to visitor management, facilitating group visits, event coordination, badging office support ... basically dealing with the flows of people coming on and off Lab," Palmer said. "Now, we essentially have no visitors, and we're managing how to ensure the list of people who need to get on Lab can actually get on the facility."

Throughout March, that list began rapidly shrinking as safety restrictions moved a majority of the Lab to mandatory telework, and only mission-essential personnel were permitted on site.

"There was information and orders coming from NASA, Caltech, Los Angeles County and state officials, so we were having to quickly respond and coordinate between the Lab's management to get the correct communications to the right groups," Palmer said. "It's unprecedented. I haven't seen anything like this since the 2009 Station fire shut down the Lab. But that was for three days. This is for the foreseeable future."

In the new status quo, Palmer says the Lab is a shadow of what he has known.

"We're so used to seeing thousands of people here every day, and providing services for those people," Palmer said. "With the few people we have left, we're trying to limit interactions to comply with social distancing protocols, while still being as helpful as possible."

That's one of the things Palmer says he misses the most—those daily interactions he had grown accustomed to while rising through the ranks from security officer to lieutenant, to captain, to becoming chief this past year.

“I’d go to two or three meetings a day with different groups across Lab, to discuss upcoming events or tours, and meet with our officers, but now it’s all telecon,” Palmer said. “It’s a totally different feel when you can’t see the person. But it’s where we’re at right now, and it’s how we’re getting things done.”

On top of social distancing, officers are now advised to wear earloop masks while on duty, nitrile gloves if they are expected to come in contact with another person, and goggles if necessary.

Palmer says the experience has brought home the idea of the Lab as “family” for him.

“Everyone who’s here, from the engineers, to the officers, to the maintenance and cleaning personnel, to the transportation team, we are all dependent on each other. We’re counting on each other so that the Lab can function,” Palmer said. “We’re all in the same boat. When you work at JPL, you are a part of the family.”



*PSD officers are provided masks, goggles and gloves to wear in areas where interaction is necessary. Image Credit: Courtesy of Ben Palmer*

### **Janitors on the Spot**

The Lab has never been cleaner. Chris Williams, deputy program manager for AFM, the company that provides janitorial services for JPL, says teams are sanitizing certain occupied buildings with Virex two or three times a day.

All unoccupied buildings also are due to be disinfected with Virex, so they will be ready for JPLers to return safely whenever the situation improves enough. In addition to overall cleaning, janitors are focusing in particular on high-touch items, like door knobs, light switches and chair arms.

Williams says that while the scope of the work has increased, staffing varies according to need, so his team members have been able to handle this unexpected situation. Janitors are provided with protective gear, and he says managers meet weekly with their staff to address any concerns or issues.

For night shift floor crew lead technician Carla Quintanilla, the battle against coronavirus has shifted her team’s routine cleanings across the Lab to high-intensity cleanings of particular buildings.

“We’re starting with buildings 301 and 180, cleaning everything, and sanitizing everything,” Quintanilla said. “We’re focusing on the touch points too—doors, handrails, desks, restrooms, anything people might touch.”

Quintanilla noted that through the tumultuous times, AFM and JPL have kept clear communication and safety a top priority for the staff.

“I’ve read stories of other facilities companies having shortages of PPE [personal protective equipment], but we’ve been provided with additional supplies, facemasks, and even personal hand sanitizers,” Quintanilla said. “We’re thankful we’ve been able to keep working, and keep JPL working, too.”

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## Survey Says: JPLers Holding Up

More than two-thirds of employees made their voices heard in a recent survey on telework and morale, and for the most part the “yeas” outnumbered the “nays.”

The survey collected input from 4,412 participants between April 2 and 8. More than 96% of respondents have been required to telework since March 17.

While nearly 90% of participants said they are extremely or somewhat concerned about the impacts of the COVID-19 pandemic, when asked how they are feeling, close to 48% said “thumbs up,” nearly 40% said “neutral” and close to 13% responded with a “thumbs down.”

With respect to employee effectiveness since mandatory teleworking began, the picture was largely positive:

- Nearly 17% said their productivity has increased
- Close to 29% said it has stayed the same
- 44% said they were 75-90% as effective



- The smallest groups, totaling less than 11%, said they are below 75% as effective.

Respondents to the productivity question included employees who cannot perform at least some tasks remotely, but the survey did not separate responses according to ability to work 100 percent from home.

And what if mandatory telework were to be required for the foreseeable future? More than three-quarters said they believe they could continue to work from home at least as productively, with close to 18% saying they would become somewhat less productive over time, and less than 6% saying they would become substantially less productive or run out of work that could be done effectively from home.

One out of ten reported significant challenges with child care or other family matters, with 17% reporting moderate challenges, and one-quarter of respondents reporting minor issues. Nearly half said they have no issues with family obligations.

More than half the respondents gave very high marks to their home network connection performance or reliability. Overall high ratings were given to remote access/smartcard login. The ratings were lower for work-from-home ergonomics and workspace.

More than 80% of respondents feel supported by immediate management and understand what is expected of them when working from home.

The survey was administered for JPL by Qualtrics.



## Kids Shine During Take Your Child to Work Day (Week) at Home

This year's Take Your Child to Work event was unlike any other, as coronavirus restrictions means most JPLers are working from home, and the Lab remains off-limits to visitors.

But that didn't keep JPL's Human Resources and Education Office from bringing a bit of the Lab into our homes. So, from April 20-23, employees were encouraged to "bring" their kids to work by having them create their own JPL badges, post videos explaining what they thought their parents did, and participate in other NASA at Home activities.

Here are photos submitted by JPLers who made the best of the event virtually:



*Jia-Rui Cook (1822) with her daughter, Stella*



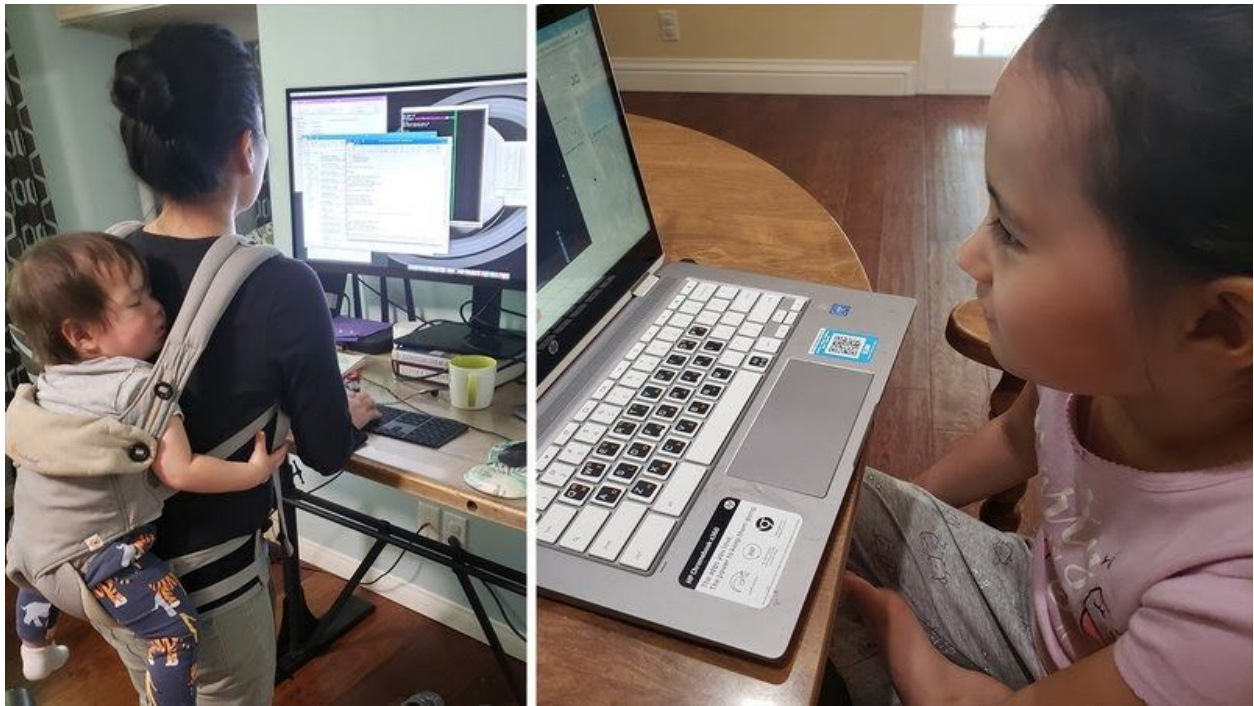
*Rob Donnelly's (394F) children, Loxton and Nora, show off their JPL badges.*



Le Kuai's (3291) son, Gerald Li, showing his rocket collection.



Christian Benitez (5030) and his son, Kian.



*Jules Lee (392A) working with son Joseph very close by, while daughter Jimyn watches a NASA Eyes Webex demonstration.*



*Kristen Shadburn (1190) with her daughter, Vivienne.*



## 2019 JPL Annual Report Available

The 2019 JPL Annual Report is available without signing into the JPL network at <https://www.jpl.nasa.gov/report/2019.pdf>.

The report celebrates the end of a decade that prepared JPL for the next advance in space. As 2019 came to a close, so did assembly of Mars 2020, the most advanced mission to the Red Planet in human history – able to rove, fly, and cache Martian soil samples for retrieval by the next mission to Mars.

As Director Michael Watkins also notes in his introductory message, 2019 was the final year for the Spitzer Space Telescope, one of NASA's Great Observatories. Celebrated for discovering the largest batch of terrestrial exoplanets in a single star system, Spitzer also identified the first molecules in an exoplanet atmosphere, and made the first measurements of wind and temperature variations above an exoplanet.

The past year saw the start of assembly for the Psyche asteroid mission, while Europa Clipper moved into final design and the Lab's next generation of flight projects moved closer to reality.

Watkins closes his message on the past year with a reflection on the present: "While we should honor JPL's achievements of 2019, I hope for our greatest accomplishment of 2020 to be our shared commitment to the health, safety and peace of mind of each other, our families and our communities."



*Artist's concept of solar particle storms -- giant surges of solar particles that erupt off the Sun. Image Credit: NASA*

## Lab Gets Sun Mission and Five Advanced Concepts

In the midst of the troubled and worrisome times of the pandemic, JPL has received some welcome bright news the past couple of weeks.

First, NASA selected the JPL-managed SunRISE mission — an array of six solar-powered CubeSats operating as one very large radio telescope — to help us understand the Sun and better protect future astronauts traveling beyond Earth in a harsh space environment..

Specifically, the mission, whose full name is the Sun Radio Interferometer Space Experiment, will study how the Sun generates and releases space weather storms — AKA solar particle storms.

NASA has awarded \$62.6 million to design, build and launch SunRISE by no earlier than July 1, 2023.

The six CubeSats will create 3D maps to pinpoint where giant particle bursts originate on the Sun and how they evolve as they expand outward into space. This will help determine what initiates and accelerates these giant radiation jets. Together, the six spacecraft will also map, for the first time, the pattern of magnetic field lines spanning from the Sun out into interplanetary space.

NASA chose SunRISE in August 2017 as a Mission of Opportunity proposal, then in February 2019, approved a continued formulation study. Missions of Opportunity are part of the Explorers Program, designed to provide frequent, low-cost access to space using PI-led space science investigations relevant to the Science Mission Directorate's astrophysics and heliophysics programs. SunRISE is led by Justin Kasper at the University of Michigan in Ann Arbor.

Full NASA/JPL news release about the SunRISE selection [here](#).

In another positive development, NASA just announced today that five JPL-led efforts will move forward for further development under the NASA Innovative Advanced Concepts (NIAC) program. The program invests in early-stage technology ideas from NASA, industry and academic researchers across the country. The selection includes 23 potentially revolutionary concepts with a total award value of \$7 million. They are categorized as Phase I, II or III, depending on how far along they are.

A mission concept to image Earth-like planets outside our solar system was selected for a Phase III study. JPL's Slava Turyshev will receive a \$2 million grant to further mature the concept and related technologies.



*Illustration of how a solar gravity lens telescope would image an exoplanet. Image Credit: NASA/JPL-Caltech*

During his Phase I and Phase II NIAC research, Turyshev outlined the feasibility of a solar gravity lens to enable enhanced viewing of exoplanets. He also developed a mission architecture that uses multiple small spacecraft and solar sail technology to propel them to their target destination 50 billion miles from Earth.

NASA had high praise for his work. "This is only the third study selected for Phase III funding in the history of the program," said NIAC Program Executive Jason Derleth. "We're excited by its potential to bring us closer to imaging an exoplanet in detail, at a resolution comparable to the well-known Apollo 8 Earthrise photo."

The NIAC proposals are managed by JPL's Space Technology Office.

Here are the five JPL selections from the NIAC announcement:

Phase 1:

Saptarshi Bandyopadhyay

[Lunar Crater Radio Telescope \(LCRT\) on the Far-Side of the Moon](#)

Benjamin Hockman

[Gravity Poppers: Hopping Probes for the Interior Mapping of Small Solar System Bodies](#)

Phase II:  
Masahiro Ono  
[Enceladus Vent Explorer](#)

Nan Yu  
[Gravity Observation and Dark energy Detection Explorer in the Solar System](#)

Phase III:  
Slava Turyshev  
[Direct Multipixel Imaging and Spectroscopy of an Exoplanet with a Solar Gravitational Lens Mission](#)

Find the full list of NIAC selections [here](#) and read more in the full NASA/JPL [news release](#).

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## Alabama High School Student Names Mars Helicopter

NASA's Mars Helicopter officially has received a new name: Ingenuity.

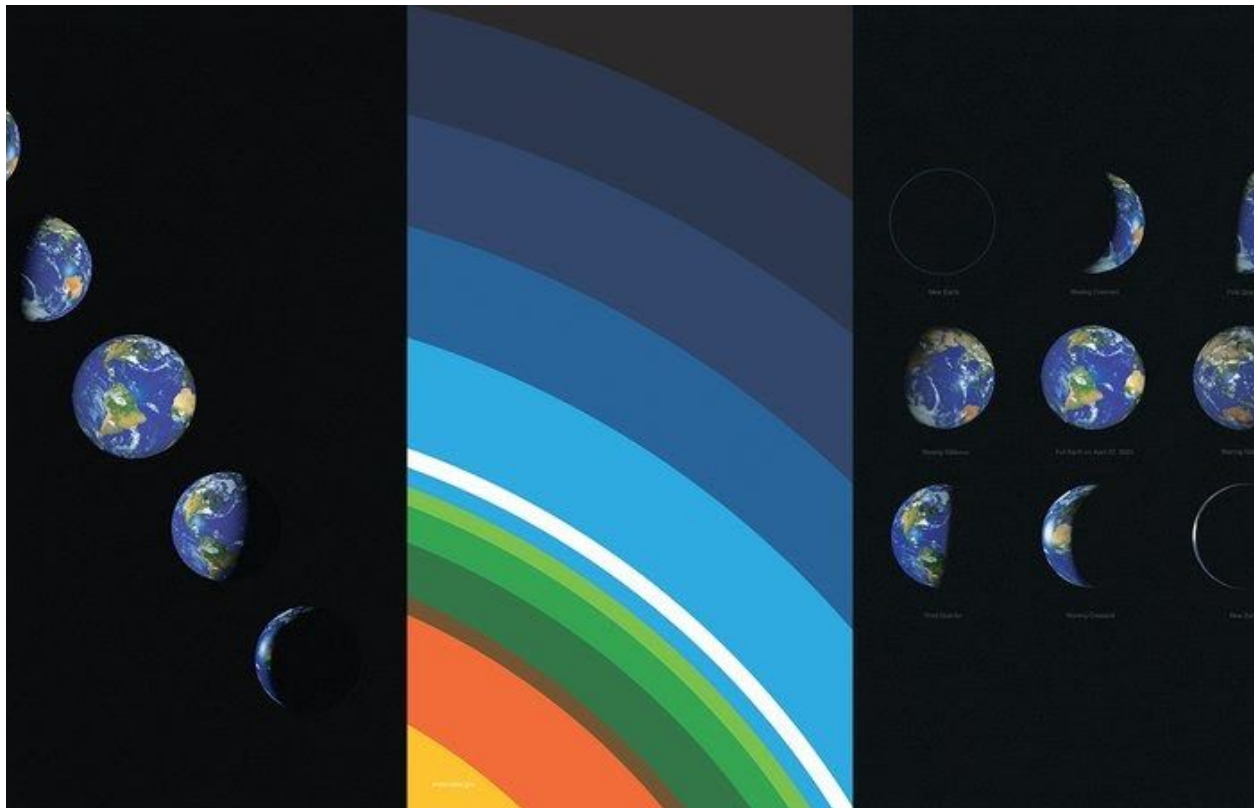
Vaneeza Rupani, a junior at Tuscaloosa County High School in Northport, Alabama, came up with the name and the motivation behind it during NASA's "Name the Rover" essay contest.

"The ingenuity and brilliance of people working hard to overcome the challenges of interplanetary travel are what allow us all to experience the wonders of space exploration," Rupani wrote in her contest submission. "Ingenuity is what allows people to accomplish amazing things, and it allows us to expand our horizons to the edges of the universe."



Rupani's was among 28,000 essays submitted to NASA by K-12 students from every U.S. state and territory recommending names for the next Mars rover. In March, it was announced that seventh-grader Alexander Mather's essay earned him the honor of naming the rover Perseverance. But with so many good essays, it seemed fitting to also choose a name for the helicopter that will accompany the rover to Mars. So NASA officials went back to the submitted essays to choose a name for the helicopter. Thomas Zurbuchen, associate administrator of NASA's Science Mission Directorate, made the choice for the rover's name, and NASA Administrator Jim Bridenstine chose the name for the helicopter.

"Ingenuity encapsulates the values that our helicopter tech demo will showcase for everyone when it takes off next year as the first aircraft on another planet's surface," said Bridenstine. "It took a lot of hard and ingenious work to get the helicopter ready and then placed on the rover, and there's a lot more going to be required. I was happy we had another great name from the naming contest finalists from which I was able to select something so representative of this exciting part of our next mission to Mars."



*The Studio at JPL has put together three Earth posters that honor our home planet. Image Credit: NASA/JPL-Caltech*

## Earth as Art

When Apollo 8 astronaut William Anders snapped the iconic Earthrise image, it captured the imagination of the people on Earth and helped to inspire the first Earth Day, on April 22, 1970. In the image, our planet hangs at a gibbous phase, as a far-off world rising in the night sky, and reminds us of the fragility of our home.

"We came all this way to explore the Moon, and the most important thing is that we discovered the Earth," was how Anders summed up the astonishing site.

In honor of Earth Day, JPL created a pair of downloadable posters that celebrate this astonishing planet.

Click [here](#) to download the posters.

### **Earth Phases**

Humanity has spent millennia studying the Moon and depicting its phases, but people often don't realize that Earth has phases, too.

Our planet's phases wax and wane — just as the Moon's phases do — but in reverse order. Unlike the Moon, which always shows the same face to Earth, if someone were looking back at Earth from the Moon, they would observe Earth's surface features change each day, as well as its phase. Shifting the perspective between planets and their moons, this poster captures those phases as they would be seen from the Moon, including the full Earth as it will actually appear on April 22, 2020.

### **Layers of Earth Science**

We live on a dynamic, living planet. Land shifts. Seas rise. Volcanoes erupt. Storms rage. Snow melts. Plants grow. Cities expand. These ever-changing systems are intertwined and affect all life on Earth, as well as the planet itself.

To understand these natural and human-caused changes, NASA Earth Science research uses unique global observations from space, from the air, at sea and on land to study Earth's interconnected systems. The Sentinel-6/Jason-CS mission — a joint U.S.-European effort — will use two identical satellites to study how the planet's climate is changing. The satellites, the first of which will launch in November 2020, will measure sea level rise, as well as the temperature and humidity of Earth's atmosphere.

Titled "Layers," this poster shares the complex layers of Earth science that NASA studies

### **Behind the Posters**

The posters were created by The Studio. For "Layers," JPL's Joby Harris worked in collaboration with artist Aaron Draplin.

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## **JPL Family News**

### **Retirees**

The following JPL employees recently announced their retirements:

#### **30+ Years:**

Thomas Thompson, Section 3300, 38 years

#### **10+ Years:**

Corinne L Karpinski, Section 3816, 12 years