

Ode to Happiness for Sunday March 7 2021

## **NASA's Perseverance Drives on Mars' Terrain for First Time**



*The first trek of the agency's largest, most advanced rover yet on the Red Planet marks a major milestone before science operations get under way.*

*NASA*

NASA's Mars 2020 Perseverance rover performed its first drive on Mars March 4, covering 21.3 feet (6.5 meters) across the Martian landscape. The drive served as a mobility test that marks just one of many milestones as team members check out and calibrate every system, subsystem, and instrument on Perseverance. Once the rover begins pursuing its science goals, regular commutes extending 656 feet (200 meters) or more are expected.

"When it comes to wheeled vehicles on other planets, there are few first-time events that measure up in significance to that of the first drive," said Anais Zarifian, Mars 2020 Perseverance rover mobility test bed engineer at NASA's Jet Propulsion Laboratory in Southern California. "This was our first chance to 'kick the tires' and take Perseverance out for a spin. The rover's six-wheel drive responded superbly. We are now confident our drive system is good to go, capable of taking us wherever the science leads us over the next two years."

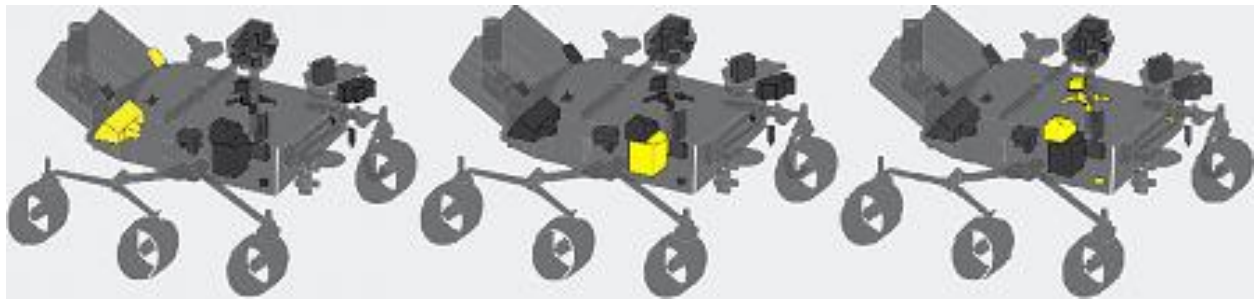
The drive, which lasted about 33 minutes, propelled the rover forward 13 feet (4 meters), where it then turned in place 150 degrees to the left and backed up 8 feet (2.5 meters) into its new temporary parking space. To help better understand the dynamics of a retrorocket landing on the Red Planet, engineers used Perseverance's Navigation

and Hazard Avoidance Cameras to image the spot where Perseverance touched down, dispersing Martian dust with plumes from its engines.

### More Than Roving

The rover's mobility system is not only thing getting a test drive during this period of initial checkouts. On Feb. 26 – Perseverance's eighth Martian day, or sol, since landing – mission controllers completed a software update, replacing the computer program that helped land Perseverance with one they will rely on to investigate the planet.

More recently, the controllers checked out Perseverance's Radar Imager for Mars' Subsurface Experiment ([RIMFAX](#)) and Mars Oxygen In-Situ Resource Utilization Experiment ([MOXIE](#)) instruments, and deployed the Mars Environmental Dynamics Analyzer ([MEDA](#)) instrument's two wind sensors, which extend out from the rover's mast. Another significant milestone occurred on March 2, or Sol 12, when engineers unstowed the rover's 7-foot-long (2-meter-long) robotic arm for the first time, flexing each of its five joints over the course of two hours.



*Where they're located—RIMFAX, MOXIE, and MEDA*

"Tuesday's first test of the robotic arm was a big moment for us," said Robert Hogg, Mars 2020 Perseverance rover deputy mission manager. "That's the main tool the science team will use to do close-up examination of the geologic features of Jezero Crater, and then we'll drill and sample the ones they find the most interesting. When we got confirmation of the robotic arm flexing its muscles, including images of it working beautifully after its long trip to Mars – well, it made my day."

Upcoming events and evaluations include more detailed testing and calibration of science instruments, sending the rover on longer drives, and jettisoning covers that shield both the adaptive caching assembly (part of the rover's Sample Caching System) and the Ingenuity Mars Helicopter during landing. The experimental flight test program for the Ingenuity Mars Helicopter will also take place during the rover's commissioning.

Through it all, the rover is sending down images from the [most advanced suite of cameras](#) ever to travel to Mars. The mission's cameras have already sent about 7,000 images. On Earth, Perseverance's imagery flows through the powerful Deep Space Network (DSN), managed by NASA's Space Communications and Navigation (SCaN) program. In space, several Mars orbiters play an equally important role.

"Orbiter support for downlink of data has been a real gamechanger," said Justin Maki, chief engineer for imaging and the imaging scientist for the Mars 2020 Perseverance

rover mission at JPL. "When you see a beautiful image from Jezero, consider that it took a whole team of Martians to get it to you. Every picture from Perseverance is relayed by either the European Space Agency's Trace Gas Orbiter, or NASA's MAVEN, Mars Odyssey, or Mars Reconnaissance Orbiter. They are important partners in our explorations and our discoveries."

The sheer volume of imagery and data already coming down on this mission has been a welcome bounty for Matt Wallace, who recalls waiting anxiously for the first images to trickle in during NASA's first Mars rover mission, Sojourner, which explored Mars in 1997. On March 3, Wallace became the mission's new project manager. He replaced John McNamee, who is stepping down as he intended, after helming the project for nearly a decade.

"John has provided unwavering support to me and every member of the project for over a decade," said Wallace. "He has left his mark on this mission and team, and it has been my privilege to not only call him boss but also my friend."

### Touchdown Site Named

With Perseverance departing from its touchdown site, mission team scientists have memorialized the spot, informally naming it for the late science fiction author Octavia E. Butler. The groundbreaking author and Pasadena, California, native was the first African American woman to win both the Hugo Award and Nebula Award, and she was the first science fiction writer honored with a MacArthur Fellowship. The location where Perseverance began its mission on Mars now bears the name "[\*Octavia E. Butler Landing\*](#)."

Official scientific names for places and objects throughout the solar system – including asteroids, comets, and locations on planets – are designated by the International Astronomical Union. Scientists working with NASA's Mars rovers have traditionally given unofficial nicknames to various geological features, which they can use as references in scientific papers.

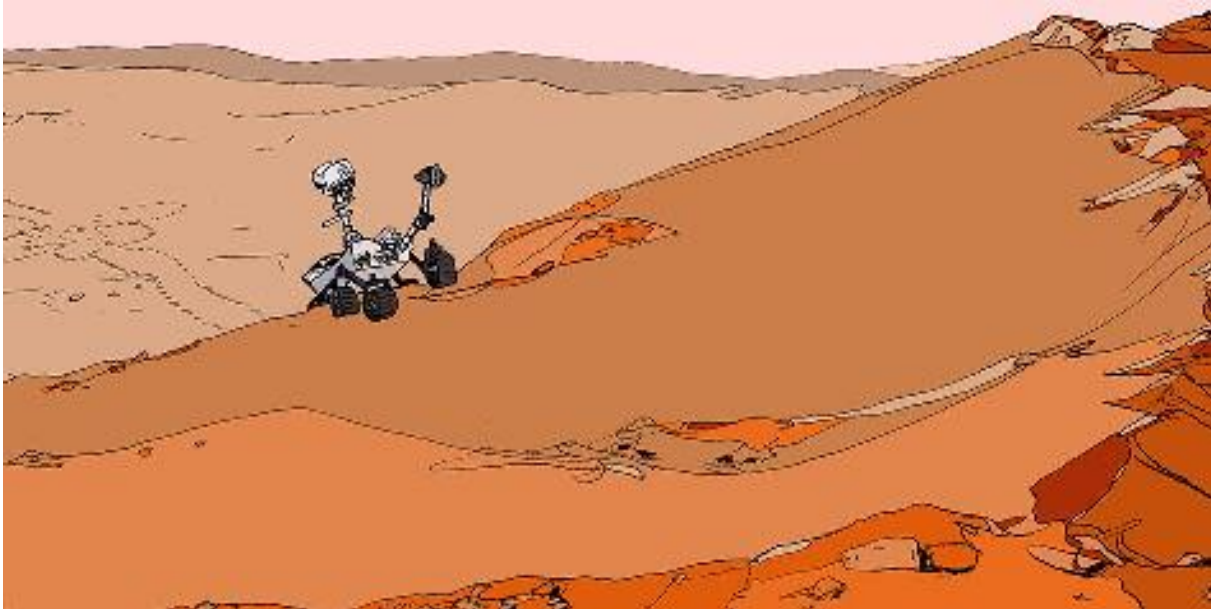
"Butler's protagonists embody determination and inventiveness, making her a perfect fit for the Perseverance rover mission and its theme of overcoming challenges," said Kathryn Stack Morgan, deputy project scientist for Perseverance. "Butler inspired and influenced the planetary science community and many beyond, including those typically under-represented in STEM fields."

"I can think of no better person to mark this historic landing site than Octavia E. Butler, who not only grew up next door to JPL in Pasadena, but she also inspired millions with her visions of a science-based future," said Thomas Zurbuchen, NASA associate administrator for science. "Her guiding principle, 'When using science, do so accurately,' is what the science team at NASA is all about. Her work continues to inspire today's scientists and engineers across the globe – all in the name of a bolder, more equitable future for all."

Butler, who died in 2006, authored such notable works as "Kindred," "Bloodchild," "Speech Sounds," "Parable of the Sower," "Parable of the Talents," and the "Patternist"

series. Her writing explores themes of race, gender, equality, and humanity, and her works are as relevant today as they were when originally written and published.

More About the Mission



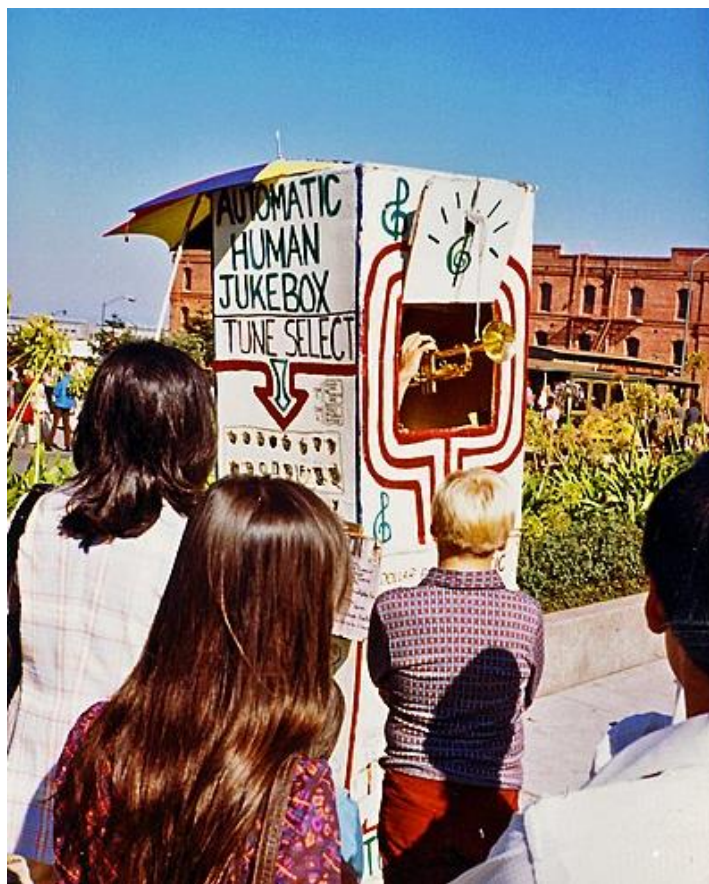
A key objective of Perseverance’s mission on Mars is astrobiology, including the search for signs of ancient microbial life. The rover will characterize the planet’s geology and past climate, pave the way for human exploration of the Red Planet, and be the first mission to collect and cache Martian rock and regolith.

Subsequent NASA missions, in cooperation with ESA (European Space Agency), would send spacecraft to Mars to collect these sealed samples from the surface and return them to Earth for in-depth analysis.

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## **This Day in History**

**Remember San Francisco’s Automatic Human Jukebox?**



The tourist institution near Ghirardelli Square, had his plug yanked On March 7, 1987 after 15 years, when tourists standing at Hyde and Beach Streets could insert money unto the slot of Grimes Poznikov's homemade "jukebox" booth and request a tune.

A window would pop open and from inside, Poznikov would pop up, dressed in brown fedora, wild tie and shoulder-length hair, blaring away on a beat-up trumpet. But no more.

Poznikov was ticketed by noise police and lost his street corner. He was 13 decibels too high, said noise abatement officer William Arieta, who used a decibel meter to catch him in the act as Poznikov played "I Left My Heart in San Francisco."

Poznikov is not just any old street artist. He has appeared in Newsweek, been mentioned in the Wall Street Journal and even ran for the city school board, garnering 14,783 votes. Nevertheless he has detractors.

"They ought to have a law that you can play only if you know how to play," said Dan Cass, a fellow street artist. "If you listen to him for five minutes, you know you wouldn't want to listen all day."

*But listen people did—San Franciscans as well as tourists. In line with Emperor Norton, jukebox was among the city's greatest institutions...alas the victim of **grownupitis**.*

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A moment of tension in Vatican.  
If the bishop moves forward the  
queen can take him.



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**Europe for the Last 2400 Years**



<https://youtu.be/UY9P0QSxlnI>

This video shows the borders and populations of each country in Europe from 400 BC to the present

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## **Spacewalking Astronauts Prep Station for New Solar Wings**

By Marcia Dunn



fox28spokane.com

CAPE CANAVERAL, Fla. (AP) — Spacewalking astronauts ventured out Sunday to install support frames for new, high-efficiency solar panels arriving at the International Space Station later this year.

NASA's Kate Rubins and Victor Glover put the first set of mounting brackets and struts together, then bolted them into place next to the station's oldest and most degraded solar wings. But the work took longer than expected, and they barely got started on the second set before calling it quits.

Rubins will finish the job during a second spacewalk later this week.

The spacewalkers had to lug out the hundreds of pounds of mounting brackets and struts in 8-foot (2.5-meter) duffle-style bags. The equipment was so big and awkward that it had to be taken apart like furniture, just to get through the hatch.

Some of the attachment locations required extra turns of the power drill and still weren't snug enough, as indicated by black lines. The astronauts had to use a ratchet wrench to deal with the more stubborn bolts, which slowed them down. At one point, they were two hours behind.

"Whoever painted this black line painted outside the lines a little bit," Glover said at one particularly troublesome spot.

"We'll work on our kindergarten skills over here," Mission Control replied, urging him to move on.

Rubin and Glover at work: <https://youtu.be/Dx-FmYdoxqQ>



With more people and experiments flying on the space station, more power will be needed to keep everything running, according to NASA. The six new solar panels — to be delivered in pairs by SpaceX over the coming year or so — should boost the station's electrical capability by as much as 30%.

Rubins and Glover tackled the struts for the first two solar panels, due to launch in June. Their spacewalk ended up lasting seven hours, a bit longer than planned.

"Really appreciate your hard work. I know there were a lot of challenges," Mission Control radioed.

The eight solar panels up there now are 12 to 20 years old — most of them past their design lifetime and deteriorating. Each panel is 112 feet (34 meters) long by 39 feet (12 meters) wide. Tip to tip counting the center framework, each pair stretches 240 feet (73 meters), longer than a Boeing 777's wingspan.

Boeing is supplying the new roll-up panels, about half the size of the old ones but just as powerful thanks to the latest solar cell technology. They'll be placed at an angle above the old ones, which will continue to operate.

A prototype was tested at the space station in 2017.

Rubins' helmet featured a new high-definition camera that provided stunning views, particularly those showing the vivid blue Earth 270 miles (435 kilometers) below.

"Pretty fantastic," observed Mission Control.

Sunday's spacewalk was the third for infectious disease specialist Rubins and Navy pilot Glover — both of whom could end up flying to the moon.

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## **Is an Electric Car Better for the Planet?**

By Benjamin Plackett - Live Science Contributor

**It depends on how we make electricity that power these cars.**



*euanmeans.com*

Which is better for Earth: an electric or gas-powered vehicle? The answer to this question might seem blindingly obvious: Of course electric cars must be better for the environment, because they don't have exhausts and so don't emit greenhouse gases as they drive. However, electric vehicles (EVs) aren't perfect, and they come with their

own set of polluting problems. Notably, their batteries contain components, such as lithium, that require a significant amount of energy to source and extract.

But battery production is just one part of an electric car's life span. A 2014 study published in the journal *Proceedings of the National Academy of Sciences* looked at the entire life cycle of an EV's emissions, from mining the metals required for the batteries to producing the electricity needed to power them, and then compared this with the average emissions of a gas-powered vehicle. The team found that when electric vehicles are charged with coal-powered electricity, they're actually worse for the environment than conventional gasoline cars.

In much of the world, however, national grids are now clean enough for EVs to beat their gasoline-powered counterparts when it comes to pollution and greenhouse-gas emissions during their lifetimes.

"Only when connected to the dirtiest, coal-heavy electric grids do gasoline internal combustion engines become comparable to EVs on a greenhouse gas basis," said Colin Sheppard, a researcher with expertise in energy and transportation systems engineering at the Lawrence Berkeley National Laboratory in California.

There are very few places where electric grids are still supplied entirely or mainly by coal. China is one of them; in 2019 it was estimated that 58% of the country's power supply came from coal and it's likely that some parts of China are still entirely supplied by coal. However, China's grid is improving with more investments in renewables – for example, it has twice the wind energy capacity as the U.S. and it builds more solar panels per year than any other countries, according to *Nature* magazine.

This pattern of improvement — more renewable energies and fewer fossil fuels — is a global one and it helps to boost the environmental credentials of electric vehicles, said Gordon Bauer, an electric vehicle researcher at the International Council on Clean Transportation in San Francisco. "As grids become greener during the lifetime of an electric vehicle, it's only going to get better."

In a study published this month in the journal *Environmental Science and Technology*, Sheppard modeled a hypothetical future scenario in which all cars were electric. "We wanted to understand what the energy, infrastructure and emissions implications might be if all passenger vehicles are electrified," Sheppard told *Live Science*. Bauer also collaborated with Sheppard on the project. Their findings come out strongly in favor of an electric vehicle future.

For example, Sheppard calculated that if all privately owned vehicles in the U.S. were electric, it would reduce greenhouse-gas emissions in the country by 46% annually (0.5 gigatons of carbon dioxide) compared with conventionally gas-powered cars. This reduction could be increased even further if those vehicles were subject to so-called "controlled charging," a technique also known as "smart charging," in which vehicles are recharged at strategically chosen times to minimize the financial cost of generating electricity. (For instance, charging at night is often less pricey than during the day; this strategy also favors more efficient energy-producing plants that produce cheaper

electricity.) If all privately owned electric cars were charged in such a way, the emissions savings could rise to 49% annually.

These estimates are based on what Sheppard admits is an "ambitious" imagining of the U.S.'s future energy portfolio. This future envisions a country with a lot more renewable energy, but which still hasn't reached the goal of zero carbon, or having a national grid that doesn't contribute to climate change, he said. There is a considerable amount of political will and practical change that needs to happen to make this scenario possible, but it's still helpful to map out the full theoretical potential electric vehicles under these circumstances.

In short, it's far easier to argue in favor of buying an EV than a gas- or diesel-powered vehicle from an environmental perspective. But what about cost? Aren't electric vehicles too expensive for most people to afford?

A 2020 report from the consumer rights group, Consumer Reports, suggests this is also changing. The paper estimated that the per-mile repair and maintenance costs over the lifetime of an EV is a little less than half that of traditional vehicles with internal combustion engines. This is largely because electric motors have just one moving part, compared to traditional engines which often have dozens. This means fewer components need to be replaced in an EV, resulting in significant savings albeit not at the point of sale.

"It may sound radical right now, but by the time 2030 rolls around, I think the problem will be about how quickly manufacturers can make them," Bauer said.

In a recent U.S.-wide analysis carried out by Bauer, he concluded that the high rate of depreciation for new electric vehicles will lead to larger benefits for lower-income households that are more likely to buy used cars. This, along with other factors driving price reductions, such as technological innovations and increased supplier competition, will mean that an EV should cost the same as a conventional gasoline-powered car for almost all income levels by approximately 2029, Bauer found. Furthermore, Bauer calculated that by 2030, low-income households in the U.S. stand to save \$1,000 per year from fuel savings if they were to switch to an EV.

*Originally published on Live Science.*

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## **Dave Brubeck Quartet - Brubeck Meets Bach (2007)**



[https://www.youtube.com/watch?v=FQO90Q\\_E4rg&t=197s](https://www.youtube.com/watch?v=FQO90Q_E4rg&t=197s)

Ok folks. For those who, as I, go bonkers for both Bach and Brubeck, here's nearly two hours of the Dave's Quartet romping through some of Johann's greatest hits. It's why both will be around four centuries from now, with marble busts to attest to their staying power. Now that's Time way way Out

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### **Gandhi on Why a Pig and a Bird do not Sit Together to Eat.**

*[Allen Lynch passed this along, stating, "Not sure about the credibility of this but it offers a worthwhile message regardless.]*



When Mahatma Gandhi was studying law at the University College of London, a professor by the name of Peters disliked him intensely and always displayed animosity

towards him. And because Gandhi never lowered his head when addressing him, as he expected, there were always "arguments" and confrontations.

One day Mr Peters was having lunch at the University dining room when Gandhi came along with his tray and sat next to him.

The professor said, "Mr. Gandhi, you do not understand. A pig and a bird do not sit together to eat.

Gandhi looked at him as a parent would a rude child and calmly replied, "You do not worry, professor, I'll fly away," and he went and sat at another table.

Peters, red with rage, decided to take revenge on the next test paper, but Gandhi responded brilliantly to all questions. Unhappy and frustrated, Mr. Peters asked him the following question: "Mr Gandhi, if you were walking down the street and found a package, and within was a bag of wisdom and another bag with a lot of money, which one would you take?"

Without hesitating, Gandhi responded, "The one with the money, of course."

Mr Peters, smiling sarcastically, said, "I, in your place, would have taken the wisdom."

Gandhi shrugged indifferently and responded, "Each one takes what he doesn't have."

Mr Peters, by this time, was fit to be tied. So great was his anger that he wrote on Gandhi's exam sheet the word "idiot" and handed it back to him.

Gandhi took the exam sheet and sat down at his desk, trying hard to remain calm while he contemplated his next move. A few minutes later, Gandhi got up, went to the professor and said to him in a dignified but sarcastically polite tone, "Mr Peters, you autographed the sheet, but you did not give me a grade".

*"The quotation is not from Gandhi, but it is an attempt to sort of put Gandhi's thinking into words," said Johannes Bakker, a retired University of Guelph professor and editor of "Gandhi and the Gita.,"*

*Of course he could be wrong.*

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## WINE PAIRING IN THE STONE AGE



“Simple rule of thumb; if it tries to eat us, serve with red. If it runs away from us, serve with white.”

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**What if the World Adopted a Plant Based Diet?**





<https://www.youtube.com/watch?v=OehTO9l1Hp8>

Amazing, an 18th century programmable wonder built before the modern computer was even imagined. The precision and precise miniature construction proves that any talent can be honed to something very special. His cursive is a lot better than mine.

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### **Bear Tagging in the Algonquin Forest**



<https://www.youtube.com/embed/vJRDpTUIrJI>

Luckily mama's pretty sleepy.

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### **Roman Holiday**

Remember this story the next time someone who knows nothing and cares less tries to make your life miserable:





A woman was at her hairdresser's getting her hair styled for a trip to Rome with her husband..

She mentioned the trip to the hairdresser, who responded, "Rome ? Why would anyone want to go there? It's crowded and dirty...You're crazy to go to Rome .. so how are you getting there?"

"We're taking British Airways," was the reply. "We got a great rate!"

"British Airways?" exclaimed the hairdresser.. That's a terrible airline. Their planes are old, their Flight attendants are ugly, and they're always late. So, where are you staying in Rome ?"

"We'll be at this exclusive little place over on Rome's Tiber River called Tesse"

"Don't go any further. I know that place. Everybody thinks it's gonna be something special and exclusive, but it's really a dump."

"We're going to go to see the Vatican and maybe get to see the Pope."

"That's rich," laughed the hairdresser. You and a million other people trying to see him. He'll look the size of an ant. Boy, good luck on this lousy trip of yours. You're going to need it."

A month later, the woman again came in to the hairdressing shop. The hairdresser asked her about her trip to Rome

"It was wonderful," explained the woman, "not only were we on time in one of BA's brand new planes, but it was overbooked, and they bumped us up to first class. The food and wine were wonderful, and I had a handsome 28-year-old steward who waited on me hand and foot.

And the hotel was great! They'd just finished a \$5 million remodeling job. And now it's a jewel, the finest hotel in the city. They too, were overbooked, so they apologized and gave us their owner's suite at no extra charge!"

"Well," muttered the hairdresser, "that's all well and good, but I bet you didn't get to see the Pope "

"Actually, we were quite lucky, because as we toured The Vatican, a Swiss Guard tapped me on the shoulder and explained that the Pope likes to meet some of the visitors, and if I'd be so kind as to step into his private room and wait, the Pope would personally greet me.

"Sure enough, five minutes later, the Pope walked through the door and shook my hand. I knelt down and he spoke a few words to me"

"Oh, really! What'd he say ?"

He said: "Who did your hair? She belongs in Hell"

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## **SpaceX Is Ready to Launch More Astronauts Next Month**

By Chelsea Gohd for space.com

Liftoff is set for April 20.



The Crew-2 mission astronauts — from left, ESA's Thomas Pesquet, NASA's Megan McArthur and Shane Kimbrough, and JAXA's Akihiko Hoshide — train for their upcoming mission on a SpaceX Crew Dragon capsule, which is scheduled to launch April 20, 2021. SpaceX's second fully-crewed astronaut flight, Crew-2, is prepared for launch, mission team members said today (March 1) during a news briefing.

The Crew-2 mission astronauts — from left, ESA's Thomas Pesquet, NASA's Megan McArthur and Shane Kimbrough, and JAXA's Akihiko Hoshide — train for their upcoming mission on a SpaceX Crew Dragon capsule, which is scheduled to launch April 20, 2021. SpaceX's second fully-crewed astronaut flight, Crew-2, is prepared for launch, mission team members said today (March 1) during a news briefing. (Image credit: SpaceX)

SpaceX's second fully-crewed astronaut flight, Crew-2, is prepared for launch, mission team members said Monday (March 1) during a news briefing.

Crew-2, which is set to launch April 20, follows the company's Demo-2 launch in May 2020, the first crewed test flight for SpaceX's Crew Dragon spacecraft, and Crew-1 launch in November 2020, which saw the company's first fully crewed mission to space. Like Crew-2, these missions took place as part of NASA's Commercial Crew Program.

"Everybody is on track and ready," SpaceX director of crew mission management Benji Reed said during the briefing.

The mission will launch NASA astronauts Megan McArthur and Shane Kimbrough, who will act as spacecraft pilot and commander, respectively, Japan Aerospace Exploration Agency (JAXA) astronaut Akihiko Hoshide and European Space Agency (ESA) astronaut Thomas Pesquet, both of whom will serve as mission specialists. The quartet will spend a little more than six months on the International Space Station.

"This flight exemplifies the [international] partnership," Kathy Lueders, NASA's associate administrator of the Human Exploration and Operations Mission Directorate, said today during the briefing about the inclusion of JAXA and ESA astronauts in Crew-2. It exemplifies, she continued, "how we are continuing to advance human spaceflight with what we do every day," and how missions like this "lead us to not only doing great things on the space station, but doing even more in our space exploration programs going forward."

The Crew Dragon vehicle used for Crew-2 will deliver not just the four astronauts, but over 440 lbs. (200 kilograms) of pressurized cargo to the space station, supporting science and technology development on the orbiting lab, space station program manager Joel Montalbano said today.

"Last year, we celebrated 20 years of continuous human presence on board the International Space Station," Montalbano said, adding that including the commercial space sector has allowed them to bring more people to the International Space Station. "It's an exciting time," he said.

"It's a sacred honor to make sure that we're going to carry this crew safely to the space station," Reed said of the upcoming launch.

Passing the torch



*The crew for SpaceX's Crew-2 mission. From the left it's NASA astronauts Megan McArthur and Shane Kimbrough, JAXA astronaut Akihiko Hoshide and ESA astronaut Thomas Pesquet.  
(Image credit: NASA)*

To prepare for Crew-2's arrival at the space station, the four astronauts making up Crew-1, who are still living in orbit, will don their spacesuits and relocate their Crew Dragon capsule to another port attached to the station, allowing the incoming spacecraft to dock where they have been "parked." This will also give the crew an opportunity to "get into their suits and check the suits out and make sure those suits are functioning and working fine," program manager for Commercial Crew Steve Stich told Space.com.

Now, while this is all happening in space, mission teams will be prepared here on the ground as well, just in case anything were to not go as planned. For the maneuver, "SpaceX will have their recovery ship ready to go for the Atlantic sites off the coast of Florida," Stich added. "It's the first time we've done this in the U.S. I would say the SpaceX and NASA teams are taking this operation very seriously and [are] working through checking all the procedures ... and just making sure we're ready to go do this. It's something that we'll do quite often, but it's the first time we'll have done it with the Dragon vehicle."

Once the capsule has been moved to another port, making room for the Crew-2 craft, and the Crew-2 mission launches and docks and the astronauts board the space station, a handover will take place between the astronaut crews that will take place over five to seven days, Montalbano told Space.com.

While the astronauts flying to the station with Crew-2 are no strangers to the station, this handover gives the crew finishing their mission the opportunity to go over emergency procedures for possible events like fire or depressurization with the new crew and help them acclimate to life on the space laboratory, walking them through

everyday essential activities, odd challenges that present themselves and necessary maintenance.

### Possible delays

While the teams behind Crew-2 are ready for the April 20 launch, it's possible that the launch may be delayed a few days, Stich said during the conference. SpaceX is one of two companies

The next launch for Boeing's crew capsule, OFT-2, the second uncrewed test launch with the company's crew capsule Starliner, which will test the vehicle after its first uncrewed flight failed to reach the space station due to software issues. OFT-2 is currently targeting April 2, but will likely be delayed further, due partly to unforeseen challenges that came with unusually harsh winter weather and resulting power outages across Texas.

"We had some unfortunate weather here in the Houston area, where we lost about a week of time and some critical software testing," Stich said. "The vehicle's coming together nicely .. we're about two weeks down from where we'd like to be and we're in the process of figuring out the next step on OFT-2."

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Join our Space Forums to keep talking space on the latest missions, night sky and more! And if you have a news tip, correction or comment, let us know at: [community@space.com](mailto:community@space.com).

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## **The Biggest Threats to Earth's Biodiversity**



**Biodiversity benefits humanity in many ways.**

It helps make the global economy more resilient, it functions as an integral part of our culture and identity, and research has shown it's even linked to our physical health.

However, despite its importance, Earth's biodiversity has decreased significantly over the last few decades. In fact, between 1970 and 2016, the population of vertebrate species fell by 68% on average worldwide. What's causing this global decline?

Today's graphic uses data from WWF's Living Planet Report 2020 to illustrate the biggest threats to Earth's biodiversity, and the impact each threat has had globally.

Measuring the Loss of Biodiversity

Before looking at biodiversity's biggest threats, first thing's first—how exactly has biodiversity changed over the years?

WWF uses the Living Planet Index (LPI) to measure biodiversity worldwide. Using data from over 4,000 different species, LPI tracks the abundance of mammals, birds, fish, reptiles, and amphibians across the globe.

Here's a look at each region's average decline between 1970 and 2016:

Rank	Region	Average decline
1	Latin America & Caribbean	94%
2	Africa	65%
3	Asia Pacific	45%
4	North America	33%
5	Europe and Central Asia	24%

Latin America & Caribbean has seen the biggest drop in biodiversity at 94%. This region's drastic decline has been mainly driven by declining reptile, amphibian, and fish populations.

Despite varying rates of loss between regions, it's clear that overall, biodiversity is on the decline. What main factors are driving this loss, and how do these threats differ from region to region?

### **Biggest Threats to Biodiversity, Overall**

While it's challenging to create an exhaustive list, WWF has identified five major threats and shown each threat's proportional impact, averaged across all regions:

Threat Proportion of threat (average across all regions)

Changes in land and sea use	50%
Species overexploitation	24%
Invasive species and disease	13%
Pollution	7%
Climate Change	6%

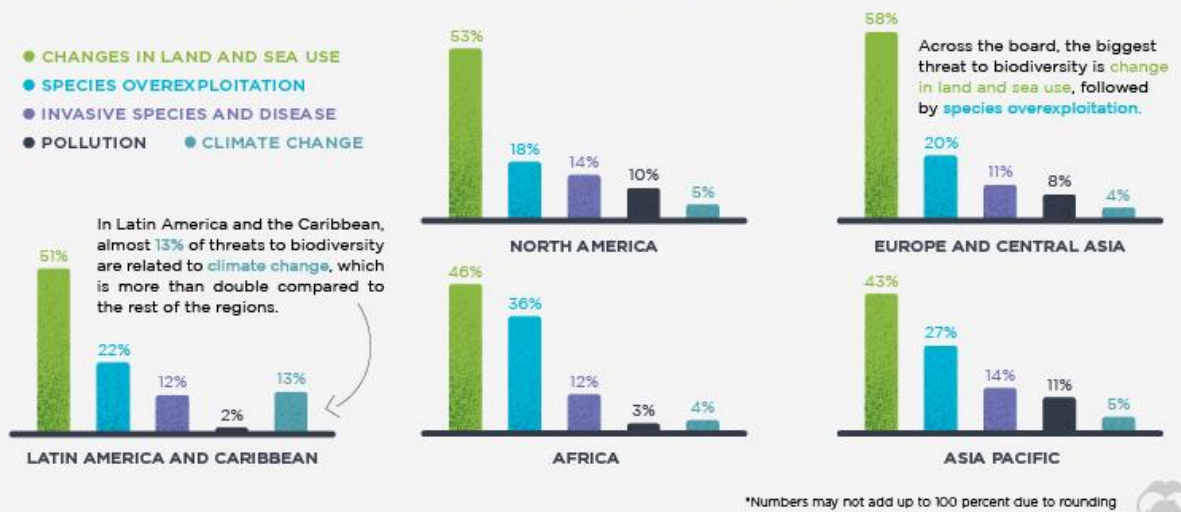
Across the board, changes in land and sea use account for the largest portion of loss, making up 50% of recorded threats to biodiversity on average. This makes sense, considering that approximately one acre of the Earth's rainforests is disappearing every two seconds.

Species overexploitation is the second biggest threat at 24% on average, while invasive species takes the third spot at 13%.

### **Biggest Threats to Biodiversity, By Region**

When looking at the regional breakdown, the order of threats in terms of biodiversity impact is relatively consistent across all regions—however, there are a few discrepancies:

## REGIONAL BREAKDOWN OF THREATS TO BIODIVERSITY



In Latin America and Caribbean, climate change has been a bigger biodiversity threat than in other regions, and this is possibly linked to an increase in natural disasters. Between 2000 and 2013, the region experienced 613 extreme climate and hydro-meteorological events, from typhoons and hurricanes to flash floods and droughts.

Another notable variation from the mean is species over-exploitation in Africa, which makes up 35% of the region's threats. This is higher than in other regions, which sit around 18-27%.

While the regional breakdowns differ slightly from place to place, one thing remains constant across the board—all species, no matter how small, play an important role in the maintenance of Earth's ecosystems.

Will we continue to see a steady decline in Earth's biodiversity, or will things level out in the near future?

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FOR ALL, WHO MAY BE HAVING  
A BAD DAY..



It Can Always Be Worse.

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### **Kitchen Exhaust Fan Demo Sucks Up Woman**



<https://www.youtube.com/watch?v=bjpbT2rA05A>

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### **A Review of Last Sunday's Ode by Joe Horton**

A lot of pieces in past Odes have come from Joe Horton, but here is something quite special that I need to share with you.

Dr. Joseph Horton, MD, Neuroradiology, Interventional Neuroradiology, claims to be trying to retire, but it is not truly likely since he has a number of professional

publications to his credit, and I would guess more to come. He and I met in the sky over Southern California, engaged in some healthy air combat maneuvering.



It's said that in heaven, they give you a harp and a tuning key. In hell, they give you a harp.



Watching the soap bubbles freeze reminded me of the one liquid nitrogen cocktail I had once in Boston. My host (another chemist) told me about them on the way to the restaurant. At first I thought it sounded like eating Tide pods, but he explained that you don't drink the N<sub>2</sub>; they bring it in a glass and pour your cocktail into it. This makes it about -76 degrees, which is pretty nippy. At that point, I had to get one. Which I did.

Just a glass of vodka, making it the driest possible martini. So the waiter brings a martini glass filled about halfway up with a very clear, colorless liquid and the warning not to drink it. No problem. Then he pours the contents of a shaker into the glass,

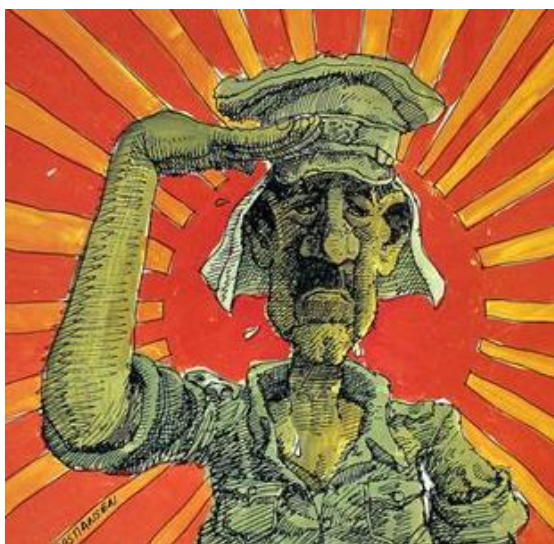
which then starts bubbling and steaming. conversation in the restaurant stops and people turn their heads to see what's going on. It feels like I'm in the Mos Isely Cantina. After a minute or two, an almost hemispherical dome has formed on top of my drink. The dome is frozen vodka. I'd never seen that before. Waiter gives me a toothpick, tells me to chip through it and enjoy the drink.

Which I also did.

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As the curtain is about to fall on Joe Horton's review of the Ode:

"I don't know how many versions of the Major General song have been recorded--there are a bunch just on youtube--but I do know the best I've ever heard, and by a wide margin;"



<https://www.youtube.com/watch?v=l0252P1Cg2M&feature=related>

Colonel Bogey March:

<https://www.youtube.com/watch?v=IPRfL2vnQoM>

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## Game Changers

### Science Moves on...at Haavaad

On Wednesday we covered additions to the Periodic Table

Joe Horton moved ahead himself with, "As for the new elements, there's always Tom Lehrer whom we can count on to take things from sublime to totally ridiculous. First up is the original,



<https://www.youtube.com/watch?v=AcS3NOQnsQM>

...and now, for something completely different, the update with new elements, and well beyond warp speed--solidly in plaid:

The ordering of elements in the lyrics fits the meter of the song, and includes much alliteration, and thus has little or no relation to the ordering in the periodic table. This can be seen for example in the opening and closing lines:

**There's antimony, arsenic, aluminum, selenium,  
And hydrogen and oxygen and nitrogen and rhenium,  
And argon, krypton, neon, radon, xenon, zinc, and rhodium,  
And chlorine, carbon, cobalt, copper, tungsten, tin, and sodium.  
These are the only ones of which the news has come to Harvard,  
And there may be many others, but they haven't been discovered.**

Lehrer was a Harvard Mathematics lecturer, and the final rhyme of "Harvard" and "discovered" is delivered in a parody of a Boston accent—a non-rhotic manner—so that the two words rhyme. Lehrer did not normally speak with that accent. Lehrer accompanied himself on the piano while singing the song.

<https://www.youtube.com/watch?v=Dv1UJMYPDs>

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