Space News Update

— August 22, 2017 —

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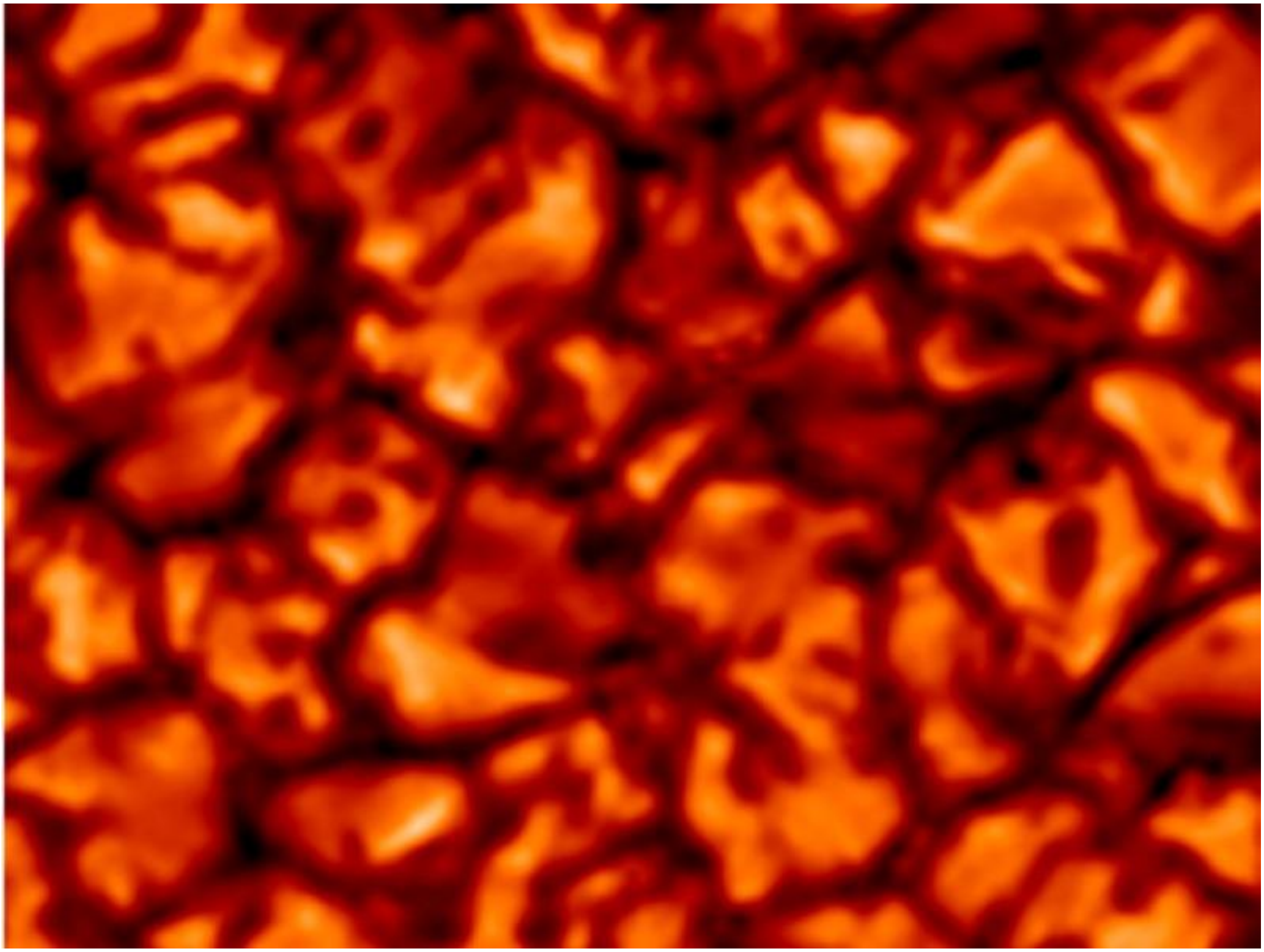
In the News

Departments

1. Variable sunshine— researchers explain why our Sun's brightness fluctuates



The Sun shines from the heavens, seemingly calm and unvarying. In fact, it doesn't always shine with uniform brightness, but shows dimmings and brightenings. Two phenomena alone are responsible for these fluctuations: the magnetic fields on the visible surface and gigantic plasma currents, bubbling up from the star's interior. A team headed by the Max Planck Institute for Solar System Research in Göttingen reports this result in today's issue of *Nature Astronomy*. For the first time, the scientists have managed to reconstruct fluctuations in brightness on all time scales observed to date – from minutes up to decades. These new insights are not only important for climate research, but can also be applied to distant stars. And they may simplify the future search for exoplanets.

When an exoplanet transits in front of its parent star, the star darkens briefly. Even from a distance of many light-years, space telescopes register these changes – and thus detect the exoplanets. In theory. In practice, it's more complicated, as the brightness of many stars fluctuates, similar to that of the Sun.

These fluctuations can overlay the signals of passing exoplanets. "However, if we are aware of the details of the star's intrinsic brightness fluctuations, exoplanets can be detected with great precision," says Alexander Shapiro of the Max Planck Institute for Solar System Research.

Shapiro and his colleagues have taken a first step in this direction with their current paper – with a detailed look at a special star: our Sun. Since the beginning of the space age, numerous spacecraft have delivered detailed data collected unaffected by the disturbances caused by the Earth's atmosphere.

These data seriously challenge any model describing fluctuations in stellar brightness: can the measured fluctuations be reconstructed using a model? And is it possible to link the fluctuations to the physical properties of the star?

One particular difficulty: the brightness of our Sun varies on very different time scales. Some fluctuations have cycles of only a few minutes; others, which have an impact on Earth's long-term climate, can only be recorded by researchers over decades. A unified theory encompassing all of these time scales has so far been lacking.

The new study's tour de force lies exactly in this point. It proves that only two phenomena determine how bright our star shines. On the one hand are the hot plasma currents rising from the interior of the Sun, cooling and sinking again into its depths. The hot, ascending material is brighter than the plasma that has already cooled on the surface.

In this way, the currents generate a characteristic, rapidly changing pattern of light and dark areas, known as granulation. Typical structures within this granulation are several hundred kilometres in size. "Granulation primarily causes rapid brightness fluctuations, with time-scales of less than five hours," says Max Planck researcher and co-author Natalie Krivova.

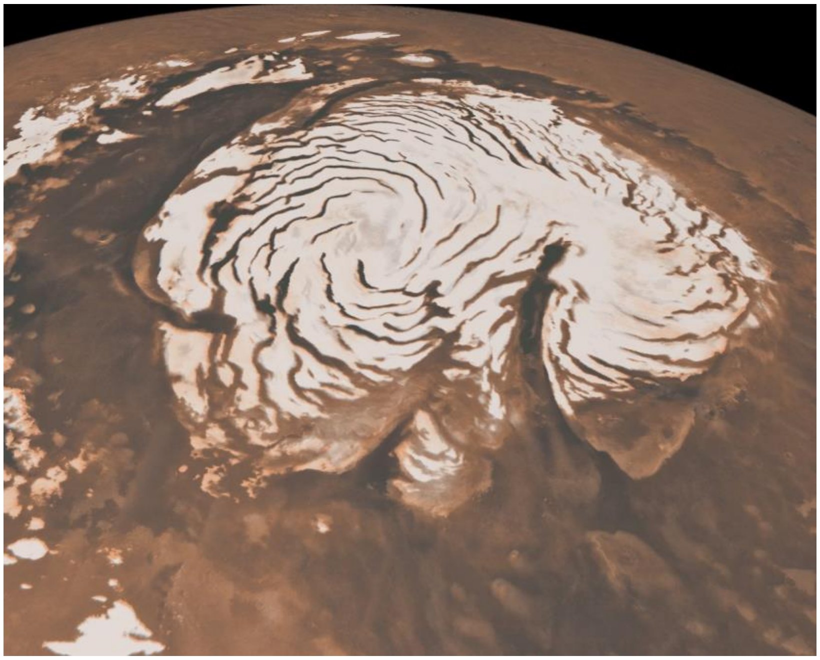
On the other hand, the Sun's variable magnetic fields play a decisive role. During periods of high activity, they can be recognized on the visible surface of our star by way of dark regions (sunspots) and especially bright areas (faculae). Compared to granulation, both structures are very large; some sunspots can even be discerned with the naked eye from Earth. In addition, variations in their number and form are considerably slower. Changes in the Sun's magnetic field therefore lead to brightness fluctuations across time scales of more than five hours.

For their analyses, the researchers employed data obtained from instruments on the SOHO (Solar and Heliospheric Observatory) and SDO (Solar Dynamics Observatory) space probes, which have been recording the brightness patterns and the magnetic fields on the surface of the Sun for years. Using these records, some of which cover a 19-year period of solar development, they were able to analyze brightness fluctuations and in turn compare them with measured data obtained from PICARD and SOHO (obtained by another instrument than recorded the magnetic field).

All previously measured brightness fluctuations – both rapid and very long term – can be reproduced in this way. "The results of our study show us that we have identified the governing parameters in our model," concludes Sami K. Solanki, Director at the Max Planck Institute for Solar System Research and second author of the study. "This will now allow us, finally, to model the brightness fluctuations of other stars."

Source: Phys.org Return to Contents

2. New Study says that Martian Weather May Get Snowy Overnight



For decades, scientists have tried to crack the mystery of Mars' weather patterns. While the planet's atmosphere is much thinner than our own – with less than 1% of the air pressure that exists on Earth at sea level – clouds have been seen periodically in the skies above the surface. In addition, periodic snowfalls has been spotted over the years, mainly in the form of carbon dioxide snow (i.e. dry ice).

However, according to a new study by a team of French and American astronomers, Mars experiences snowfalls in the form of water-ice particles. These snowfalls occur only at night, coinciding with drops in global temperature. The presence of these storms, and the speed at which they reach the surface, is forcing scientists to rethink Mars' weather patterns.

The study, titled "Snow Precipitation on Mars Driven by Cloud-Induced Night-Time Convection", recently appeared in the journal *Nature Geosciences.* Led by Aymeric Spiga, a tenured lecturer at theUniversité Pierre et Marie Curie and a researcher at Laboratoire de Météorologie Dynamique in Paris, the team conducted numerical simulations of Mars' cloudy regions to demonstrate that localized convective snowstorms can occur there.

For decades, scientists believed that Mars experienced snowfall in the form of frozen carbon dioxide (aka. dry ice), particularly around the south pole. But it has only been in recent years that direct evidence has been obtained. For instance, on September 29th, 2008, the *Phoenix* lander took pictures of snow falling from clouds that were 4 km (2.5 mi) above its landing site near the Heimdal Crater.

In 2012, the *Mars Reconnaissance Orbiter* revealed additional evidence of carbon-dioxide snowfalls on Mars. And there has also been evidence in recent years of low-falling snows, which appear to have helped shape the Martian landscape. These include a relatively young gully fan system in the Promethei Terra region of Mars, which researchers at Brown University determined were shaped by melting snow.

Further, in 2014, data obtained by the ESA's *Mars Express* probe showed how the Hellas Basin (a massive crater) was also weathered by melting snows. And in 2015, the *Curiosity* rover confirmed that the Gale Crater (where it landed in 2012) was once filled by a standing body of water. According to the science team's findings, this ancient lake received runoff from snow melting on the crater's northern rim.

All of these findings were rather perlexing to scientists, as Mars was thought to not have a dense enough atmosphere to support this level of condensation. To investigate these meteorological phenomena, Dr. Spiga and his colleagues combined data provided by various Martian lander and orbiter missions to create a new atmospheric model that simulated weather on Mars.

What they found was that during the nights when Mars' atmosphere became cold enough, water-ice particles could form clouds. These clouds would become unstable and release water-ice precipitation, which fall rapidly to the surface. The team then compared these results to localized weather phenomena on Earth, where cold dense air results in rains or snow falling rapidly from clouds (aka. "microbursts").

As they state in their study, this information was consistent with data provided by Martian lander and orbiter missions:

"In our simulations, convective snowstorms occur only during the Martian night, and result from atmospheric instability due to radiative cooling of water-ice cloud particles. This triggers strong convective plumes within and below clouds, with fast snow precipitation resulting from the vigorous descending currents."

The results also contradicted the long-held belief that low-lying clouds would only deposit snow on the surface slowly and gently. This was believed to be the case based on the fact that Mars has a thin atmosphere, and therefore lacks violent winds. But as their simulations showed, water-ice particles that lead to microburst snowstorms would reach the ground within minutes, rather than hours.

These findings indicate that Martian snowstorms also have a profound influence on the global transport of water vapor and seasonal variations of ice deposits. As they state further:

"Night-time convection in Martian water-ice clouds and the associated snow precipitation lead to transport of water both above and below the mixing layers, and thus would affect Mars' water cycle past and present, especially under the high-obliquity conditions associated with a more intense water cycle."

As Aymeric Spiga explained in an interview with the AFP, these snows are not quite what we are used to here on Earth. "It's not as if you could make a snowman or ski," he said. "Standing on the surface of Mars you wouldn't see a thick blanket of snow—more like a generous layer of frost." Nevertheless, these findings do point towards their being some similarities between the meteorlogical phenomena of Earth and Mars.

With crewed missions to Mars planned for the coming decades – particularly NASA's "Journey to Mars", scheduled for the 2030s – it helps to know precisely what kinds of meteorological phenomena our astronauts will encounter. While snowshoes or skis might be out of the question, astronauts could at least look forward to the possibility of seeing fresh snow when they wake up in their habitats!

Source: Universe Today

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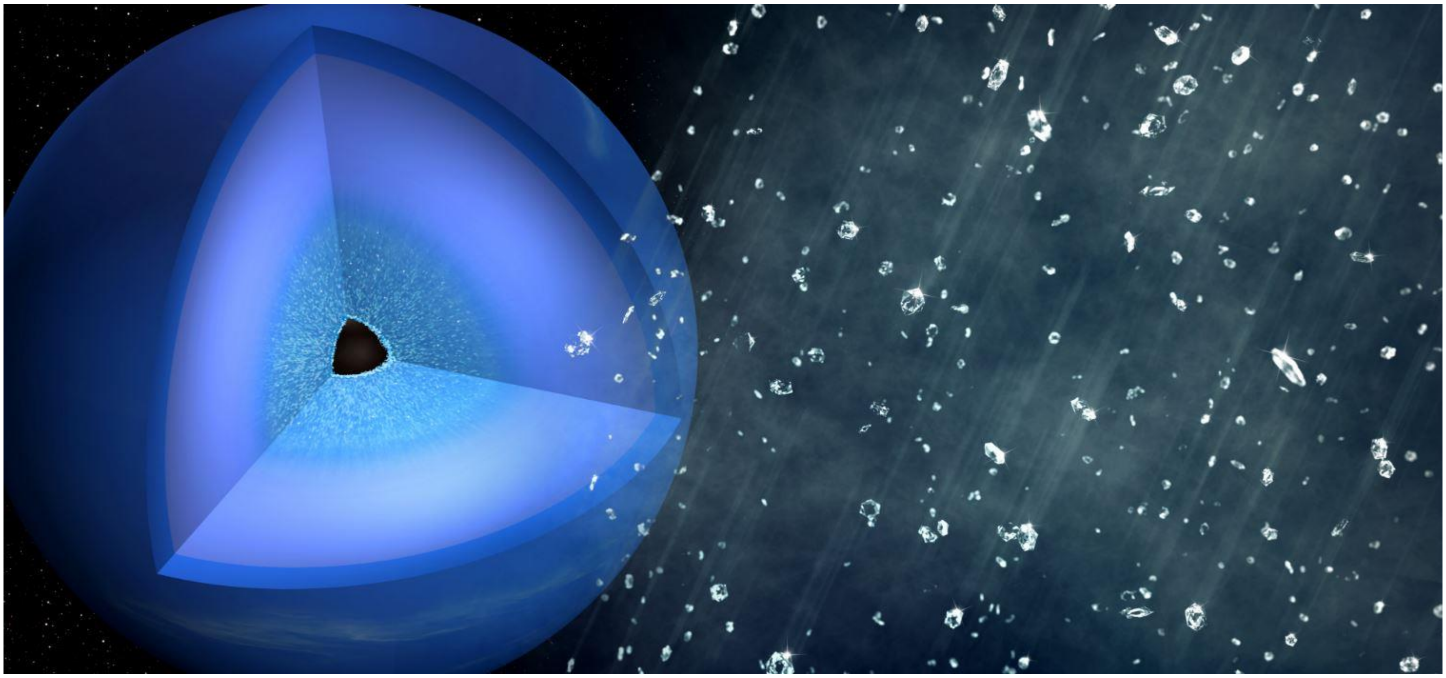
3. Scientists create 'diamond rain' that forms in the interior of icy giant planets



In an experiment designed to mimic the conditions deep inside the icy giant planets of our solar system, scientists were able to observe "diamond rain" for the first time as it formed in high-pressure conditions. Extremely high pressure squeezes hydrogen and carbon found in the interior of these planets to form solid diamonds that sink slowly down further into the interior.

The glittering precipitation has long been hypothesized to arise more than 5,000 miles below the surface of Uranus and Neptune, created from commonly found mixtures of just hydrogen and carbon. The interiors of these planets are similar—both contain solid cores surrounded by a dense slush of different ices. With the icy planets in our solar system, "ice" refers to hydrogen molecules connected to lighter elements, such as carbon, oxygen and/or nitrogen.

Researchers simulated the environment found inside these planets by creating shock waves in plastic with an intense optical laser at the Matter in Extreme Conditions (MEC) instrument at SLAC National Accelerator Laboratory's X-ray free-electron laser, the Linac Coherent Light Source (LCLS).

In the experiment, they were able to see that nearly every carbon atom of the original plastic was incorporated into small diamond structures up to a few nanometers wide. On Uranus and Neptune, the study authors predict that diamonds would become much larger, maybe millions of carats in weight. Researchers also think it's possible that over thousands of years, the diamonds slowly sink through the planets' ice layers and assemble into a thick layer around the core.

The research was published in *Nature Astronomy* on August 21.

"Previously, researchers could only assume that the diamonds had formed," said Dominik Kraus, scientist at Helmholtz Zentrum Dresden-Rossendorf and lead author on the publication. "When I saw the results of this latest experiment, it was one of the best moments of my scientific career."

Earlier experiments that attempted to recreate diamond rain in similar conditions were not able to capture measurements in real time, due to the fact that currently we can create these extreme conditions under which tiny diamonds form only for very brief time in the laboratory. The high-energy optical lasers at MEC combined with LCLS's X-ray pulses—which last just femtoseconds, or quadrillionths of a second—allowed the scientists to directly measure the chemical reaction.

Other prior experiments also saw hints of carbon forming graphite or diamond at lower pressures than the ones created in this experiment, but with other materials introduced and altering the reactions.

The results presented in this experiment is the first unambiguous observation of high-pressure diamond formation from mixtures and agree with theoretical predictions about the conditions under which such precipitation can form and will provide scientists with better information to describe and classify other worlds.

Turning Plastic Into Diamond

In the experiment, plastic simulates compounds formed from methane—a molecule with just one carbon bound to four hydrogen atoms that causes the distinct blue cast of Neptune.

The team studied a plastic material, polystyrene, that is made from a mixture of hydrogen and carbon, key components of these planets' overall chemical makeup.

In the intermediate layers of icy giant planets, methane forms hydrocarbon (hydrogen and carbon) chains that were long hypothesized to respond to high pressure and temperature in deeper layers and form the sparkling precipitation.

The researchers used high-powered optical laser to create pairs of shock waves in the plastic with the correct combination of temperature and pressure. The first shock is smaller and slower and overtaken by the stronger second shock. When the shock waves overlap, that's the moment the pressure peaks and when most of the diamonds form, Kraus said.

During those moments, the team probed the reaction with pulses of X-rays from LCLS that last just 50 femtoseconds. This allowed them to see the small diamonds that form in fractions of a second with a technique called femtosecond X-ray diffraction. The X-ray snapshots provide information about the size of the diamonds and the details of the chemical reaction as it occurs.

"For this experiment, we had LCLS, the brightest X-ray source in the world," said Siegfried Glenzer, professor of photon science at SLAC and a co-author of the paper. "You need these intense, fast pulses of X-rays to unambiguously see the structure of these diamonds, because they are only formed in the laboratory for such a very short time."

Nanodiamonds at Work

When astronomers observe exoplanets outside our solar system, they are able to measure two primary traits—the mass, which is measured by the wobble of stars, and radius, observed from the shadow when the planet passes in front of a star. The relationship between the two is used to classify a planet and help determine whether it may be composed of heavier or lighter elements.

"With planets, the relationship between mass and radius can tell scientists quite a bit about the chemistry," Kraus said. "And the chemistry that happens in the interior can provide additional information about some of the defining features of the planet."

Information from studies like this one about how elements mix and clump together under pressure in the interior of a given planet can change the way scientists calculate the relationship between mass and radius, allowing scientists to better model and classify individual planets. The falling "diamond rain" also could be an additional source of energy, generating heat while sinking towards the core.

"We can't go inside the planets and look at them, so these laboratory experiments complement satellite and telescope observations," Kraus said.

The researchers also plan to apply the same methods to look at other processes that occur in the interiors of planets.

In addition to the insights they give into planetary science, nanodiamonds made on Earth could potentially be harvested for commercial purposes - uses that span medicine, scientific equipment and electronics. Currently, nanodiamonds are commercially produced from explosives; laser production may offer a cleaner and more easily controlled method.

Research that compresses matter, like this study, also helps scientists understand and improve fusion experiments where forms of hydrogen combine to form helium to generate vast amounts of energy. This is the process that fuels the sun and other stars but has yet to be realized in a controlled way for power plants on Earth.

In some fusion experiments, a fuel of two different forms of hydrogen is surrounded by a plastic layer that reaches conditions similar to the interior of planets during a short-lived compression stage. The LCLS experiment on plastic now suggests that chemistry may play an important role in this stage.

"Simulations don't really capture what we're observing in this field," Glenzer said. "Our study and others provide evidence that matter clumping in these types of high-pressure conditions is a force to be reckoned with."

Source: Phys.org Return to Contents

The Night Sky

Tuesday, August 22

• After dusk as August nears its end, the Great Square of Pegasus looms up in the east, balancing on one corner. Its stars are only 2nd and 3rd magnitude. Extending leftward from the Square's left corner is the main line of the constellation Andromeda, made of stars about the same brightness.

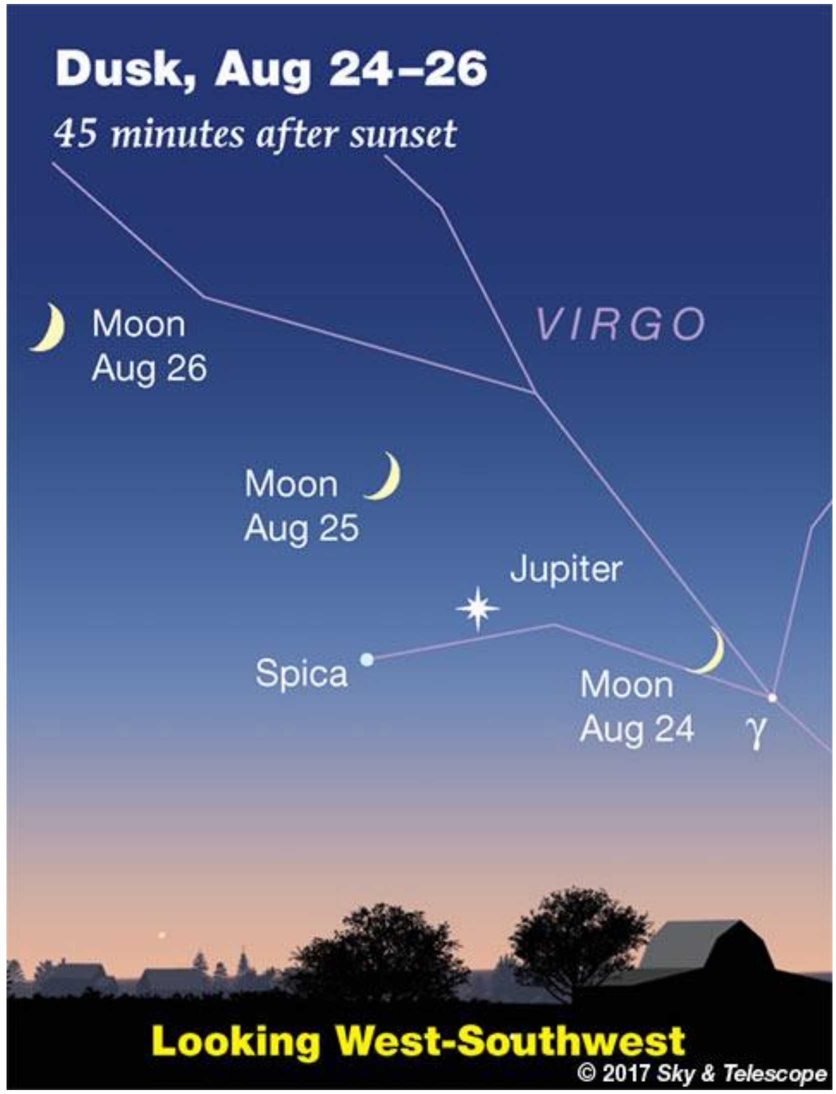
This whole giant pattern was named "the Andromegasus Dipper" by the late *Sky & Telescope* columnist George Lovi. Shaped somewhat like a giant Little Dipper, it currently scoops upward.

Wednesday, August 23

• The actual Little Dipper, meanwhile, is tipping over leftward in the north. It's only 40% as long as the Andromegasus Dipper, and most of it is much fainter. As always, it's rotated about 90° counterclockwise from Andromegasus.

Thursday, August 24

• After causing so much fuss on Monday, the Moon now gleams shyly low in the west after sunset, as shown here. Almost a fist-width to its left is Jupiter, and fainter Spica is farther left or lower left.



Friday, August 25

• Look low in the west in twilight for the waxing crescent Moon. It forms a triangle with Jupiter and Spica below it, as shown here.

Source: Sky & Telescope

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ISS Sighting Opportunities

For Denver:

No sighting opportunities for Denver through Aug. 29.

Sighting information for other cities can be found at NASA's Satellite Sighting Information

NASA-TV Highlights

(all times Eastern Daylight Time)

- **12:30 p.m., Tuesday, August 22 -** ISS Expedition 52 In-Flight Event with the Astronaut Candidate Class of 2017 and Flight Engineers Peggy Whitson, Jack Fischer and Randy Bresnik of NASA (starts at 12:45 p.m.) (all channels)
- **10:30 a.m., Wednesday, August 23 -** ISS Expedition 52 In-Flight Event with the UNITY Space Suit Project and Flight Engineers Peggy Whitson, Jack Fischer and Randy Bresnik of NASA (Starts at 10:25 a.m.) (all channels)

Watch NASA TV on the Net by going to the NASA website.

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Space Calendar

- Aug 22 - Comet 5D/Brorsen Closest Approach To Earth (1.120 AU)
- Aug 22 - Asteroid 3 Juno Occults 2UCAC 28762234 (12.4 Magnitude Star)
- Aug 22 - [Aug 21] Apollo Asteroid 2017 QT1 Near-Earth Flyby (0.007 AU)
- Aug 22 - NEW [Aug 18] Amor Asteroid 2017 QB Near-Earth Flyby (0.066 AU)
- Aug 22 - Apollo Asteroid 2017 PX24 Near-Earth Flyby (0.096 AU)
- Aug 22 - Asteroid 5540 Smirnova Closest Approach To Earth (0.821 AU)
- Aug 22 - Asteroid 804 Hispania Closest Approach To Earth (1.437 AU)
- Aug 22 - Asteroid 1791 Patsayev Closest Approach To Earth (1.509 AU)
- Aug 22 - Asteroid 8423 Macao Closest Approach To Earth (1.627 AU)
- Aug 22 - Asteroid 289586 Shackleton Closest Approach To Earth (1.643 AU)
- Aug 22 - Raymonde de Laroche's 135th Birthday (1882)
- Aug 23 - Comet 49P/Arend-Rigaux At Opposition (2.273 AU)
- Aug 23 - Comet 247P/LINEAR At Opposition (3.161 AU)
- Aug 23 - Comet P/2016 BA14 (PANSTARRS) At Opposition (3.283 AU)
- Aug 23 - Apollo Asteroid 54509 YORP Closest Approach To Earth (0.652 AU)
- Aug 23 - Lubor Kresak's 90th Birthday (1927)
- Aug 24 - UPDATED [Aug 21] FORMOSAT 5/ Sherpa Falcon 9 Launch
- Aug 24 - Comet 73P-BC/Schwassmann-Wachmann Closest Approach To Earth (0.441 AU)
- Aug 24 - Comet 339P/Gibbs At Opposition (2.742 AU)
- Aug 24 - Comet P/2011 W2 (Rinner) At Opposition (3.115 AU)
- Aug 24 - Comet 252P/LINEAR At Opposition (3.308 AU)
- Aug 24 - Comet P/2016 A7 (PANSTARRS) At Opposition (3.550 AU)
- Aug 24 - Apollo Asteroid 2017 PE Near-Earth Flyby (0.050 AU)
- Aug 24 - Asteroid 2531 Cambridge Closest Approach To Earth (2.176 AU)
- Aug 24 - Asteroid 88705 Potato Closest Approach To Earth (2.212 AU)
- Aug 24 - Asteroid 51827 Laurelclark Closest Approach To Earth (2.309 AU)
- Aug 25 - UPDATED [Aug 21] ORS 5 Minotaur 4 Launch
- Aug 25 - UPDATED [Aug 21] Northern Iota Aquarids Meteor Shower Peak
- Aug 25 - NEW [Aug 21] Apollo Asteroid 2017 QJ2 Near-Earth Flyby (0.023 AU)
- Aug 25 - Apollo Asteroid 2005 QQ87 Near-Earth Flyby (0.087 AU)
- Aug 25 - Asteroid 2598 Merlin Closest Approach To Earth (1.651 AU)
- Aug 25 - Asteroid 2305 King Closest Approach To Earth (1.731 AU)
- Aug 25 - Asteroid 2742 Gibson Closest Approach To Earth (1.851 AU)
- Aug 25 - Asteroid 18728 Grammier Closest Approach To Earth (2.123 AU)
- Aug 25 - 20th Anniversary (1997), Advanced Composition Explorer (ACE) Launch

Source: JPL Space Calendar

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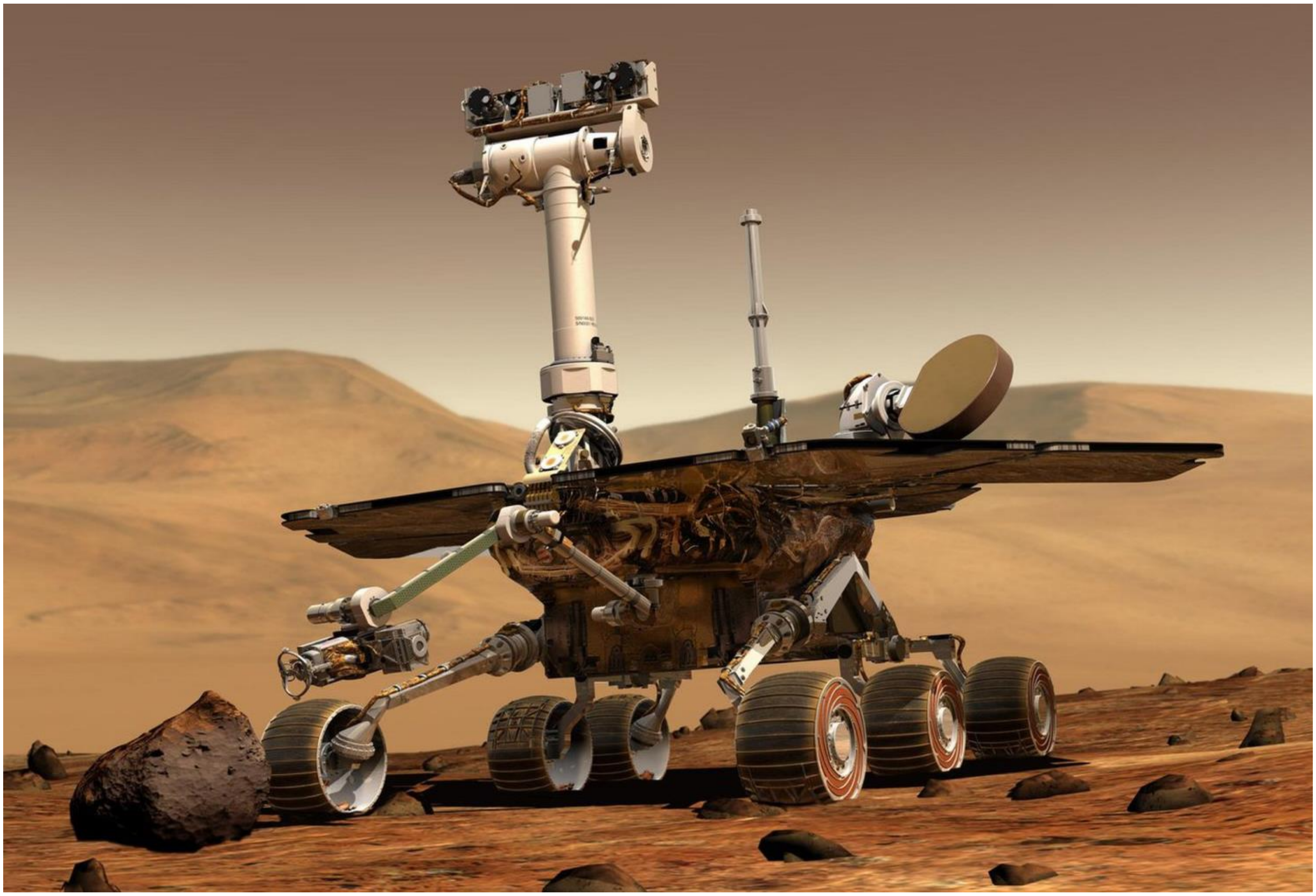
Food for Thought

NASA Has Big Plans for AI on Mars and Beyond



Imagine an interstellar probe where the spacecraft can pick its own orbit, take its own pictures, and send probes down to the surface of a far-away planet without human help. Or imagine a mission that hitchhikes on a comet, scanning the sky and picking out the most interesting targets among millions of locations without guidance from engineers back on Earth sitting in a control room.

These are two examples of how NASA hopes to use artificial intelligence. As far-fetched as the concept sounds, the agency is already using AI in missions on both Earth and Mars. And there are other missions in the works that could see AI exploring icy moons in search of life.

This bot-friendly future stands counter to some of the fuss in the press this past week, after Facebook shut down an experiment because two artificially intelligent bots began communicating in a shorthand language instead of English. Many in the media portrayed the bots as coming up with their own language.

NASA Jet Propulsion Laboratory's Steve Chien says that the reality is more subtle: The bots were not rewarded for using English, so they just sought out the most efficient route possible to communicate with one another. NASA, he added, takes robot safety very seriously. Space station astronauts occasionally work alongside Robonaut 2, a simple machine that can flip switches and do other menial tasks. In the future, he said, NASA astronauts could work with more intelligent robots on Mars, with the robots scouting sites and telling humans the most interesting locations to survey.

"NASA is very risk-averse [about crewed missions]," said Chien, who is technical group supervisor of the artificial intelligence group at JPL. "It's a high-profile mission, and with a crewed program there's even more of an obsession with safety than with robotic ones — as there should be."

When thinking of autonomous robots working in space, a person might recall scary examples from movies — HAL from *2001: A Space Odyssey*, for instance. But AI robots are already working in space, and these are all helpful bots — more like GERTY in the 2009 film *Moon*, which works alongside astronaut Sam Bell on a lunar colony.

NASA's Mars rovers are already equipped with artificial intelligence, which makes some decisions independently — a useful feature since communication between a rover and Earth might take 20 minutes because of the vast distance. The most famous example is the Curiosity rover, which has an automatic targeting system that helps direct its cameras — and its laser — at rocks and other objects that the system considers worthy of inspection. A more primitive version was installed on the older Opportunity and Spirit rovers — and Opportunity is still running 13 years after landing on Mars.

Closer to home, NASA used artificial intelligence on its Earth Observing-1 satellite, which completed its mission earlier this year after operating since 2003. The instrument was called the Autonomous Sciencecraft Experiment (ASE) and helped scientists look for interesting events on Earth's surface like volcanoes, which meant they could send out alerts to the public faster than humans working on the surface.

There are also two ongoing experiments that scan for interesting events such as supernovas and select the "best of the best" data for scientists to evaluate. The first is V-FASTR (an acronym that refers to radio transients or events, such as pulsar pulses) and the second is the Intermediate Palomar Transient Factory (iPTF), which looks for supernovas or other neat things in optical wavelengths. Work from iPTF helped establish the existence of gravitational waves, as there were no supernovas in the sky that affected the results first seen by the Laser Interferometer Gravitational-Wave Observatory (LIGO) in 2016, Chien said.

The sky is a big place, and you might see thousands of things at any given moment peering into the night. Before these experiments were available, Chien said, scientists arbitrarily picked 50 things to look at. Now, they can look at the 50 objects that AI instruments determined to be the most interesting.

Here's the exciting thing: These existing artificial intelligence bots are the technology of yesterday — particularly in the case of the teenaged Opportunity mission on Mars. As powerful as that technology was back in the early 2000s, researchers today can do so much more with computing.

The Mars 2020 rover is expected to depart for the Red Planet in three years. Multiple instruments on the rover will have autonomous imaging capability, Chien said, and the targeting will be a lot smarter. Not only will the rover be clever enough to choose an interesting target, but also to pick the best approach for scanning it and obtaining information relevant to researchers. Mars 2020 could even change its schedule of tasks on the fly if it finishes something ahead of time, allowing scientists to squeeze the most they can out of the mission.

NASA's planned Europa Clipper mission is scheduled to perform multiple flybys of an icy moon of Jupiter, one that has been observed spouting what appears to be water geysers — at least in the eyes of the Hubble Space Telescope. Clipper will operate in an extremely harsh radiation environment that is expected to reset or crash its computer several times in a single flyby. It takes hours to send instructions to and from Jupiter, so the Clipper will be equipped with a computer system that can diagnose problems and fix them before engineers back on Earth even knew a problem occurred.

Other projects remain in the proposal stage, but no less exciting when considering the possibilities for artificial intelligence. NASA hopes to one day land a device on Europa, or perhaps Enceladus — another water geyser-spouting moon orbiting Saturn. (The agency is quite interested in these "ocean worlds," as NASA calls them, since the moons could harbor microbial life.) Early studies suggest that space agencies could put a submarine in an ocean on one of these moons. But it would be a solo voyage because, Chien said, we can only communicate with the little submarine for perhaps a month.

Artificial intelligence on board a submarine would be tasked with figuring out where to go safely. But other considerations might include: How to avoid obstacles? Which targets have the most potential for observation? Or at what temperature is it safe to travel? Chien pointed out that on Earth, if we take a typical robotic submersible from temperate waters to the Arctic, recalibrations are always needed to adjust for the change in temperature.

The Comet Hitchhiker project — funded by NASA's Advanced Innovative Concepts program that gives early-stage funding to far-off mission concepts — could develop a spacecraft capable of catching a ride with a comet on its way to the outer solar system. With the craft operating so far from Earth, it would take hours for it to communicate back and forth with engineers. So an AI bot would be more efficient in picking targets by itself and sending data back to Earth. Self-selecting AI would also be useful for another mission concept that would send 100 small CubeSats to nearby asteroids; it would help the little spacecraft decide how to orbit the asteroids and what to image on the surface.

Breakthrough Starshot is a $100 million research and development program, aiming to establish proof of concept for a 'nanocraft' – a fully functional space probe at gram-scale weight – driven by a light beam.

Last year, the Breakthrough Starshot initiative, which includes billionaire Yuri Milner and physicist Stephen Hawking, proposed to send a tiny nanocraft to our nearest star system, Alpha Centauri, around the year 2038. The nanocraft would travel at an incredible 15- 20 percent the speed of light, allowing it to get to the star in only a couple of decades.

Chien pointed out that an interstellar mission would be a perfect use of AI. It could figure out by itself what type of planets are in a system, how to navigate the craft into orbit, what types of data to collect, and where to deploy probes, if the world looked habitable. But science observations of this kind would not work with Breakthrough Starshot's current design because the mission is not supposed to slow down. However, some proposals from other groups suggest slowing it down would be possible. But regardless of the mission architecture, an interstellar probe would be best served using AI because humans cannot anticipate everything, Chien said.

"When an interstellar probe gets there, it will have lots of information," he said. "Let's assume the planet has oceans and we have probes that we can drop from orbit to sample those oceans and take measurements." The question then, he said, is where to deploy the probe, and AI could make that decision quickly.

The JPL scientist encouraged a healthy respect and concern in the public when thinking about using AI in future missions, but added that fear of AI is irrational as long as we make sure that people familiar with the technology are involved in its development and are consulting with the public.

"There was a time when to make a phone call, a human had to be involved. When you rode the elevator, a human had to be involved," Chien said. "Now we would say that's insane. These are the wheels of progress. It's going to happen, we need to get used to it, and we need to do it in a reasonable and rational fashion."

Source: Space.com Return to Contents

Space Image of the Week

A Total Solar Eclipse over Wyoming
Image Credit & Copyright: Ben Cooper

Explanation: Will the sky be clear enough to see the eclipse? This question was on the minds of many people attempting to view yesterday's solar eclipse. The path of total darkness crossed the mainland of the USA from coast to coast, from Oregon to South Carolina -- but a partial eclipse occurred above all of North America. Unfortunately, many locations saw predominantly clouds. One location that did not was a bank of Green River Lake, Wyoming. There, clouds blocked the Sun intermittantly up to one minute before totality. Parting clouds then moved far enough away to allow the center image of the featured composite sequence to be taken. This image shows the corona of the Sun extending out past the central dark Moon that blocks our familiar Sun. The surrounding images show the partial phases of the solar eclipse both before and after totality.

Source: APOD

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