# Space News Update

## — August 24, 2018 —

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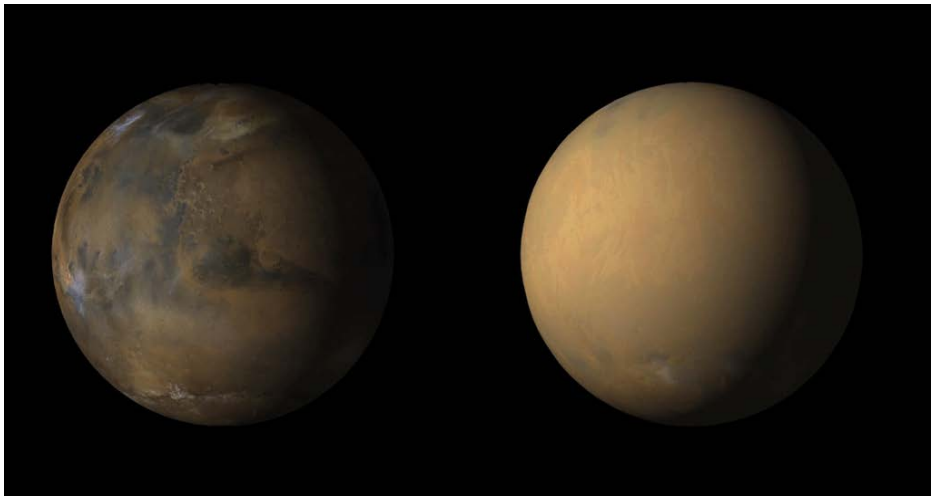
## 1. NASA Still Hopeful Mars Rover Will Phone Home



Flight controllers have not heard from NASA's Opportunity Mars rover since June 10 when an increasingly severe dust storm on the planet blocked out the sun, preventing solar arrays from recharging the rover's batteries. But the dust storm is finally abating and engineers are hopeful the long-lived rover will wake up and phone home in the next few weeks.

"The weather's been improving on Mars," said Project Manager John Callas at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "So the atmospheric opacity over the rover site is decreasing."

That opacity, a measure of how effectively suspended dust blocks out sunlight, climbed to record levels as the storm developed in June. A major 2007 dust storm had an opacity level, or tau, above 5.5 while the current storm had an estimated tau of nearly 11 as of June 6.

It is now back down to a tau of around 2, "starting to approach a range where there should be energy being generated by the solar arrays," Callas said. "So we're starting to get close to the time frame where the vehicle should start to charge. We're looking every day. People are making bets as to when they think we'll hear from it."

But it is not a sure thing.

Mars is now past its point of closest approach to the sun in its two-year orbit, and the dust storm, which has been keeping the atmosphere warmer than usual, is abating. As time passes, temperatures at Opportunity location will drop, posing a threat to the rover's electronics and other temperature-sensitive systems in the absence of power to run its heaters.

Even so, Callas said a detailed analysis of the rover's systems shows it should have survived its trial by dust. It's just a matter of building up enough of a charge to wake up, run through its fault programming and attempt to contact Earth.

"I think everyone is staying closer to their email and their cellphones right now because we think now's about when we'll start to hear something," Callas said.

Opportunity's story is an improbable tale of exploration and scientific success by a spacecraft designed to last just 90 days and yet surviving, albeit with a variety of age-related ailments, for more than 14 years since it bounced to an airbag-cushioned landing in January 2004.

Given the bounty of data already collected during its extended mission, a failure to wake up, while disappointing to its legions of fans, would not be considered a failure in the traditional sense. Few space missions have chalked up a greater record of success, and scientists are hopeful the rover will be able to continue its trail-blazing exploration.

Even though sunlight is believed to be falling once again on Opportunity's solar arrays, it could take several more weeks to establish contact.

"The problem is, there are still parasitic loads on the electronics," Callas said. "It's just like your TV at home. Even though you have your TV turned off, it's still drawing energy from the outlet. So even though the rover's powered off, the electronics will still waste energy at a low level."

Those parasitic loads account for about 40 watt hours of energy. Another 220 watt hours could be going to waste because of an external heater that became stuck on full time early in Opportunity's mission.

Flight controllers dealt with that problem by putting the rover into "deep sleep" every night to make sure the heater was turned off. Opportunity then woke up each morning thanks to its fully charged batteries.

"It's kind of like you have a light switch stuck on in your home, so every night you go outside and turn off the master breaker for your house," Callas said. "That's kind of like deep sleep on the rover. We turn everything off so that heater goes off."

But if Opportunity initially lost enough power to trigger a clock fault, "the rover will lose track of time and so it won't know when to properly deep sleep," Callas added. "And so it may not be deep sleeping when this heater is stuck on, and so it may be wasting energy that we're trying to charge the batteries with."

A clock fault likely developed in the wake of the extended power outage. If so, whenever it wakes up, Opportunity's computer will reset its clocks to a time in the future and then set timers to trigger communications attempts.

"The rover won't wake up in the middle of the night, it'll only wake up during the day, but we won't know when during the day," Callas said. "It could be a game of whack-a-mole. It could wake up at one time of day and then we may not hear from it for three days and then wake up at a different time of day."

To cover those scenarios, NASA's Deep Space Network, made up of giant antennas used to relay data and commands to spacecraft spread out across the solar system, is "listening" for Opportunity's call multiple times each weak and at various times of day, covering a broader range of frequencies just to be on the safe side.

Asked how confident he was about Opportunity's eventual wakeup, Callas said the odds were better than 50-50.

"Unless we got a whole bunch of dust dumped on the arrays, if we have at least a 50 percent clean array, this vehicle should be charging about now," he said. "As long as the batteries haven't gone kaput, and we don't think they have, this thing should wake up.

"If we haven't heard (from it) in a couple of months, yeah, then I'm really worried. But I think in the next few weeks, four or five weeks, we should hear something."

Source: CBS News Return to Contents

## 2. 15 Years in Space for NASA's Spitzer Space Telescope

Initially scheduled for a minimum 2.5-year primary mission, NASA's Spitzer Space Telescope has gone far beyond its expected lifetime -- and is still going strong after 15 years.

Launched into a solar orbit on Aug. 25, 2003, Spitzer was the final of NASA's four Great Observatories to reach space. The space telescope has illuminated some of the oldest galaxies in the universe, revealed a new ring around Saturn, and peered through shrouds of dust to study newborn stars and black holes. Spitzer assisted in the discovery of planets beyond our solar system, including the detection of seven Earth-size planets orbiting the star TRAPPIST-1, among other accomplishments.

"In its 15 years of operations, Spitzer has opened our eyes to new ways of viewing the universe," said Paul Hertz, director of the Astrophysics Division at NASA Headquarters in Washington. "Spitzer's discoveries extend from our own planetary backyard, to planets around other stars, to the far reaches of the universe. And by working in collaboration with NASA's other Great Observatories, Spitzer has helped scientists gain a more complete picture of many cosmic phenomena."

### A view into the past

Spitzer detects infrared light -- most often heat radiation emitted by warm objects. On Earth, infrared light is used in a variety of applications, including night-vision instruments.

With its infrared vision and high sensitivity, Spitzer has contributed to the study of some of the most distant galaxies in the known universe. The light from some of those galaxies traveled for 13.4 billion years to reach Earth. As a result, scientists see these galaxies as they were less than 400 million years after the birth of the universe.

Among this population of ancient galaxies was a surprise for scientists: "big baby" galaxies that were much larger and more mature than scientists thought early-forming galaxies could be. Large, modern galaxies are

thought to have formed through the gradual merger of smaller galaxies. But the "big baby" galaxies showed that massive collections of stars came together very early in the universe's history.

Studies of these very distant galaxies relied on data from both Spitzer and the Hubble Space Telescope, another one of NASA's Great Observatories. Each of the four Great Observatories collects light in a different wavelength range. By combining their observations of various objects and regions, scientists can gain a more complete picture of the universe.

"The Great Observatories program was really a brilliant concept," said Michael Werner, Spitzer project scientist at NASA's Jet Propulsion Laboratory in Pasadena, California. "The idea of getting multispectral images or data on astrophysical phenomenon is very compelling, because most heavenly bodies produce radiation across the spectrum. An average galaxy like our own Milky Way, for example, radiates as much infrared light as visible wavelength light. Each part of the spectrum provides new information."

**New worlds**

In recent years, scientists have utilized Spitzer to study exoplanets, or planets orbiting stars other than our Sun, although this was not something the telescope's designers anticipated.

With Spitzer's help, researchers have studied planets with surfaces as hot as stars, others thought to be frozen solid, and many in between. Spitzer has studied some of the nearest known exoplanets to Earth, and some of the most distant exoplanets ever discovered.

Spitzer also played a key role in one of the most significant exoplanet discoveries in history: the detection of seven, roughly Earth-size planets orbiting a single star. The TRAPPIST-1 planetary system was unlike any alien solar system ever discovered, with three of its seven planets located in the "habitable zone," where the temperature might be right for liquid water to exist on the planets' surfaces. Their discovery was an enticing step in the search for life elsewhere in the universe.

"The study of extrasolar planets was still in its infancy when Spitzer launched, but in recent years, often more than half of Spitzer's observation time is used for studies of exoplanets or searches for exoplanets," said Lisa Storrie-Lombardi, Spitzer's project manager at JPL. "Spitzer is very good at characterizing exoplanets, even though it wasn't designed to do that."

Some other major discoveries made using the Spitzer space telescope include:

-- The largest known ring around Saturn, a wispy, fine structure with 300 times the diameter of Saturn.

-- First exoplanet weather map of temperature variations over the surface of a gas exoplanet. Results suggested the presence of fierce winds.

-- Asteroid and planetary smashups. Spitzer has found evidence for several rocky collisions in other solar systems, including one thought to involve two large asteroids.

-- Recipe for "comet soup." Spitzer observed the aftermath of the collision between NASA's Deep Impact spacecraft and comet Tempel 1, finding that cometary material in our own solar system resembles that around nearby stars.

-- The hidden lairs of newborn stars. Spitzer's infrared images have provided unprecedented views into the hidden cradles where young stars grow up, revolutionizing our understanding of stellar birth.

-- Buckyballs in space. Buckyballs are soccer-ball-shaped carbon molecules discovered in laboratory research with multiple technological applications on Earth..

-- Massive clusters of galaxies. Spitzer has identified many more distant galaxy clusters than were previously known.

-- One of the most extensive maps of the Milky Way galaxy ever compiled, including the most accurate map of the large bar of stars in the galaxy's center, created using Spitzer data from the Galactic Legacy Mid-Plane Survey Extraordinaire project, or GLIMPSE.

**An extended journey**

Spitzer has logged over 106,000 hours of observation time. Thousands of scientists around the world have utilized Spitzer data in their studies, and Spitzer data is cited in more than 8,000 published papers.

Spitzer's primary mission ended up lasting 5.5 years, during which time the spacecraft operated in a "cold phase," with a supply of liquid helium cooling three onboard instruments to just above absolute zero. The cooling system reduced excess heat from the instruments themselves that could contaminate their observations. This gave Spitzer very high sensitivity for "cold" objects.

In July 2009, after Spitzer's helium supply ran out, the spacecraft entered a so-called "warm phase." Spitzer's main instrument, called the Infrared Array Camera (IRAC), has four cameras, two of which continue to operate in the warm phase with the same sensitivity they maintained during the cold phase.

Spitzer orbits the Sun in an Earth-trailing orbit (meaning it literally trails behind Earth as the planet orbits the Sun) and has continued to fall farther and farther behind Earth during its lifetime. This now poses a challenge for the spacecraft, because while it is downloading data to Earth, its solar panels do not directly face the Sun. As a result, Spitzer must use battery power during data downloads. The batteries are then recharged between downloads.

"Spitzer is farther away from Earth than we ever thought it would be while still operating," said Sean Carey, manager of the Spitzer Science Center at Caltech in Pasadena, California. "This has posed some real challenges to the engineering team, and they've been extremely creative and resourceful to keep Spitzer operating far beyond its expected lifetime."

In 2016, Spitzer entered an extended mission dubbed "Spitzer Beyond." The spacecraft is currently scheduled to continue operations into November 2019, more than 10 years after entering its warm phase.

In celebration of Spitzer's 15 years in space, NASA has released two new multimedia products: The NASA Selfies app for iOS and Android, and the Exoplanet Excursions VR Experience for Oculus and Vive, as well as a 360-video version for smartphones. Spitzer's incredible discoveries and amazing images are at the center of these new products.

Source: NASA Return to Contents

## 3. Researchers Find Out Why a Supermassive Black Hole Appears to Move

Researchers often assume that massive galaxies host supermassive black holes (SMBHs) in their nuclei. In recent years, observers have sought galaxies that might contain an SMBH that is displaced from its equilibrium position. Among the scenarios that could cause such a displacement are the merger of two SMBHs or the existence of a binary pair of SMBHs, and finding an example would give astronomers information about the evolution of galaxies and the frequency of the formation and mergers of this type of object.

One of the candidates for a displaced SMBH is the giant elliptical galaxy M87, which contains one of the nearest and most studied galactic nuclei (AGN). Previous studies on the displacement of the SMBH of M87 produced conflicting results. However a new study by Elena López Návas, a student at the University of La Laguna, has produced new data suggesting that the SMBH in this galaxy is in its equilibrium position, and that the displacements found previously were due to variations in the centre of production of light, the "photocentre" caused by outbursts from its relativistic jet, a flow of material expelled from near the surface of the black hole at velocities close to light speed.

To perform this research, it was necessary to analyze a large number of high-resolution images of M87 taken at different times and with different instruments on the NASA/ESA Hubble Space Telescope (HST) and on ESA's Very Large Telescope (VLT) (Cerro Paranal, Chile).

"In our work, we have found that the SMBH has been in a very stable position for the past 20 years. What has changed is the centre of light production, the'"photocentre,"" explains López, the author of this study, which has just been published in the journal *Monthly Notices of the Royal Astronomical Society* (*MNRAS*).

"As a result of what we have found, we realised that the images which appeared to show a displacement of the centre of the galaxy were taken at an epoch when M87 had a major outburst, which could be measured over the whole range of the electromagnetic spectrum," says Almudena Prieto Escudero, co-author of the article and a researcher at the Instituto de Astrofísica de Canarias (IAC).

This outburst took place between the years 2003 and 2007 in a knot within the jet known as HST-1, the closest knot to the nucleus of M87. While this outburst lasted, this knot increased in brightness so much that it even outshone the nucleus itself.

"A time series analysis of the displacements of the centre of the galaxy show that this outburst is related to the change in the position of the photocentre," explains the astrophysicist. "But afterward, the photocentre and the nucleus were in the same place, so that we inferred that the nucleus and the black hole were always in the same place, which is the potential mínimum at the centre of the galaxy."

These new data have inspired much interest in the astrophysical community, because studying the position of the SMBH in M87 is critical for understanding the evolution of the galaxy, and for the analysis of jets in other AGNs. "In addition, this research reminds us that we must be very careful when we study variable sources that show irregularities,such as this enormous jet," says Lopez, who is now working with a training research contract at the IAC.

Source: Phys.org Return to Contents

# The Night Sky

**Friday, August 24**

• For yet another week, four bright planets await your view at once as twilight fades. From right to left, they're Venus very low in the west-southwest, Jupiter in the southwest (upper left of Venus), Saturn in the south a little higher than Jupiter, and bright Mars lower in the south-southeast. Best view: about 40 minutes after your local sunset time.


**Saturday, August 25**

• Full Moon tonight and tomorrow (it's exactly full at 7:56 a.m. on the 26th Eastern Daylight Time). This evening, the Moon shines in Capricornus far left of Mars.

**Sunday, August 26**

• *A winter preview:* Step out before the first light of dawn this week, and the sky displays the same starry panorama as it does after dinnertime in late January and early February. Orion is standing up in the southeast, with Aldebaran and then the Pleiades high above him. Sirius sparkles far below Orion. The Gemini twins are lying on their sides left of Orion, well up in the east.

**Monday, August 27**

• Mars shines fire-color in the south-southeast after dark. High above it, by three or four fists at arm's length, shines white Altair.

And a finger width above Altair is fainter Tarazed, an orange giant that's actually more luminous than Altair but far in the background. The two are 17 and 390 light-years away.

**Tuesday, August 28**

• After nightfall this week, Arcturus and the Big Dipper shine equally high in the west and northwest, respectively.

Source: Sky & Telescope

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# ISS Sighting Opportunities

## For Denver:

| Date | Visible | Max Height | Appears | Disappears |
|---|---|---|---|---|
| Sun Aug 26, 5:56 AM | 2 min | 13° | 10° above SSE | 12° above ESE |
| Tue Aug 28, 5:47 AM | 4 min | 33° | 10° above SSW | 29° above ESE |

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

# NASA-TV Highlights

**(all times Eastern Daylight Time)**

**August 27, Monday**
12:10 p.m. – Space Station In-Flight Educational Event with the Dakota State University in Madison, South Dakota, and NASA astronaut Ricky Arnold (All Channels)

**August 28, Tuesday**
10:25 a.m. – Space Station In-Flight Interview with Sky Sports in London and Space Station Commander Drew Feustel of NASA (All Channels)

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

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# Space Calendar

- Aug 24 - Comet C/2017 U2 (Fuls) At Opposition (6.104 AU)
- Aug 24 - Apollo Asteroid 2018 PR9 Near-Earth Flyby (0.046 AU)
- Aug 24 - Asteroid 2002 Euler Closest Approach To Earth (1.432 AU)
- Aug 25 - BeiDou-3 (M11 & M12) CZ-3C/YZ-1 Launch
- Aug 25 - UPDATED [Aug 22] Telstar 18V/APStar 5C Falcon 9 Launch
- Aug 25 - Northern Iota Aquarids Meteor Shower Peak
- Aug 25 - Apollo Asteroid 2005 QQ87 Near-Earth Flyby (0.089 AU)
- Aug 25 - Apollo Asteroid 2012 BD14 Near-Earth Flyby (0.100 AU)
- Aug 25 - Apollo Asteroid 54509 YORP Closest Approach To Earth (0.704 AU)
- Aug 25 - Asteroid 7010 Locke Closest Approach To Earth (1.121 AU)
- Aug 25 - Asteroid 35137 Meudon Closest Approach To Earth (1.206 AU)
- Aug 25 - Asteroid 11926 Orinoco Closest Approach To Earth (1.264 AU)
- Aug 25 - Asteroid 10346 Triathlon Closest Approach To Earth (1.467 AU)
- Aug 25 - Asteroid 2521 Heidi Closest Approach To Earth (2.041 AU)
- Aug 25 - Asteroid 6546 Kaye Closest Approach To Earth (2.520 AU)
- Aug 25 - UPDATED [Aug 24] 15th Anniversary (2003), Spitzer Space Telescope Launch
- Aug 26 - Mercury At Its Greatest Western Elongation (18 Degrees)
- Aug 26 - Comet 243P/NEAT Perihelion (2.454 AU)
- Aug 26 - Comet 332P-G/Ikeya-Murakami At Opposition (3.540 AU)
- Aug 26 - Amor Asteroid 2016 RW17 Near-Earth Flyby (0.069 AU)
- Aug 26 - Asteroid 5799 Brewington Closest Approach To Earth (1.201 AU)
- Aug 26 - Asteroid 115561 Frankherbert Closest Approach To Earth (2.364 AU)
- Aug 27 - Crew Space Transportation 100 (CST-100) Atlas 5 Launch (Unmanned)
- Aug 27 - Progress MS-8 Reenters Earth's Atmosphere
- Aug 27 - Comet 65P/Gunn Closest Approach TO Earth (2.296 AU)
- Aug 27 - Amor Asteroid 2018 LQ2 Near-Earth Flyby (0.024 AU)
- Aug 27 - Apollo Asteroid 2018 PQ10 Near-Earth Flyby (0.079 AU)
- Aug 27 - Kuiper Belt Object 225088 (2007 OR10) At Opposition (87.061 AU)
- Aug 27 - Sergei Krikalev's 60th Birthday (1958)
- Aug 27 - Hal Weaver's 65th Birthday (1953)
- Aug 28 - Comet 125P/Spacewatch Perihelion (1.520 AU)
- Aug 28 - Comet C/2017 P2 (PANSTARRS) Closest Approach To Earth (2.895 AU)
- Aug 28 - Comet 81P/Wild At Opposition (3.832 AU)
- Aug 28 - Aten Asteroid 2016 GK135 Near-Earth Flyby (0.043 AU)
- Aug 28 - Apollo Asteroid 358744 (2008 CR118) Near-Earth Flyby (0.099 AU)
- Aug 28 - Apollo Asteroid 12711 Tukmit Closest Approach To Earth (0.652 AU)
- Aug 28 - Asteroid 9622 Terryjones Closest Approach To Earth (1.424 AU)
- Aug 28 - 25th Anniversary (1993), Galileo Flyby of Asteroids Ida & Dactyl

Source: JPL Space Calendar

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# Food for Thought

## Building Bricks on the Moon from Lunar Dust

*This 1.5 tonne building block was produced as a demonstration of 3D printing techniques using lunar soil. The design is based on a hollow closed-cell structure – reminiscent of bird bones – to give a good combination of strength and weight. Credit: ESA*

In the coming decades, many space agencies hope to conduct crewed missions to the Moon and even establish outposts there. In fact, between NASA, the European Space Agency (ESA), Roscosmos, and the Indian and Chinese space agencies, there are no shortages of plans to construct lunar bases and settlements. These will not only establish a human presence on the Moon, but facilitate missions to Mars and deeper into space.

For instance, the ESA is planning on building an "international lunar village" on the Moon by the 2030s. As the spiritual successor to the International Space Station (ISS), this village would also allow for scientific research in a lunar environment. Currently, European researchers are planning how to go about constructing this village, which includes conducting experiments with lunar dust simulants to create bricks.

To put it simply, the entire surface of the Moon is covered in dust (aka. regolith) that is composed of fine particles of rough silicate. This dust was formed over the course of billions of years by constant meteorite impacts which pounded the silicate mantle into fine particles. It has remained in a rough and fine state due to the fact that the lunar surface experiences no weathering or erosion (due to the lack of an atmosphere and liquid water).

Because it is so plentiful, reaching depths of 4-5 meters (13-16.5 feet) in some places – and up to 15 meters (49 feet) in the older highland areas – regolith is considered by many space agencies to be the building material of choice for lunar settlements. As Aidan Cowley, the ESA's science advisor and an expert when it comes to lunar soil, explained in a recent ESA press release:

*"Moon bricks will be made of dust. You can create solid blocks out of it to build roads and launch pads, or habitats that protect your astronauts from the harsh lunar environment."*

In addition to taking advantage of a seemingly inexhaustible local resource, the ESA's plans to use lunar regolith to create this base and related infrastructure demonstrates their commitment to in-situ resource utilization. Basically, bases on the Moon, Mars, and other locations in the Solar System will need to be as self-sufficient as possible to reduce reliance on Earth for regular shipments of supplies – which would both expensive and resource-exhaustive.

To test how lunar regolith would fare as a building material, ESA scientists have been using Moon dust simulants harvested right here on Earth. As Aiden explained, regolith on both Earth and the Moon are the product of volcanism and are basically basaltic material made up of silicates. "The Moon and Earth share a common geological history," he said, "and it is not difficult to find material similar to that found on the Moon in the remnants of lava flows."

The simulant were harvested from the region around Cologne, Germany, that were volcanically active about 45 million years ago. Using volcanic powder from these ancient lava flows, which was determined to be a good match for lunar dust, researchers from the European Astronaut Center (EAC) began using the powder (which they've named EAC-1) to fashioning prototypes of the bricks that would be used to created the lunar village.

Spaceship EAC, an ESA initiative designed to tackle the challenges of crewed spaceflight, is also working with EAC-1 to develop the technologies and concepts that will be needed to create a lunar outpost and for future missions to the Moon. One of their projects centers on how to use the oxygen in lunar dust (which accounts for 40% of it) to help astronauts have extended stays on the Moon.

But before the ESA can sign off on lunar dust as a building material, a number of tests still need to be conducted. These include recreating the behavior of lunar dust in a radiation environment to simulate their electrostatic behavior. For decades, scientists have known that lunar dust is electrically-charged because of the way it is constantly bombarded by solar and cosmic radiation.

This is what causes it to lift off the surface and cling to anything it touches (which the Apollo 11 astronauts noticed upon returning to the Lunar Module). As Erin Transfield – a member of ESA's lunar dust topical team – indicated, scientists still do not fully understand lunar dust's electrostatic nature, which could pose a problem when it comes to using it as a building material.

What's more, the radiation-environment experiments have not produced any conclusive results yet. As a biologist who dreams of being the first woman on the Moon, Transfield indicated that more research is necessary using actual lunar dust. "This gives us one more reason to go back to the Moon," she said. "We need pristine samples from the surface exposed to the radiation environment."

Beyond establishing a human presence on the Moon and allowing for deep-space missions, the construction of the ESA's proposed lunar village would also offer opportunities to leverage new technologies and forge partnerships between the public and private sector. For instance, the ESA has collaborated with the architectural design firm Foster + Partners to come up with the design for their lunar village, and other private companies have been recruited to help investigate other aspects of building it.

At present, the ESA plans to build their international lunar village in southern polar region, where plentiful water ice has been discovered. To investigate this, the ESA will be sending their Package for Resource Observation and in-Situ Prospecting for Exploration, Commercial exploitation and Transportation (PROSPECT) mission to the Moon in 2020, which will be travelling as part of the Russian Luna-27 mission.

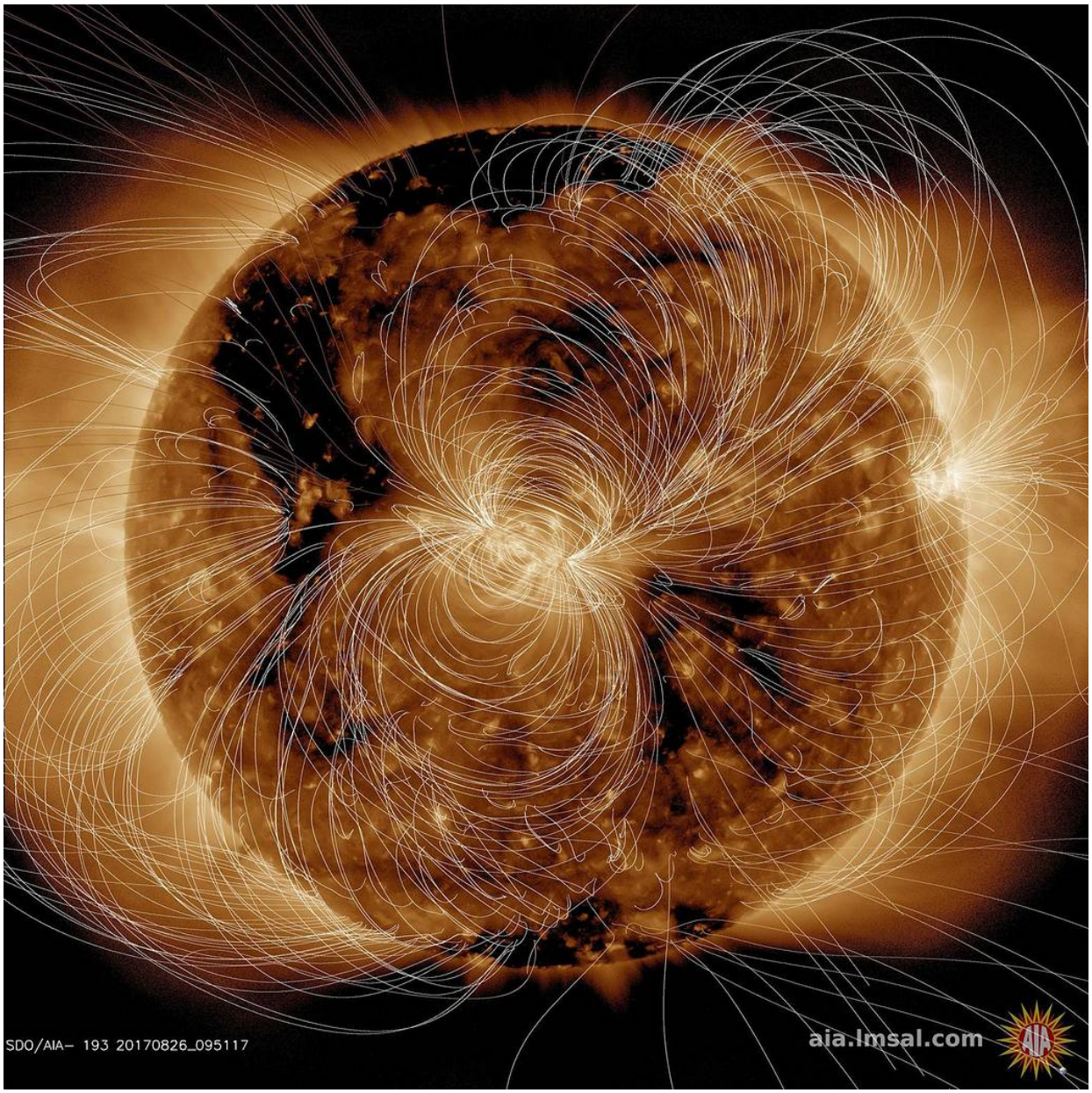
This mission, a joint effort between the ESA and Roscosmos, will involve a Russian-built lander setting down in the Moon's South Pole-Aitken Basin, where the PROSPECT probe will deploy and drill into the surface to

retrieve samples of ice. Going forward, the ESA's long-term plans also call for a series of missions to the Moon beginning in the 2020s that would involve robot workers paving the way for human explorers to land later.

In the coming decades, the intentions of the world's leading space agencies are clear – not only are we going back to the Moon, but we intend to stay there! To that end, considerable resources are being dedicated towards researching and developing the necessary technologies and concepts needed to make this happen. By the 2030s, we might just see astronauts (and even private citizens) coming and going from the Moon with regular frequency.

Source: Universe Today Return to Contents

# Space Image of the Week




**Sun's Magnetic Field Portrayed**

NASA's Solar Dynamics Observatory (SDO) scientists used their computer models to generate a view of the Sun's magnetic field on August 10, 2018. The bright active region right at the central area of the Sun clearly shows a concentration of field lines, as well as the small active region at the Sun's right edge, but to a lesser extent. Magnetism drives the dynamic activity near the Sun's surface.

SDO is managed by NASA's Goddard Space Flight Center, Greenbelt, Maryland, for NASA's Science Mission Directorate, Washington. Its Atmosphere Imaging Assembly was built by the Lockheed Martin Solar Astrophysics Laboratory (LMSAL), Palo Alto, California.

*Image Credit: NASA/GSFC/Solar Dynamics Observatory*

Source: NASA

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