

Society News

The Observatory is still Closed and All Monthly Meetings are Cancelled Until Further Notice

We are still unable to hold meetings during the current Covid-19 virus pandemic.

The Observatory is still closed and all of our monthly meetings are currently cancelled.

Latest News

Sorry, but we still can't open the observatory or restart meetings yet. In fact the latest rule changes have made things even more difficult!

Tourist numbers visiting the Island have now started to decrease, but still, we must not forget that COVID-19 is still with us.

The safety of all members and visitors to our premises and meetings is our prime concern and latest restrictions on social gathering mean we cannot open to members or visitors.

Your committee is meeting regularly and discussing the situation in depth. Our duty is to remain responsible during the pandemic and to only make steps forward when all agree to do so.

We are also working (within the regulations) on the observatory and are making slow but good progress.

As we now have the 4 new large monitors, Dudley Johnson has taken the 8 spare smaller ones to the British Heart Foundation (BHF) as they were very happy to accept them as a donation. *Thanks Dudley!*

The old tea and coffee making cupboard/worktop has been demolished and this has provided better access to the storage space underneath the dome as well as providing more storage space. There's still a lot to do and the restrictions aren't really helping but it'd be good to get the *entrance hall painted*, and the *floor painted*, and the *dome sealed etc, etc, etc.....* 😊

Stay safe and well.

VAS Website: wightastronomy.org

Submissions or letters to New Zenith are always welcome and should be sent to:

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Material for the next issue by the 6th of the month please.

The Vectis Astronomical Society and the Editor of the New Zenith accept no responsibility for advice, information or opinion expressed by contributors.

Registered Charity No 1046091

Observatory Diary

The diary is currently empty!

VAS Website: wightastronomy.org

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2020 Monthly Meetings

Check <http://www.wightastronomy.org/meetings/> for the latest information

All Monthly Meetings are Cancelled Until Further Notice

Sorry but we are still unable to hold meetings during the current Covid-19 virus pandemic.

All meetings are currently cancelled and the VAS Observatory is closed. The government will let us know when the situation changes and, of course, we will contact members both here and via the website and social media when that situation changes.

I hope we can resume normal activities soon but we find ourselves affected by a very serious situation.

Stay safe and well and let's hope we're back to normal soon.

Please read the latest news on the front page.

Observatory Visits Booked

All Observatory Visits are Cancelled Until Further Notice

Please see the important information above this.

IMPORTANT

Could all VAS members please ensure they notify the Membership Secretary of any change of address. To ensure our compliance with GDPR rules, we must maintain accurate membership records.

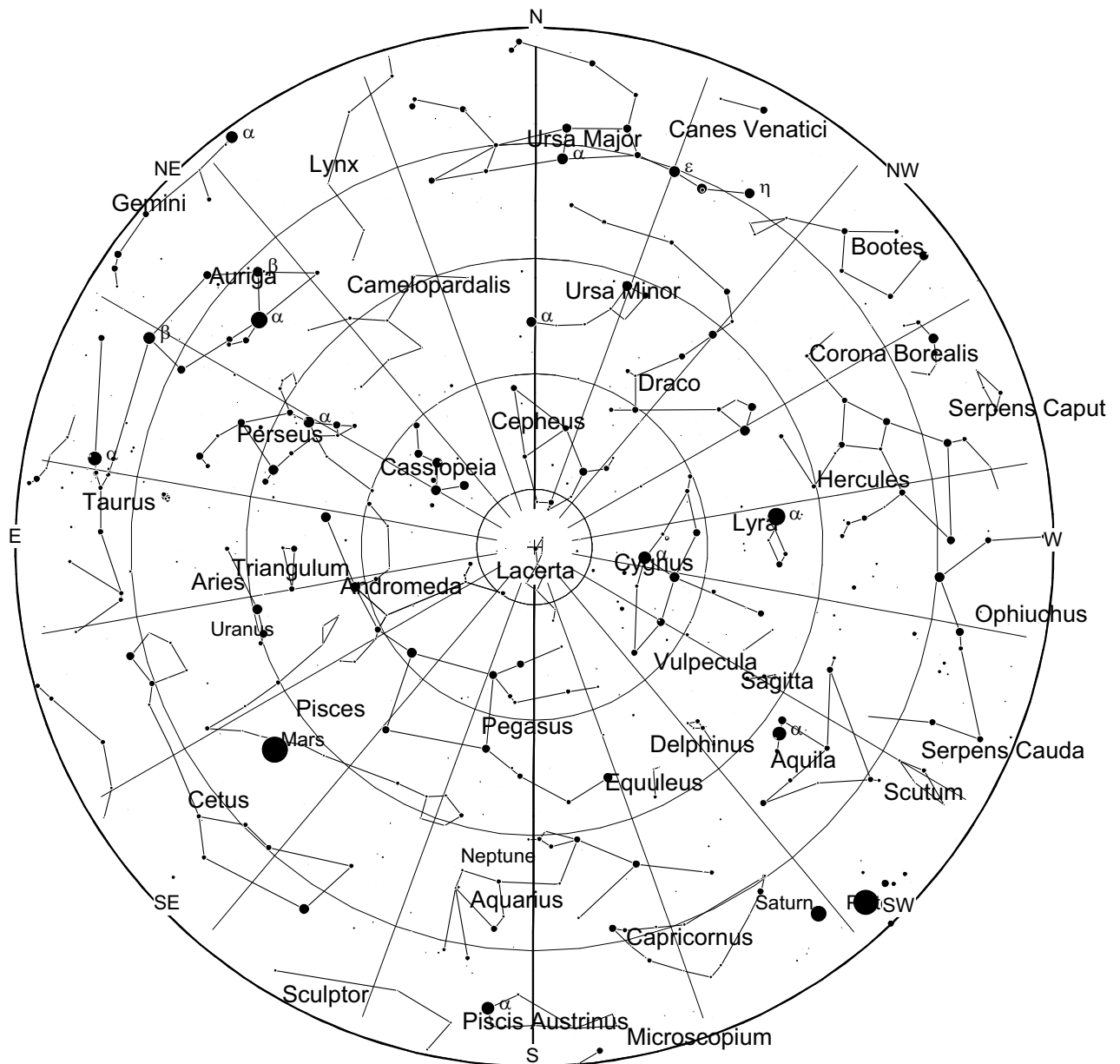
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Important

Sorry, but the Observatory is still closed to all members and visitors until further notice

October 2020 Sky Map



View from Newchurch Isle of Wight UK - 2200hrs - 15 October 2020







Mars is the 4th planet from the Sun and the second-smallest in the Solar System. Mars carries the name of the Roman god of war and is often referred to as the “Red Planet”. The latter refers to the effect of the iron oxide prevalent on Mars's surface, which gives it a reddish appearance distinctive among the astronomical bodies visible to the naked eye. Mars is a terrestrial planet with a thin atmosphere, surface features reminiscent of the impact craters of the Moon and the valleys, deserts and polar ice caps of Earth.

The days and seasons are comparable to those of Earth, because the rotational period as well as the tilt of the rotational axis relative to the ecliptic plane are similar. Mars is the site of Olympus Mons, the largest volcano and highest known mountain on any planet in the Solar System, and of Valles Marineris, one of the largest canyons in the Solar System. The smooth Borealis basin in the northern hemisphere covers 40% of the planet and may be a giant impact feature. Mars has two moons, Phobos and Deimos, which are small and irregularly shaped.

This article is licensed under the [GNU Free Documentation License](https://www.gnu.org/licenses/fdl.html).
It uses material from the Wikipedia article “Mars”.

October 2020 Night Sky

Moon Phases

New 16th	First Qtr 23rd	Full 1st	Last Qtr 10th
			

Planets

Mercury

Mercury concludes its poor evening apparition started during September, moving into conjunction with the Sun and remaining invisible to us.

Venus

Venus remains the prominent object in the eastern sky before dawn. It is moving closer to the Sun so rising earlier each morning. On the 3rd it is in close conjunction with Regulus the brightest star in Leo the lion. The separation is 15 arc minute, half the diameter of the full moon. On the morning of the 14th there is a photo opportunity with the crescent moon a little to the left of Venus.

Mars

Early month sees Mars at opposition and it's closest to Earth. Rising at sunset, it is now at its biggest and brightest as we sweep past on the inside of its orbit. We will be pulling away quite rapidly at the end of the month and the planet shrinks away again. This is the best Mars will be for the next two years. If you have the opportunity use a large telescope to see what surface features that are visible. You may be able to spot the tiny moons Phobos and Deimos as they race around the planet; at magnitudes 10.6 & 11.7 they are considerably fainter than Mars.

Jupiter

At sunset Jupiter can be found in the south is and is observable until it gets too low in the sky. It is very bright and can easily be seen from just after sunset.

Saturn

Saturn is as it has been all this year following along few degrees behind Jupiter in the southern sky. It is bright and easily seen, but nowhere near as bright as Jupiter.

Uranus

Uranus is close to the border between the constellations of Ares and Cetus in a part of the sky with very few guide stars. It can be found about 5° north of the fourth magnitude star Mu Ceti, and about 1.5 degrees west of the sixth magnitude star 29 Arietis. See the finder chart in the August NZ.

Neptune

Neptune is on the eastern side of the constellation of Aquarius. It can be found about 2° east of the fourth magnitude star Phi Aquarii, and 0.5° south of the fifth magnitude 96 Aqarii. See the finder chart in the July NZ.

Deep Sky

M39 Open Cluster

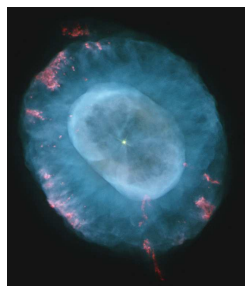
RA 21h 32m Dec 48° 26' mag 4.6



An open cluster with an apparent diameter equal to that of the full moon, it is rather sparsely populated triangular shaped grouping with around 30 magnitude 7 to 9 stars. This like many galactic clusters is an object best enjoyed through binoculars or a low powered telescope.

NGC7662 Planetary Nebula

RA 23h 26m Dec 42° 32' mag 8.3



A small but relatively bright planetary nebula sometimes referred to as the blue snowball. The planetary is only about a quarter the size of the famous Ring Nebula, but being bright takes magnification well. A large telescope is needed to reveal a central void and the 13th magnitude white dwarf that powers the surrounding nebula.

Melotte 20 Open Cluster

RA 3h 20m Dec 49° 2' mag 1.2



Centred on Mirfack, Alpha Persei and easily visible to the naked eye this magnificent cluster is best observed using binoculars. The view is that of a multitude of dazzlingly bright blue stars centred on the bright Mirfack. This cluster is rather too large for a telescope but ideal for binoculars.

And finally: A NASA Youtube Video showing the relative sizes of the planets over the next 2 years

https://www.youtube.com/watch?v=fNbplPseL_8

Peter Burgess

Square Kilometre Array Signs Off on Construction Plans

Now to figure out how to run 100,000-plus antennae and squeeze out 130 petabytes of data each year!

The Board of the Square Kilometre Array has signed off on plans to build the colossal radio-telescope.

A *note* from chair Catherine Cesarsky posted on Tuesday says that a meeting conducted on September 17th and 18th considered the three core documents that describe the project – the “SKA-1 Construction Proposal”, “Observatory Establishment and Delivery Plan” and the “SKA Prospectus 2020” – and formally endorsed their contents.

The *Prospectus* [PDF from Dropbox] explains that the project will build over 130,000 antennae in Australia, plus another 133 in South Africa, eventually totalling a square kilometre of electromagnetic radiation detecting apparatus. By way of contrast, the world’s largest radio telescope is the Arecibo observatory at 73,000m². And it is out of commission due to a physical layer problem – a cable broke and some panels collapsed.

The prospectus also points out that the SKA will make a shedload of data – 130 petabytes of it each year is expected to reach users. And that’s after grooming to remove irrelevant data that will flow from each antenna at a rate of 8.8 terabytes per second. All that data will need to be moved from the antennae to a pair of supercomputers mightier than any currently in existence. The prospectus therefore suggests the SKA could spark breakthroughs to match the World Wide Web, which was born from CERN’s need for collaborative tools, plus more technical inventions to provide wireless comms and meet countless other technical challenges.

The documents still require sign-off from one other body – the SKA Observatory Council.

At present, that Council does not exist, but that is not a cause for undue worry because it will be summoned into existence once the SKA Observatory Convention comes into force. The convention requires five signatories and Australia today did its duty, joining South Africa, Italy and The Netherlands.

The UK is expected to be the last signatory and presented the relevant treaty to Parliament in July 2019.

More at: https://www.theregister.com/2020/09/29/ska_signoff/

New Minimoon is Headed Towards Earth, and it’s Not Natural

Astronomers spot an object heading into Earth orbit.



- Small objects such as asteroids get trapped for a time in Earth orbit, becoming “minimoons.”
- Minimoons are typically asteroids, but this one is something else.
- The new minimoon may be part of an old rocket from the 1960s.

From time to time, asteroids whizzing past Earth get trapped by our gravitational pull, falling into orbit around the planet. These rocks only stay for a while, eventually escaping and continuing on their journey to who-knows-where. While they’re here, they’re considered “minimoons.”

Astronomers have detected an object that’s likely to become our next minimoon. But it’s either not an asteroid or it’s an odd one. Really, scientists suspect it’s man-made tech returning home after many years out in cold, lonely space.

Minimoons

Scientists have confirmed just two prior minimoons. One was 2006 RH120, which orbited us from September 2006 to June 2007. The other was 2020 CD3, which got stuck in the 2015–2016 timeframe, and is believed to gotten away in May 2020.

2020 SO, the new kid on the block, is expected to arrive in October 2020 and pop out of orbit in May 2021.

Identifying 2020 SO

The first clue 2020 SO isn’t your ordinary asteroid is its exceptionally low velocity. It’s traveling much more slowly that a typical asteroid — their average rate of travel

is 18 kilometers (58,000 feet) per second. Even moon rocks sent careening into Earth orbit by impacts on the lunar surface outpace pokey 2020 SO.

For another thing, 2020 SO has an orbital path very similar to Earth's, lasting about one Earth year. It's also just slightly less circular than our own orbit, from which it's barely tilted off-axis.

So, what is it? NASA estimates that the object has dimensions very reminiscent of a discarded Centaur rocket stage from the Surveyor 2 mission that landed an unmanned craft on the moon. Back in the day, rocket stages were jettisoned as craft were aimed toward their desired position. This stuff, if released high enough, remains in space. It appears that this Centaur rocket, launched in September 1966, is now making its way back homeward, at least for a little bit.

When 2020 SO arrives at its closest point in December, the rocket is expected to be about 50,000 kilometers from Earth. Its next closest approach is much further: 220,000 kilometers, in February 2010.

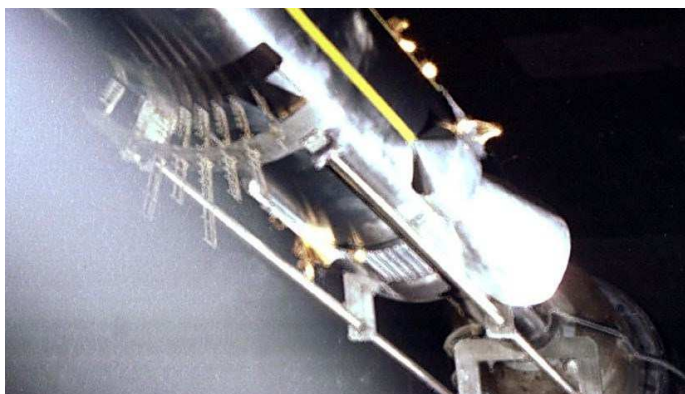
What We May be Able to Learn

Earthly space programs being as young as they are, scientists would love to know what's happened to our rocket during a half century in space.

While 2020 SO won't get close enough to drop into our atmosphere, its slow progress has scientists hopeful that they'll still get some kind of a decent look at it.

Spectroscopy may be able to reveal what the rocket's surface is like now - has any of its paint survived, for example? Of course, being out in space, it's likely to have been hit by lots of dust and micrometeorites, so the current state of its surfaces is also of interest. Experts are curious to know how reflective the rocket is at this point, valuable information that can help planners of future long-term missions anticipate how well a craft out in space for extended periods will remain able to reflect sunlight.

More with Links: <https://bigthink.com/>



Unique Supernova Explosion

100 million light years away from Earth, an unusual supernova is exploding. That exploding star, known as “supernova LSQ14fmg”, was the object discovered by a team led by Florida State University Assistant Professor of Physics Eric Hsiao. Their research, helped uncover the origins of the group of supernovae this star belongs to.

This supernova's characteristics - getting brighter extremely slowly, and one of the brightest explosions in its class - are unlike any other. “This was a truly unique and strange event, and our explanation for it is equally interesting,” said Hsiao, the paper's lead author. The exploding star is what is known as a Type Ia supernova, and more specifically, a member of the “super-Chandrasekhar” group.

Stars have a sort of life cycle, and these supernovae are the exploding finale of some stars with low mass. They are so powerful that they shape the evolution of galaxies, and so bright that we can observe them from Earth.

Ia supernovae were crucial for discovering dark energy, the unknown energy that causes the current accelerated expansion of the universe. Astronomers knew little about the origins of these supernova explosions, other than that they are thermonuclear explosions of white dwarf stars.

Using data from telescopes in Chile and Spain, the team saw the supernova was hitting some surrounding material, which caused more light to be released along with the light from the decaying nickel. They saw evidence that carbon monoxide was being produced. Their conclusion - the supernova was exploding inside what was an asymptotic giant branch star about to become a planetary nebula.

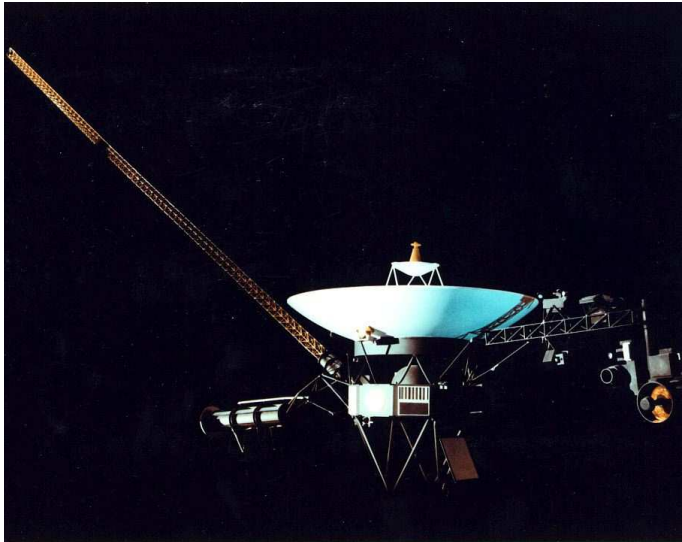
They theorized that the explosion was triggered by the merger of the core of the AGB star and another white dwarf star orbiting within it. The central star was losing a copious amount of mass through a stellar wind before the loss was turned off abruptly creating a ring of material surrounding the star. After the supernova exploded, it impacted a ring of material often seen in planetary nebulae producing the extra light and slow brightening observed.

“This is the first strong observational proof that a Type Ia supernova can explode in a post-AGB or proto-planetary-nebula system and is an important step in understanding the origins of Type Ia supernovae,” Hsiao said. “These supernovae can be particularly troublesome because they can mix into the sample of normal supernovae used to study dark energy. This research gives us a better understanding of the possible origins of Type Ia supernovae and will help to improve future dark energy research.”

From: <https://www.sciencedaily.com/>

Let's Go Space Truckin': 1970s Probe Voyager 1 is now 14 Billion Miles from Home

NASA's long-lived spacecraft reaches another milestone



NASA's extraordinarily long-lived Voyager 1 probe this week passed 14 billion miles from Earth.

It takes light nearly 21 hours to reach the spacecraft, making commanding the thing increasingly tricky.

Of course, the distance counter can occasionally roll backwards slightly due to the orbit of the Earth around the Sun, but the milestone is an impressive feat nonetheless.

The spacecraft was a mere 3.7 billion miles from Earth when it snapped the iconic Pale Blue Dot image 30 years ago.

At 150.6 Astronomical Units (AU) from Earth and 150.5 AU from the Sun, NASA's Jet Propulsion Laboratory (JPL) noted this week that the venerable probe is the farthest human-made object from Earth. It is currently travelling at just over 38,000mph (with respect to the Sun).

Dr Garry E Hunt, a member of the original imaging team, paid tribute to the spacecraft's longevity: "It's actually 50 years since I joined JPL and we started talking about these missions, and then we started the feasibility study, which I was involved in and, blimey, it's still going."

Voyager 1 (and its sibling, Voyager 2, which is only 11.6 billion miles from Earth) has continued to cruise serenely through space, despite the disruption back home. Hunt was thrilled the mission was continuing and, noting that improvements to NASA's Deep Space Network

should keep communication going, told us: "A lot of the control work is being carried out by people working at home. Not even coronavirus can stop Voyager."

Launched within days of each other in 1977, the Voyager probes have endured beyond all reasonable expectations. The 43rd anniversary of Voyager 1's launch recently passed, and it is nearly 40 years since the probe began its interstellar mission, having passed Saturn in 1980.

The Voyagers are not NASA's only veteran spacecraft headed for deep space. The Pioneer 10 and 11 probes were launched a few years earlier for a Jupiter flyby and, in the case of Pioneer 11, an additional encounter with Saturn. The last contact with Pioneer 11 was made in 1995, while a final feeble signal was picked up from Pioneer 10 in 2003.

Voyager, however, continues. Now down to four functioning instruments, Voyager 1 is expected to reach the Oort cloud in approximately 300 years. It fired up its trajectory correction thrusters for the first time in decades in 2017 to keep its antenna pointed toward Earth, adding a few more years to its mission.

The end, alas, is approaching. Over the coming years scientists will be forced to shut down the remaining instruments in order to eke out the probe's diminishing power supply. By 2025, all the science instruments will have been shut down although there is a good chance engineering data will still be transmitted.

The Voyagers could, however, remain within range of the Deep Space Network through 2036 "depending on how much power the spacecraft still have to transmit a signal back to Earth," according to JPL.

Until then, join us in toasting another achievement notched up by NASA's farthest.

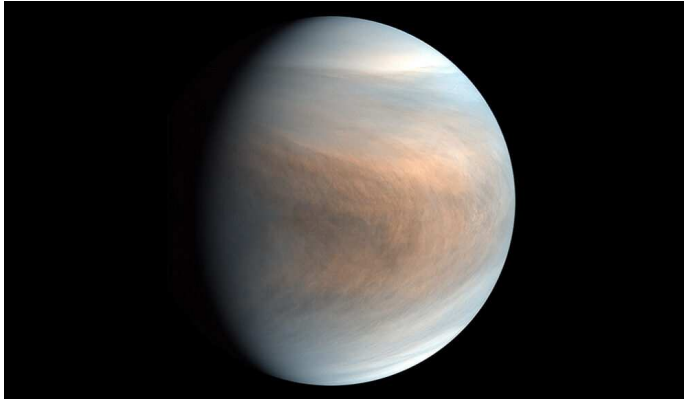
From: <https://www.theregister.com/>

More: <https://voyager.jpl.nasa.gov/>



Phosphine Gas Found in Venus' Atmosphere may be 'A Possible Sign of Life'

Astronomers detected signs of a smelly, toxic gas that microbes can make in the planet's clouds



Chemical signs of the gas phosphine have been spotted in observations of the Venusian atmosphere. Examining the atmosphere in millimeter wavelengths of light showed that the planet's clouds appear to contain up to 20 parts per billion of phosphine — enough that something must be actively producing it, the researchers say.

If the discovery holds up, and if no other explanations for the gas are found, then the hellish planet next door could be the first to yield signs of extraterrestrial life — though those are very big ifs.

“We’re not saying it’s life,” says astronomer Jane Greaves of Cardiff University in Wales. “We’re saying it’s a possible sign of life.”

Venus has roughly the same mass and size as Earth, so, from far away, the neighboring planet might look like a habitable world. But up close, Venus is a scorching hellscape with sulfuric acid rain and crushing atmospheric pressures.

Still, Venus might have been more hospitable in the recent past. And the current harsh conditions haven’t stopped astrobiologists from speculating about niches on Venus where present-day life could hang on, such as the temperate cloud decks.

Greaves looked at Venus with the James Clerk Maxwell Telescope in Hawaii over five mornings in June 2017, aiming to set a detectability benchmark for future studies seeking the gas in the atmospheres of exoplanets but was startled to find the hints of phosphine. “That’s a complete surprise,” Greaves says. When she was analyzing the observations, “I thought ‘Oh, I must have done it wrong.’”

So the team checked again with a more powerful telescope, the Atacama Large Millimeter/submillimeter Array in Chile, in March 2019. But the signature of phosphine was still there.

Phosphine takes a fair amount of energy to create and is easily destroyed by sunlight or sulfuric acid, which is found in Venus’ atmosphere. So if the gas was produced a long time ago, it shouldn’t still be detectable. “There has to be a source,” Greaves says.

Greaves, Sousa-Silva and colleagues considered every explanation they could think of apart from life: atmospheric chemistry; ground and subsurface chemistry; volcanoes outgassing phosphine from the Venusian interior; meteorites peppering the atmosphere with phosphine from the outside; lightning; solar wind; tectonic plates sliding against each other. Some of those processes could produce trace amounts of phosphine, the team found, but orders of magnitude less than the team detected.

“We’re at the end of our rope,” Sousa-Silva says. She hopes other scientists will come up with other explanations. “I’m curious what kind of exotic geochemistry people will come up with to explain this abiotically.”

The idea of searching for life on Venus “has been regarded as a pretty out-there concept,” says Planetary Science Institute astrobiologist David Grinspoon, who is based in Washington, D.C. Grinspoon has been publishing about the prospects for life on Venus since 1997, but was not involved in the new discovery.

“So now I hear about this, and I’m delighted,” he says. “Not because I want to declare victory and say this is definite evidence of life on Venus. It’s not. But it’s an intriguing signature that could be a sign of life on Venus. And it obligates us to go investigate further.”

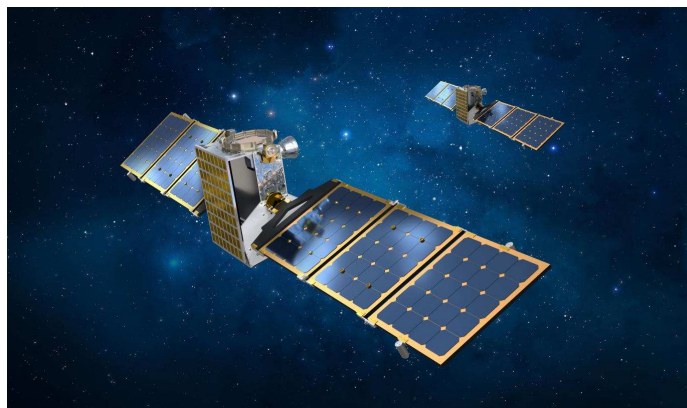
Because of the planet’s acidic atmosphere, extreme pressures and lead-melting temperatures, sending spacecraft to Venus is a challenge. But several space agencies are considering missions that could fly in the next few decades.

In the meantime, Greaves and colleagues want to confirm the new phosphine detection in other wavelengths of light. Observations they had planned for the spring were put on hold by the coronavirus pandemic. And now, Venus is in a part of its orbit where it’s on the other side of the sun.

“Maybe when Venus comes around on the other side of the sun again,” Greaves says, “things will be better for us here on Earth.”

Much more: <https://www.sciencenews.org/>

New Satellite to Rendezvous With Binary Asteroids



*An artist's depiction of the twin Janus spacecraft.
Credit: Lockheed Martin*

The University of Colorado Boulder and Lockheed Martin will soon lead a new space mission to capture the first-ever closeup look at a mysterious class of solar system objects: binary asteroids.

These bodies are pairs of asteroids that orbit around each other in space, much like the Earth and moon. In a project review NASA gave the official go-ahead to the Janus mission, named after the two-faced Roman god. The mission will study these asteroid couplets in never-before-seen detail. Known as Key Decision Point-C (KDP-C), this review and approval from NASA allows for the project to begin implementation, and baselines the project's official schedule and budget.

It will be a moment for twos: In 2022, the Janus team will launch two identical spacecraft that will travel millions of miles to individually fly close to two pairs of binary asteroids. Their observations could open up a new window into how these diverse bodies evolve and even burst apart over time, said Daniel Scheeres, the principle investigator for Janus.

“Binary asteroids are one class of objects for which we don't have high-resolution scientific data,” said Scheeres, “Everything we have on them is based on ground observations, which don't give you as much detail as being up close.”

The mission, which will cost less than \$55 million under NASA's SIMPLEx program, may also help to usher in a new era of space exploration, said Lockheed Martin's Janus Project Manager Josh Wood. He explained that Janus' twin spacecraft are designed to be small and nimble, each one about the size of a carry-on suitcase.

“We see an advantage to be able to shrink our spacecraft,” said Wood. “With technology advancements,

we can now explore our solar system and address important science questions with smaller spacecraft.”

The mission will rendezvous with two binary pairs--named 1996 FG3 and 1991 VH--each showcasing a different kind of orbital pattern. The pair called 1991 VH, for example, has a “moon” that whips around a much bigger “primary” asteroid following a hard-to-predict pattern.

The team will use a suite of cameras to track the dynamical motion in unprecedented detail. Among other goals, Scheeres and his colleagues hope to learn more about how binary asteroids move--both around each other and through space.

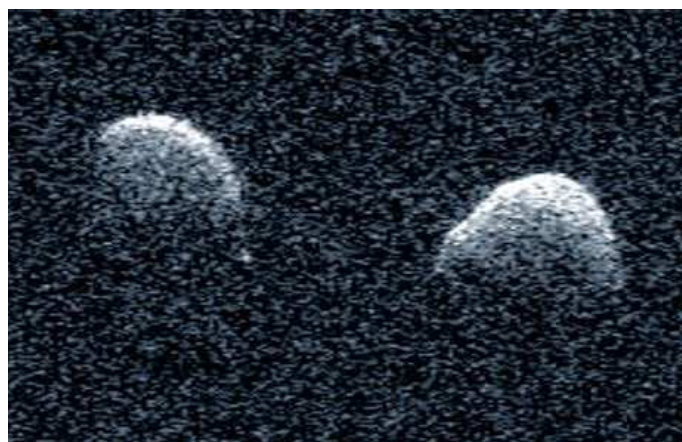
“Once we see them up close, there will be a lot of questions we can answer, but these will raise new questions as well,” Scheeres said. “We think Janus will motivate additional missions to binary asteroids.”

Wood added that the mission's twin spacecraft, each of which weigh just about 80lbs, will travel farther than any small satellite to date.

After blasting off in 2022, they'll first complete an orbit around the sun, before heading back toward Earth and sling-shooting their way far into space and beyond the orbit of Mars.

“I think it's a great test for what is achievable from the aerospace community,” Wood said. “And the Colorado-centric development for this mission, combining the space talent of both CU Boulder and Lockheed Martin, is a testament to the skills available in the state.”

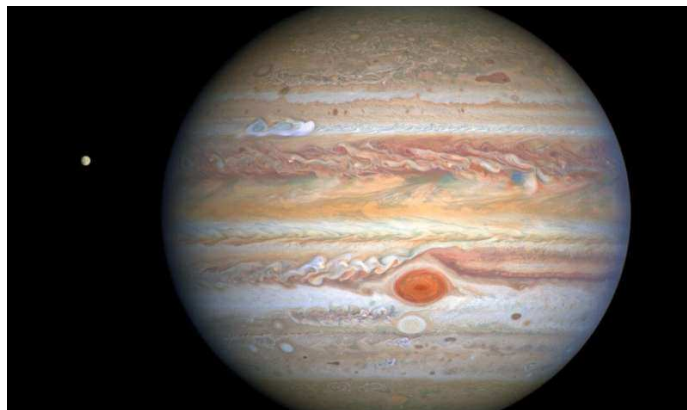
More: <https://www.eurekaalert.org/>



A bi-static radar image of the binary asteroid 2017 YE5 from the Arecibo Observatory and the Green Bank Observatory on June 25, 2018.

Credit: Arecibo / GBO/NSF/NASA/JPL-Caltech.

Hubble Captures Crisp New Portrait of Jupiter's Storms



This latest image of Jupiter, taken by NASA's Hubble Space Telescope on Aug. 25, 2020, was captured when the planet was 406 million miles from Earth. Hubble's sharp view is giving researchers an updated weather report on the monster planet's turbulent atmosphere, including a remarkable new storm brewing, and a cousin of the famous Great Red Spot region gearing up to change color again.

A unique and exciting detail of Hubble's snapshot appears at mid-northern latitudes as a bright, white, stretched-out storm traveling around the planet at 350mph (560kph). This single plume erupted on Aug. 18, 2020 — and ground-based observers have discovered two more that appeared later at the same latitude.

While it's common for storms to pop up in this region every six years or so, often with multiple storms at once, the timing of the Hubble observations is perfect for showing the structure in the wake of the disturbance, during the early stages of its evolution. Trailing behind the plume are small, rounded features with complex “red, white, and blue” colors in Hubble's ultraviolet, visible, and near-infrared light image. Such discrete features typically dissipate on Jupiter, leaving behind only changes in cloud colors and wind speeds, but a similar storm on Saturn led to a long-lasting vortex. The differences in the aftermaths of Jupiter and Saturn storms may be related to the contrasting water abundances in their atmospheres, since water vapor may govern the massive amount of stored-up energy that can be released by these storm eruptions.

Hubble shows that the Great Red Spot, rolling counterclockwise in the planet's southern hemisphere, is ploughing into the clouds ahead of it, forming a cascade of white and beige ribbons. The Great Red Spot is currently an exceptionally rich red color, with its core and outermost band appearing deeper red.

Researchers say the Great Red Spot now measures about 9,800 miles across, big enough to swallow Earth. The super-storm is still shrinking as noted in telescopic

observations dating back to 1930, but the reason for its dwindling size is a complete mystery.



Another feature researchers are noticing has changed is Oval BA, nicknamed by astronomers as Red Spot Jr., which appears just below the Great Red Spot in this image. For the past few years, Red Spot Jr. has been fading in color to its original shade of white after appearing red in 2006. However, now the core of this storm appears to be darkening slightly. This could hint that Red Spot Jr. is on its way to turning to a color more similar to its cousin once again.

Hubble's image shows that Jupiter is clearing out its higher altitude white clouds, especially along the planet's equator, where an orangish hydrocarbon smog wraps around it.

The icy moon Europa, thought to hold potential ingredients for life, is visible to the left of the gas giant.

This Hubble image is part of yearly maps of the entire planet taken as part of the Outer Planets Atmospheres Legacy program, or OPAL. The program provides annual Hubble global views of the outer planets to look for changes in their storms, winds, and clouds.

More at: <https://phys.org/news/>

Jupiter is the fifth planet from the Sun and the largest in the Solar System. It is a gas giant with a mass one-thousandth that of the Sun, but two-and-a-half times that of all the other planets in the Solar System combined. Jupiter is one of the brightest objects visible to the naked eye in the night sky, and has been known to ancient civilizations since before recorded history. It is named after the Roman god Jupiter. When viewed from Earth, Jupiter can be bright enough for its reflected light to cast visible shadows, and is on average the third-brightest natural object in the night sky after the Moon and Venus.

Climate Change Impacts Astronomical Observations



Climate changes associated with global warming can affect astronomical observations. That is the result of a study involving scientists from the University of Cologne. The international research team investigated a range of climate parameters at the Very Large Telescope (VLT) at the Paranal in the Atacama Desert in Chile, where the European Southern Observatory (ESO) operates its telescopes. Among other things, the team evaluated the data for temperature, wind speed and wind direction, and the water vapor content in the atmosphere over a period of several decades. This revealed an increase in temperatures above the world average and also increasing image blur due to air turbulence — so-called seeing.

The study “The impact of climate change on astronomical observations” was published in the current issue of *Nature Astronomy* and can be viewed online. Its results are not only important for astronomers to adapt their observations to changing environmental conditions, but must also be taken into account when planning new large telescopes - such as the Extremely Large Telescope (ELT), which is currently being built near the Paranal.

The Cologne-based scientists Professor Dr. Susanne Crewell and Christoph Böhm from the Institute of Geophysics and Meteorology were involved in the study. In the past, they had already explored various aspects of the past, present and future climate at the telescope's site in the framework of Collaborative Research Centre 1211 “Earth — Evolution at the Dry Limit.” The first author of the article is Faustine Cantalloube from the Max Planck Institute for Astronomy in Heidelberg.

The researchers investigated the extent to which climate change affects astronomy and in particular the quality of observations. The team focused on the Paranal Observatory in northern Chile because it has a whole range of environmental sensors that document local meteorological conditions. These measurements yielded one of the most comprehensive data sets over the last three decades at a largely untouched location.

Based on this data set, astronomers, climate researchers, atmosphere scientists, and meteorologists joined forces to identify important meteorological parameters that play a role in the quality of astronomical observations. The data allowed them to analyze long-term trends over a period of more than thirty years to determine the impact of climate change on future observations. Using four examples, they showed how climate change is already affecting, or might affect the operation of an astronomical observatory in future. The VLT, operated by ESO, was served as an example.

“The data showed a 1.5 °C increase in near-ground temperature over the last four decades at the Paranal Observatory. This is slightly higher than the worldwide average of 1°C since the pre-industrial age,” said Susanne Crewell. Since the original telescope cooling system was not designed for such warm conditions, the quality of observations is increasingly endangered by more frequent turbulences — a consequence of the rise in temperature. The expected rise of 4° C (the most pessimistic scenario of the IPCC climate simulations) within the next century thus has to be taken into account in the construction of the 39-meter Extremely Large Telescope (ELT) at a nearby site.

In particular, astronomers face the challenge of a reduction in the so-called ‘dome seeing,’ a reduction in resolution due to turbulence within the telescope dome. The researchers furthermore noticed an increase in turbulence in the air layer near the ground, making images blurred since cold and warm air layers with different refractive indices alternate more quickly. However, attributing this to climate change is difficult, since there were also constructional changes. The increase in wind shear in the upper troposphere in connection with the jet stream also leads to a so-called ‘wind-driven halo.’ This phenomenon appears when atmospheric turbulence conditions vary faster than the telescope's control system can correct them. This limits the contrast capabilities of the instrument and could potentially limit exoplanet studies. An increase in water vapor in the atmosphere moreover could lead to a reduction of the astronomical signal.

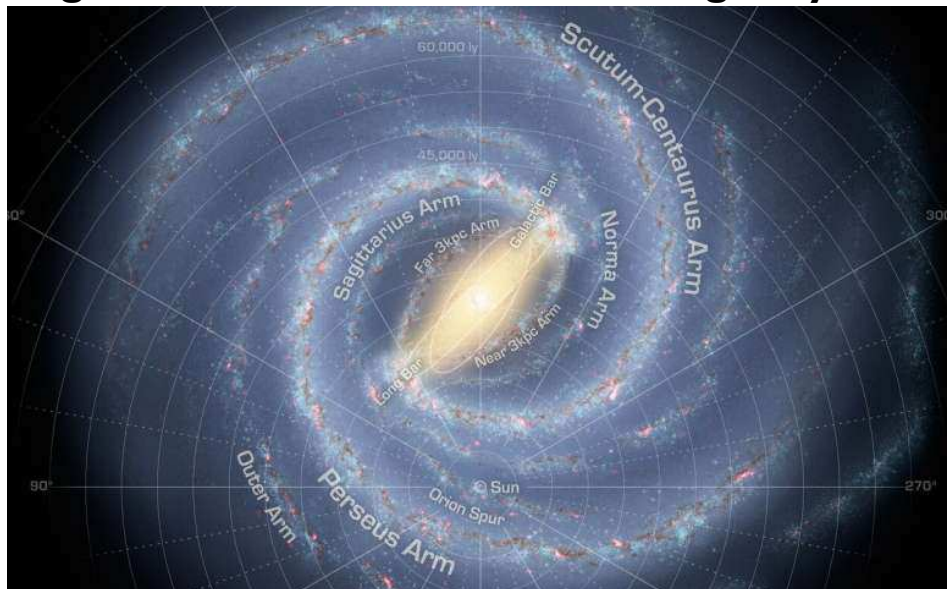
Through their unique perspective on the universe, astronomers know that the origin of life on Earth was a complex process made possible only by the coincidence of extremely rare circumstances. There is no second Earth in our neighborhood. For this reason, the current issue of *Nature Astronomy*, published on September 10, is dedicated to the topic of climate. The special issue aims to raise awareness in astronomy for climate aspects that are important for the work of astronomers.

More with links: <https://phys.org/news/2020-09-climate-impacts-astronomical.html>

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LINKS, COMMENTS AND OBSERVATIONS

Stars at the centre of the Milky Way could have migrated from the outskirts of the galaxy



In a research paper published by The Astrophysical Journal Letters, an international team of astrophysicists, including scientists from the University of Surrey, detail how they discovered a group of stars with different characteristics than their neighbors found in the Milky Way's Nuclear Star Cluster (NSC).

The team used high-resolution computer simulations to explain how this group of metal-poor and fast-rotating stars came to be located at the center of our galaxy.

Calculations found that it is likely that this group of stars are leftovers from the migration of a massive star cluster that formed a few light-years away from the Milky Way's center. Alternatively, while not as likely as the cluster scenario, the team also noted that the group of stars could possibly have originated from a dwarf galaxy up to 320,000 light-years away from the galactic center.

All evidence points towards an accretion event that happened 3-5 billion years ago during which a massive cluster migrated towards the center of the Milky Way and was disrupted by the strong tidal forces of the NSC, a region of high stellar density. Cluster stars were deposited in the region and were discovered based on their peculiar velocities and low metal content.

Dr. Alessia Gualandris, from the University of Surrey, added: "This discovery may be the 'smoking gun' evidence that the Milky Way has been accreting star clusters or dwarf galaxies over its lifetime. Its past was much more active than we previously thought."

Dr. Tuan Do, assistant research scientist at UCLA, said: "It is remarkable how these new observations of the NSC can reveal so much about the history of the whole galaxy."

Dr. Manuel Arca-Sedda, a Humboldt Fellow at the Astronomisches Rechen-Institut, Heidelberg, concluded: "A close collaboration between observers and theorists has been key in this study. Combining new exquisite observations with state-of-the-art computer models has allowed us to uncover the birthplace of these peculiar stars".

From: <https://phys.org/>

At The Observatory

For your own safety, please bring a torch.

Make sure you close and lock the car park gate if you are the last to leave.

Articles Needed

NZ needs letters, articles, reviews or pictures related to astronomy. Contact details on page 1.

"There are many ways of knocking electrons out of atoms. The simplest is to rub two surfaces together"

Fred Hoyle

"When you hear a physicist invoke the uncertainty principle, keep a hand on your wallet"

David Griffiths

"You have to learn the rules of the game. And then you have to play better than anyone else"

Albert Einstein

"Any fundamental theory of physics is beautiful. If it isn't, it's probably wrong"

John Moffat

"I don't think there is one unique real universe.... Even the laws of physics themselves may be somewhat observer dependent"

Stephen Hawking

"One of the biggest and most important tools of theoretical physics is the wastebasket"

Richard Feynman