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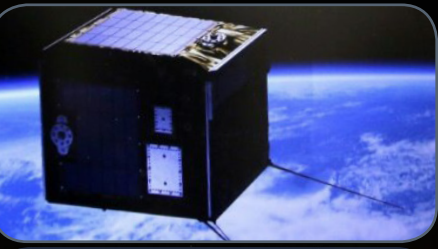
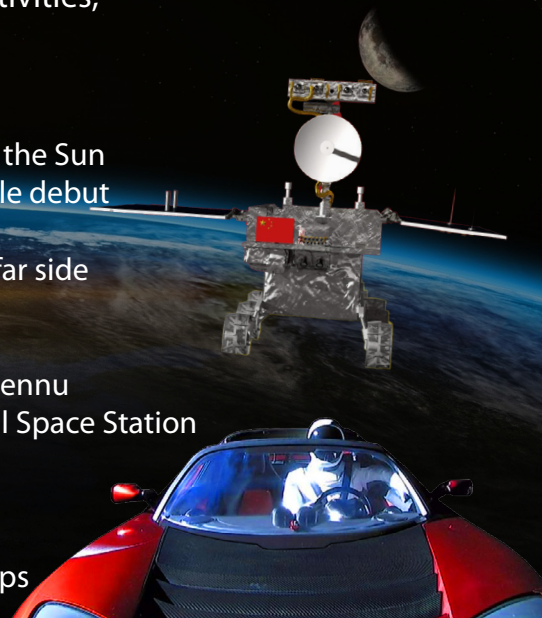
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BACK TO THE 2018

The Greatest Spaceflight Stories of 2018!

The year 2018 saw a wide range of milestones in spaceflight, stretching all the way from the Sun to the edge of interstellar space. Here are some of the highlights of this year's spaceflight activities;

- 1) NASA's InSight lands on Mars
- 2) Soyuz crew launch abort
- 3) Parker Solar Probe launches to "touch" the Sun
- 4) SpaceX's Falcon Heavy makes incredible debut
- 5) TESS launches in search of exoplanets
- 6) China lander launches to the moon's far side
- 7) Goodbye, Kepler and Dawn
- 8) Japan's Hayabusa 2 arrives at Ryugu
- 9) NASA's OSIRIS-REx arrives at asteroid Bennu
- 10) Hole in Soyuz capsule at International Space Station
- 11) Voyager 2 reaches interstellar space
- 12) Virgin Galactic reaches space
- 13) BepiColombo launches to Mercury
- 14) Cubesats make space exploration leaps

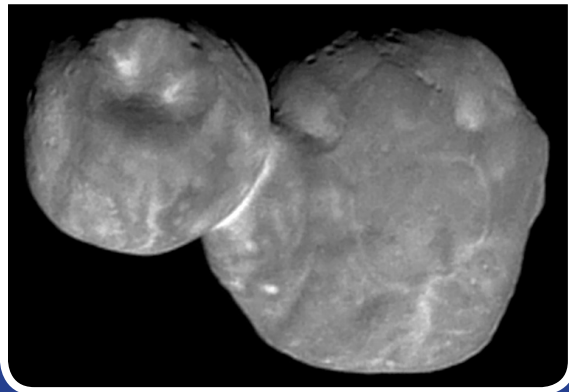


Japan Satellite Blasts Into Space to Deliver Artificial Meteors

A rocket carrying a satellite on a mission to deliver the world's first artificial meteor shower blasted into space on Friday, Japanese scientists said. A start-up based in Tokyo developed the micro-satellite for the celestial show over Hiroshima early next year as the initial experiment for what it calls a "shooting stars on demand" service. The satellite is to release tiny balls that glow brightly as they hurtle through the atmosphere, simulating a meteor shower. It hitched a ride on the small-size Epsilon-4 rocket that was launched from the Uchinoura space centre by the Japan Aerospace Exploration Agency (JAXA) on Friday morning. The company ALE Co. Ltd plans to deliver its first out-of-this-world show over Hiroshima in the spring of 2020.

Phys.com

Space.com



High-Quality Image of Ultima Thule

The New Horizons spacecraft got famous for its Pluto flyby in 2015, but here in 2019, it's been making discoveries that are just as fascinating.

On New Year's Day, New Horizons flew past a distant asteroid orbiting far beyond Pluto, which NASA is calling Ultima Thule. The day after the flyby, NASA released an image of the asteroid that revealed it to be snowman-shaped. Now they're releasing an even higher-quality image showing all of Ultima Thule's tiny details and explaining some of its mysteries.

At the border between day and night, the image shows a collection of small craters that are almost certainly caused by impacts. These small craters are important because astronomers can use them to estimate the number of small asteroids floating around in this part of the solar system. Such asteroids are so small and distant that it's impossible for us to survey them with telescopes, so impacts on a larger asteroid are the evidence we have that they even exist.

This is only the beginning of a lot of data New Horizons will send back over the next few months, and future downloads will include even better images along with all sorts of data scientists can use to learn more about this mysterious outer region of our solar system.

Popularmechanics.com



Prolonged Spaceflight Could Weaken Astronauts' Immune Systems

NASA hopes to send humans to Mars by 2030 on a round-trip mission that could take up to three years - far longer than any human has ever traveled in space. Such long-term spaceflights could adversely affect certain cells in the immune systems of astronauts, according to a new study led by University of Arizona researchers.

"What NASA and other space agencies are concerned about is whether or not the immune system is going to be compromised during very prolonged spaceflight missions," said Richard Simpson, senior author and associate professor of nutritional sciences at the UA.

"What clinical risks are there to the astronauts during these missions when they're exposed to things like microgravity, radiation and isolation stress? Could it be catastrophic to the level that the astronaut wouldn't be able to complete the mission?"

Simpson and his team of researchers at the UA, the University of Houston, Louisiana State University and NASA-Johnson Space Center, studied the effects of spaceflights of six months or more on natural killer cells, or NK cells, a type of white blood cell that kills cancerous cells in the body and prevents old viruses from reactivating.

"Cancer is a big risk to astronauts during very prolonged spaceflight missions because of the exposure to radiation," Simpson said. "The next question would be, how do we mitigate these effects? How do we prevent the immune system from declining during space travel?" he said. "In order to do that, you have to first figure out what's causing the decline: Is it stress? Is it microgravity? Is it radiation? Is it a plethora of things? When we figure that out, we can try to find ways to directly target those factors and mitigate them."

Simpson and his fellow researchers at NASA-Johnson Space Center, along with European and Russian scientists, are already working on potential countermeasures that could help keep astronauts healthy in space, including nutritional or pharmacological intervention and increased exercise, all of which have been shown to have a positive effect on immune system function.

Studies have shown that spending extended periods of time away from Earth comes with some health risks, such as muscle and bone loss due to the effects of microgravity. But scientists didn't know whether the unique conditions encountered by astronauts had an impact on the immune system until now. The paper, Spaceflight inhibits NK-cell function, was published in the *Journal of Applied Physiology*.

Spacedaily.com



Scientists are Learning How to Farm on Mars Through Trial and Error

By finely tuning optimal growing conditions, researchers hope to find the sweet spot for growing lettuce in space. Scientists in Norway and the Netherlands may have brought us closer to workable space farms, which experts agree are necessary if astronauts are ever going to reach Mars. "Astronauts stay on the International Space Station for six months and they can bring everything they need in either freeze-dried or vacuum packs, but the next goal for all space agencies is to reach Mars where travel is much longer," explained Silje Wolff, a plant physiologist at the Centre for Interdisciplinary Research in Space in Trondheim, Norway.

In the best possible conditions, it would take a spacecraft between six and nine months to reach Mars and the same to get back — not to mention the additional months they would likely spend there. "It's very challenging, if not impossible, for them to take everything they would need for such a long mission," she said. Growing plants in space is tough — low gravity means water distribution is difficult to manage, the roots are often starved of oxygen, and stagnant air reduces evaporation and increases the leaf temperature. But in a recent study, published

in the journal *Life*, Wolff conducted a sequence of trial-and-error tests to perfect the process of growing lettuce, data which the researchers plan to use to grow salad in space. By creating highly precise and optimal growing conditions, Wolff and her colleagues hope to offset the biological stress plants experience in space. The next step is to try out the experiments on the International Space Station. But a hydroponics system in space is not without its challenges. Hydroponic solutions in space wouldn't mix as they do on Earth, because density and weight don't separate cold and warm water in the same way. So as soon as the lettuce roots extract the oxygen from the solution in its immediate vicinity, it would become oxygen-deprived.

"The answer would be to bubble air through it, but if you inject air into hydroponics in space it just makes a foam that never goes away," said Gilroy. That's why Wolff and her team propose putting their plants in a centrifuge when they take their experiment to the International Space Station. This will create at least some gravity for the lettuce. Nevertheless, Levine said that Wolff's experiments in space will be highly valuable for the space farming endeavor.

A Meteorite Hit the Moon During Total Lunar Eclipse

Observers of Monday's lunar eclipse were blessed with the first known sighting of a meteorite impact during such an event. The so-called "super wolf blood moon" was eagerly watched by millions of people around the world, mostly via live streaming video. During the eclipse, some people noticed a tiny flash, a brief yellow-white speck, popping up on the lunar surface during the online broadcasts. One Reddit user raised the possibility that this was a meteorite impact and others scoured eclipse footage for evidence of the event. A flash is visible in at least three different videos.

Jose Maria Madiedo at the University of Huelva in Spain has confirmed that the impact is genuine. For years, he and his colleagues have been hoping to observe a meteorite impact on the moon during a lunar eclipse, but the brightness of these events can make that very difficult — lunar meteorite impacts have been filmed before, but not during an eclipse. On this occasion, Madiedo doubled the number of telescopes trained on different parts of the moon — from four to eight — in the hope of seeing an impact. "I had a feeling, this time will be the time it will happen," says Madiedo.

After the eclipse, software automatically pinpointed a flash in imagery recorded by several of his telescopes. This helps to confirm that the flashes seen by live stream-watchers were not just optical anomalies on camera sensors.

NewsScientist.com

ASTRO *Special* "Firsts in Space"

First Animal in Space

The first animal from Earth to be launched into space was a female dog from Russia named Laika, who took flight in 1957. She lived for seven days inside Sputnik II, proving that living creatures could survive in space.



First Woman in Space

The Soviets launched Valentina Tereshkova into space on June 16, 1963, on board Vostok 6. She spent three days alone in space.

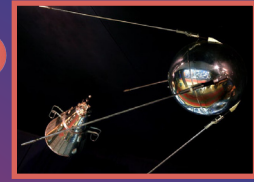


First Man on the Moon

Neil Armstrong became the first man to walk on the moon on July 20, 1969. He famously said, "That's one small step for man, one giant leap for mankind."



First Satellite to Orbit Earth



On October 4, 1957, the Soviet Union launched Sputnik, the world's first artificial satellite. This marked the beginning of the space race between the United States and the Soviet Union.

First Human in Space



Yuri Gagarin became the first human in space on April 12, 1961. There were some problems upon reentry, and Gagarin ejected from the Vostok 1 and parachuted to Earth.

First Space Walk



Cosmonaut Alexei Leonov took the first space walk on March 18, 1965. He was tethered to the Voskhod 2 and was outside the craft for 10 minutes.

CREDIT: SPACE.COM

Astronomy Picture of the Day

Sharpless 308: Star Bubble

Blown by fast winds from a hot, massive star, this cosmic bubble is huge. Cataloged as Sharpless 2-308 it lies some 5,200 light-years away toward the constellation of the Big Dog (Canis Major) and covers slightly more of the sky than a Full Moon. That corresponds to a diameter of 60 light-years at its estimated distance. The massive star that created the bubble, a Wolf-Rayet star, is the bright one near the center of the nebula. Wolf-Rayet stars have over 20 times the mass of the Sun and are thought to be in a brief, pre-supernova phase of massive star evolution. Fast winds from this Wolf-Rayet star create the bubble-shaped nebula as they sweep up slower moving material from an earlier phase of evolution.

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