Space News Update

— January 19, 2018 —

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1. Newly Spotted Asteroid Slips by Earth and Nearby Satellites

Lots of overheated headlines in tabloids and other publications this week have been screaming about a large, "potentially hazardous" asteroid set to pass close by Earth.

Meanwhile, a newly discovered car-size asteroid passed over 100 times closer to us on Thursday -- coming near the altitude where many man-made satellites orbit -- and hardly anyone noticed.

Asteroid 2018 BD flew by our planet at a distance of about 22,000 miles (35,406 km) at 7:43 a.m. PT, just seven hours after being discovered via the Catalina Sky Survey.

Notably, satellites in geosynchronous orbit are typically at an altitude of around 22,236 miles (35,786 kilometers). So while much smaller, 2018 BD was arguably much more potentially hazardous than the other space rock making headlines: skyscraper-size 2002 AJ129, which will pass by us on Feb. 4 at a distance of over 2 million miles, or more than 10 times the distance between the Earth and our moon.

In reality, neither asteroid poses much of a threat to life and limb. But the idea of a building-size rock labeled "potentially hazardous" making its way through our cosmic neighborhood makes for good headlines.

The thing is no one is sitting at NASA and deciding which individual asteroids make them the most nervous and thereby worthy of such a title. Instead the classification is based on simply how far away and how big the asteroid is. Roughly speaking, earning the label requires nothing more than being larger than about 500 feet (140 meters) in diameter and passing within about 4.7 million miles (7.5 million kilometers) of Earth.

That means that an awful lot of asteroids are classified as "potentially hazardous," including a number of newly discovered asteroids, which the International Astronomical Union's Minor Planet Center regularly

announces via Twitter. In fact, a few dozen such rocks cruised through the inner solar system last year without incident.

2018 BD is too small to be considered for the title, and if it were on a collision course with Earth, much of it would likely burn up in the atmosphere. But its proximity to geosynchronous orbit makes it potentially more hazardous than the more distant, larger asteroids that garner attention like 2002 AJ129.

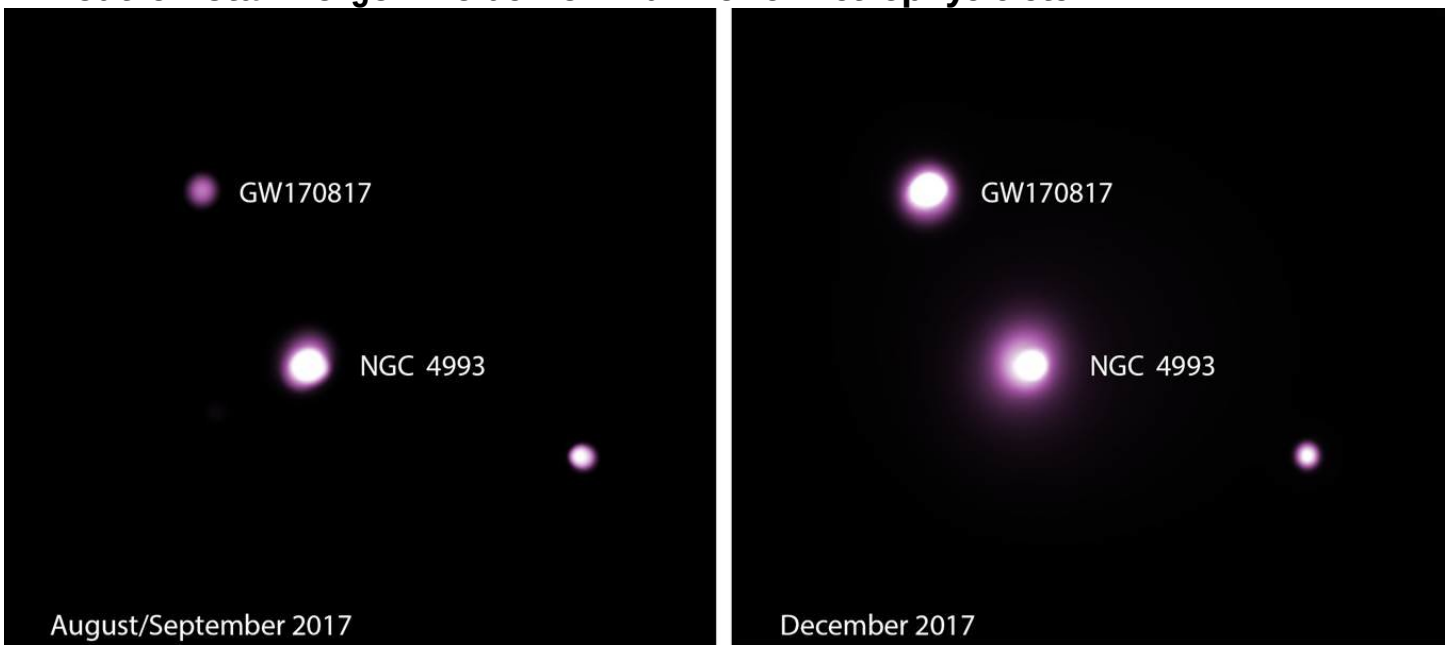
A collision with a satellite could create a whole mess of orbital space junk that then collides with other satellites. In the worst case scenario, cascading collisions could trigger something called Kessler Syndrome, which essentially cuts off our access to space and presumably has major impacts on our satellite-dependent global communications system.

Realistically though, the notion of a small asteroid like 2018 BD hitting a satellite probably shouldn't keep you up at night. Even though it's coming near the altitude of geosynchronous orbit, there's still an awful lot of three-dimensional space in that range and a collision would be quite unlikely (though certainly not impossible).

What's probably more important is to know what a potentially hazardous asteroid really is: something that astronomers think is worth watching. It's not unlike those potentially hazardous storm clouds on the horizon that have never flung a deadly lightning bolt your way. Even still, it's best to keep an eye on them.

Source: CNET Return to Contents

2. Neutron-Star Merger Yields New Puzzle for Astrophysicists



The afterglow from the distant neutron-star merger detected last August has continued to brighten - much to the surprise of astrophysicists studying the aftermath of the massive collision that took place about 138 million light years away and sent gravitational waves rippling through the universe.

New observations from NASA's orbiting Chandra X-ray Observatory, reported in *Astrophysical Journal Letters*, indicate that the gamma ray burst unleashed by the collision is more complex than scientists initially imagined.

"Usually when we see a short gamma-ray burst, the jet emission generated gets bright for a short time as it smashes into the surrounding medium - then fades as the system stops injecting energy into the outflow," says McGill University astrophysicist Daryl Haggard, whose research group led the new study. "This one is different; it's definitely not a simple, plain-Jane narrow jet."

Cocoon theory

The new data could be explained using more complicated models for the remnants of the neutron star merger. One possibility: the merger launched a jet that shock-heated the surrounding gaseous debris, creating a hot 'cocoon' around the jet that has glowed in X-rays and radio light for many months.

The X-ray observations jibe with radio-wave data reported last month by another team of scientists, which found that those emissions from the collision also continued to brighten over time.

While radio telescopes were able to monitor the afterglow throughout the fall, X-ray and optical observatories were unable to watch it for around three months, because that point in the sky was too close to the Sun during that period.

"When the source emerged from that blind spot in the sky in early December, our Chandra team jumped at the chance to see what was going on," says John Ruan, a postdoctoral researcher at the McGill Space Institute and lead author of the new paper. "Sure enough, the afterglow turned out to be brighter in the X-ray wavelengths, just as it was in the radio."

Physics puzzle

That unexpected pattern has set off a scramble among astronomers to understand what physics is driving the emission. "This neutron-star merger is unlike anything we've seen before," says Melania Nynka, another McGill

postdoctoral researcher. "For astrophysicists, it's a gift that seems to keep on giving." Nynka also co-authored the new paper, along with astronomers from Northwestern University and the University of Leicester.

The neutron-star merger was first detected on Aug. 17 by the U.S.-based Laser Interferometer Gravitational-Wave Observatory (LIGO). The European Virgo detector and some 70 ground- and space-based observatories helped confirm the discovery.

The discovery opened a new era in astronomy. It marked the first time that scientists have been able to observe a cosmic event with both light waves—the basis of traditional astronomy—and gravitational waves, the ripples in space-time predicted a century ago by Albert Einstein's general theory of relativity. Mergers of neutron stars, among the densest objects in the universe, are thought to be responsible for producing heavy elements such as gold, platinum, and silver.

Explore further: Radio observations point to likely explanation for neutron-star merger phenomena

More information: John J. Ruan et al. Brightening X-Ray Emission from GW170817/GRB 170817A: Further Evidence for an Outflow, *The Astrophysical Journal* (2018). DOI: 10.3847/2041-8213/aaa4f3

Source: Phys.org

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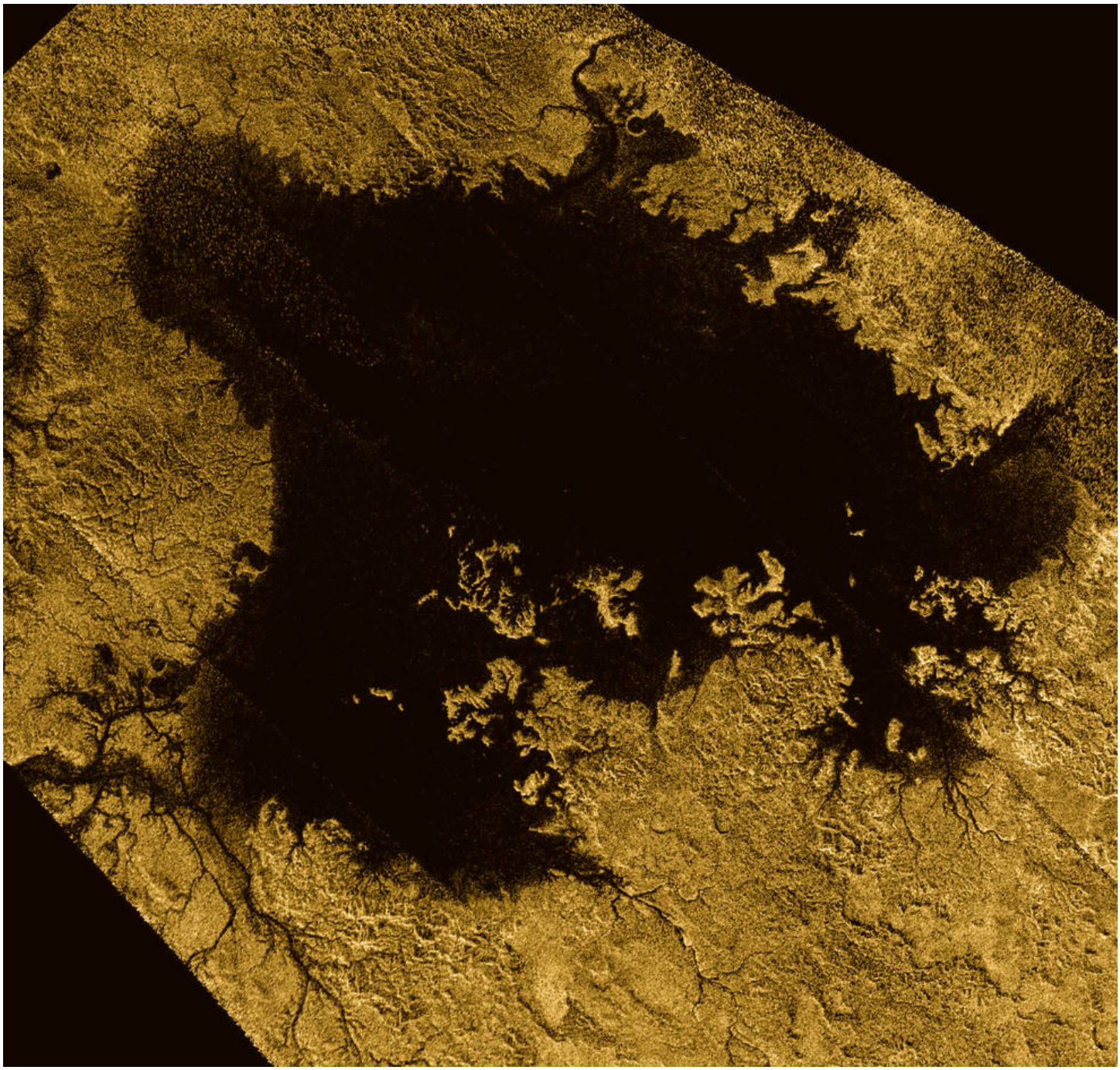
3. Cassini Finds Saturn Moon Has 'Sea Level' Like Earth



Saturn’s moon Titan may be nearly a billion miles away from Earth, but a recently published paper based on data from NASA’s Cassini spacecraft reveals a new way this distant world and our own are eerily similar. Just as the surface of oceans on Earth lies at an average elevation that we call “sea level,” Titan’s seas also lie at an average elevation.

This is the latest finding that shows remarkable similarities between Earth and Titan, the only other world we know of in our solar system that has stable liquid on its surface. The twist at Titan is that its lakes and seas are filled with hydrocarbons rather than liquid water, and water ice overlain by a layer of solid organic material serves as the bedrock surrounding these lakes and seas.

The new paper, led by Alex Hayes at Cornell University in Ithaca, New York, and published in the journal Geophysical Research Letters, finds that Titan's seas follow a constant elevation relative to Titan's gravitational pull -- just like Earth's oceans. Smaller lakes on Titan, it turns out, appear at elevations several hundred feet, or meters, higher than Titan's sea level. Lakes at high elevation are commonly found on Earth. The highest lake navigable by large ships, Lake Titicaca, is over 12,000 feet [3,700 meters] above sea level.

The new study suggests that elevation is important because Titan's liquid bodies appear to be connected under the surface in something akin to an aquifer system at Earth. Hydrocarbons appear to be flowing underneath Titan's surface similar to the way water flows through underground porous rock or gravel on Earth, so that nearby lakes communicate with each other and share a common liquid level.

The paper was based on data obtained by Cassini's radar instrument until just months before the spacecraft burned up in the Saturn atmosphere last year. It also used a new topographical map published in the same issue of Geophysical Research Letters.

For more details on the two papers, visit:

https://news.cornell.edu/stories/2018/01/saturns-moon-titan-sports-earth-features

The Cassini-Huygens mission is a cooperative project of NASA, ESA (European Space Agency) and the Italian Space Agency. NASA's Jet Propulsion Laboratory, a division of Caltech in Pasadena, manages the mission for NASA's Science Mission Directorate, Washington. JPL designed, developed and assembled the Cassini orbiter. The radar instrument was built by JPL and the Italian Space Agency, working with team members from the U.S. and several European countries.

More information about Cassini:

https://www.nasa.gov/cassini

https://saturn.jpl.nasa.gov

Source: NASA Return to Contents

The Night Sky

Friday, January 19

• Sirius twinkles brightly below Orion in the southeast. Sometime around 8 p.m., depending on your location, Sirius shines *precisely below* fiery Betelgeuse in Orion's shoulder, as captured at right. How accurately can you time this event for your location, perhaps using a plumb bob or the vertical edge of a building?

Of the two, Sirius leads early in the evening, and Betelgeuse leads later. Welcome to pre-telescopic astronomy.

• The Moon is still just a thin waxing crescent, and in any case it sets pretty soon after dark. So: is your sky dark enough for you to see the winter Milky Way? The Milky Way runs up from Canis Major low in the southeast, then between Orion and Gemini, through Auriga and Perseus almost overhead, and down through Cassiopeia, Cepheus, and Cygnus to the northwest horizon. The Milky Way goes right across your zenith around 9 p.m. (depending on your location).

Saturday, January 20

• Zero-magnitude Capella high overhead, and equally bright Rigel in Orion's foot, are at almost the same right ascension. This means they cross your sky's meridian at almost exactly the same time: around 9 p.m., depending on how far east or west you live in your time zone. (Capella goes exactly through your zenith if you're at latitude 46° north: Portland, Oregon; Montreal; central France.)

So whenever Capella passes its very highest, Rigel always marks true south over your landscape, and vice versa.

Sunday, January 21

• The waxing crescent Moon remains up in the west-southwest after dark now. Right after dusk, look to the Moon's left (by about two fists at arm's length) for orange Beta Ceti, 2nd magnitude. That's about as bright as the stars of the Great Square of Pegasus — which you'll find balancing on one corner a little farther to the Moon's upper right.

Monday, January 22

• Orion is now high in the southeast right after dark, and he's highest due south around 10 p.m. Orion is the brightest of the 88 constellations, but his main pattern is surprisingly small compared to some of his dimmer neighbors. The biggest of these is Eridanus the River to his west, enormous but hard to trace. Dimmer Fornax the Furnace, to Eridanus's lower right, is almost as big as Orion! Even the main pattern of Lepus, the Hare cowering under Orion's feet, isn't much smaller than he is.

Source: Sky & Telescope

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ISS Sighting Opportunities

For Denver:

Date	Visible	Max Height	Appears	Disappears
Mon Jan 22, 6:53 PM	< 1 min	10°	10° above S	10° above S
Tue Jan 23, 7:36 PM	< 1 min	13°	10° above SW	13° above SW

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

NASA-TV Highlights

(all times Eastern Daylight Time)

Friday, January 19

1 p.m., 4 p.m., 8 p.m, SpaceCast Weekly (all channels)

2 p.m., 6 p.m., 9 p.m., Replay of the RS-25 Engine Fire Test from Stennis Space Center (all channels)

Saturday, January 20

8 a.m., 8 p.m., Replay of SpaceCast Weekly (all channels)

9 a.m., 3 p.m., 7 p.m., Replay of the ISS Expedition 54 U.S. Spacewalk Preview Briefing (all channels)

1 p.m, NASA in Silicon Valley Live - Episode 01 - We're Going Back to the Moon! (NTV-1 (Public))

2 p.m., 4 p.m., 6 p.m., 9 p.m., Replay of the RS-25 Engine Fire Test from Stennis Space Center (all channels)

5 p.m., 10 p.m., Replay of NASA in Silicon Valley Live - Episode 01 - We're Going Back to the Moon! (NTV-1 (Public))

Sunday, January 21

7 a.m., Replay of SpaceCast Weekly (all channels)

8 a.m., Replay of NASA in Silicon Valley Live - Episode 01 - We're Going Back to the Moon! (NTV-1 (Public))

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

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Space Calendar

- Jan 19 - UPDATED [Jan 17] SBIRS GEO-4 Atlas 5 Launch
- Jan 19 - UPDATED [Jan 17] Flock-2/ Lemur-2 Electron Launch
- Jan 19 - Jilin 1-07 & 1-08/ Kepler 1/ Xiaoxiang 2-5/Huaian/QTT CZ-11 Launch
- Jan 19 - Comet 238P/Read Closest Approach To Earth (2.243 AU)
- Jan 19 - Comet C/2017 Y1 (PANSTARRS) At Opposition (3.013 AU)
- Jan 19 - Comet P/1998 VS24 (LINEAR) Perihelion (3.439 AU)
- Jan 19 - Comet C/2016 A1 (PANSTARRS) At Opposition (4.398 AU)
- Jan 19 - NEW [Jan 18] Apollo Asteroid 2018 BC Near-Earth Flyby (0.002 AU)
- Jan 19 - NEW [Jan 19] Apollo Asteroid 2018 AE13 Near-Earth Flyby (0.092 AU)
- Jan 19 - Asteroid 43844 Rowling Closest Approach To Earth (1.978 AU)
- Jan 19 - Harold Reitsema's 70th Birthday (1948)
- Jan 20 - Comet 149P/Mueller Closest Approach To Earth (2.675 AU)
- Jan 20 - Comet 338P/McNaught At Opposition (2.680 AU)
- Jan 20 - Comet C/2017 G3 (PANSTARRS) Closest Approach To Earth (2.945 AU)
- Jan 20 - NEW [Jan 19] Amor Asteroid 2018 BU Near-Earth Flyby (0.052 AU)
- Jan 20 - Apollo Asteroid 2015 NJ3 Near-Earth Flyby (0.056 AU)
- Jan 20 - Apollo Asteroid 2017 MT8 Near-Earth Flyby (0.057 AU)
- Jan 20 - NEW [Jan 15] Amor Asteroid 2018 AN3 Near-Earth Flyby (0.071 AU)
- Jan 20 - Asteroid 2322 Kitt Peak Closest Approach To Earth (1.314 AU)
- Jan 20 - Jerry Ross' 70th Birthday (1948)
- Jan 20 - Simon Marius' 445th Birthday (1573)
- Jan 21 - Comet P/2011 S1 (Gibbs) At Opposition (6.727 AU)
- Jan 21 - Apollo Asteroid 2015 XK351 Near-Earth Flyby (0.073 AU)
- Jan 21 - Asteroid 15845 Bambi Closest Approach To Earth (1.465 AU)
- Jan 21 - Asteroid 10168 Stony Ridge Closest Approach To Earth (1.707 AU)
- Jan 21 - Asteroid 24750 Ohm Closest Approach To Earth (1.760 AU)
- Jan 21 - Asteroid 23469 Neilpeart Closest Approach To Earth (1.921 AU)
- Jan 21 - Apollo Asteroid 314082 Dryope Closest Approach To Earth (1.939 AU)
- Jan 21 - Kuiper Belt Object 20000 Varuna At Opposition (42.904 AU)
- Jan 21 - Bengt Stromgren's 110th Birthday (1908)
- Jan 21 - Luis Cruls' 170th Birthday (1848)
- Jan 22 - HOT [Jan 15] 50th Anniversary (1968), Apollo 5 Launch
- Jan 22 - Comet 130P/McNaught-Hughes Perihelion (1.824 AU)
- Jan 22 - Comet 10P/Tempel At Opposition (3.610 AU)
- Jan 22 - Comet C/2015 D3 (PANSTARRS) Closest Approach To Earth (8.144 AU)
- Jan 22 - Aten Asteroid 306383 (1993 VD) Near-Earth Flyby (0.037 AU)
- Jan 22 - Amor Asteroid 2006 AL4 Near-Earth Flyby (0.055 AU)
- Jan 22 - Asteroid 2843 Yeti Closest Approach To Earth (1.058 AU)
- Jan 22 - Asteroid 6216 San Jose Closest Approach To Earth (1.635 AU)
- Jan 22 - Asteroid 7000 Curie Closest Approach To Earth (1.720 AU)
- Jan 22 - Asteroid 6128 Lasorda Closest Approach To Earth (2.093 AU)
- Jan 22 - Asteroid 12542 Laver Closest Approach To Earth (2.603 AU)
- Jan 22 - 20th Anniversary (1998), STS-89 Launch (Space Shuttle Endeavour, Mir Space Station)
- Jan 22 - UNOOSA Director's Briefing on UNISPACE+50, Vienna, Austria
- Jan 22 - Lev Landau's 110th Birthday (1908)

Source: JPL Space Calendar

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Food for Thought

Kilopower: What's Next?

When astronauts someday venture to the Moon, Mars and other destinations, one of the first and most important resources they will need is power. A reliable and efficient power system will be essential for day-to-day necessities, such as lighting, water and oxygen, and for mission objectives, like running experiments and producing fuel for the long journey home.

That's why NASA is conducting experiments on Kilopower, a new power source that could provide safe, efficient and plentiful energy for future robotic and human space exploration missions.

This pioneering space fission power system could provide up to 10 kilowatts of electrical power -- enough to run two average households -- continuously for at least ten years. Four Kilopower units would provide enough power to establish an outpost.

About the Experiment
The prototype power system was designed and developed by NASA's Glenn Research Center in collaboration with NASA's Marshall Space Flight Center and the Los Alamos National Laboratory, while the reactor core was provided by the Y12 National Security Complex. NASA Glenn shipped the prototype power system from Cleveland to the Nevada National Security Site (NNSS) in late September.

The team at the NNSS recently began tests on the reactor core. According to NASA Glenn's Marc Gibson, the Kilopower lead engineer, the team will connect the power system to the core and begin end-to-end checkouts this month. Gibson says the experiments should conclude with a full-power test lasting approximately 28 hours in late March.

The Kilopower advantage
Fission power can provide abundant energy anywhere we want humans or robots to go. On Mars, the sun's power varies widely throughout the seasons, and periodic dust storms can last for months. On the Moon, the cold lunar night lingers for 14 days.

"We want a power source that can handle extreme environments," says Lee Mason, NASA's principal technologist for power and energy storage. "Kilopower opens up the full surface of Mars, including the northern latitudes where water may reside. On the Moon, Kilopower could be deployed to help search for resources in permanently shadowed craters."

In these challenging environments, power generation from sunlight is difficult and fuel supply is limited. Kilopower is lightweight, reliable and efficient, which makes it just right for the job.

For more information about the Kilopower project, visit
https://www.nasa.gov/directorates/spacetech/kilopower

Source: NASA

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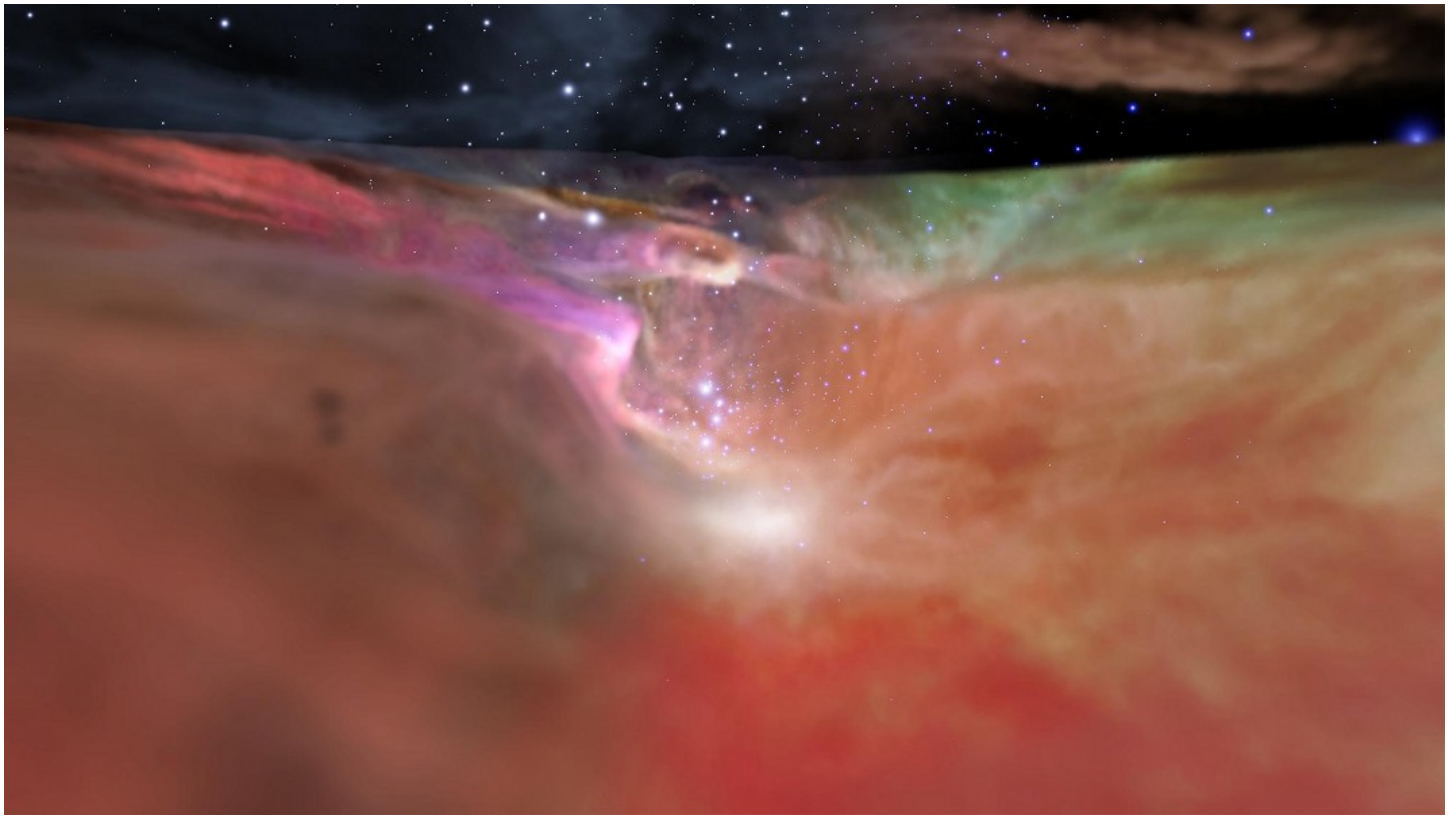
Space Image of the Week



In the Valley of Orion

Explanation This exciting and unfamiliar view of the Orion Nebula is a visualization based on astronomical data and movie rendering techniques. Up close and personal with a famous stellar nursery normally seen from 1,500 light-years away, the digitally modeled frame transitions from a visible light representation based on Hubble data on the left to infrared data from the Spitzer Space Telescope on the right. The perspective at the center looks along a valley over a light-year wide, in the wall of the region's giant molecular cloud. Orion's valley ends in a cavity carved by the energetic winds and radiation of the massive central stars of the Trapezium star cluster. The single frame is part of a multiwavelength, three-dimensional video that lets the viewer experience an immersive, three minute flight through the Great Nebula of Orion.

Source: APOD

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