

Space 2022

NASA

3- March 1, 2022

NASA Inspector General Paul Martin says that operational costs alone for a single Artemis launch—for just the rocket, Orion spacecraft, and ground systems—will total \$4.1 billion... "...a price tag that strikes us as unsustainable."

<https://arstechnica.com/science/2022/03/nasa-inspector-general-says-sls-costs-are-unsustainable/>

6- March 18, 2022

NASA astronaut Mark Vande Hei reached a historic milestone this week, claiming the record for the longest single spaceflight of a U.S. astronaut after spending 355 days in low-Earth orbit.

<https://www.nasa.gov/feature/record-breaking-nasa-astronaut-mark-vande-heis-contributions-to-human-research-studies>

4- March 23, 2022

NASA to support development of second Artemis lunar lander

<https://spacenews.com/nasa-to-support-development-of-second-artemis-lunar-lander/>

...update December 9, 2022: Blue Origin's "The National Team" submitted its Option A proposal for its Human Landing System (HLS) National Team, which includes Lockheed Martin, Northrop Grumman, and Draper.

<https://blueorigin.com/news/national-team-submits-moon-proposal-to-nasa/>

5- September 29, 2022

SOFIA's last flight

Most infrared light from outer space never reaches the ground. It's absorbed along the way by water in Earth's atmosphere. So if astronomers want to observe that distant light, they have to get creative.

For years, particularly between the retirement of the [Spitzer Space Telescope](#) and the launch of the [James Webb Space Telescope](#) (JWST), the Stratospheric Observatory for Infrared Astronomy (SOFIA) was that creative solution. The airborne observatory carried a 2.5-meter telescope aboard a modified Boeing 747SP airplane. Rather than going all the way to space, however, SOFIA simply flew high *enough* — up to 45,000 feet (13.7 kilometers) — to get above some 99 percent of the water in our atmosphere.

But [earlier this year](#), NASA and the German Space Agency announced SOFIA would be shut down by Sept. 30. SOFIA's final flight was overnight on Sept. 28/29, taking off from and landing at Palmdale, California. The loss of SOFIA, according to those who flew on it, will be profound. But the legacy it leaves behind is something to cherish.

<https://spacenews.com/nasa-and-dlr-to-end-sofia-operations/>

<https://astronomy.com/news/2022/09/sofia-flying-observatory-takes-final-flight>

...update December 8, 2022. The 747 will be retired to Pima Air & Space Museum in Tucson, Arizona.

<https://www.nasa.gov/feature/nasa-s-retired-sofia-aircraft-finds-new-home-at-arizona-museum>

July 27, 2022

NASA, ESA CHANGE COURSE ON MARS SAMPLE RETURN

NASA and ESA announced a major change of plans today for the Mars Sample Return campaign. The two agencies will still work together to return the samples now being collected by NASA's Perseverance rover, but Perseverance itself will transport the samples to their departure point for the trip back to Earth instead of an ESA rover. Not only that, but NASA will send two more helicopters to Mars to

provide a backup method for retrieving the samples in case something goes awry with Perseverance. ESA still is providing the spacecraft to make the trip back to Earth and a robotic transfer arm
<https://spacepolicyonline.com/news/nasa-esa-change-course-on-mars-sample-return/>

August 19, 2022

NASA selects potential lunar landing sites for Artemis 3

<https://spacenews.com/nasa-selects-potential-lunar-landing-sites-for-artemis-3/>

5- September 30, 2022

NASA and SpaceX to study possible private Hubble servicing mission

<https://spacenews.com/nasa-and-spacex-to-study-possible-private-hubble-servicing-mission/>

8- October 20, 2022

NASA Orders Three More Orion Spacecraft From Lockheed Martin

<https://news.lockheedmartin.com/2022-10-20-NASA-Orders-Three-More-Orion-Spacecraft-from-Lockheed-Martin>

7- November 15, 2022

NASA awards SpaceX \$1.15 billion contract for second Artemis lander mission

<https://spacenews.com/nasa-awards-spacex-1-15-billion-contract-for-second-artemis-lander-mission/>

1- November 16, 2022

SLS takes flight. Artemis 1 in route to the Moon

<https://spacenews.com/sls-launches-artemis-1-mission/>

...update 12/11/22: Orion capsule splashes down in the Pacific

2- December 12, 2022:

NASA, Boeing Finalize \$3.2 Billion Contract to continue manufacturing core and upper stages for future Space Launch System rockets for Artemis missions to the Moon.

<https://spacecoastdaily.com/2022/12/nasa-boeing-finalize-3-2-billion-contract-to-continue-future-artemis-moon-rocket-production/>

Space Science

February 11, 2022

Third planet discovered around Proxima Centauri

<https://www.centauri-dreams.org/2022/02/11/a-third-world-at-proxima-centauri/>

April 2, 2022

NASA's Perseverance Rover Captures Video of Solar Eclipse on Mars

<https://www.jpl.nasa.gov/news/nasas-perseverance-rover-captures-video-of-solar-eclipse-on-mars>

7- April 25, 2022

The much-anticipated Decadal Survey for Planetary Science and Astrobiology hit the streets today.

<https://nap.nationalacademies.org/catalog/26522/origins-worlds-and-life-a-decadal-strategy-for-planetary-science>

Experts spent two years deliberating over the key planetary science questions to be addressed over the next 10 years and agreed that the top priorities are finishing two flagship programs recommended in the last Decadal Survey: Europa Clipper and Mars Sample Return. For this round, they identified Uranus as next in line, pointing out that the Ice Giant may be the most common type of planet in the universe, but one we have investigated the least.

4- May 11, 2022

First image of Milky Way's supermassive blackhole Sag A*

The image was created by the Event Horizon Telescope (EHT) — a global network of radio telescopes whose movements are choreographed so they function as one virtual, planet-sized telescope. The researchers focused the EHT array on the center of our galaxy, 27,000 light years from Earth, cutting through our planet's atmosphere and the turbulent plasma beyond our solar system.

The resulting image reveals Sgr A* for the first time, in the form of a glowing, donut-shaped ring of light. This ring structure lies just outside the event horizon, or the point beyond which light cannot escape, and is the result of light being bent by the black hole's enormous gravity. The bright ring encircles a dark center, described as the black hole's "shadow."

The ring's white-hot plasma is estimated to be 10 billion Kelvin, or 18 billion degrees Fahrenheit. Judging from the ring's dimensions, Sgr A* is roughly 4 million times the mass of the sun and incredibly compact, with a size that could fit within the orbit of Venus.

<https://news.mit.edu/2022/first-supermassive-black-hole-sagittarius-0512>

1- July 12, 2022

First JWST images excite and relieve astronomers

NASA released the long-anticipated first science observations from the James Webb Space Telescope July 12, the culmination of decades of work and the start of a new era in astrophysics.

<https://spacenews.com/first-jwst-images-excite-and-relieve-astronomers/>

- a) Carina Nebula "Cosmic Cliffs"
- b) Stephan's Quintet, a visual grouping of five galaxies, is best known for being prominently featured in the holiday classic film, "It's a Wonderful Life."

- c) Southern Ring Nebula, a planetary nebulae composed of clouds of gas and dust expelled by a star at the end of its life.
- d) WASP – 96 b: Hot gas giant planet orbiting a sun-like star spectrum showing the distinct signature of water, along with evidence for clouds and haze, in the atmosphere surrounding a hot, puffy gas giant planet orbiting a distant Sun-like star.
- e) Galaxy cluster SMACS 0723 - deepest and sharpest infrared image of the distant universe so far is approximately the size of a grain of sand held at arm's length, a tiny sliver of the vast universe. The combined mass of this galaxy cluster acts as a [gravitational lens](#), magnifying more distant galaxies, including some seen when the universe was less than a billion years old.

...update November 17, 2022 Researchers found two exceptionally bright galaxies that existed approximately 350 and 450 million years after the big bang. Their extreme brightness is puzzling to astronomers. The young galaxies are transforming gas into stars extremely rapidly. They appear compacted in spherical or disk shapes that are much smaller than our Milky Way galaxy. <https://webbtelescope.org/contents/news-releases/2022/news-2022-044>

...update November 22, 2022: (update 11/22/22: 5 papers have now been published on line including one documenting evidence of photochemistry, i.e. Sulfur Dioxide) <https://news.ucsc.edu/2022/11/exoplanet-spectra.html>

...update December 1, 2022 NASA Releases New JWST And W. M. Keck Observatory Images Of Titan, Saturn's Moon showing clouds in the methane atmosphere <https://keckobservatory.org/titan-clouds/>

....update December 3, 2022 James Webb Space Telescope have just identified the most distant galaxy ever observed by human eyes. <https://blogs.nasa.gov/webb/2022/12/09/nasas-webb-reaches-new-milestone-in-quest-for-distant-galaxies/>

As reported by Andrew Fraknoi, this galaxy is so far away that the infrared light we see left the baby galaxy just 350 million years after the Big Bang. That's looking back through 98% of the time that has passed in the universe — closer to the dawn of time than any other galaxy seen so far. Andrew recently gave a talk on November 30 at the Commonwealth Club in SF on JWST discoveries which was made public on YouTube: https://www.youtube.com/watch?v=j57HR0QZw_Y

3- August 31, 2022

MOXIE Experiment Successfully Making Oxygen on Mars

In a study published today (August 31, 2022) in the journal *Science Advances*, researchers report that, by the end of 2021, MOXIE was able to produce oxygen on seven experimental runs. These were performed in a variety of atmospheric conditions, including during the day and night, and through different Martian seasons. In each experimental run, the instrument reached its target of producing six grams of oxygen per hour. This is about the rate of a modest tree on Earth.

From the Abstract:

MOXIE [Mars Oxygen In Situ Resource Utilization (ISRU) Experiment] is the first demonstration of ISRU on another planet, producing oxygen by solid oxide electrolysis of carbon dioxide in the martian atmosphere. A scaled-up MOXIE would contribute to sustainable human exploration of Mars by producing on-site the tens of tons of oxygen required for a rocket to transport astronauts off the surface of Mars, instead of having to launch hundreds of tons of material from Earth's surface to transport the required oxygen to Mars. MOXIE has produced oxygen seven times between landing in February 2021 and the end of 2021 and will continue to demonstrate oxygen production during night and day

throughout all martian seasons. This paper reviews what MOXIE has accomplished and the implications for larger-scale oxygen-producing systems.

<https://www.science.org/doi/10.1126/sciadv.abp8636>

2- September 26, 2022

DART collides with asteroid in planetary defense test

<https://spacenews.com/dart-collides-with-asteroid-in-planetary-defense-test/>

...continued:

October 11, 2022

Analysis of data obtained over the last two weeks by NASA's Double Asteroid Redirection Test (DART) investigation team shows the spacecraft's kinetic impact with its target asteroid, Dimorphos, successfully altered the asteroid's orbit. This marks humanity's first time purposely changing the motion of a celestial object and the first full-scale demonstration of asteroid deflection technology.

<https://www.nasa.gov/press-release/nasa-confirms-dart-mission-impact-changed-asteroid-s-motion-in-space>

6- October 4, 2022

Quantum experiments with entangled photons win the 2022 Nobel Prize in physics

Experiments on a bizarre feature of quantum physics known as entanglement, what Einstein called "Spooky Action at a Distance". When two particles are entangled, what happens to one determines what happens to the other — even if the particles are across the universe.

<https://www.sciencenews.org/article/physics-nobel-prize-2022-quantum-entanglement-tech>

PBS Space Time has a good video on it:

<https://youtu.be/US7fEkBsy4A>

5- October 9, 2022

Brightest-Ever Space Explosion Reveals Possible Hints of Dark Matter

<https://www.quantamagazine.org/brightest-ever-space-explosion-could-help-explain-dark-matter-20221026/>

Scientists are calling it the BOAT. The explosion was a long gamma-ray burst, a cosmic event where a massive dying star unleashes powerful jets of energy as it collapses into a black hole or neutron star. This particular burst was so bright that it oversaturated the Fermi Gamma-ray Space Telescope, an orbiting NASA telescope designed in part to observe such events. "There were so many photons per second that they couldn't keep up," said Andrew Levan, an astrophysicist at Radboud University in the Netherlands. The burst even appears to have caused Earth's ionosphere, the upper layer of Earth's atmosphere, to swell in size for several hours. "The fact you can change Earth's ionosphere from an object halfway across the universe is pretty incredible," said Doug Welch, an astronomer at McMaster University in Canada.

October 27, 2022

NASA's InSight Lander Detects Stunning Meteoroid Impact on Mars

<https://www.nasa.gov/feature/jpl/nasa-s-insight-lander-detects-stunning-meteoroid-impact-on-mars>

NASA's InSight lander recorded a magnitude 4 marsquake last Dec. 24 2021, but scientists learned only later the cause of that quake: a meteoroid strike in the Amazonis Planitia region estimated to be one of the biggest seen on. What's more, the meteoroid excavated boulder-size chunks of ice buried closer to the Martian equator than ever found before — a discovery with implications for NASA's future plans to send astronauts to the Red Planet.

8- November 4, 2022

Astronomers have found the closest known black hole to Earth

The closest black hole yet found is just 1,560 light-years from Earth, a new study reports. The black hole, dubbed Gaia BH1, is about 10 times the mass of the sun and orbits a sunlike star.

<https://www.sciencenews.org/article/closest-known-black-hole-to-earth>

Commercial Space

January 20, 2022

Tom Cruise space movie producers sign deal with Axiom to build studio in orbit:

<https://www.cnn.com/2022/01/20/tom-cruise-movie-producers-sign-axiom-deal-for-space-production-studio.html>

January 24, 2022

SpaceX wins \$102 million Air Force contract for point-to-point transportation

<https://spacewatch.global/2022/01/spacex-wins-102-million-air-force-contract-for-point-to-point-transportation/>

5- February 7, 2022

Startup Quantum Space plans to create robotic outpost near the Moon and will help in providing internet capabilities on the lunar surface. It will also refuel spacecrafts, collect data and help assemble structures in lunar space.

<https://www.wionews.com/science/startup-plans-to-create-robotic-outpost-near-the-moon-451096>

...update 12/13/15: The startup raises \$15 in a Series A round from venture fund Prime Movers Lab

<https://spacenews.com/quantum-space-raises-15-million-for-cislunar-spacecraft/>

February 14, 2022

SpaceX and Isaacman to partner on series of crewed Dragon and Starship flights call Polaris

Jared Isaacman, who funded and flew on the Inspiration4 Crew Dragon mission last September, said he was starting the Polaris Program to build up experience in human spaceflight in cooperation with SpaceX to help the company meet its goals of sending humans to the moon and Mars.

<https://spacenews.com/spacex-and-isaacman-to-partner-on-series-of-crewed-dragon-and-starship-flights/>

7- April 8, 2022

Rocket lab recovers first stage by helicopter for the first time.

<https://spacenews.com/rocket-lab-tests-electron-stage-recovery/>

4- April 22, 2022

The Japanese startup Ispace has now obtained the first insurance plan ever for a private lunar lander.

The startup has signed a Memorandum of Understanding with Mitsui Sumitomo Insurance (MSI), a Tokyo-based firm that started working with ispace in 2019, to insure its first attempt to send a lander to the moon later this year.

The agreement outlines intentions to finalize terms for the insurance in the months leading up to ispace's Mission 1 (M1), which is currently slated to fly on a Falcon 9 rocket no earlier than the fourth quarter of 2022.

According to ispace, the insurance would cover any damage the lander takes between separating from the rocket in a trans-lunar orbit (TLO) and touching down on the moon.

<https://spacenews.com/japans-ispac-negotiating-first-commercial-moon-landing-insurance/>

...Update Nov. 8, 2022 - Ispace receives license from Japanese Government to conduct business activity on the Moon: Under the license, the company has permission for Mission 1 operations, during which it will transfer ownership of space resources to NASA. Namely, ispace will transfer the regolith it collects to NASA as a first case of commercial space resource utilization.

<https://spacewatch.global/2022/11/inspace-receives-license-to-conduct-business-activity-on-the-moon/>

...Update 12/11/22: SpaceX [tonight successfully launched](#) Ispace's Hakuto-R lunar lander, the first private mission attempting to softly land on the Moon.

<https://www.cnn.com/2022/12/11/spacex-launches-japanese-inspace-lunar-lander-first-mission.html>

...the mission also includes The UAE's [Rashid rover](#), the first such mission to the Moon from that country. It sports three [high-resolution cameras](#) from the French space agency and an ESA-backed plasma sampler.

...A second payload is a cubesat from JPL, called Lunar Flashlight. It will go into lunar orbit, testing new fuel technologies while also attempting to identify water in the permanently shadowed craters at the lunar south pole. <https://behindtheblack.com/behind-the-black/points-of-information/spacex-successfully-launches-ispaces-hakuto-r-private-mission-to-moon/>

1- April 25, 2022

First private astronaut mission aboard a SpaceX Crew Dragon came back from the ISS. The mission sponsored by Axiom Space was commanded by López-Alegría, a former NASA astronaut, with three customers: Larry Connor, Eytan Stibbe and Mark Pathy. Endeavour docked to the ISS April 9 for what was originally billed as an eight-day stay. However, the spacecraft spent more than 15 days at the station, its departure delayed primarily by poor weather at splashdown locations. <https://spacenews.com/ax-1-undocks-from-space-station-after-extended-stay/>

Test of TESSERAE was on board. These are modular tiles that can autonomously join together to create a larger structures. TESSERAE tiles pack flat for launch; once activated, they form a robotic swarm of autonomous and self-assembling units used for on-demand construction, with future applications ranging from an extra room on a space station, to parabolic mirrors, to a home base on other worlds. The concept was invented Ariel Ekblaw, who is the founder and CEO of the Aurelia Institute. She discusses the mission in a video available on the Institute's website

<https://www.aureliainstitute.org/posts/tesseract-ax1>

My post on design of potential interiors within a TESSERAE space settlement:

<https://spacesettlementprogress.com/architectural-design-of-living-space-within-tesseract-self-assembling-space-station/>

6- May 6, 2022

SpaceX President Gwynne Shotwell says there will be people on Mars before the end of this decade.

<https://www.cnn.com/video/2022/05/06/spacexs-gwynne-shotwell-well-put-people-on-mars-within-the-next-decade.html>

8- May 18, 2022

The Federal Aviation Administration (FAA) granted Huntsville International Airport (HSV) a commercial space vehicle reentry license, the airport said. HSV, located in North Alabama, is the first commercial airport in the U.S. to be approved as a reentry site for a space vehicle landing.

The FAA license is specific to Sierra Space's Dream Chaser spaceplane only and any other space reentry vehicles would require additional FAA licensing.

Sierra Space has already been awarded six missions by NASA to resupply the International Space Station. The cooperation depends on obtaining the FAA License to Operate a Reentry Site and a Reentry Vehicle License. HSV's space vehicle reentry license means that Dream Chaser could potentially land at the airport from 2023.

https://spacewatch.global/2022/05/hsv-airport-granted-faa-license-to-land-commercial-space-vehicle/?utm_source=rss&utm_medium=rss&utm_campaign=hsv-airport-granted-faa-license-to-land-commercial-space-vehicle&mc_cid=a623017304&mc_eid=33933aec30

9- May 20, 2022

Boeing's CST-100 Starliner spacecraft successfully docked with the International Space Station May 20

<https://spacenews.com/starliner-docks-with-iss-for-the-first-time/>

... but it looks like their first crewed flight is delayed until April, 2023 as reported Nov. 3, 2022

<https://spacepolicyonline.com/news/boeings-starliner-delayed-again-now-expected-april-2023/>

6- October 1, 2022

Firefly's Alpha rocket reaches orbit on second launch

<https://spacenews.com/firefly-alpha-rocket-reaches-orbit-on-second-launch/>

2 - November 14, 2022

Advanced Space LLC., is the first commercial entity to own an operational satellite at the Moon.

CAPSTONE, the Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment, has finalized its insertion into a Near Rectilinear Halo Orbit (NRHO).

Now that history has been made, the small spacecraft is ready to begin operations for NASA in support of the Artemis program. This milestone also marks the beginning of the navigation experiment that will lay a foundation for future missions. Consistent with the company vision to enable the sustainable exploration, development, and settlement of space

https://www.moondaily.com/reports/Advanced_Space_leads_first_ever_commercial_mission_to_operate_at_the_moon_999.html

3-November 29, 2022

ICON awarded \$57 Million by NASA to develop lunar 3D printing technology for lunar surface construction. the Austin based company reports how the Phase III award under NASA's Small Business Innovation Research (SBIR) program will be used to adapt its existing additive manufacturing process for home building on Earth to the [Olympus system](#) using lunar regolith for fabrication of structures on the Moon.

David knows Melodie Yashar, a Space Architect at the firm.

<https://spacesettlementprogress.com/icon-awarded-57-million-by-nasa-to-develop-lunar-3d-printing-technology-for-lunar-surface-construction/>

Space Policy

2- February 2, 2020

FAA Streamlines launch licensing process

Astra announced [on Twitter](#) yesterday that it expects to receive the first-ever [Part 450](#) launch license from the FAA by Friday. That could allow the company to launch from the Florida Space Coast for the first time Saturday, carrying four NASA CubeSats aboard a Rocket 3.

Part 450? In light of the growing commercial launch sector and, in turn, the need for more mission clearances, the FAA is aiming to streamline the licensing process. Part 450 rolls up all the previously-required licenses for launch operation into one, combining former Parts 415, 417, 431, and 435. A quick recap:

- Parts 415 and 417 address the launch of expendable launch vehicles.
- Part 431 addresses the launch and reentry of reusable launch vehicles.
- Part 435 addresses the reentry of launch vehicles and components other than reusable launch vehicles.

Part 450, then, simplifies the launch licensing process by rolling these four licenses up into one general launch and reentry license for any type of launch vehicle. The licensing process will be shorter and more flexible under Part 450, and the license will be valid for five years.

<https://payloadspace.com/astra-to-receive-first-part-450-license/>

...update December 9, 2022: Biden administration drafting executive order to streamline approval for private rocket launches amid a broader effort to bring legal and regulatory clarity for American companies on everything from space travel to private space stations.

<https://www.reuters.com/world/us/biden-administration-drafting-executive-order-simplify-space-rules-sources-2022-12-09/>

4- April 5, 2022

National Science & Technology Council issues In-Space Servicing, Assembly, and Manufacturing National Strategy

This National Strategy outlines how the United States will support and stimulate the United States Government (USG), academic, and commercial ISAM capability development. It provides strategic goals to advance ISAM capability development discussed in the United States Space Priorities Framework. The next step following the strategy is to develop USG implementation action plans to fulfill the goals.

<https://www.whitehouse.gov/wp-content/uploads/2022/04/04-2022-ISAM-National-Strategy-Final.pdf>

August 12, 2022

Harris says U.S. to update commercial space regulations

<https://spacenews.com/harris-says-u-s-to-update-commercial-space-regulations/>

September 7, 2022

DoD updates space policy, formally adopts 'tenets of responsible behavior'

<https://spacenews.com/dod-updates-space-policy-formally-adopts-tenets-of-responsible-behavior/>

September 22, 2022

5- Orbital Sustainability Act of 2022 (ORBITS Act) introduced into the Senate

The Act will establish a demonstration program for the active remediation of orbital debris” and “require the development of uniform orbital debris standard practices in order to support a safe and sustainable orbital environment.”

<https://space.nss.org/nss-statement-on-the-orbital-sustainability-act-of-2022-orbits-act/>

3- September 29, 2022

FCC approves new orbital debris rule

The new rule will shorten the time for satellite operators to deorbit low Earth orbit satellites from 25 to 5 years. Under the new rule, spacecraft that end their lives in orbits at altitudes of 2,000 kilometers or below will have to deorbit as soon as practicable and no more than five years after the end of their mission. The rule would apply to satellites launched two years after the order is adopted, and include both U.S.-licensed satellites as well as those licensed by other jurisdictions but seeking U.S. market access.<https://spacenews.com/fcc-approves-new-orbital-debris-rule/>

1- November 17, 2022

The White House Office of Science and Technology Policy has released the first National Cislunar Science and Technology (S&T) Strategy.

The Four Objectives (quote taken from Payload):

Objective 1: Support research and development to enable long-term growth in cislunar space

- **Meaning:** enduring human presence, understanding effect of space environment on humans, workforce, space science, lunar tech

Objective 2: Expand international science and technology cooperation in cislunar space

- **Meaning:** International Lunar Year, peace, responsible practices, safety, new international cooperation

Objective 3: Extend US space situational awareness capabilities into cislunar space

- **Meaning:** identifying existing gaps, associated reference systems, data sharing, early warning systems, object catalog

Objective 4: Implement cislunar communications and positioning, navigation, and timing capabilities with scalable and interoperable approaches

- **Meaning:** foundational communications and navigation systems, scalability, interoperability, lower barriers to entry

<https://www.whitehouse.gov/ostp/news-updates/2022/11/17/fact-sheet-first-national-cislunar-science-technology-strategy/>

continued... July 6, 2022

Request for Information; Cislunar Science and Technology Subcommittee

The White House Office of Science and Technology Policy (OSTP)—on behalf of the Cislunar Science and Technology Subcommittee of the National Science and Technology Council (NSTC)—requests input to help inform development of a national science and technology strategy on U.S. activities in cislunar space. For the purposes of this RFI, cislunar space is defined as the entire region beyond Earth's geostationary orbit still subject to the Earth's and/or Moon's gravity, including orbits around the Moon and the lunar surface. The strategy will include key U.S.

government research and development (R&D) priorities and proposed technical standards to enable a robust, cooperative, and sustainable ecosystem in cislunar space.

<https://www.federalregister.gov/documents/2022/07/06/2022-14316/request-for-information-cislunar-science-and-technology-subcommittee>

My take on Denis Wingo's response:

<https://spacesettlementprogress.com/dennis-wingos-strategy-for-development-of-cislunar-space-and-beyond/>

Miscellaneous/General/International

January 10, 2022

Steady growth beyond the skies: five trends in outer space from 2021

<https://www.thespacereview.com/article/4310/1>

5- January 27, 2022

China and Russia will sign an agreement to build a research station on the moon, officials at the Chinese space agency said

<https://www.bloombergquint.com/china/china-confirms-it-will-team-up-with-russia-to-explore-the-moon>

4- January 28, 2022

China presents space plans and priorities in new white paper - Over the next five years China will seek to develop its space transportation capabilities, test new technologies, embark on exploration missions, modernize space governance, enhance innovation and boost international cooperation.

<https://spacenews.com/china-presents-space-plans-and-priorities-in-new-white-paper/>

....update 11/28/22 China has provided new details about its long-term human and robotic lunar exploration plans. China is currently working towards launch of the Chang'e-6, 7 and 8 missions between 2026 and 2028 that include a farside sample return mission and testing technology for a future lunar base. China is also now working towards a crewed lunar landing before 2030. The mission would use two launches of a new crew launch vehicle to send three astronauts to the moon, with two landing on the surface for around six hours. Those missions support the long-term goal of establishing an International Lunar Research Station (ILRS) in the 2030s.

[SpaceNews]

<https://spacenews.com/china-outlines-pathway-for-lunar-and-deep-space-exploration/>

February 27, 2022

The ending of an era in international space cooperation with Russia after Ukraine

Jeff Foust in Space Review

<https://www.thespacereview.com/article/4341/1>

April 29, 2022

Russia's Angara-1.2 flies its first mission

<http://www.russianspaceweb.com/angara1-flight1.html>

June 1, 2022

ESA announces Terrae Novae, who's mission is to lead Europe's human journey into the Solar system using robots as precursors and scouts, and to return the benefits of exploration back to society. Terrae Novae has the literal meaning of the 'New Worlds' that encompasses the three ESA exploration destinations: Low Earth Orbit (LEO), Moon and Mars.

https://esamultimedia.esa.int/docs/HRE/Terrae_Novae_2030+strategy_roadmap.pdf

7- July 30, 2022

Nichelle Nichols, who played Uhura in Star Trek franchise, dies at 89

<https://www.washingtonpost.com/obituaries/2022/07/31/nichelle-nichols-uhura-star-trek-dead/>

3- October 20, 2022

First Known Map of Night Sky Found Hidden in Medieval Parchment

<https://journals.sagepub.com/doi/10.1177/00218286221128289>

From abstract:

New evidence for ancient Greek astronomer Hipparchus' lost Star Catalogue was found thanks to multispectral imaging of a palimpsest manuscript. This new evidence is the most authoritative to date and allows major progress in the reconstruction of Hipparchus' Star Catalogue. It confirms that Ptolemy's Star Catalogue was not based solely on data from Hipparchus' Catalogue. Finally, the available numerical evidence is consistent with an accuracy within 1° of the real stellar coordinates, which would make Hipparchus' Catalogue significantly more accurate than his successor Claudius Ptolemy's.

2- November 8, 2022

Moon Village Association issues publication called The Lunar Commerce Portfolio –

The Lunar Commerce and Economics Working Group has set out to determine whether there can indeed be viable commercial markets on the Moon, and if so, to try to assess their timing and scale.

<https://moonvillageassociation.org/download/the-lunar-commerce-portfolio-first-edition-november-2022/>

6- November 12, 2022

X-37B orbital test vehicle concludes sixth successful mission. The OTV-6 mission hosted the Naval Research Laboratory's Photovoltaic Radiofrequency Antenna Module. This experiment successfully harnessed solar rays outside of Earth's atmosphere and aimed to transmit power to the ground in the form of radio frequency microwave energy.

<https://www.spaceforce.mil/News/Article/3217077/x-37b-orbital-test-vehicle-concludes-sixth-successful-mission/>

1- Japanese billionaire Yusaku Maezawa announces crew for Dear Moon circumlunar mission. He selected a range of creative individuals for the mission, from photographers and filmmakers to an actor and singer. Everyday Astronaut Tim Dodd is included. <https://spacenews.com/japanese-billionaire-selects-crew-for-circumlunar-starship-flight/>

<https://www.nextbigfuture.com/2022/12/everyday-astronaut-will-become-a-real-astronaut.html>

Space Solar Power

January 24, 2022

Japan planning end to end demo of SSP by 2025

<https://space.nss.org/japan-tackles-clean-energy-from-space/>

May 11, 2022

The U.K. is getting serious about beaming solar power from space – Aims to build a orbital solar power sat by 2035. Over 50 British technology organizations, including heavyweights such as aerospace manufacturer Airbus, Cambridge University and satellite maker SSTL, have joined the U.K. Space Energy Initiative, which launched last year in a quest to explore options for developing a [space-based solar power plant](#).

<https://www.space.com/space-based-solar-power-plant-2035>

4- May 28, 2022

NASA Office of Technology Policy, and Strategy to reexamine Space Based Solar Power to assess the degree to which NASA should support its development. (Announced by Nickolai Joseph at ISDC) Report due any day now.

<https://spacenews.com/nasa-to-reexamine-space-based-solar-power/>

September 21, 2022

American Foreign Policy Council publishes position paper on SBSP:

<https://www.afpc.org/publications/policy-papers/the-promise-of-space-based-solar-power>

1- September 27, 2022

To prepare Europe for future decision making on Space-Based Solar Power, ESA has proposed a preparatory programme, called SOLARIS, for the upcoming ESA Council at Ministerial Level in November 2022.

The goal of SOLARIS would be to prepare the ground for a possible decision in 2025 on a full development programme by establishing the technical, political and programmatic viability of [Space-Based Solar Power](#) for terrestrial needs.

https://www.esa.int/Enabling_Support/Space_Engineering_Technology/SOLARIS/SOLARIS2

....update 11/22/22: The European Space Agency will this week likely approve a three-year study to see if having huge solar farms in space could work and be cost effective:

<https://www.bbc.com/news/science-environment-62982113>

....update 11/28/22: [#SOLARIS](#) is no longer just a proposal... ESA's Council at the Ministerial level has confirmed full subscription to the General Support Technology Programme, Element-1, part of which was requested for funding SOLARIS activities. Element 1 makes up the core of the General Support Technology Programme. The activities performed under Element 1 are dedicated to maturing technologies and techniques, building components, making engineering tools and developing test beds for ESA and National missions, all the way from an engineering prototype, or breadboard, up to qualification. Still to be determined: how much funding will be allocated by each member of the EU.

October, 2022

Article in Science: Has a new dawn arrived for space-based solar power? Better technology and falling launch costs revive interest in a science-fiction technology.

<https://www.science.org/doi/epdf/10.1126/science.adf3948>

October 23, 2022

MIT Technology Review issues Report: Power Beaming Comes of Age

https://wp.technologyreview.com/wp-content/uploads/2022/10/MIT_TII_Report2_V11_10072022.pdf

2- November 22, 2022

China to use space station to test space-based solar power

Robotic arms already operating on the outside of Tiangong will be used to test on-orbit assembly of modules for a space-based solar power test system. The test system will then orbit independently and deploy its solar arrays and other systems. It is likely to test and verify capabilities such as power generation, conversion and transmission.

<https://spacenews.com/china-to-use-space-station-to-test-space-based-solar-power/>

3-December 5, 2022

Mike Snead concludes his four-part series on evaluation of Earth's green energy options including Astroelectricity (Space Solar Power)

From his conclusion in Part 4:

With America's terrestrial options for going green not providing practicable solutions, the time for America to develop space solar power-generated astroelectricity has arrived. America now needs to pursue space solar power-generated astroelectricity to ensure that our children and grandchildren enjoy an orderly, prosperous transition to green energy.

Part 1 - <https://www.thespacereview.com/article/4481/1>

Part 2 - <https://www.thespacereview.com/article/4485/1>

Part 3 - <https://www.thespacereview.com/article/4490/1>

Part 4 - <https://www.thespacereview.com/article/4494/1>