



LSIC Newsletter

The Lunar Surface Innovation Consortium is administered by the Johns Hopkins Applied Physics Laboratory and operates in collaboration with the NASA Space Technology Mission Directorate under the Lunar Surface Innovation Initiative. Its purpose is to harness the creativity, energy and resources of the nation to help NASA keep the United States at the forefront of lunar exploration. To find out more, sign up to participate or access past additions of this newsletter, please visit lsic.jhuapl.edu.

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Director's Corner

Hello LSIC Community!

I am really looking forward to seeing many of you at our Spring Meeting, here at APL on April 24–25. If you have not yet registered, there is still time to do so [here](#). The deadline for in-person registration is April 10, and virtual is April 17. Immediately after that meeting, we will be hosting a hybrid workshop on [Space Technology Competitive Opportunities](#), which is also still open for registration.

We have had a few members of the Executive Committee rotate off this year, and I would like to thank them all so much for their support and contributions over the last few years. Thank you so much to Sandy Magnus, who was instrumental in helping LSIC advance discussions of how crucial it is to consider interoperability now, rather than to wait until we've designed our way into a mess of disparate interfaces. Thank you, too, to Jessy Kate Schingler, who helped LSIC engage in discussions about lunar land and resource rights, and how we might go about handling the policy issues surrounding them. And thank you so much to Dave Murrow, who from the kickoff meeting at LSIC was a strong advocate for mentorship among industry members, reminding us on many occasions that working for the success of the whole, rather than that of any individual person or institution, is the only way we are going to grow a thriving future on the lunar surface. Each of these folks is moving on to exciting new phases of their careers, and I wish them all the best. I would also like to welcome a new member to our Executive Committee, Timothy Cichan. Timothy is the Space Architect at Lockheed Martin and also the vice chair for industry for GEGSLA in the Moon Village Association. Tim, we look forward to having you join us!

Finally, I'd like to close with a few words about some other exciting LSIC workshops coming up over the summer. First, a hybrid Lunar Proving Grounds Workshop is planned for July 12–13, with the in-person portion held at APL. Next, the Surface Power group is working on a Power Systems Reliability Workshop that will be held virtually on July 26–27. Finally, there Excavation and Construction and Extreme Access groups are working together to develop a workshop on autonomy, currently targeted for August 21. Stay tuned for more information about these exciting events.



Rachel Klima

Director, Lunar Surface Innovation Consortium

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Focus Areas

Monthly Telecon Schedule

Dust Mitigation

Third Thursdays at 12PM Eastern

Excavation & Construction

Last Wednesdays at 2PM Eastern

Extreme Access

Second Thursdays at 3PM Eastern

Extreme Environments

Second Tuesdays at 3PM Eastern

In Situ Resource Utilization

Third Wednesdays at 3PM Eastern

Surface Power

Fourth Thursdays at 11AM Eastern

LSIC General Updates

LSIC Spring Meeting Set for April 24–25

Leaders from NASA, the Department of Defense, and other government agencies will share insights and engage with members of the space technology community at the Lunar Surface Innovation Consortium (LSIC) Spring Meeting on April 24–25. Held virtually and on the campus of the Johns Hopkins Applied Physics Laboratory (APL) in Laurel, Maryland, the meeting will focus on the nation’s vision for a sustained presence on the lunar surface. Panels, discussions, and working sessions will include topics such as long-term use cases for infrastructure on the lunar surface, lunar technology developments, and transitioning from a mostly NASA-supported presence on the Moon to industry or other public or private involvement.

Featured speakers and panelists include: Pam Melroy, NASA deputy administrator; Stefanie Tompkins, director of the Defense Advanced Research Projects Agency; Matt Daniels, assistant director of the White House Office of Science and Technology Policy for space security and special projects; James Reuter, NASA associate administrator for the Space Technology Mission Directorate; Kurt “Spuds” Vogel, NASA director of space architecture; and Walter Englund, NASA deputy associate administrator for programs in the Space Technology Mission Directorate.

Registration deadlines are April 10 for in-person attendance and April 17 for virtual attendees. Learn more on the [LSIC website](#).

LSIC Workshop – Space Technology Competitive Opportunities Set for April 26

The morning AFTER the LSIC Spring Meeting, on April 26, APL will be hosting a LSIC Workshop: Space Technology (SpaceTech) Competitive Opportunities. The workshop is centered around SpaceTech solicited proposal opportunities and community resources and will focus on: (1) the components and requirements of various NASA Space Technology Mission Directorate proposal opportunities, (2) an advice-based panel discussion and Q&A from previously successful SpaceTech proposal awardees, and (3) general knowledge about the NASA funding process.

During the afternoon, there are planned breakout sessions to allow small groups to ask questions regarding the funding mechanisms associated with the different opportunities. Awardees will be invited to talk about their experience and lessons learned from submitting a winning proposal under the following funding mechanisms.

- Grant Opportunities (e.g., LuSTR, NSTGRO, NIAC)
- Reoccurring Contract Opportunities (e.g., SBIR, STTR)
- Funded and Unfunded Space Act Agreements Opportunities (e.g., ACOs, Tipping Points)
- Unique One-time Contract Opportunities (e.g., Vertical Solar Array, Fission Surface Power)

Registration deadlines are April 12 for in-person attendance and April 17 for virtual attendees. Learn more on the [Space Technology Competitive Opportunities Workshop website](#).

LSIC harnesses the creativity, energy, and resources of the nation to help NASA keep the United States at the forefront of lunar exploration. LSIC operates in collaboration with the NASA Space Technology Mission Directorate under the Lunar Surface Innovation Initiative, fostering communications and collaboration among academia, industry, non-profits, and government. Visit <http://lsic.jhuapl.edu> for more information.

Focus and Working Group Updates

Dust Mitigation

The Dust Mitigation Focus Group (DM) Focus Group did not hold its monthly focus group meeting for the month of March as it conflicted with the 2023 Lunar and Planetary Science Conference (LPSC).

You can view the recording, slides, and notes from February's DM Focus Group meeting and previous meetings at our LSIC Dust Mitigation Focus Group page on the LSIC website: <https://lsic.jhuapl.edu/Our-Work/Focus-Areas/index.php?fg=Dust-Mitigation>.

Save the date for the 2nd LSIC Dust Mitigation Workshop, which will be held virtually on Wednesday, May 24, and Thursday, May 25. This workshop is a follow-on to the successful LSIC Dust Mitigation Workshop held in 2021 and will feature a combination of invited presentations from NASA and the community, contributed talks, and breakout discussion sessions. The event's objectives will be to update the state of dust mitigation and identify the latest technologies available, define gaps in knowledge and research, get community perspectives, and gather input for next steps and future opportunities. More information will be provided soon!

Our next focus group meeting will be held on Thursday, April 20, at 12 p.m. EDT. The meeting will include featured technology presentations along with a discussion session. We look forward to seeing you then!

Excavation & Construction

In March, the Excavation & Construction (E&C) Focus Group hosted two guest talks. We were joined by Miguel Coto and Sergio Gomez of Herrero Builders, who specialize in mechanical, electrical, and plumbing (MEP) systems. Miguel also leads the LSIC E&C Outfitting & Maintenance Subgroup. Their career experiences span some of the biggest health care projects in the Bay Area, including multimillion-dollar hospital wing expansions and the current construction of a hospital with state-of-the-art research equipment from the ground up for the University of California. They presented on terrestrial approaches and key technologies for outfitting.

Julian Ocampo, a senior designer at Bjark Ingels Group (BIG), recently led the design teams behind Project Olympus, focused on ISRU-derived construction via additive manufacturing, and Mars Dune Alpha, a 3D-printed habitat located at NASA Johnson Space Center. Both projects were developed in collaboration with NASA and ICON Technology. Julian presented an overview of Project Olympus.

This meeting was followed by breakout discussions regarding the LSIC white paper "The Path to an Enduring Lunar Presence."

Extreme Access

At the March telecon, we had a presentation from APL's Ed Birrane on delay-tolerant networking and how it could help deal with communication challenges at the Moon. The mobility subgroup featured a presentation from Kaizad Raimawala from Mission Control titled "Autonomy & Operations Software for Lunar Mobility: A Highlight of an AI Lunar Surface Demonstration." The position, navigation, and timing (PNT) paper reading group discussed "Passive Positioning, Navigation, and Timing (PPNT) in Cislunar Space Using Earth-Based Transmitters" by Dennis Ogbe of Jet Propulsion Laboratory. We continued work on the draft of the community-driven white paper, focusing on lunar communications and PNT.

Extreme Environments

In March, Extreme Environments (EE) showcased our first SBIR technologies covering “Low Temperature Durable Siloxane/epoxy Nanocomposite Coating for Drastic Reduction in Lunar Particulate Adhesion” and “Cryogenic Oscillating Heat Pipes.” Feel free to access the LSIC EE confluence site for the presentation slides and meeting recording. In addition to our technology presentations, we introduced our new Extreme Environments facilitator, Dr. Milena Graziano, to our growing community. Milena brings her knowledge and experience as a materials and processes engineer who performs flight hardware evaluation and testing for extreme space environments. As she transitions to this role, we are searching for a new External Hazards Subgroup lead. If you are interested, please feel free to reach out to Milena: facilitator_extremeenvironments@jhuapl.edu.

In our April monthly meeting, we are learning about “Solid-State Rechargeable Batteries for Extreme Lunar Surface Environments” from Dr. Brian Elliott and “Single Event Burnout Hardened High-Power Diamond Devices” from Ilya Ponomarev.

The LSIC Spring Meeting is right around the corner, so please go register! You will see an email coming soon asking if anyone is interested in our traditional dinner after the first day of the conference. We look forward to seeing everyone there! In general, please reach out with any specific topics of interests for talks or cross talks with other groups. Additionally, if anyone is interested in joining one of our subgroups, visit <https://lsic.jhuapl.edu/Our-Work/Focus-Areas/index.php?fg=Extreme-Environments> to learn more. As always, if community members have ideas for what they would like to see or discuss, please reach out to any members of EE leadership.

In Situ Resource Utilization

The In Situ Resource Utilization (ISRU) Focus Group held its monthly meeting on March 22, pushed back a week to deconflict with the Lunar and Planetary Science Conference. This month, we focused on lunar simulants for ISRU and hosted a talk from Dr. Karen Stockstill-Cahill (APL) on the [LSIC Simulant Assessment Reports](#) and their implications for ISRU technologies. In addition to a riveting discussion on simulant considerations for ISRU and testing, we took a quick look at the results from the Vision Survey conducted during the February ISRU telecon, as well as recommendations and paths forward for ensuring the ISRU community is maximizing what it gets out of the ISRU Focus Group. April’s ISRU monthly telecon will be canceled, but we greatly look forward to seeing you at the LSIC Spring Meeting, April 24–25 in Laurel, Maryland, and online via ZoomGov!

Surface Power

The March Surface Power telecon featured a presentation by Dr. Akin Akturk (CoolCAD Electronics) about the radiation sensitivity of Silicon Carbide (SiC) power metal-oxide semiconductor field-effect transistors (MOSFETs). CoolCAD is an electronics design company that specializes in numerical modeling and radiation testing of power electronics, in collaboration with researchers at the University of Maryland. The talk addressed the design, fabrication, modeling, and irradiation testing of electrical components for both terrestrial and space applications. In particular, Dr. Akturk’s work on radiation effects in space included both experimental results with heavy ions, and single event effects on SiC MOSFETs up to 1500 V. The talk and subsequent discussion highlighted the relative unavailability of radiation testing facilities as a crucial bottleneck affecting a range of technologies and industries. An opportunity for networking within the Surface Power Focus Group presented itself at the Applied Power Electronics Conference (March 19–23). Upcoming opportunities include the LSIC Spring Meeting (April 24–25) and the LSIC Power System Reliability Workshop (July 26–27).

The Surface Power Focus Group's next monthly telecon on April 13 will feature all three Lunar Surface Technology Research (LuSTR) 2020 awardees for Power. Professor Art Witulski (Vanderbilt) will discuss ongoing work on lunar surface applications for SiC power components. Professor Jin Wang (Ohio State) will present results from his project entitled "Flexible DC Energy Router Based on Energy Storage Integrated Circuit Breaker." Finally, Professor Phil Lubin (UCSB) will discuss power beaming on the lunar surface. The following May 25 Surface Power telecon will focus on NASA's Vertical Solar Array Technology (VSAT) Phase II awards. Notably, the event will include presentations from Lockheed Martin, Honeybee Robotics, and Astrobotic. The subsequent month's telecon (June 22) will address power requirements for lunar habitats and the potential for power generation waste heat utilization by bioregenerative life support systems. If you are interested in presenting at a future telecon or coordinating a meeting with the APL Surface Power team, please don't hesitate to reach out.

Modular Open Systems Approach Working Group

On February 1, Jaret Matthews (Venturi Astrolab) presented on the FLEX rover's capabilities and payload accommodation; details can be found in the [Payload Interface Guide](#). Astrolab offers quarterly payload field testing opportunities and invites the community to reach out regarding these opportunities. You can catch the replay of this event on the LSIC website.

The next Modular Open Systems Approach (MOSA) Working Group telecon is scheduled for April 5, when team members from the Southwest Research Institute (SwRI) will present on VICTORY and provide feedback on what lessons can be leveraged for developing interoperability for the space industry.

Lunar Simulants Working Group

Our main activity in March has been sharing the results of our 2022 Lunar Simulants Assessment and promoting the [Lunar Simulants Working Group](#) (LSWG) at the 54th Lunar and Planetary Science Conference held in Houston, Texas, on March 13–17. We shared the results of our geotechnical measurements and talked to simulant users and providers. The 2022 Lunar Simulants Assessment document is available on the LSIC webpage (under Assessments and Databases tab) and on the LSIC [Confluence](#) page, as well as results displayed with previous years' results in the [Lunar Simulants Data Repository](#). Our biggest news is that we are starting up an email listserv for those interested in being a part of the LSWG and hearing about simulants and simulant research, so please email Karen Stockstill-Cahill (Karen.Stockstill-Cahill@jhuapl.edu) if you would like to be added. Finally, we continue to monitor the [LSII Lunar Simulant User Needs Survey](#), which helps us to advise NASA on what the current and upcoming simulants needs are.

Feature Article

Becoming a Member Institution of the LSIC

LSIC has had multiple inquiries by members regarding the criteria to have their organization recognized as a LSIC Institutional Member. These are institutions whose members have provided consistent and substantive supportive efforts to LSIC and NASA's Artemis endeavors by sharing their wisdom and experience with the broader membership of the LSIC. Here we outline the basic criteria for recognition and benefits.

While any individual can sign up to be an LSIC participant, only organizations recognized by peers in the space and lunar technology development community are invited to become LSIC Institutional Members. The goal of the LSIC Institutional Membership status is to provide visibility, recognition, and prestige to those organizations actively engaging within the LSIC to strengthen the community and help achieve its goals to the wider academic, industrial, nonprofit, and governmental communities. There is no fee or other obligation associated with joining. Member institutions must provide a primary organizational point of contact, and will have their logo and website included on LSIC's official [member institution](#) page.

In addition to being recognized on the LSIC website, institutional members are prioritized for site visits by LSII/LSIC personnel, as well as for the "Member Spotlight" in the LSIC newsletter. Individuals from member organizations are also prioritized for in-person attendance at events with limited capacity. Member organizations are also eligible to host official LSIC events, such as the Fall Meeting, and may be offered special opportunities as a part of LSIC-sponsored outreach or events.

An organization interested in being a candidate for institutional membership may volunteer to be recognized for this status at any time. Candidate organizations must be active in the LSIC and technology community, and provide a link to their organizational website. These organizations will be taken to the LSIC Leadership for evaluation and a vote for acceptance/declination by the LSIC leadership team, including group facilitators, with additional input provided by the Executive Committee, as needed. If the LSIC team determines that an organization does not fit the criteria to be considered an institutional member, the organization may reapply after a period of one year for reconsideration. Note that there may be some delay in formalizing membership due to the large number of participating institutions.

Member Spotlight

Colorado School of Mines

NASA recently selected seven university teams to develop concepts to produce metals on the Moon in the agency's annual Breakthrough, Innovative and Game-Changing (BIG) Idea Challenge: Lunar Forge.

One of those teams, from the Colorado School of Mines, is building on experience gained in three previous BIG Idea Challenges to shape its concept for a Lunar Alloy Metal Production Plant (LAMPP), a self-contained, scalable, deployable metal production system for use in the lunar environment.

Based on molten regolith electrolysis (MRE), seen as a potential way to extract oxygen and molten metals from lunar dust, LAMPP would offer the capability to extract pure metals or create metal alloys from MRE byproducts.

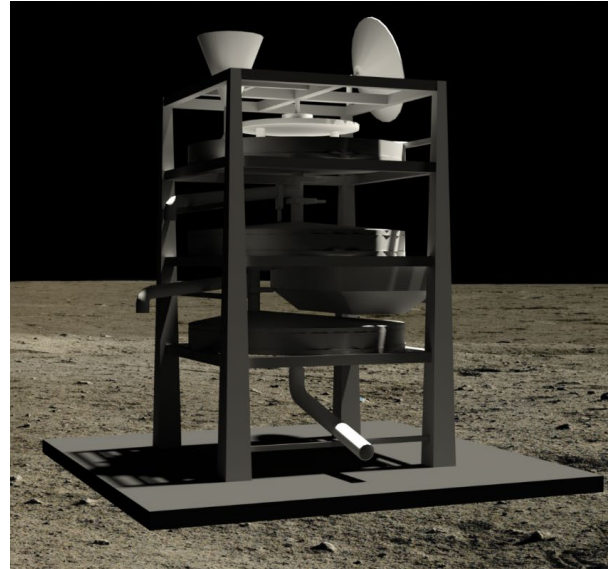
"There's a layer of excess slag from the MRE process that could possibly be utilized to extract additional metals," said Mines team member Ian Jehn, a Ph.D. student in space resources. "Our idea is to actually pull out structural metals from the MRE process, from which we'd get material to build actual large-scale infrastructure elements like towers, solar arrays, pipes, and storage vessels for a lunar base. We think it's a very vital process."

NASA says in-situ resource utilization (ISRU) – the ability to use naturally existing resources – is fundamental to a steady cadence of Artemis missions and a sustained human presence on the Moon. The Lunar Surface Innovation Consortium ([LSIC](#)) has an [entire focus group](#) dedicated to it. Of those resources, with its strength and resistance to corrosion, metal is seen as critical to any designs of a lunar base. But metal is also heavy, making it difficult and expensive to send from Earth.

Producing metal on the Moon, according to NASA, is an extensive process that includes metal detecting, specifically for minerals such as anorthite and ilmenite; material refining; forming materials for additive manufacturing; production of metal matrix composites; and testing and qualification of the metal products.

Aiming for the middle steps of that process, the Mines team – which includes seven graduate students and two faculty advisers from the school's [Space Resources](#) program, as well as an industry consultant – plans to run tests to determine which refractory material is going to work the best in the lunar environment.

"We produce lunar simulants, basically turning that into lava within our foundry, and then test different refractory materials," said team member Peter Corwin, also working toward a Ph.D. in space resources. "Some of the test will involve actually dipping refractory rods into the material, and in



Artist's impression of the Lunar Alloy Metal Production Plant, the Colorado School of Mines' entry into NASA's BIG Idea Challenge. (Credit: Colorado School of Mines)

some we'll create small crucibles, pouring the liquid inside and see how it performs." The team will also be able to follow those trials with high-temperature testing in the school's vacuum chambers.

"Our team has backgrounds in civil and mining engineering, metallurgy, and geology," said team member and space resources Ph.D. student David Purcell. "We will need every single one of these disciplines to make this project work on their surface. The BIG Idea Challenge is great at showcasing how diverse disciplines can commit and combine to make a difference."

As ambitious as the ideas for its technologies might be, the team remains focused on the basics.

"I think the most important thing is applying the principles of mining, civil engineering, or metallurgy into the space environment," Chris Dreyer, director of engineering at Mines' Center for Space Resources, who advises the team along with faculty colleague George Sowers. "We don't design a piece of mining equipment in exactly the same way you see it built on Earth; it has to be adapted to the lunar environment to excavate lunar regolith, and this changes the design. We find, more often it's the principles that are more important than the actual piece of hardware being used."

The group also aims to speak with and potentially collaborate with other challenge teams, whose concepts cover technologies needed at other points in the lunar metal production pipeline.

"The BIG Idea Challenge expands opportunities for students and faculty to immerse themselves in real NASA projects, as well as supports student pursuits in STEM," NASA's Space

Grant Project Manager Tomas Gonzalez-Torres said in a news release announcing the winning teams. "Through participating in the BIG Idea Challenge, these teams are making big strides at the university level as well as toward excellence in their future careers."

After a mid-project review in May, the teams will showcase their work for the public and a panel of NASA and industry judges at a BIG Idea Challenge forum in November. The forum is an opportunity for the teams to plug into lunar mission planning discussions underway within NASA's Lunar Surface Innovation Initiative, of which LSIC is part. NASA expects the universities to incubate the developed projects, which could augment technology the agency is currently developing.

Read more about the BIG Idea Challenge teams and their winning proposals [here](#). All seven teams will discuss their ideas at the August meeting of the LSIC ISRU Focus Group. Contact Facilitator_ISRU@jhuapl.edu for more information.



The Mines team plans to run tests in the school's foundry, like that shown above, to determine which refractory material is going to work the best in the lunar environment. (Credit: Colorado School of Mines)

NASA and Community News

New Program Office Leads NASA's Path Forward for Moon, Mars

03/30/2023 \\\ NASA \\\ Abbey Donaldson

<https://www.nasa.gov/press-release/new-program-office-leads-nasa-s-path-forward-for-moon-mars>

NASA wants university students to solve the Moon landing dust problem

03/23/2023 \\\ bgr.com \\\ Joshua Hawkins

<https://bgr.com/science/nasa-wants-university-students-to-solve-the-moon-landing-dust-problem/>

HAKUTO-R Mission 1 Lunar Lander Enters Lunar Orbit

03/23/2023 \\\ The Journal of Space Commerce \\\ Tom Patton

<https://exterrajsc.com/hakuto-r-mission-1-lunar-lander-enters-lunar-orbit/2023/03/23/>

Europe told to aim for a Moon mission

03/23/2023 \\\ Politico \\\ Joshua Posaner

<https://www.politico.eu/article/europe-told-to-aim-for-a-moon-mission/>

First 3D Printed Rocket, Created by Trojan Engineers, Soars Into the Upper Atmosphere

03/23/2023 \\\ USC Viterbi \\\ Adam Smith

<https://viterbischool.usc.edu/news/2023/03/first-3d-printed-rocket-created-by-trojan-engineers-soars-into-the-upper-atmosphere/>

Lockheed Martin Again Taps Makerbot 3D Printers for Their Next Big Space Project – An AI-Assisted Lunar Rover for NASA

03/22/2023 \\\ MakerBot.com

https://www.makerbot.com/stories/engineering/case-study-lockheed-martin-again-taps-makerbot-3d-printers-for-their-next-big-space-project-an-ai-assisted-lunar-rover-for-nasa/?utm_source=marketo&utm

VIPER Instruments Arriving for Integration!

03/20/2023 \\\ NASA \\\ Dan Andrews

<https://www.nasa.gov/feature/ames/viper-instruments-arriving-for-integration>

AROSE Awarded Stage 1 Grant to Design Lunar Rover for Moon Mission

03/20/2023 \\\ AROSE \\\ Peter Harris and Tim Larcombe

<https://www.arose.org.au/news/arose-awarded-stage-1-grant-to-design-lunar-rover-for-moon-mission/>

NASA Begins Building its First Robotic Moon Rover

03/15/2023 \\\ NASA \\\ Rachel Hoover

<https://www.nasa.gov/image-feature/ames/nasa-begins-building-its-first-robotic-moon-rover>

Mix-and-match kit could enable astronauts to build a menagerie of lunar exploration bots

03/14/2023 \\ MIT News Office \\ Jennifer Chu

<https://news.mit.edu/2023/mixed-robot-kit-lunar-exploration-0314>

SOFIA Reveals Map of Moon's Water Near its South Pole Artemis Landing Sites

03/14/2023 \\ USRA \\ Suraiya Farukhi

<https://newsroom.usra.edu/sofia-reveals-map-of-moons-water-near-its-south-pole-artemis-landing-sites/>

Firefly Awarded \$112 Million NASA Contract for Payload Delivery to Lunar Orbit and the Far Side of the Moon

03/14/2023 \\ Firefly Aerospace \\ Firefly Media Contact

<https://fireflyspace.com/news/firefly-awarded-second-nasa-clps-contract/>

Notification of Listing on The Tokyo Stock Exchange Growth Market

03/08/2023 \\ ispace

<https://ispace-inc.com/news-en/?p=4416>

Lonestar Data Holdings raises \$5m for data centers on the Moon

03/06/2023 \\ DCD.com \\ Sebastian Moss

<https://www.datacenterdynamics.com/en/news/lonestar-data-holdings-raises-5m-for-data-centers-on-the-moon/>

Funding Opportunities

Requests for Information (RFIs)

- [Lunar Science Rideshare Mission \(Luna Ride\)](#)

Also see information at:

https://newspace.asu.edu/wp-content/uploads/2023/01/FINAL_RFI_Luna-Ride_R2.3.pdf

Tech Development

- [MUREP Space Technology Artemis Research \(M-STAR\)](#)

Proposals Due: April 10, 2023

Pre-proposal Webinar Slides: [February 23, 2023](#), and [March 14, 2023](#)

- [Early Career Faculty 2023](#)

Proposals Due: April 13, 2023

- [Lunar Surface Technology Research \(LuSTR\) Opportunities](#)

Proposals Due: April 24, 2023

- [NASA Innovative Advanced Concepts \(NIAC\) Phase III](#)

Final Proposals Due: May 17, 2023

- [NSF SBIR and STTR](#)

NSF recommends treating the submission window like a deadline, but you can submit anytime within a year of receiving an official invitation from NSF. (NSF uses submission windows to help gather and review proposals, but sometimes proposals are reviewed as they are received.)

Windows: November 22, 2022 – March 1, 2023, March 2, 2023 – July 5, 2023, and July 6, 2023 – November 1, 2023.

Student Tech Opportunities/Competitions

- [PI Launchpad: Developing Your First Flight Mission Proposal](#)

Applications Due via NSPIRES: April 14, 2023

Workshop Dates: July 24–27, 2023

Future Solicitations and Opportunities

- [TechFlights Solicitation](#)

Expected release on or about April 7, 2023. Review the pre-solicitation summary to learn more about the topics and focus areas for TechFlights 2023. Researchers from U.S.-based industry, academia, and other non-NASA organizations can compete for funding through the Flight Opportunities program's TechFlights solicitation. TechFlights supports the advancement of space-based innovations that may meet NASA or industry technology needs. Awardees receive a grant or collaborative agreement allowing them to purchase flights directly from any qualified U.S. commercial flight provider that best suits their technology demonstration, including suborbital vehicles or hosted orbital platforms. Keep an eye on NSPIRES and subscribe to the Flight Opportunities newsletter for information as it becomes available. Visit the Flight Opportunities website for resources on flight testing space technologies and to review previous solicitations.

- **Early-Stage Innovations (ESI) Solicitation**

The goal of ESI is to accelerate the development of groundbreaking, high-risk/high-payoff space technologies to support the future space science and exploration needs of NASA, other government agencies, and the commercial space sector. Accredited U.S. universities are eligible to submit proposals.

- **NASA Innovative Advanced Concepts (NIAC) 2024 Phase I Call for Proposals**

The NIAC program supports visionary research ideas through multiple progressive phases of study. Phase I studies are nine-month efforts to explore the overall viability and advance the technology readiness level (TRL). Eligible recipients of Phase I awards can propose for a follow-on Phase II study.

- **SmallSat Technology Partnerships (STP)**

The Small Spacecraft Technology program's SmallSat Technology Partnerships (STP) initiative awards cooperative agreements to U.S. colleges and universities for projects that develop new technologies and capabilities for small spacecraft in collaboration with NASA centers. Technological advancements may be demonstrated in the laboratory environment or as suborbital, balloon, or orbital space flight demonstrations.