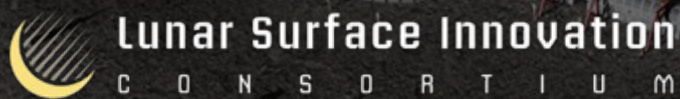


# LSIC Joint MOSA and Surface Power Telecon

September 22, 2022

Begins at 11:03



Matt Clement, PhD  
Johns Hopkins Applied Physics Laboratory  
Space Exploration Sector  
LSIC Surface Power Focus Group

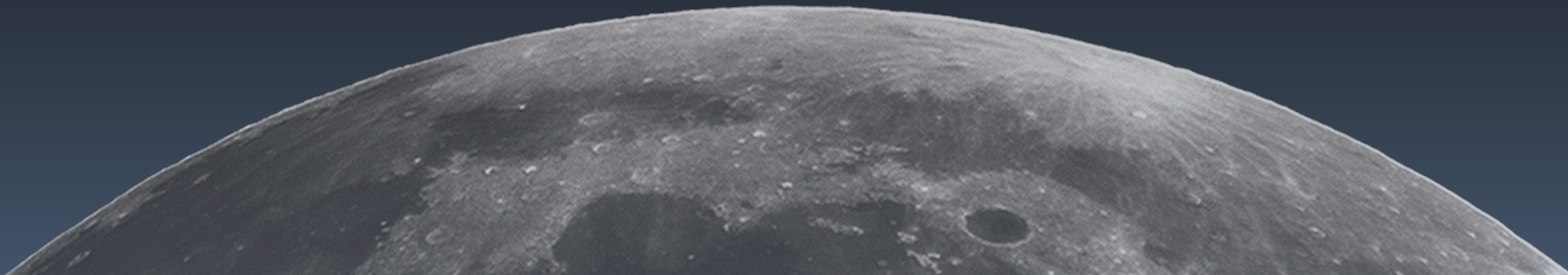
[Matt.Clement@jhuapl.edu](mailto:Matt.Clement@jhuapl.edu)

*To Join LSIC MOSA WG or  
Surface Focus Group:  
Email Andrea Harman*

Kristin Jaburek  
Johns Hopkins Applied Physics Laboratory  
Space Exploration Sector  
LSIC MOSA Working Group

[Kristin.Jaburek@jhuapl.edu](mailto:Kristin.Jaburek@jhuapl.edu)

- Community Updates
  - MOSA is Live on LSIC Website
  - Solicitations and Awards
  - NASA RFIs
  - Conferences/Workshops
- APS4DS Conference debrief: Matt Clement
- Technical Talk; International Space Power System Interoperability Standards
- Question and Answer Session



# LSIC | MOSA Live on LSIC Website



Resources ▾ News

Funding Opportunities

LSIC Resources

Community

Lunar Simulation

MOSA

<https://lsic.jhuapl.edu>

The screenshot shows the LSIC website page for the Modular Open Systems Approach Working Group (MOSA). The page has a dark header with navigation links: About, Focus Areas, Resources, News, Events, and Contact Us. The APL logo (Applied Physics Laboratory, Johns Hopkins University) is in the top right. A purple banner at the top of the main content area reads "Modular Open Systems Approach Working Group". Below this, a paragraph states: "The LSIC has established the Modular Open Systems Approach (MOSA) working group (WG) to collect community feedback on lunar interoperability and establishing MOSAs for lunar exploration. The WG works with all six focus groups to gather feedback and connect communities to promote lunar interoperability discussions." To the right, under "APL Staff", are two profiles: James Mastandrea (MOSA WG LEAD) and Kristin Jaburek (MOSA WG SYSTEMS ENGINEER). Below the main text, there is a "Working Group" section with a "Past Meetings" tab highlighted. It lists three telecon events: July 2022 Telecon, June 2022 Telecon, and April 2022 Telecon, each with links for "Presentation" and "Recording" and a "View Supporting Files (1)" link. To the right of the meetings is a section titled "LSIC Wiki on Confluence" with the text "Open to LSIC members only." and "To request access, please contact Andrea Harman at [ams573@alumni.psu.edu](mailto:ams573@alumni.psu.edu)." Below this are two yellow buttons: "LSIC Wiki" and "LSIC MOSA WG Resources".

## 3 Past Telecons Available to Watch:

1. April: Chad Thrasher from NASA on Artemis GUI Standards
2. June: Dr. Katherine Morse from APL on where standards come from
3. July: Dr. Brian Weeden from CONFERS on the Consortium for Execution of Rendezvous and Servicing Operations

# LSIC | VSAT Phase 2 Awards!

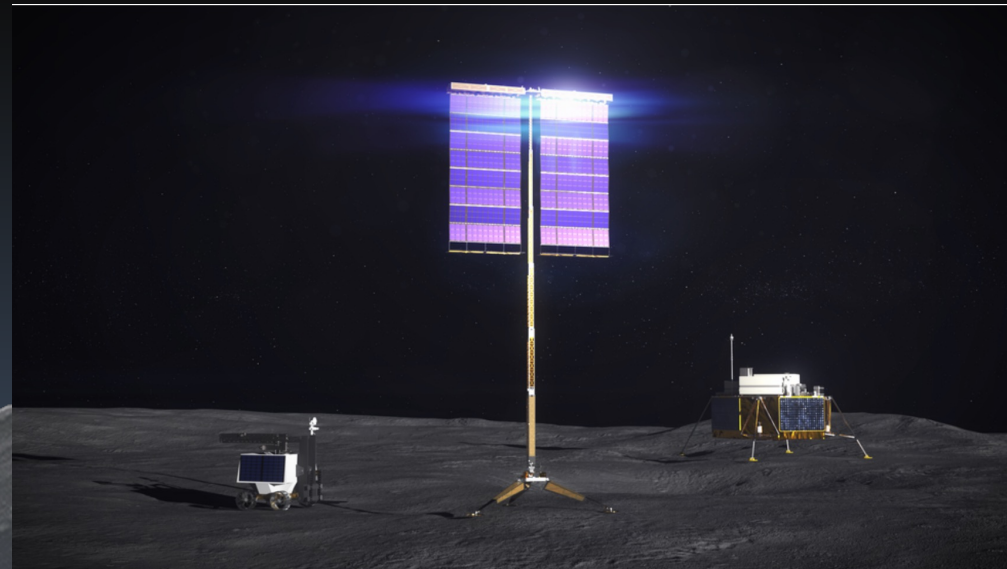


The agency awarded a total of \$19.4 million to three companies to build prototypes and perform environmental testing, with the goal of deploying one of the systems near the Moon's South Pole near the end of this decade. The designs must remain stable on sloped terrain and be resistant to abrasive lunar dust, all while minimizing both mass and stowed volume to aid in the system's delivery to the lunar surface. The awards include:

**Astrobotic Technology** of Pittsburgh, Pennsylvania: \$6.2 million

**Honeybee Robotics** of Brooklyn, New York: \$7 million

**Lockheed Martin** of Littleton, Colorado: \$6.2 million



Space Tech Solicitations (<https://www.nasa.gov/directorates/spacetech/solicitations>)

## Break the Ice Lunar Challenge Phase 2

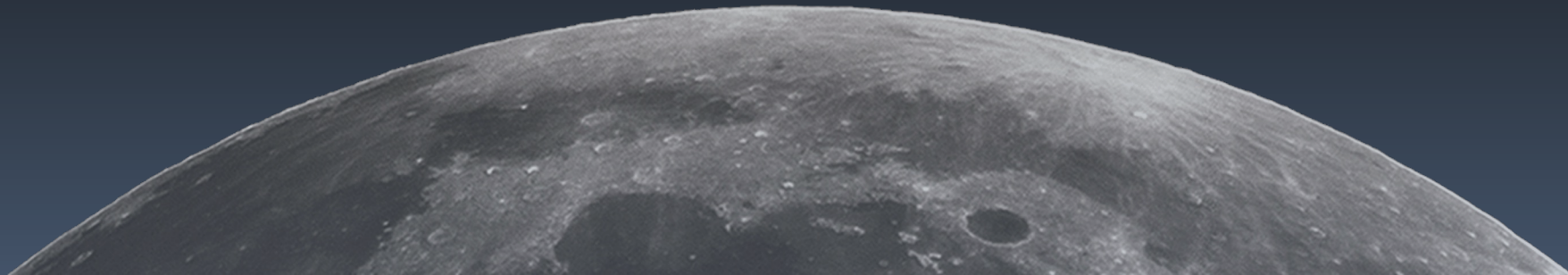
Registration closes: September 30, 2022

Submission deadline: November 4, 2022



NASA Space Technology Graduate Research Opportunities (NSTGRO) solicitation – September 2022

NASA Innovative Advanced Concepts (NIAC) 2022 Phase II Call for Proposals – October 2022



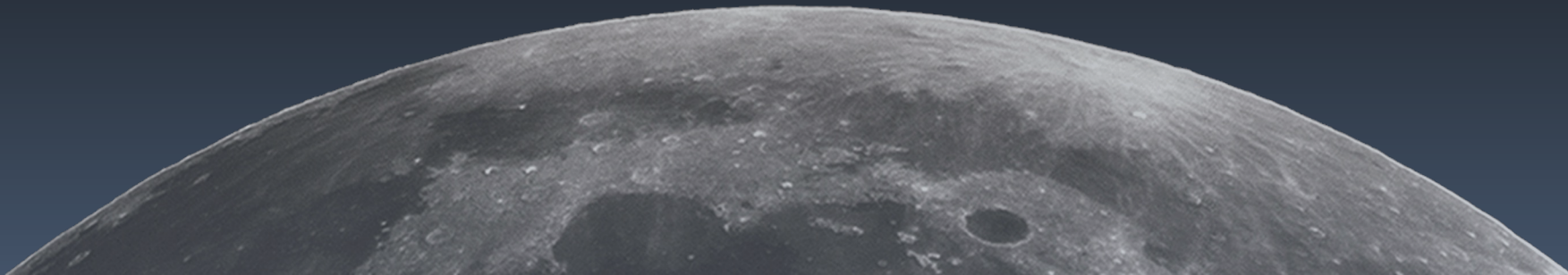
- Enabling Industry Efforts for Space Nuclear Systems and Capabilities
  - Released: 16 August
  - Closes: 15 October
- NASA's Strategic Technology Framework "Explore & Land Thrusts"
  - Released: 25 August
  - Closes: 6 October



# LSIC | Upcoming Meetings and Workshops



- **International Astronautical Congress**
  - September 18-22, Paris
- **AIAA ASCEND**
  - October 24-26, Las Vegas + Virtual
- **LSIC Fall Meeting**
  - November 2-3, UTEP + Virtual
- **Cislunar Security Conference**
  - November 15-17, JHU/APL + Virtual
- **CLPS Survive the night workshop**
  - December 6-8, GRC + Virtual
- **AGU Fall Meeting**
  - December 12-16, Chicago + Virtual
- **More complete calendar on LSIC website, email with additional events!**



- **November 2-3, 2022**
- University of Texas-El Paso
- Focus will be on how the 6 Focus Areas relate to Excavation and Construction.
- Abstract deadline has passed, registration opening soon!



Credit: UTEP

<https://lsic.jhuapl.edu/Events/Agenda/index.php?id=350>







NASA's Science Mission Directorate (SMD) and the Space Technology Mission Directorate (STMD) are pleased to announce a workshop to facilitate collaboration between lander and rover providers and technology developers to share technologies that can enable survival through the lunar night.

- Obvious importance/relevance to our FG - last day to submit an abstract!!!
- What's your take on what the scope should be for the technical program?

<https://www.hou.usra.edu/meetings/clps2022/>

Virtual  
**2022**

30 August – 1 September

**ADVANCED  
POWER SYSTEMS**

FOR DEEP SPACE EXPLORATION

## • Power Systems and Architectures

- Deep Space Missions
- Lunar SP and Grids
- Standards and Design for deep space

## • Power Sources

- Fission & Radioisotope
- photovoltaics

## • Advanced Power Concepts

- Extreme environment access
- Beta-voltaics and small RTGS
- Chemical heat

## • Energy Storage:

- Li-Ion Tech
- Advanced Battery Chemistries
- Fuel Cells & High-Temp Storage
- Extreme Environment and primary power sources

## • Conversion/Switching/Transfer

- Wide Bandgap Semiconductors
- Power Converter Designs

## 1) Lesson's Learned from NASA's FSP Project (Lee Mason, GRC)

- Budget challenges: FSP is expensive!
- Emphasized need to AVOID over-complicating FSP systems

## 2) On-orbit reactor assembly and design of a regulatory pathfinder mission (Lucas Beveridge)

- Launch 2 sub-critical core components, assemble in space as demo, no NRC licensing needed

## 3) Curiosity MMRTG Behavior (Christofer Whiting, INL)

- Deviated from expected performance at  $\sim t=7$  yrs resulting in 2 W degradation at EOL.

## 4) PV Testbed for the lunar surface (Jerimiah McNatt, GRC)

- Flying "circuit board" orientation of six different cells (SolAero, Spectrolab, ASU) on CLPS mission

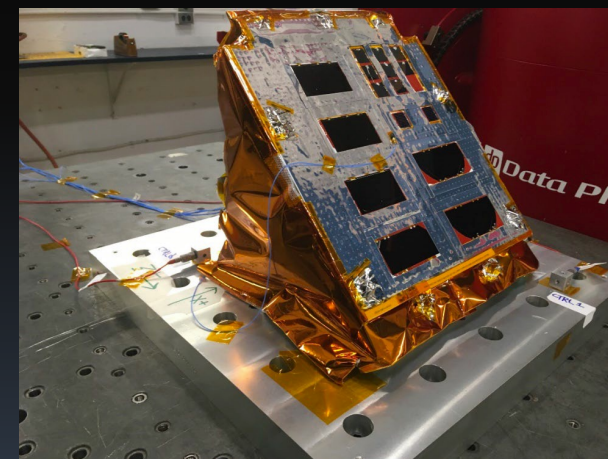
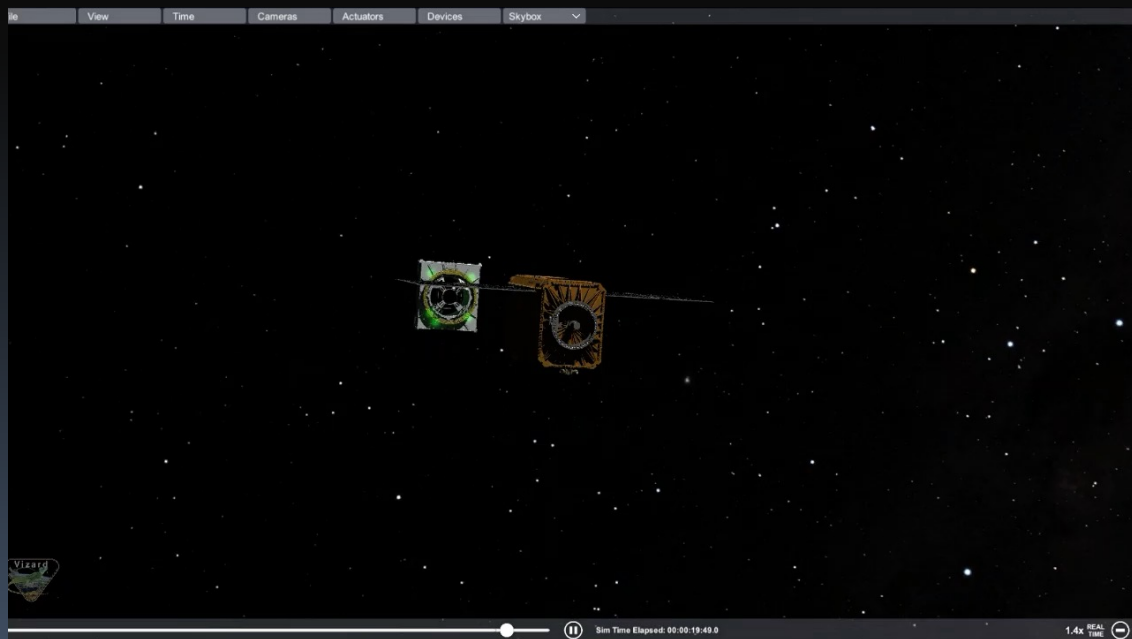
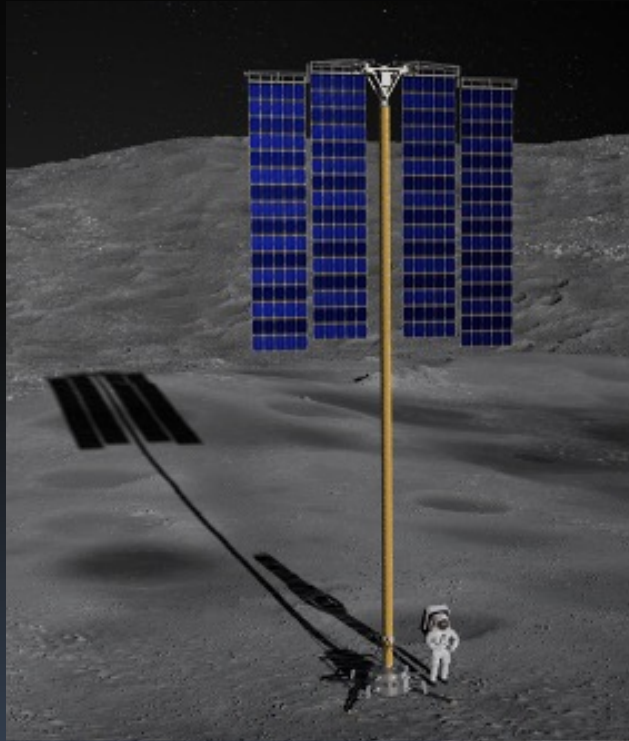


Image Credit: NASA

## 5) Honeybee Robotics LVSAT Design (Hunter Williams)

- Concept for unified grid w/ beaming options between peaks of eternal light: TRL-4 with many components at TRL-6



## 6) Air Liquide RFC (Pascal Barbier)

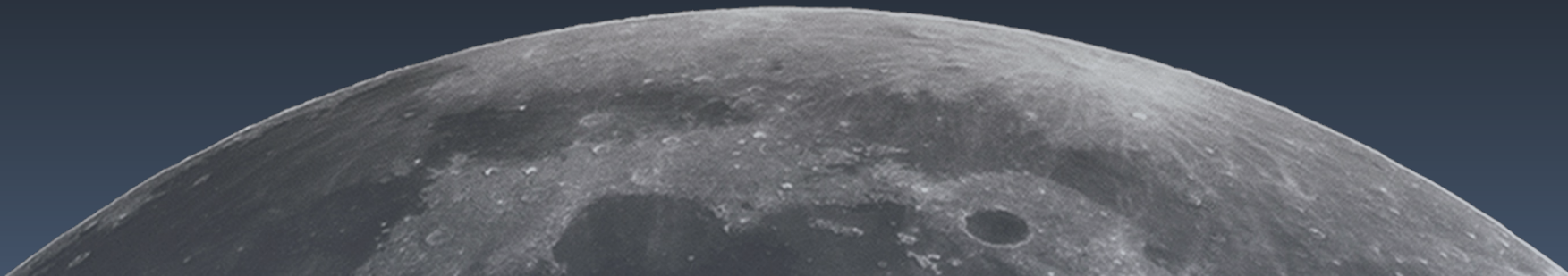
- TRL-4 prototype PEM, 55% Efficiency, tested for 3x200 hr cycles, TRL-5 electrolyzer, lunar demon in 2026 w/ ESA



# International Space Power System Interoperability Standards (ISPSIS) Overview

Nicolas Carbone and David Sadey

[https://nasasitebuilder.nasawestprime.com/wp-content/uploads/sites/45/2019/09/power\\_baseline\\_final\\_3-2019.pdf](https://nasasitebuilder.nasawestprime.com/wp-content/uploads/sites/45/2019/09/power_baseline_final_3-2019.pdf)





JOHNS HOPKINS  
APPLIED PHYSICS LABORATORY

