



# Lunar Surface Innovation

C O N S O R T I U M

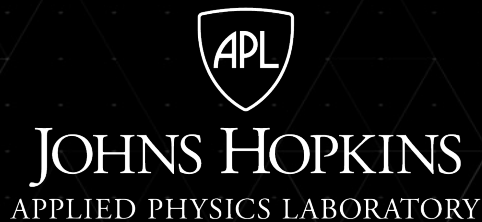
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## Extreme Environments Focus Group April Meeting

**April 12, 2022**

Jamie Porter, PhD  
Johns Hopkins Applied Physics Laboratory

[Facilitator\\_ExtremeEnvironments@jhuapl.edu](mailto:Facilitator_ExtremeEnvironments@jhuapl.edu)



# Today's Agenda

- LSIC Updates
- LSIC Facilities Directory
- 3 Month Agenda for EE
- Featured Presentations (Karen Stockstill-Cahill)
  - **Simulants**
- Open floor

# LSIC Updates

## *Lunar Community Meetings*

- LSIC's Spring Meeting
  - Registration Deadline: April 25, 2022 (for virtual attendance)
  - Event Date: May 4-5, 2022 (hybrid)
  - <https://lsic.jhuapl.edu/Events/Agenda/index.php?id=200>
- *IEEE Nuclear & Space Radiation Effects Conference (NSREC)*
  - Event Date: July 18-22, 2022 in Provo, Utah
  - <https://www.nsrec.com/>
- AIAA ASCEND 2022
  - Call for Content Deadline: March 31, 2022
  - Event Date: October 24-26, 2022 (hybrid)
  - <https://www.ascend.events/2022>
- COSPAR 2022
  - Early Bird Registration Deadline: April 29, 2022
  - Event Date: July 16-24, 2022 in Athens, Greece
  - <https://www.cosparathens2022.org/>

## *Lunar Community Meetings (Continued)*

- NASA Exploration Science Forum
  - Event Date: July 19 - 21, 2022 in Boulder, Colorado
  - <https://sservi.nasa.gov/nesf2022/>
- Intelligent Systems Workshop
  - Event Date: July 26-27, 2022 in College Station, TX
  - <https://www.iafastro.org/events/iac/iac-2022/technical-programme/>
- International Astronautical Congress
  - Event Date: September 18 – 22, 2022 in Paris, France
  - <https://www.iafastro.org/events/iac/iac-2022/technical-programme/>

# LSIC Updates

## *Funding Opportunities*

- Nighttime Precision Landing Challenge No. 1
  - Develop sensing systems that can detect terrain hazards in the dark
  - Register Deadline: May 5, 2022, at 5:00 PM Pacific
  - Application Deadline: May 19, 2022, at 5:00 PM Pacific
  - <https://www.precisionlanding1.nasatechleap.org/>
- Space Technology Research Institutes (STRI) Solicitation
  - June 2022
  - <https://www.nasa.gov/directorates/spacetech/strg/stri>
- Early Stage Innovations (ESI)
  - April 2022
  - <https://www.nasa.gov/directorates/spacetech/strg/early-stage-innovations-esi>
- NASA Innovative Advanced Concepts (NIAC) 2023 Phase I Call for Proposals
  - June 2022
  - <https://www.nasa.gov/content/apply-to-niac>

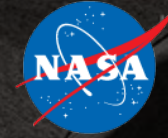
Please visit LSIC website for full list

<http://lsic.jhuapl.edu/Resources/Funding-Opportunities.php>



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# The LSIC Facilities Directory

A Searchable Facilities Directory to Spur Innovation,  
Technological Advancement, and Team Building

Josh Cahill (APL), Kristen John (NASA), Andrea Harman (APL), and  
Jacquelyn Black (NASA)



# The Need

An aerial, top-down view of a simulated lunar base on a dark, cratered surface. The base consists of several interconnected white and grey modules, some with yellow accents. A large, central, hexagonal structure with a yellow and white pattern is prominent. To the left, there are several large, white, cylindrical tanks. In the foreground, there are rows of small, white, rectangular objects, possibly solar panels or equipment. A winding path or road leads through the base. The background shows a dark, cratered landscape with a large, circular crater in the upper right corner.

- To return to the Moon with the most advanced technologies during Artemis, knowledge of, and access to, appropriate testing facilities is critical.
- NASA and LSIC have heard this need conveyed by the LSIC community and have begun working together to provide some informational support.
- Beginning by gathering searchable knowledge

# NASA Facilities

- Dr. Kristen John and Jaquelyn Black managed to:
  - Collect ~150 NASA facilities and POC's focused upon dust mitigation
  - Have been gathering POC permission to list publicly as potentially available to be utilized.
- LSIC has been:
  - Creating and populating a searchable interface on LSIC Confluence Wiki (password protected)
  - And will be placing a call out to the larger LSIC community for additional commercial, academic, government, and non-profit facilities.



# LSIC Facilities Directory Interface

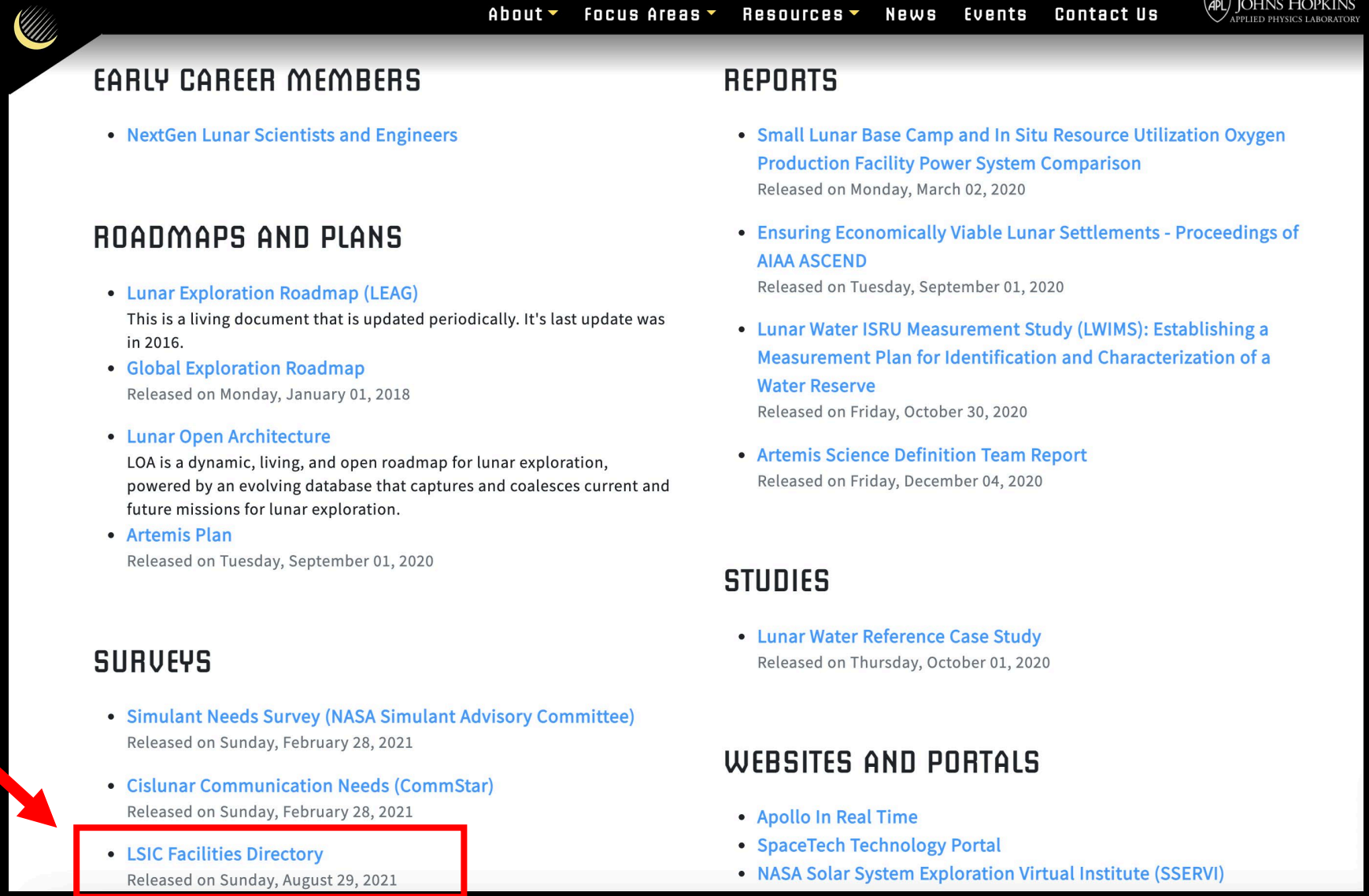
- Directory is organized by keywords/labels
- But, is also full listing searchable (not dependent upon selected keywords/labels)
- Currently ~75 facilities; Working on getting approval for an additional 75 facilities
- Most consist of dust mitigation led facilities
- Calling for EE focused facilities here

The screenshot shows the 'Facilities Directory Home' page. The sidebar on the left contains a 'Pages' section with a 'Blog' link and a 'SPACE SHORTCUTS' section with instructions on how to add shortcut links. Below that is a 'PAGE TREE' section listing various facility types such as '5 x 5 Chamber', '18" Vac Chamber', and 'Active Response Gravity Offload System'. The main content area has a title 'Facilities Directory Home' and a subtitle 'Created by Andrea Harman, last modified by Josh Cahill on Aug 27, 2021'. The main heading is 'LSIC Facilities Directory' with a description: 'This directory is meant for any testing facilities that may be leveraged to assess or advance the technology readiness level of lunar surface technologies.' A link to add a facility is provided: 'https://forms.gle/MronYz72WeWbAqdx6'. A search bar is present with the instruction: 'Use the search bar above to review a cultivated list of available testing facilities. While keywords/labels are listed below, the search function examines all text in the directory.' Below the search bar is a 'Full List Of Facilities' link and a 'Facilities Overview' section. The 'Facilities Overview' section contains a grid of keywords organized by letter: A, B, C, D, E, F, G-H, I-K, L-M, N-O, P-Q. Each letter has a list of related keywords.

A	B	C	D	E	F
abrasion	balance	cathode-testing	dark-regolith	electrostatics	fabric
abrasion-testing	bell-jar	chamber	deposition	endurance	fatigue-testing
actuators	bending	cleaner	development	excavation	film
adhesion	buoyancy	closed	dirty-chamber	excavation-construction	filter
aerosols		components	dry-cleaner-tumbler		filter-evaluation
air-permeability		creasing	drying/heating		fire-safety
ambient		cryogenic	durability		flex
anorthosite		cycler	dust		flex-fold
atmosphere		cylinder	dust-box		fold
atmospheric			dust-deposition		folding
			dust-distribution		force
			dust-testing		
			dusty-vacuum		
G-H	I-K	L-M	N-O	P-Q	
gases	icy-regolith	lh2	nasa	paper	
gas-extraction	imaging	light-regolith	neutral-buoyancy	particles	
gasket	in-situ	ln2	nondust	pascehn-breakdown	
glovebox	in-situ-resource-utilization	lo2	open	performance	

# How Does A Facility Get Listed?

- Fill out the Facilities Survey!
- Find under path: Resources > Community > Surveys



The screenshot shows the top navigation bar of the Applied Physics Laboratory (APL) website. The navigation items are: About, Focus Areas, Resources, News, Events, and Contact Us. The APL logo and 'JOHNS HOPKINS APPLIED PHYSICS LABORATORY' are in the top right corner. Below the navigation bar, the page is divided into several sections: EARLY CAREER MEMBERS, ROADMAPS AND PLANS, SURVEYS, REPORTS, STUDIES, and WEBSITES AND PORTALS. A red arrow points from the 'Surveys' section to the 'LSIC Facilities Directory' link, which is highlighted with a red box. The 'LSIC Facilities Directory' link is located under the 'SURVEYS' section, with the text 'Released on Sunday, August 29, 2021' below it.

**EARLY CAREER MEMBERS**

- [NextGen Lunar Scientists and Engineers](#)

**ROADMAPS AND PLANS**

- [Lunar Exploration Roadmap \(LEAG\)](#)  
This is a living document that is updated periodically. It's last update was in 2016.
- [Global Exploration Roadmap](#)  
Released on Monday, January 01, 2018
- [Lunar Open Architecture](#)  
LOA is a dynamic, living, and open roadmap for lunar exploration, powered by an evolving database that captures and coalesces current and future missions for lunar exploration.
- [Artemis Plan](#)  
Released on Tuesday, September 01, 2020

**SURVEYS**

- [Simulant Needs Survey \(NASA Simulant Advisory Committee\)](#)  
Released on Sunday, February 28, 2021
- [Cislunar Communication Needs \(CommStar\)](#)  
Released on Sunday, February 28, 2021
- [LSIC Facilities Directory](#)  
Released on Sunday, August 29, 2021

**REPORTS**

- [Small Lunar Base Camp and In Situ Resource Utilization Oxygen Production Facility Power System Comparison](#)  
Released on Monday, March 02, 2020
- [Ensuring Economically Viable Lunar Settlements - Proceedings of AIAA ASCEND](#)  
Released on Tuesday, September 01, 2020
- [Lunar Water ISRU Measurement Study \(LWIMS\): Establishing a Measurement Plan for Identification and Characterization of a Water Reserve](#)  
Released on Friday, October 30, 2020
- [Artemis Science Definition Team Report](#)  
Released on Friday, December 04, 2020

**STUDIES**

- [Lunar Water Reference Case Study](#)  
Released on Thursday, October 01, 2020

**WEBSITES AND PORTALS**

- [Apollo In Real Time](#)
- [SpaceTech Technology Portal](#)
- [NASA Solar System Exploration Virtual Institute \(SSERVI\)](#)

# Directory Questionnaire

- Questionnaire Link:  
<https://forms.gle/MronYz72WeWbAqdx6>
- Details on each facility, its location, availability, scheduling, pricing, etc, as well as a Point of Contact and e-mail address
- Listing is Free

## LSIC Facilities Directory

Please add information about facilities you have available for the lunar surface development community! This information will be shared using LSIC's Facilities Directory on Confluence.

 [jtmcahill@gmail.com](#) (not shared) [Switch account](#)



Affiliated Organization

Your answer

Your Name

Your answer

Your Email

Your answer

Facility Name

Your answer

Facility Location

Your answer

# Getting to the Directory Itself

- Resources > LSIC
- Resources > LSIC and LSII Resources

- Link: <https://lsic-wiki.jhuapl.edu/x/HINf>

- Password protected

- Contact Andrea Harman if you are a member of LSIC and would like an account

APL JOHN'S HOPKINS APPLIED PHYSICS LABORATORY

## LSIC Resources

### LSIC and LSII Resources

- Code of Conduct (PDF)
- Welcome Package (PDF)
- Listserv Overview (PDF)
- NASA Lunar Surface Innovation Initiative
- NASA Space Technology Mission Directorate
- Lunar Simulants
- LSIC Facilities Directory (on Confluence wiki)**

### Reference Materials

- Ice Mining in Lunar Permanently Shadowed Regions
- Dallas Bienhoff, Cislunar Space Development Company, LLC "CSDC ISRU Propellant Needs and Value"
- Pascal Barbier, Air Liquide "ISRU Development for Sustainable Space Exploration"
- Nicholas Bennett, UNSW ACSEr "An Existing Market for Lunar Propellant — GTO Orbit Raising as a Service"

### Newsletters

- September 2021
- August 2021
- July 2021
- June 2021
- May 2021
- April 2021
- March 2021
- February 2021
- January 2021
- December 2020
- November 2020
- October 2020
- September 2020
- August 2020
- July 2020

To suggest resources for this page, please contact us at [SES-LSIC-Web@jhuapl.edu](mailto:SES-LSIC-Web@jhuapl.edu)

[https://www.nasa.gov/directorates/spacetech/Lunar\\_Surface\\_Innovation\\_Initiative...](https://www.nasa.gov/directorates/spacetech/Lunar_Surface_Innovation_Initiative...)

LSIC Home ☆

Pages

Blog

SPACE SHORTCUTS Here you can add shortcut links to the most important content for your team or project. Configure sidebar.

PAGE TREE

- Focus Group - Guest Speaker Schedule
- > Focus Group Leads
- Funding Opportunities
- Open Positions
- > Internal Event Planning
- > LSIC Administration
- Newsletters
- Wiki Suggestion Box
- Who's Who - Main
- Resources & Library - Main
- 2021 Fall Meeting Abstracts

Pages 🔒

# LSIC Home

Created by Andrea Harman, last modified by Josh Cahill on Sep 01, 2021

Edit Save for later Watching Share



### Confluence Training Sessions

If you're just getting to know Confluence, please contact @Andrea Harman for support and training.

## Focus Areas

Dust Mitigation (DM)	Excavation & Construction (E&C)	Extreme Access (EA)
Extreme Environments (EE)	In Situ Resource Utilization (ISRU)	Surface Power (SP)

Visit LSIC's external website here: [lsic.jhuapl.edu](https://lsic.jhuapl.edu)  
 Visit LSIC's LinkedIn site here: <https://www.linkedin.com/groups/13861869/>  
 LSIC's code of conduct for members is available [here](#).

### Contents

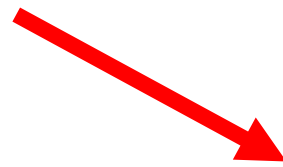
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### Tools & Resources

- Lunar Simulants Working Group
- LSIC Facilities Directory**

### LSIC-Wide Events

- 2021 Spring Meeting
- 2020 Fall Meeting



### Recent Space Activity

### News & Announcements

# 3 Month Agenda for EE

- May 10, 2022
  - Overview of Subgroup Progress
  - Speaker: Subgroup Leads
- June 14, 2022
  - “Cold-Operable Electronics”
  - Speaker: Tom McCarthy, Motiv Space Systems
- July 12, 2022
  - Radiation and Regolith Crosstalk
  - Speaker: TBD



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