Lunar Surface Innovation
CONSORTIUM

LSIC ISRU Focus Group Monthly

http://lsic.jhuapl.edu/
http://lsic-wiki.jhuapl.edu/ (sign-up required)

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Agenda

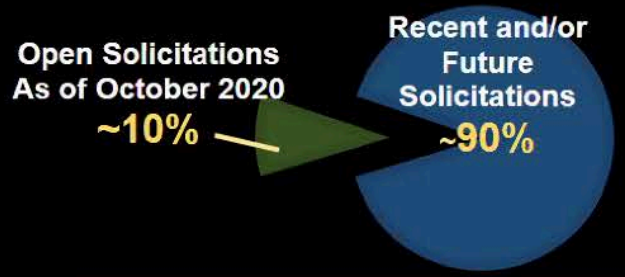
Discussions to be captured on Confluence. https://lsic-wiki.jhuapl.edu

Email Andrea at ams573@alumni.psu.edu, for an account .

- Update on funding opportunities (5min)
- Brief recap of Fall Workshop and S&D Workshop (5min, discussions off line on confluence)
- Brief recap of S&D Workshop (5min)
- An eye on the Future for our FG. *A working session*. (20min – on Confluence)
  - Our 1-yr goal and the needs of the Focus Group Members
  - Topics worthy of a ½ day workshop (it needs to resolve a dilemma). Ideas generated from the Fall meeting?
  - Joint & multi-FG topics and workshop concepts.
- Technology Showcase – TransAstra, Joel Sercel (5min)
- Space Mining and relevance to ISRU – Dale Boucher of Deltion Innovations. (20min)
- December FG meeting. 16 Dec.
  - Send suggestions if interested in hearing more about topics presented at the ASCEND conference. You can download the presentations by registering.

SPACE TECHNOLOGY OPPORTUNITIES

Space Technology anticipates awarding ~$600M to academia and industry supporting 2020 solicitations and awards.



Note: Funding awards are approximate and subject to change.

NextSTEP Broad Agency Announcements (BAAs): *Varied Release Dates*	Varies
SmallSat Technology Partnerships (STP): *September – November 2021*	$3M
Vertical Solar Array Technology (NRA,REDDI) *November 2020*	$7.5M
NASA Breakthrough, Innovative, Game-changing (BIG) Idea Challenge: *July – December 2020*	$1M

https://breaktheicechallenge.com/
https://lsic-wiki.jhuapl.edu/x/JYFf

$250M	Space Technology Tipping Point Multiple Awards: *January – March 2020*
$212M	Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) Phases I, II, II-E, Civilian Commercialization Readiness Pilot Program (CCRPP), Sequential: *Phase I Solicitation, January – April 2020*
$30M	Space Technology Research Institutes (STRI): *June – November 2020*
$20M	Lunar Surface Technology Research (LuSTR) Opportunities: *July – September 2020*
$19M	NASA Space Technology Graduate Research Opportunities (NSTGRO): *September – November 2020*
$10M	Announcement of Collaborative Opportunity (ACO): *January – March 2020*
$10M	Flight Opportunities Tech Flights: *February – May 2020*
$9M	Early Stage Innovations (ESI): *April – October 2020*
$6M	Early Career Faculty (ECF): *February – April 2020*
$4M	NASA Innovative Advanced Concepts (NIAC) Phases I, II, III: *Phase I Solicitation, June – July 2020*

Please visit the STMD Solicitation website for more information: https://www.nasa.gov/directorates/spacetech/solicitations

SBIR & STTR released on Nov 9

https://sbir.nasa.gov/solicit/66886/detail?data=ch9

T14.01 Advanced Concepts for Lunar and Martian Propellant Production, Storage, Transfer, and Usage

STTR S1.07 Z10.01

Lead Center: GRC

Participating Center(s): JSC

Scope Title: Advanced Concepts for Lunar and Martian Propellant Production, Storage, Transfer, and Usage Scope Description: This subtopic seeks technologies related to cryogenic propellant (e.g., hydrogen, oxygen, and methane) production, storage, transfer, and usage to support NASA's in-situ... Read more>>

Z12.01 Extraction of Oxygen and Water from Lunar Regolith SBIR Z10.01

Lead Center: JSC

Participating Center(s): GRC, JPL, KSC, MSFC

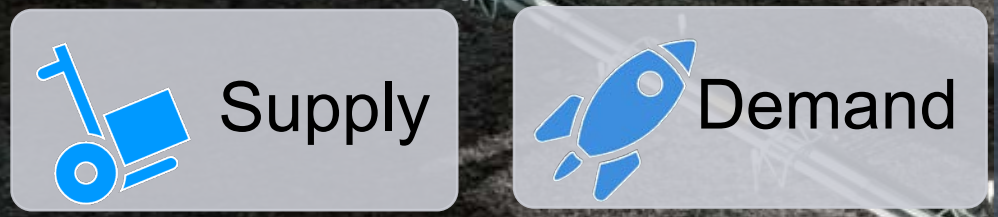
Scope Title: Solar Concentrator Technologies for Oxygen Extraction and In Situ Construction Scope Description: Solar concentrators have been used to successfully demonstrate multiple in situ resource utilization (ISRU) technologies, including hydrogen and carbothermal reduction, sintering of... Read more>>

Fall Meeting Take-Aways

- What are Your thoughts and take-aways? Do you agree or disagree with these below? This is on confluence at https://lsic-wiki.jhuapl.edu/x/KoFf where you can make comments that will be captured.
- Modular/scalable technology and/or power options
- Dust mitigation and wear/tear on systems
  - How to do maintenance?
- ISRU demonstrations
  - Including prospecting and a better understanding of resource distribution and concentration
- Autonomous navigation/operations will be needed at all power levels
  - How long can a base be run autonomously?
- Need for detailed architecture and plans
- International cooperation is very important
- The need for ground-truthing measurements in PSRs and for geotechnical properties
- Sustained funding and policy support are necessary to maintain progress and ensure sustainability
- More information can be found on the Extreme Access monthly presentation.
- A more detailed recap will be presented on Dec 3 at the Power FG monthly.

LSII | ISRU Industry Propellant Supply and Demand Workshop

A dozen industry talks with discussions during a half day virtual workshop in September, 2020.
Over 200 attendees from over 100 institutions (recording at http://lsic.jhuapl.edu/Events/103.php?id=103)



Strong demand projected for in-situ derived propellant.

- Industry based on actual plans and hardware
- 10s to 100s of metric tons of propellants a year, near term (within a decade)
- 80% of the demand is LOX
- NASA and DOD can serve as anchor customers to ensure initial viability for this new marketplace

Two potential supply options

- Water (O_2 and H_2) from ice. (technology TBD)
- O_2 directly from regolith. (two possible technologies)

Supply challenges

- Low TRL of extraction equipment for ice and O2R.
- Insufficient knowledge of water as a reserve.

Eye on the Future
https://lsic-wiki.jhuapl.edu/x/GYFf

- ISRU FG Year 1 Goal.

Draft: There is a need for 10s to 100s of metric tons of O_2 per year for propellent use by the 2030 timeframe (S&D workshop, 2020). The first-year goal of the ISRU focus group is to provide specific input to NASA with respect to technology needs, the systems-level end to end processes, and for identifying the ground truth data needed to inform on technology/capability development, for both O_2 extraction from regolith and water extraction from PSRs at the above level.

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Your input to NASA…what do you want LSIC to do for you? Ideas you want to get in front of NASA?

Note Taking Slide to Supplement Confluence

- Add more text here

Technology Showcase
TransAstra Corporation
Joel Sercel

Space Mining
Dale Boucher

Confluence site: https://lsic-wiki.jhuapl.edu/x/EIFf

Also under ISRU/ISRU Meeting Notes/November 18/Space Mining Presentation/

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