Lunar Surface Innovation
CONSORTIUM

LSIC Excavation and Construction Focus Group

http://lsic.jhuapl.edu/

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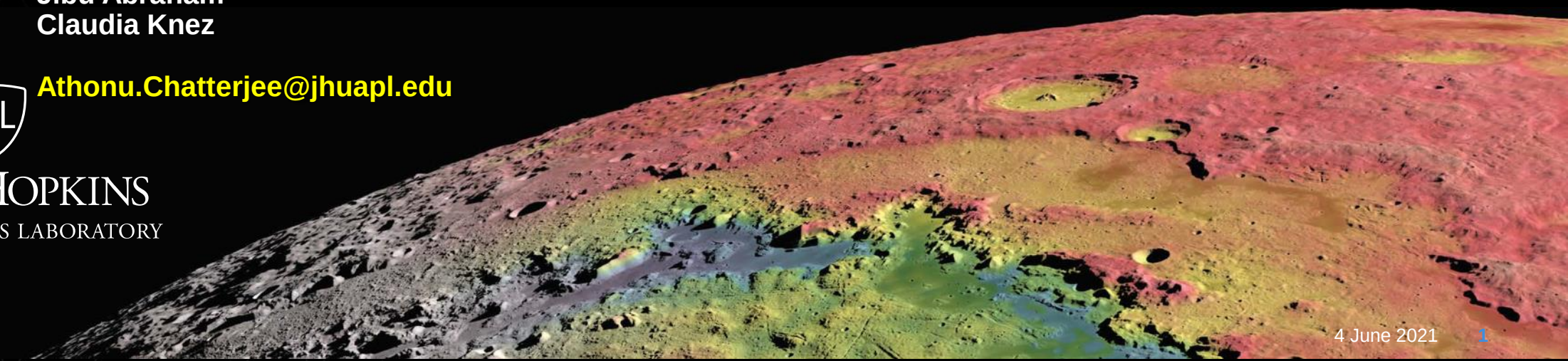

Friendly Reminders

- Slides, chat and recording will be posted in our website in 2-3 days. (http://lsic.jhuapl.edu/Focus-Areas/Excavation-and-Construction.php)

- Feel free to post your questions/suggestions in ‘chat’.
  - We can move the discussion to Confluence.

- Mute yourself if you are not speaking.

Contact me if you want to present in this meeting.

Agenda

- Focus group update.
- Two ~20-minute presentations:
  - Dr. Bob Moses (NASA Langley Research Center): **Suggesting Requirements for GCR Shielding, Surface Excavation &Construction**
  - Dr. Mark Hilburger (NASA Langley Research Center): **Outfitting for Lunar Infrastructure**

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LSIC Spring Workshop Take-aways

- NASA will be a user of technology – focus is continuing to shift from NASA building to industry providing.
  - Public – Private Partnership (PPP) : Dr. Peter Carroto's (Bechtel) presentation in March.
  - Streamline terrestrial construction industry and space industry collaboration by aligning their work-processes and practices.

- **Infrastructure is needed**. Excavation and Construction FG will play a critical role.
  - LSIC should identify its vision of infrastructure and share/collaborate with NASA .

- Other E&C–related major take–aways:
  - Standardization is important. Proactive with standards and safety.
  - Think about how technology can be operated and maintained alongside developing them.
  - Inter-operability in autonomous construction realm is important. *SafeAI* presentation in February.
  - Dealing with many unknowns – moonquakes, geo properties, ---. Need a robust risk-mitigation approach.
  - Underestimated areas: thermal management, wear and tear.

IDA SCIENCE & TECHNOLOGY POLICY INSTITUTE REPORT

Report is public now, "***Demand Drivers of the Lunar and Cislunar Economy***" by Thomas J. Colvin, Keith W. Crane, Rachel Lindbergh and Bhavya Lal.

Synopsis:

Examined the contours and future scale of demand drivers of lunar and cislunar activities through 2040 to ascertain whether private sector demand could support commercial lunar activities. Our focus was on non-NASA commercial demand.

https://www.ida.org/research-and-publications/publications/all/d/de/demand-drivers-of-the-lunar-and-cislunar-economy

Today's Talks

(1) Dr. Bob Moses : **Suggesting Requirements for GCR Shielding, Surface Excavation &Construction**

(2) Dr. Mark Hilburger: **Outfitting for Lunar Infrastructure**

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E&C Technical Areas Google Survey Results

Habitat construction in lunar conditions. (Inflatable habitat, underground habitat, radiation shielding, multi-functional materials/structures)	**70.5%**
Manufacturing processes for lunar construction. (Additive manufacturing, sintering, regolith fiber pulling)	63.6%
Excavation technology for hard regolith/icy material. (Drilling, mining, lightweight construction equipment)	61.4%
Autonomous vehicles and robots for E&C on lunar surface.	59.1%
Lunar surface structure development. (Landing pads, berms, roads)	54.5%
Increased autonomy of operations.	34.1%
Virtual lunar terrain simulation.	29.5%
Beyond additive technology.	22.7%
Long duration robust , easily maintainable robot design for industrial scale use (not science)	2.3%
Subsurface and interior imaging and composition analysis	2.3%
Compressed, sifted regolith as a building material	2.3%
Spacecraft refueling station development	2.3%

LSII System Integrator - APL

A key tenet of LSII is to implement a multitude of novel collaborations across industry, academia, and government in order to successfully develop the transformative capabilities for lunar surface exploration.

Origin of the APL Task

- NASA was investigating using a University Affiliated Research Center (UARC) to bring efficiencies to development
- LSII initiated a tasked APL, to assess system integration role for the Lunar Surface Innovation Initiative
- APL established a Lunar Surface Consortium with academia and industry representatives, as well as NASA experts, that span a broad range of capabilities to execute timely studies, tasks, and/or acquisitions

The Consortium will assist NASA in

- Identifying lunar surface technology needs and assessing the readiness of relative systems and components
- Making recommendations for a cohesive, executable strategy for development and deployment of the technologies required for successful lunar surface exploration
- Providing a central resource for gathering information, analytical integration of lunar surface technology demonstration interfaces, and sharing of results