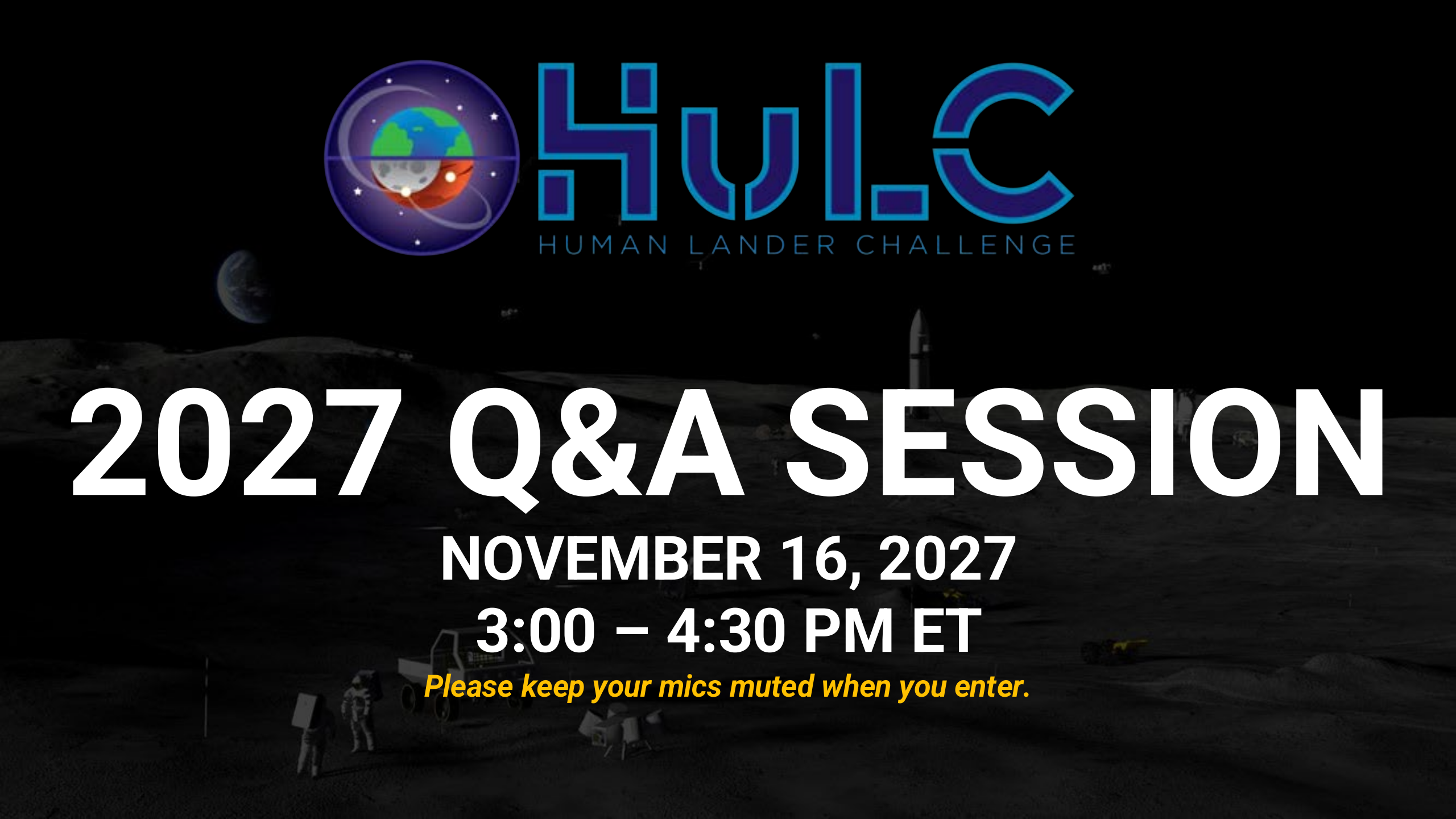

HuLC
HUMAN LANDER CHALLENGE
2027 Q&A SESSION
NOVEMBER 16, 2027
3:00 – 4:30 PM ET
Please keep your mics muted when you enter.

AGENDA

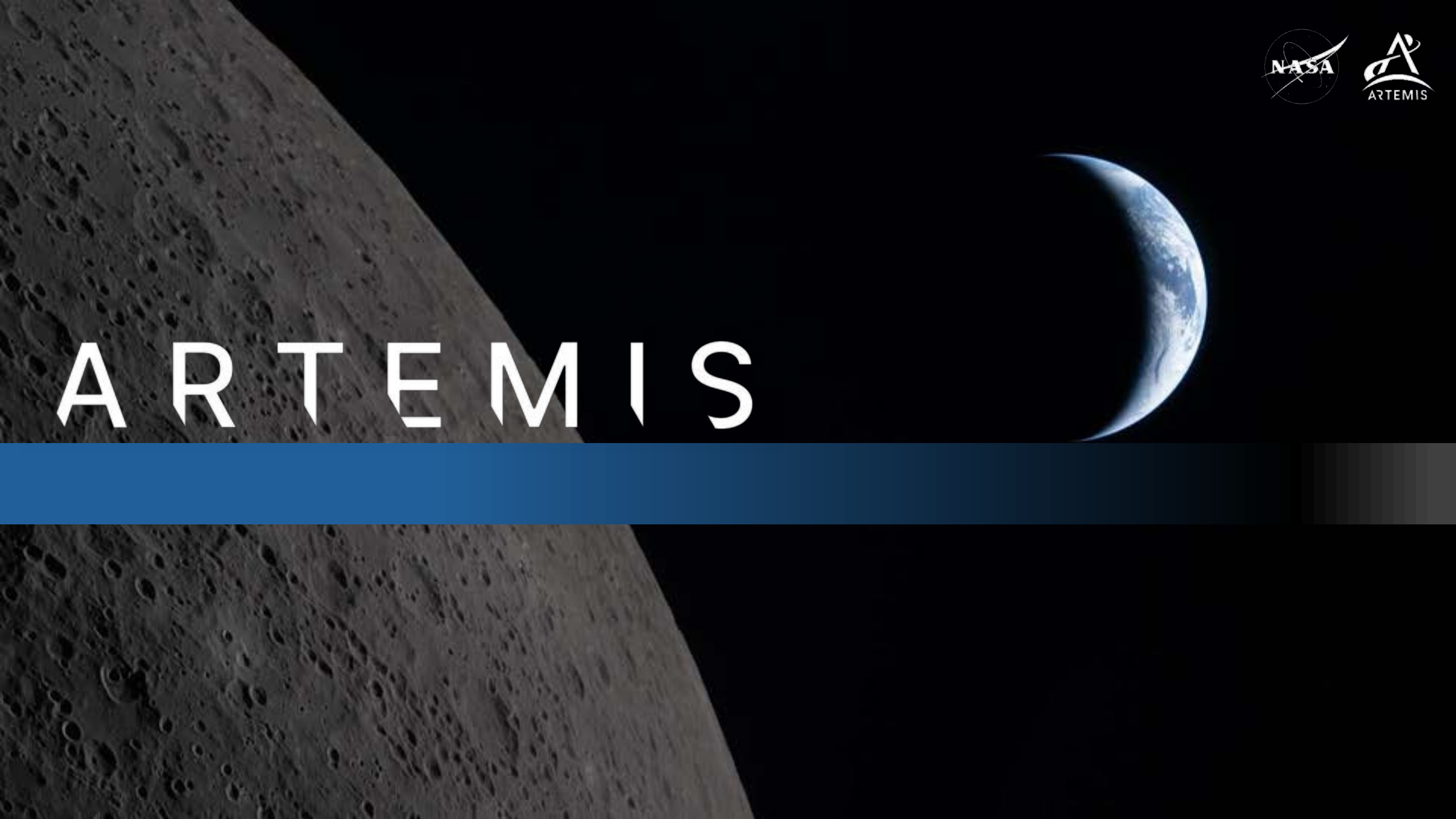


- 2027 Challenge Theme Context
- Programmatic Remarks & What's New for 2027
- Questions Received in Advanced
  - Technical
  - Miscellaneous
  - Programmatic
- Additional Questions
- Wrap-Up



2027 CHALLENGE THEME: LUNAR COMMUNICATIONS

Alexander Bahrim
2027 HuLC Chair
NASA Avionics Engineer


NASA
ARTEMIS
ARTEMIS



ARTEMIS I

First Mission
(Uncrewed Test Flight)



COMPLETE

ARTEMIS II

First Artemis Crew



COMPLETE

ARTEMIS III

First Artemis Docking in Space
With Human Landing System



ARTEMIS IV

First Artemis
Human Surface Landing



ARTEMIS V+

Annual Mission Cadence
Sustained Lunar Presence



Artemis III Mission



Blue Origin Blue Moon Pathfinder



SpaceX Starship Pathfinder

Artemis III Progress



SpaceX Starship Test Flight 14 – Sept. 28, 2026
First Orbital Flight



SpaceX Starship Test Flight 14 – Sept. 28, 2026
First Orbital Flight



Blue Origin Atmospheric Test Stand in West Texas
June 17, 2026



Artemis III Crew Visit Blue Origin in Florida

Artemis IV Progress



Liquid Hydrogen Tank Completes Proof Testing
Michoud Assembly Facility

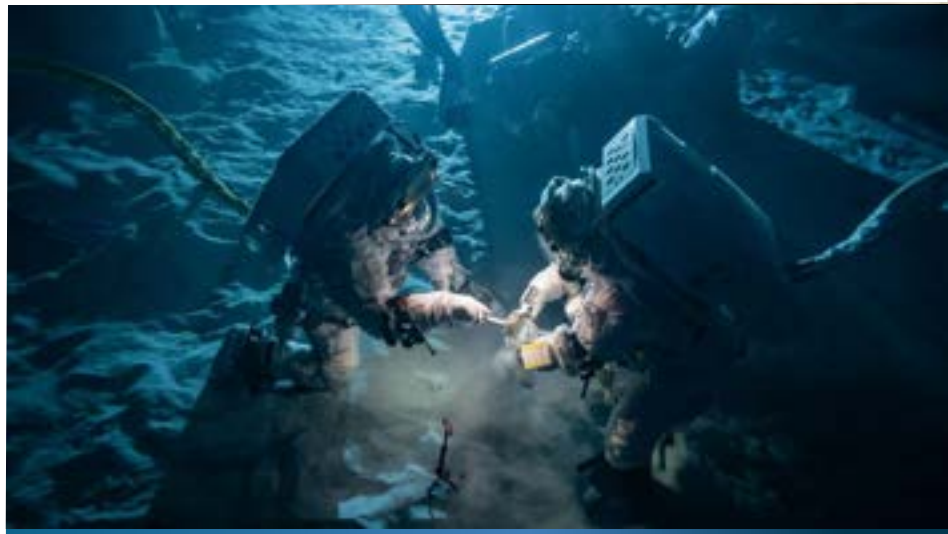


European Service Module IV
Kennedy Space Center





Crew Module IV
Kennedy Space Center



Artemis Lunar Spacesuit Testing
Johnson Space Center


NASA
ARTEMIS
MOON BASE

We’re Building Humanity’s First Moon Base

NASA is building the Moon Base at the lunar South Pole to unlock scientific discovery, drive innovation with industry and international partners, and prepare humanity for missions to Mars.

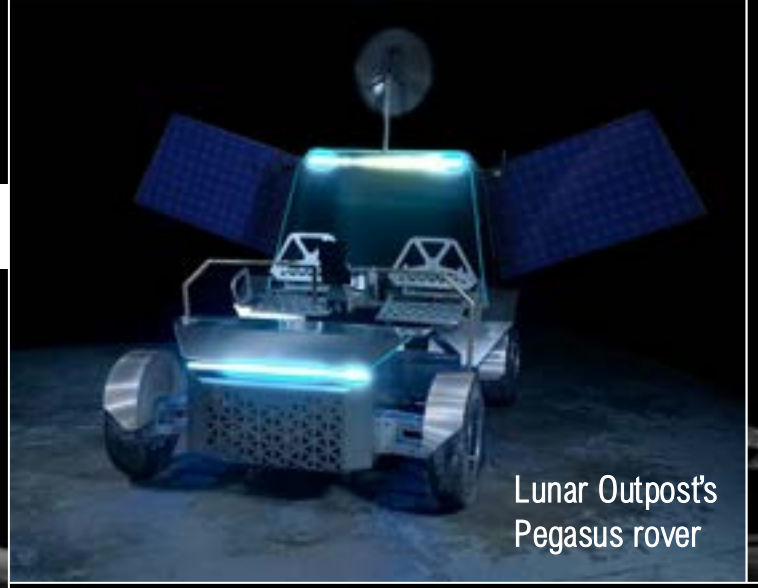


MOON BASE

ON THE HORIZON



Astrolab's
CLV-1 rover



Lunar Outpost's
Pegasus rover



JAXA's
Pressurized Rover



NASA JPL's
MoonFall
Drones



Habitat Concept



2027 CHALLENGE THEME: LUNAR COMMUNICATIONS

Background



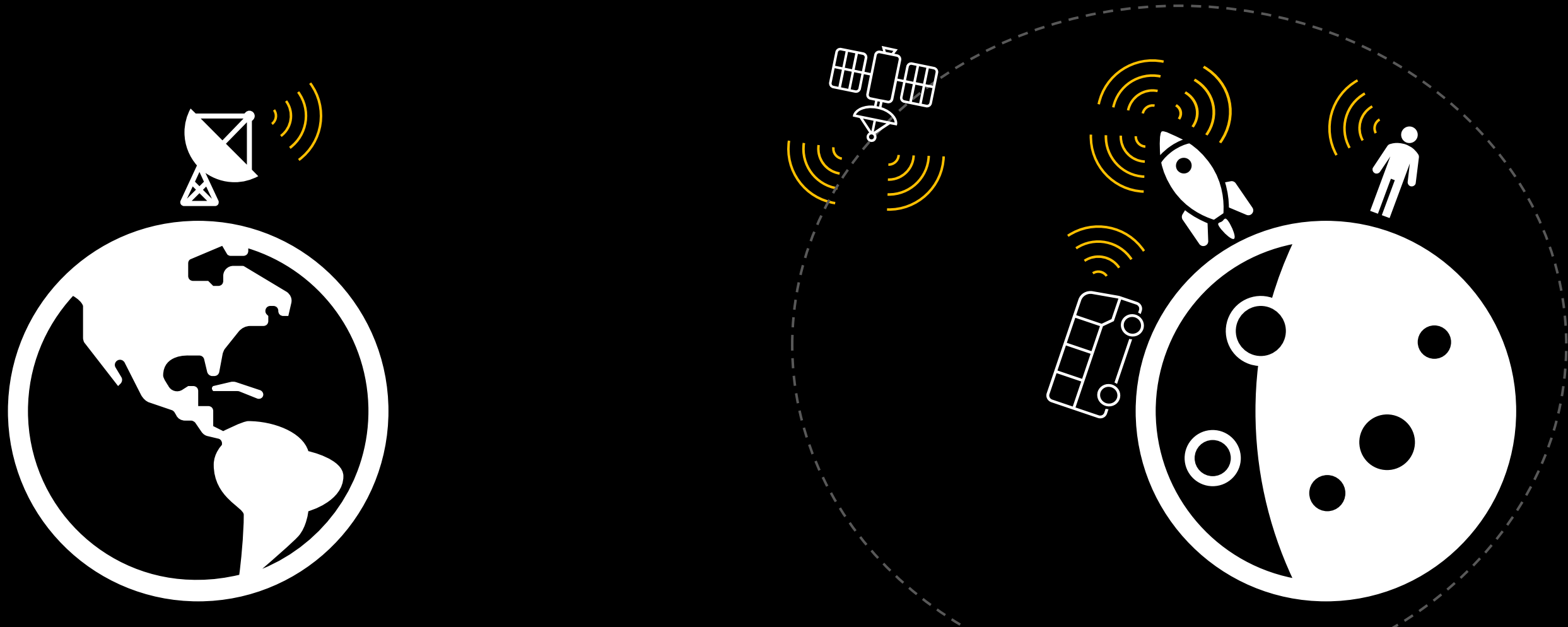
NASA's Human Lander Challenge (HuLC) is an initiative supporting its Human Spaceflight Mission Directorate's (HSMD's) efforts to explore innovative solutions for a variety of known Human Landing System (HLS) challenge areas.

Through this competition, students contribute to the advancement of HLS technologies, concepts, and approaches. Improvements in these technology areas have the potential to revolutionize NASA's approach to space exploration, and contributions from the academic community are a valuable part of the journey to discovery.

https://hulc.nianet.org/

What is Lunar Comms?

Lunar communications (comms) refers to the technology and infrastructure used to transmit voice, data, video, and navigation signals between Earth, lunar orbit, and the surface of the Moon.



What is Lunar Comms?

Wireless technologies in space include:

- **Radio Frequency (RF) Communications**
  - VHF and UHF Bands (30 MHz – 3 GHz)
  - L-Band (1 – 2 GHz)
  - S-Band (2 – 4 GHz)
  - X-Band (8 – 12 GHz)
  - Ku and Ka-Bands (12 – 40 GHz)
- **3rd Generation Partnership Project (3GPP) Cellular Wireless**
  - 4G Long-Term Evolution (LTE)
  - 5G
- **Wi-Fi (IEEE 802.11)**
- **Free-Space Optical (Laser)**



Image Credit: NASA

How does Lunar Comms work?

Direct-to-Earth – transmit signals directly with ground stations on Earth, bypassing any intermediate relay satellites or in space routing networks.

Relayed-with-Earth – transmit signals with Earth ground stations and assets on the lunar surface or in space using lunar orbiting relays (LORs).

- Cross-Link – transmit signals between relays.

Surface-to-Surface – transmit signals between lunar surface assets.

Surface-to-Orbit – transmit signals to lunar orbit and back to lunar surface assets.

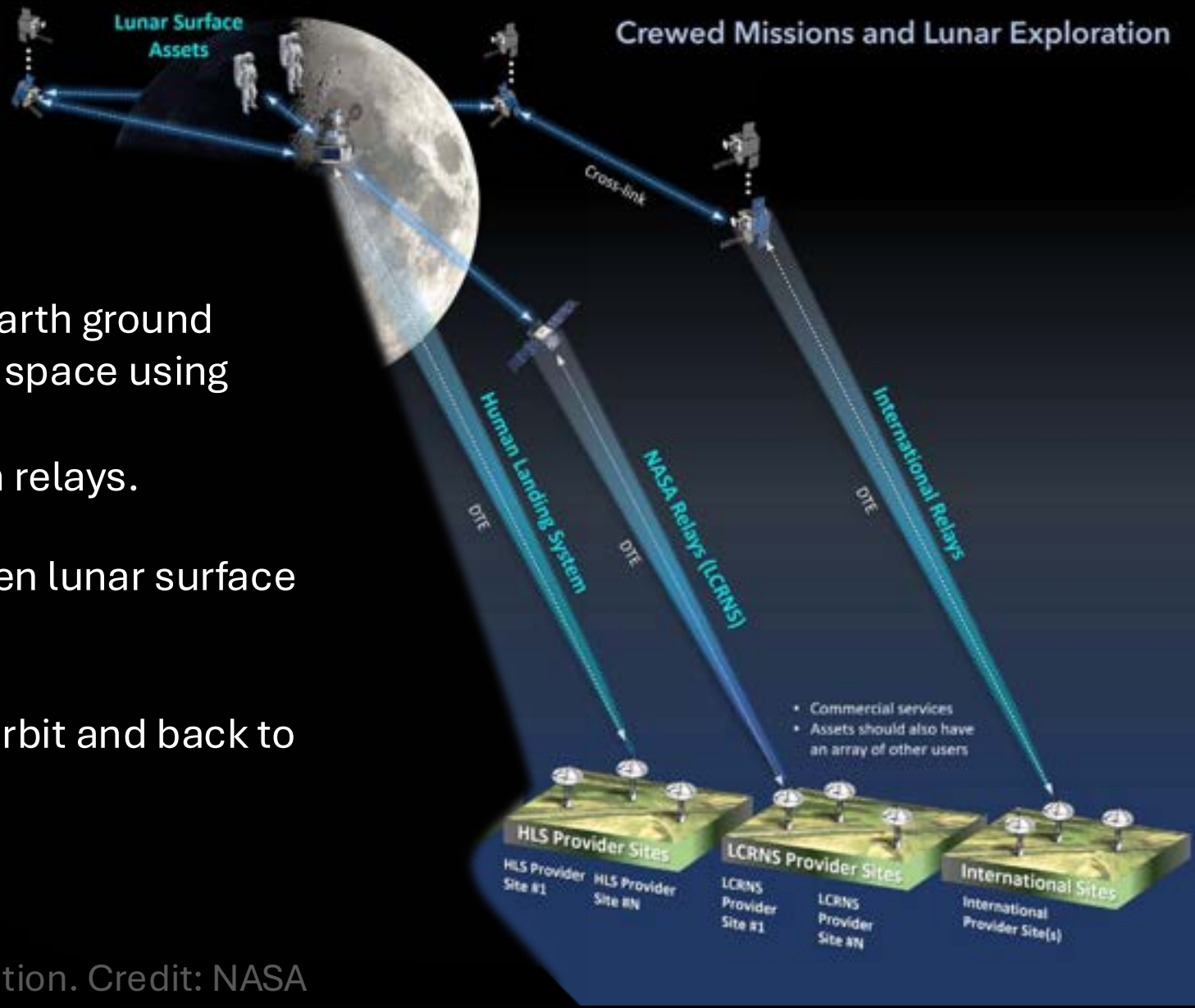


Image: The CPNT Architecture for Early Lunar Exploration. Credit: NASA

Why is Lunar Comms important to NASA?

Lunar comms are **critical** to ensuring the safe and effective operation of human and non-human missions on the Moon.

It is paramount lunar comms are centered around crewed HLS landers and maintained with necessary orbital and/or surface assets.

Orbital and surface assets/users HLS landers should be capable communicate with include but are not limited to:

- Suits
- Rovers
- Habitats
- Surface Relays
- Orbital Relays

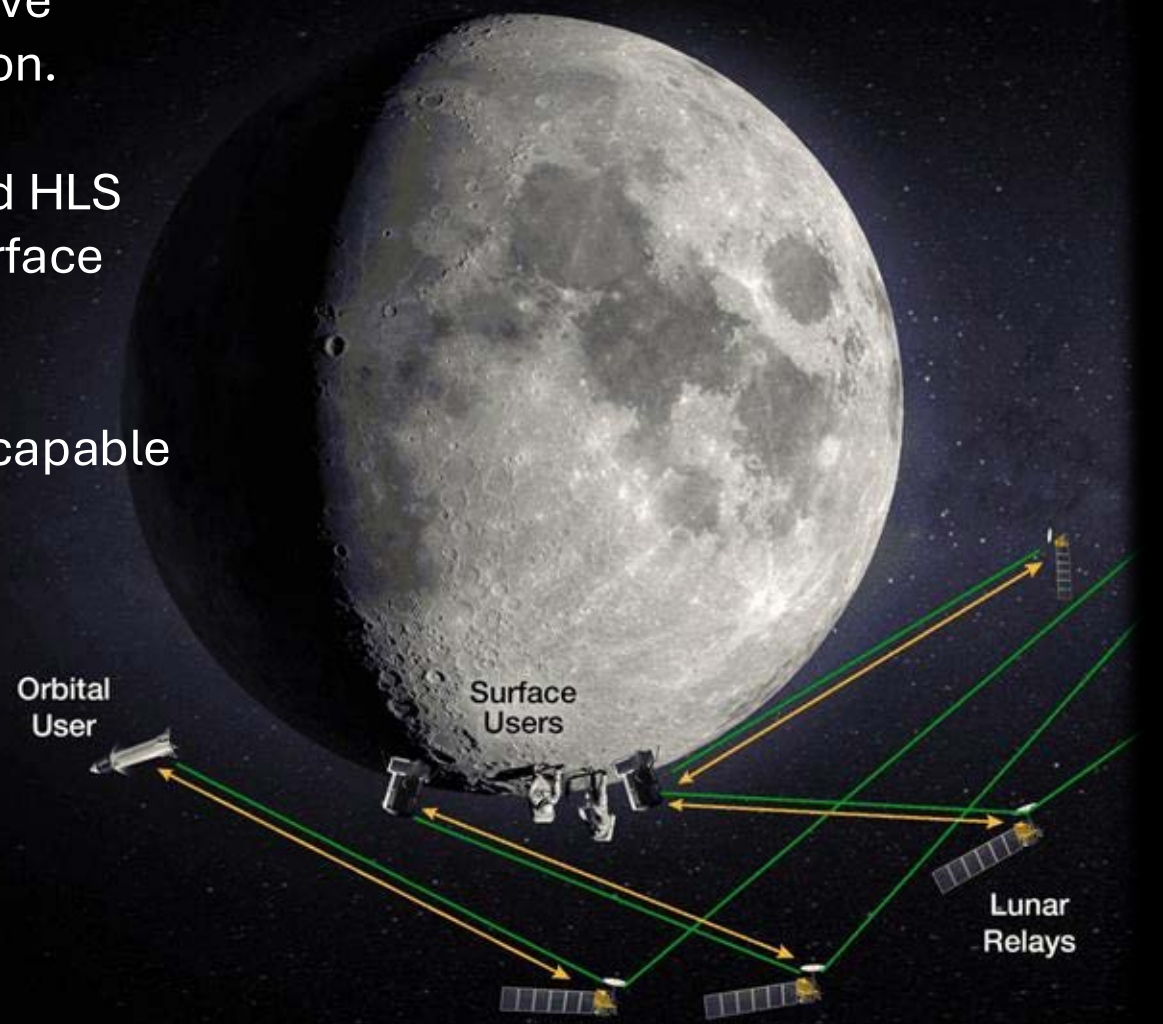


Image: Lunar relay supporting Artemis Moon missions. Credit: NASA/David Ryan

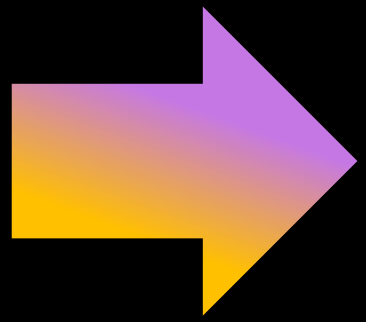
Challenges to Topics

HLS Comm Challenges:

Extreme Environments
- Lunar Surface Effects
- Thermal Gradients
- High Radiation
- Dust Abrasion and Electrostatic Effects

Data Handling
- Data Compression
- Prioritization
- Encryption

Coverage
- Terrain and Network Constraints
- Bandwidth, Range, and Latency Needs
- Future Expansion



HuLC Topics:

Hardware
- Space-Rated Wireless Networks and Electronics
- Antenna Signal Propagation, Modeling, and Environmental Mitigation

Software
- Data Efficiency and Link Optimization
- Network Management and Scheduling

Architecture
- Surface Comm System Architecture
- Orbital Comm System Architecture

Recommended Resources

Visit the Recommended Reading Tab for the full list of documents on the Resources Page.

HLS Concept of Operations (ConOps)

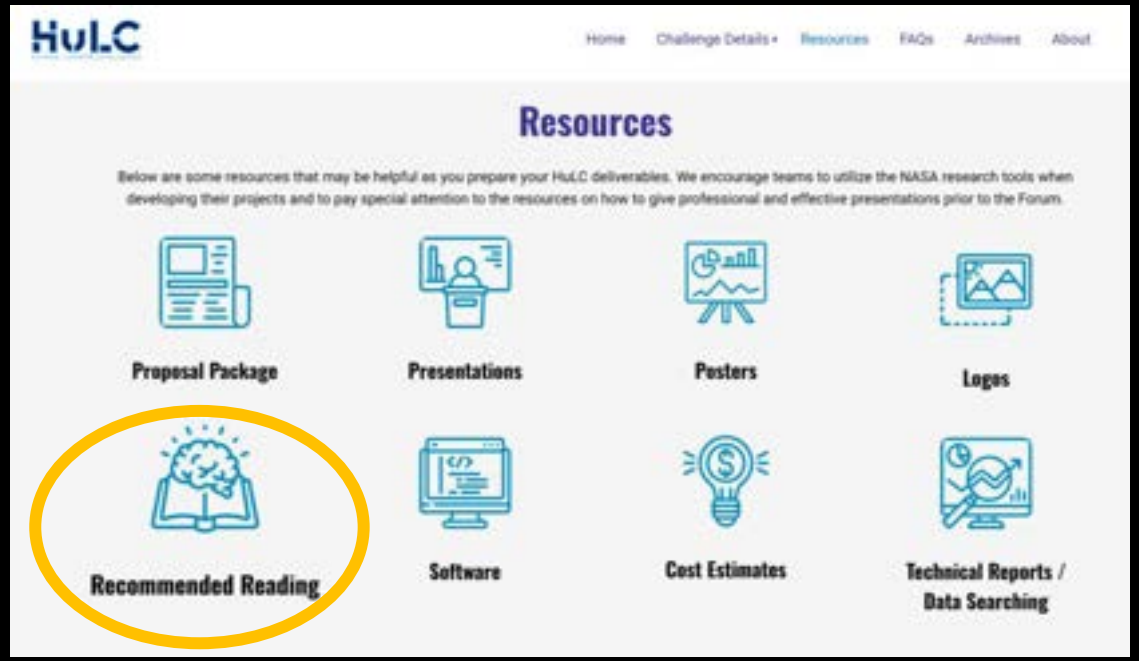
- HLS-CONOP-008: Human Landing System (HLS) Sustaining Phase Radio Frequency (RF) Communications Concept of Operations

NASA Comm Architectures:

- NASA's Lunar Communications and Navigation Architecture
- NASA's Lunar Communications Relay and Navigation Systems (LCRNS)

NASA Studies:

- NTRS - NASA Technical Reports Server
- IEEE 2023: 3GPP Mobile Telecommunications Technology on the Moon
- SLS-SPEC-159: NASA Cross-Program Design Specification for Natural Environments (DSNE) Revision I



Screenshot: HuLC Resources Page. Credit: NIA

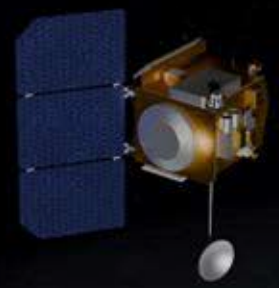
Q&A Highlights & Comments

- State your assumptions.
- Focus on the HLS Lander in your proposal.
- Review and implement the “Design Constraints and Guidelines” from the Phase 1 Guidelines into your proposals.
  - Address the considerations “Proposed Solutions Must Consider” section. Remember, adjustments are permitted if accompanied by good engineering rationale.
- Proposals are not limited to a particular landing site.
- Remember mission architectures change and adapt, so again, state your assumptions!

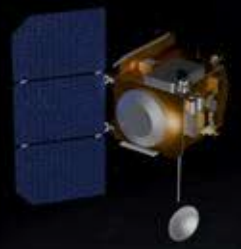


Good Luck!

Programmatic Remarks



Programmatic Remarks



Read the Competition Guidelines in full!

- They provide the foundation upon which your submission will be judged.
- Carefully review the evaluation criteria.

Important! You will need to submit some additional items with your proposal:

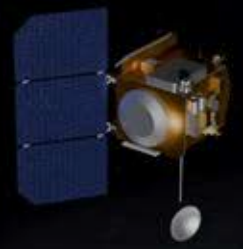
- A W-9/Vendor Form
- Primary Academic Advisor must sign the Faculty Attestation Form.
  - Participation Agreement – 1 per team, signed by advisor on the Attestation Form

Finalists selected based on Proposal and Video Submission.

- Remember to use the Proposal Checklist to ensure all required proposal items are accounted for prior to submitting.

YOU are selling your proposed concept to the judges!

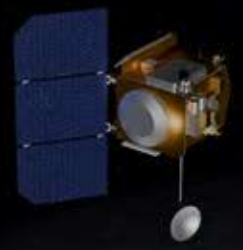
Prototypes



- Teams may use a variety of presentation materials to help communicate their concepts, including:
  - graphics
  - renderings
  - simulations
  - Videos
  - physical models
- However, these materials are entirely optional.

- **Teams are NOT expected to build models in any phase of the HuLC competition**
- **Evaluation of submissions is NOT based on whether a physical model is provided**

WHAT'S NEW FOR 2027



Excerpt from NEW HuLC LLM & AI Use Disclosure Policy:

AI/SI may be used to develop parts of a team's submission, **but the outputs of these tools must be significantly analyzed and synthesized by human team members.** All uses of these tools must be acknowledged, and teams must provide justification for why the tool was used in place of traditional methods (i.e., peer reviews, CAD modeling, etc.).

Excessive use may negatively impact selection. NASA and the NIA reserve the right to reject or disqualify any submission if the use of AI tools and software is not disclosed or adequately described.

Any use of AI/SI in developing the proposal must be disclosed and appropriately cited in a concise paragraph on a separate page at the end of the proposal.

Generated images must include captions with, at a minimum, the name and version of the tool used, and date of generation.

WHAT'S NEW FOR 2027



Team Size & Composition

Minimum U.S. Citizen Requirement

- Each team must include **at least two U.S. Citizens or legal permanent residents** who:
  - Contribute to the project, and,
  - Attend and participate in the Forum (if selected)

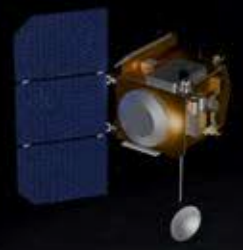
Foreign National (FN) Participants

- **FNs students** may participate if they:
  - Are full-time students at the proposing U.S. institution,
  - Hold a valid student visa,
  - Reside in the U.S., and,
  - Comply with all applicable laws and regulations.

- **FN advisors** may participate if they are employed by the lead U.S.-based university.

Participation by FNs **does not affect proposal evaluation or scoring.**

WHAT'S NEW FOR 2027



Prize Eligibility

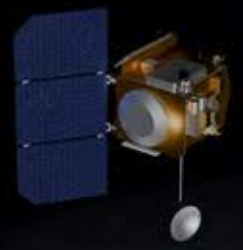
Foreign Nationals may participate on a team but are **not eligible to receive prizes.**
This applies to students and faculty.

Prizes

The following are considered prizes for the Human Lander Challenge:

- Monetary awards
- NASA site visit/tour
- Final Forum attendance & presentation

WHAT'S NEW FOR 2027



New Documentation Requirements for Foreign National Participants

Required for Proposal Submission

Foreign National Acknowledgement Form

- A separate form is required for **each FN team member or advisor**
- Each form must be **signed by the FN team member and the primary faculty advisor** and uploaded on the proposal submission form at the time of submission.
    - If the primary advisor is also an FN, he/she must sign both signature blocks on their form

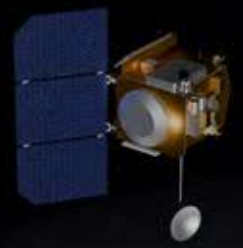
Citizenship Disclosure

- Citizenship of all team members and advisors must be listed on the proposal cover page

Faculty Advisors

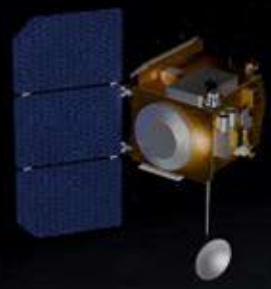
- Primary Advisor **does not need to be a U.S. Citizen or Lawful Permanent Resident**
- But he/she must be employed by the proposing U.S.-based institution

WHAT'S NEW FOR 2027



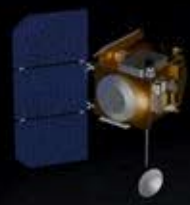
Important Clarifications
Foreign National students **may participate on teams but may not attend the Final Forum**
Foreign National advisors **may advise teams but may not attend the Forum**
Presence of Foreign Nationals **will not impact selection or judging**

QUESTIONS RECEIVED IN ADVANCE



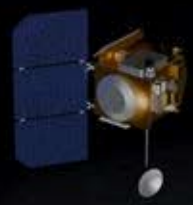
TECHNICAL QUESTIONS:
HARDWARE CATEGORY

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



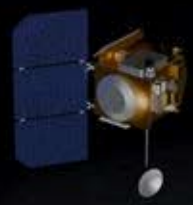
1. Are teams expected to develop both an antenna-system concept and a predictive propagation model, or may a solution emphasize one area while still addressing the complete communication system?
    a. Teams are not necessarily expected to develop both. However, the recommendation is to provide a solution that demonstrates how your system addresses challenges posed by terrain, regolith, dust, and thermal extremes. Think of “how am I addressing the problem?” and “how can I demonstrate my solution?”

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



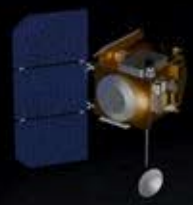
2. Is it acceptable to use primarily existing antenna/RF technology if the innovation comes from its system-level application, environmental protection, mobility, or propagation modeling?
    a. Yes, using existing technology is appropriate, as long as your innovation is clearly highlighted.
3. Besides accounting for the ability to transport our system to space and its survivability in the space environment, are there additional physical hardware requirements that our design must meet?
    a. No, but clearly state your assumptions, needs, and/or limitations. Take into consideration having minimal barriers for NASA adoption (e.g., low mass, small size, low power, etc.). Refer to the HuLC Recommended Reading on the Resources webpage.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



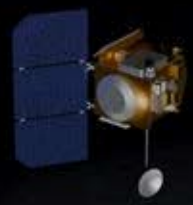
4. For a mobile surface relay intended to overcome terrain shadowing, should the relay primarily extend local communications between surface assets and the human landing system (HLS) lander, interface directly with LunaNet/LCRNS, or may teams select and justify either architecture? Which communication links should teams prioritize: surface-to-surface, surface-to-orbit, surface-to-Earth, or a combination of these links?
    a. In all lander RF communication systems, crew voice communications are always given the highest priority. General link prioritization can be driven by operational criticality, lunar topography/geometry, and link availability. Justify the architecture you choose. Refer to the HuLC Recommended Reading on the Resources webpage for content regarding communication prioritizations.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



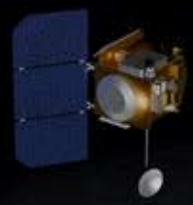
5. We are using off-the-shelf Raspberry Pi computers. Would this phase's proposal need to include a plan for space rating those or moving to other hardware that's on a known to work devices list or would the focus stay on configuring the network architecture?
    a. A plan addressing space rating could be appropriate rather than using known devices. All these options are not mutually exclusive.
6. Are there reference mass, power, volume, or delivery assumptions that teams should design against, such as delivery by an HLS or CLPS (Commercial Lunar Payload Services) lander?
    a. Proposals should provide innovative, system-level solutions to understand, establish, and optimize lunar communications systems primarily revolving around HLS crewed and cargo landers.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



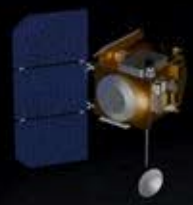
7. Is there a specific range for data transmitting speed or bandwidth size that would be preferred for this mission and will power consumption be a significant factor to consider for the communications from larger nodes like a main habitat? Or smaller nodes?
    a. Refer to the HuLC Recommended Reading on the Resources webpage for information regarding speed or bandwidth requirements. Bandwidth, range, and latency requirements can be determined by mission needs and capabilities such as the number of astronauts, rovers, habitats, or lunar landers for lunar communications. Clearly state your assumptions. It is good practice to address power consumption.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



8. For teams utilizing software-heavy solutions/tools, what is the limit for power consumption and also for processing speed/delay on a lander that we can acceptably assume?
    a. Limits can be determined by mission needs and capabilities such as bandwidth, range, and latency requirements and the number of orbital and/or surface assets. Clearly state your assumptions based on references and analysis.

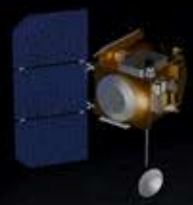
QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



9. What level of model accuracy is expected when predicting quantities such as received power, path loss, coverage area, link margin, or communication availability?
    a. Predictive models may provide a “reasonable margin” of accuracy. Research previous studies, review NASA standards, and remember to state your assumptions. Recommendation is to clearly state the validation methods for your models.

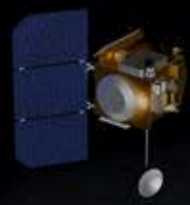
10. Should teams independently select and justify their communication frequency, data rate, transmitter power, antenna gain, link margin, and allowable outage duration?
    a. Yes.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



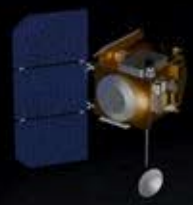
11. Would regolith-simulant testing with before-and-after optical-link measurements support Phase 1 validation, and what vacuum, thermal-cycle, radiation, or other environmental evidence is expected?
    a. Regolith-simulant testing would be an acceptable demonstration of hardware capabilities. Focus on link optimization and mitigating the effects of space and/or lunar environments.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



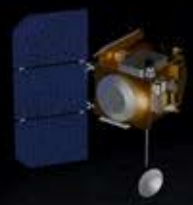
12. Can a solution target the operating conditions of a specific lunar region, such as the south pole, while accounting separately for environmental survival requirements? Or should teams demonstrate functionality across the full temperature range?
    a. Both of these options are acceptable. Keeping alignment with the recommended assumption of 3 to 5 years targeted use, immediate needs are in the lunar South Pole region. However, proposals are not strictly excluded from targeting other lunar regions, provided the proposed mission architecture directly justifies the alternative site. State your assumptions.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



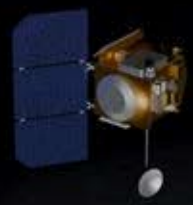
13. The guidelines specify at least 30 continuous days of uninterrupted surface coverage. With this, how should teams evaluate temporary line-of-sight obstructions and handoffs? Can we assume other communication assets in place as backups?
    a. 30 continuous days of uninterrupted surface coverage is a design constraint (or target) to emphasize extended surface operations, particularly with crew members, or astronauts. Consider reducing line-of-sight obstructions or handoffs with backups.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



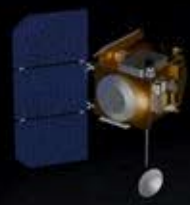
14. What physical effects should the predictive model include beyond line of sight and free-space path loss, such as terrain diffraction, multipath, regolith properties, dust accumulation, antenna orientation, or temperature-dependent performance?
    a. An end-to-end predictive model should address physical effects, such as the examples listed above. Consider designs that mitigate signal interference.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



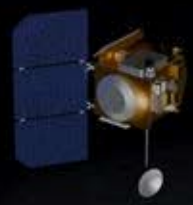
15. If surface communication hardware is stowed during landing and deployed only after touchdown, should it still be designed for direct exposure to landing- or ascent-plume-driven regolith, or may teams address only post-landing deployment ?
    a. Consider how plume-surface interactions (PSI) may or may not interfere with post-touchdown deployment and link reliability and/or performance. Explore and state your methods of mitigating direct exposure to landing- or ascent-plume-driven regolith if teams only address post-landing deployment.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



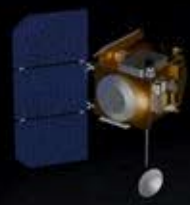
16. Should the predictive model function as an offline design tool, a real-time operational tool for antenna pointing and relay placement, or both?
    a. There are unique benefits to having predictive models function in either or both use cases.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



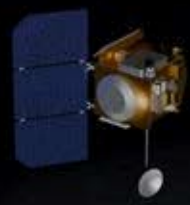
17. What forms of model validation are considered sufficient, such as comparison with published research, analytical calculations, RF testing over representative terrain, or scaled laboratory experiments?
    a. Prototypes or laboratory experiments are entirely optional for teams. Teams are not expected or required to build or bring models, and proposals are not evaluated based on whether a physical model is provided. Model validation can be accomplished through computer-aided or in-lab simulations and testing, if preferred. Using published research and analytical calculations should strengthen your model validation and conclusions drawn.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



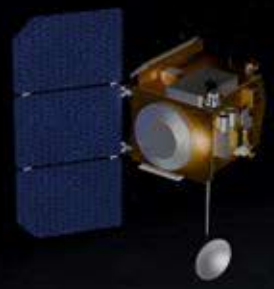
18. Which NASA datasets or models should teams use for lunar dust deposition, electrostatic behavior, optical-surface degradation, and resulting communications losses?
    a. Teams are encouraged to research their own models based on published research such as that which is found in Chapter 5.0 Communications Antennas and Electronics in Lunar Dust Mitigation: A Guide and Reference: First Edition (2021). An example of a NASA dataset publicly available is LADEE Lunar Dust Experiment (LDEX) Data. Unique team conducted analysis can be substituted for NASA provided datasets or models.

QUESTIONS RECEIVED IN ADVANCE
HARDWARE CATEGORY



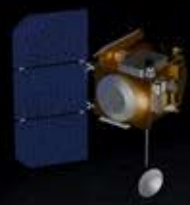
19. For the 30-day operating requirement and ideal five-year hardware life, what combination of short-duration testing, accelerated testing, environmental analysis, and comparison with existing systems is considered sufficient verification?
    a. Use best judgement for meeting the constraints of uninterrupted surface coverage for at least 30 continuous days and ideal hardware lifespan of at least 5 years. Recommendation would be researching NASA standards on qualification by similarity such as NASA-STD-7002, Payload Test Requirements, or producing and suggesting a tailored Verification and Validation approach using a combination of the above. See also the response to Question #17.

QUESTIONS RECEIVED IN ADVANCE



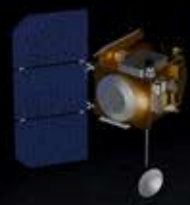
TECHNICAL QUESTIONS:
SOFTWARE CATEGORY

QUESTIONS RECEIVED IN ADVANCE
SOFTWARE CATEGORY



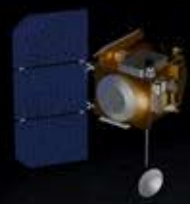
1. **Are specific communications protocols, data-transfer standards, or RF frequencies required or recommended for lunar communications designs?**
    a. There are various communication standards that students can reference, but none are prescribed. Refer to the HuLC Recommended Reading on the Resources webpage for information regarding existing analysis.

QUESTIONS RECEIVED IN ADVANCE
SOFTWARE CATEGORY



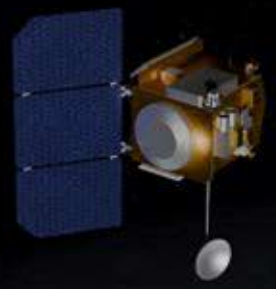
2. Since the goal is to deploy within 3-5 years, do you prefer that we stick closely to established frameworks like LunaNet and standard 3GPP protocols, or is NASA looking for teams to propose new, custom compression and modulation methods for lunar terrain? Can proposed solutions assume that the plan for LunaNet is still current and rely on, or possibly interact with, architecture like LunaNet or similar architecture to be implemented?
    a. Either option is acceptable. Adjustments are permitted from the targeted use of 3-5 years if accompanied by strong engineering rationale such as proposing new, custom compression and modulation methods that may require more time.

QUESTIONS RECEIVED IN ADVANCE
SOFTWARE CATEGORY



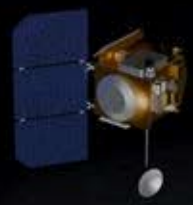
3. **Which hardware/software interfaces and interoperability requirements should teams prioritize to ensure compatibility with current or planned NASA systems?**
    a. Interfaces change based on mission scope. Recommendation is to optimize interfaces between targeted orbital relays and/or surface assets like astronauts, rovers, habitats, and other lunar landers on the lunar surface. Proposals should primarily revolve around HLS crewed and cargo landers. Clearly state your assumptions. Refer to the HuLC Recommended Reading on the Resources webpage for content regarding mission requirements.

QUESTIONS RECEIVED IN ADVANCE



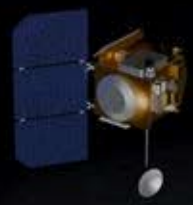
TECHNICAL QUESTIONS:
ARCHITECTURE CATEGORY

QUESTIONS RECEIVED IN ADVANCE
ARCHITECTURE CATEGORY



1. **If our design uses off-lander elements like surface relay towers or small sat constellations alongside hardware on the lander itself, how will the judges balance the mass/power penalty on the solution against the extra cost and complexity?**
    a. Proposals should primarily revolve around HLS crewed and cargo landers and be designed for deployment on or integrated with NASA/commercial HLS. Take into consideration how you are transporting and deploying surface or orbital relays and how that could integrate with HLS.

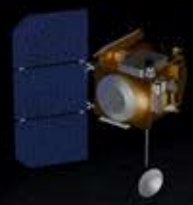
QUESTIONS RECEIVED IN ADVANCE
ARCHITECTURE CATEGORY



2. **May teams assume lunar relays, LunaNet services, and Earth ground stations will be available within 3–5 years, or must they model the full surface-to-Earth path?**
    a. Yes, however, timeline adjustments are permitted if accompanied by strong engineering rationale. Be sure to clearly document ground rules and assumptions.

3. **Would the challenge require the use of NASA recommendations or constraints for the architecture, or would a system using exclusively layer 2 meet the challenge's requirements?**
    a. Proposals should research, but are not required to use, NASA recommendations or constraints for the architecture.

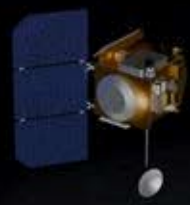
QUESTIONS RECEIVED IN ADVANCE
ARCHITECTURE CATEGORY



4. **Are satellites planned to be placed in the Moon's orbit? If so, what frequency and which orbit does NASA plan to operate these in?**
    a. Research into NASA Lunar Communications and Navigation Systems (LCRNS) publications are available on the HuLC Recommended Reading on the Resources webpage for content regarding orbits.

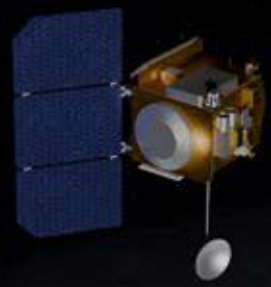
5. **For our proposal, how much end-to-end architecture, link-budget analysis, and lander/surface-network integration detail is needed to demonstrate meaningful system-level communications benefits?**
    a. Proposals should clearly highlight and demonstrate integration efforts between HLS landers and the team's proposed concept.

QUESTIONS RECEIVED IN ADVANCE
ARCHITECTURE CATEGORY



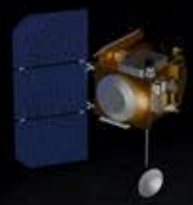
6. **Would an optical-aperture dust-mitigation solution fit HuLC's lunar communications scope if it quantifies end-to-end benefits, or should concepts prioritize RF propagation or network architecture?**
    a. Innovative concepts that go beyond the potential solutions areas included in the Challenge Description and Proposal Subtopics are acceptable as long as the proposed communications systems primarily revolve around HLS crewed and cargo landers.

QUESTIONS RECEIVED IN ADVANCE



MISCELLANEOUS QUESTIONS

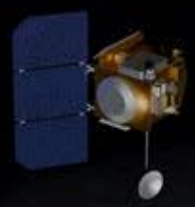
QUESTIONS RECEIVED IN ADVANCE
MISCELLANEOUS



1. Is there a target TRL that we should aim for in our proposed concept?
    a. Proposals should reflect the actual Technology Readiness Level (TRL) of their concept and indicate a maturation plan to obtain Flight Qualification.

2. Are teams expected to address communications across multiple mission phases, or is it acceptable to focus on one specific scenario, such as communications between a lunar lander and a rover operating behind terrain obstructions near the lunar south pole?
    a. Teams have the flexibility to focus on any mission phase(s) in their proposal. The proposal should clearly document any ground rules and assumptions made.

QUESTIONS RECEIVED IN ADVANCE
MISCELLANEOUS



3. (A) Which NASA standards or recommended practices should teams follow, and (B) how much does demonstrated compliance influence judging?
    a. NASA has developed several technical volumes and handbooks. Some core resources would be NPR 7120.5, NPR 7123.1 and the 7000 series handbooks/standards. Refer to the HuLC Recommended Reading on the Resources webpage for the libraries to find these resources.

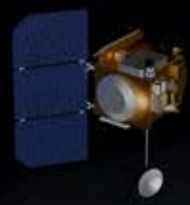
    Judging is based solely on the published evaluation criteria. The 2027 HuLC Phase 1 Scoring Matrix (found on page 13 of Guidelines) is a valuable resource for teams to review to understand exactly how the proposals will be evaluated, including point-value assessment for each evaluation criteria. Compliance is included as part of the Technical Management criteria, specifically “Adheres to all HuLC Guidelines."

QUESTIONS RECEIVED IN ADVANCE
MISCELLANEOUS



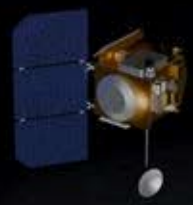
4. **Is there a preferred lunar region, landing site, or terrain dataset that NASA recommends teams use as a reference case for surface communication and propagation analysis? If not, should teams select a representative site and justify that choice?**
    a. Keeping alignment with the recommended assumption of 3- 5 years of targeted use, immediate needs are in the lunar South Pole region. However, proposals are not strictly excluded from targeting other lunar regions, provided the proposed mission architecture directly justifies the alternative site. State your assumptions. There are several NASA lunar terrain data sets available online such as found in the NASA Open Data Portal.

QUESTIONS RECEIVED IN ADVANCE
MISCELLANEOUS



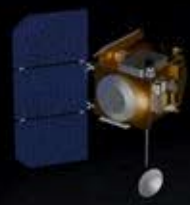
5. How detailed must cost estimates and technology-readiness-level progression be to demonstrate credible implementation within 3–5 years?
    a. NASA has developed cost modeling tools that are informed by Technology Readiness Levels (TRLs). Those tools are available to the public.

QUESTIONS RECEIVED IN ADVANCE
MISCELLANEOUS



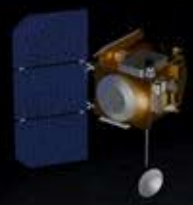
6. For a distributed or mobile communication system, what is meant by "uninterrupted surface coverage for at least 30 continuous days?" Can individual nodes reposition or temporarily go offline as long as the overall communication service remains continuous?
    a. 30 continuous days of uninterrupted surface coverage is a design constraint (or target) to emphasize extended surface operations, particularly with astronauts. It is acceptable for individual nodes to reposition or temporarily go offline as long as continuous communication is maintained with the HLS crewed lander.

QUESTIONS RECEIVED IN ADVANCE
MISCELLANEOUS



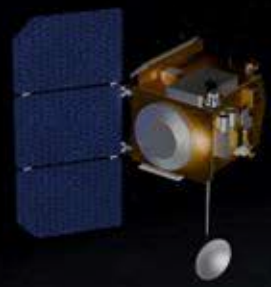
7. **What level of environmental fidelity is expected for testing and validation when fully reproducing lunar conditions may not be feasible? Are combinations of simulation, benchtop testing, and subsystem testing acceptable if their limitations are justified?**
    a. **Use best judgement on the level of environmental fidelity teams can produce. Using a combination of simulations and testing is acceptable. Clearly state your assumptions and limitations.**

QUESTIONS RECEIVED IN ADVANCE
MISCELLANEOUS



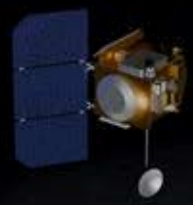
8. Given existing dust shields and link monitoring, what evidence would best establish our project's innovation: novel control logic, superior measured performance, architecture, or another new capability?
    a. All proposals and solutions presenting novel innovations are acceptable. Potential areas include, but are not limited to, the subtopics listed in the Challenge Description and Proposal Subtopics in the Phase 1 Guidelines.

QUESTIONS RECEIVED IN ADVANCE



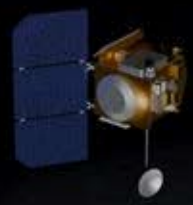
PROGRAMMATIC QUESTIONS

QUESTIONS RECEIVED IN ADVANCE
PROGRAMMATIC



1. **Are we expected to have a tested physical hardware solution by the end of Phase 1/for Phase 2 or is a simplified model/simulation enough?**
    a. Models and simulations are acceptable. Physical prototypes or laboratory experiments are entirely optional for teams. Teams are not expected or required to build or bring models, and proposals are not evaluated based on whether a physical model is provided.

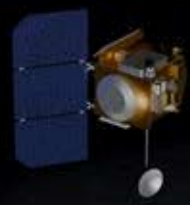
QUESTIONS RECEIVED IN ADVANCE
PROGRAMMATIC



2. **Is a physical prototype required by the March proposal and video deadline, or are simulations and engineering analysis acceptable? Does prototype maturity affect judging? Are physical models allowed at the Forum?**
    a. Physical prototypes are not required at any stage of the competition. Teams may support their proposals with simulations, engineering analyses, renderings, or other technical evidence, and these approaches are fully acceptable.

    Prototype maturity is not a judging criterion, and teams are not evaluated based on whether they have built a physical model. At the Forum, teams may choose to use physical models, simulations, videos, graphics, or other visual aids to help communicate their concepts, but none of these materials are required.

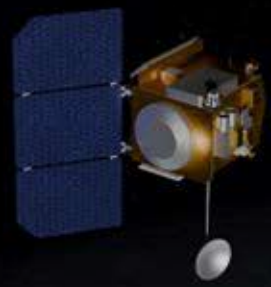
QUESTIONS RECEIVED IN ADVANCE
PROGRAMMATIC



3. **In the guidelines it states if any information other than calculations and references are in the appendices of the proposal it may be disqualified. Would having simulations in the appendix be means for a disqualification?**
    a. Yes. Simulations should be included in the body of the proposal or in the 2-minute video if they're important enough to include in your submission.

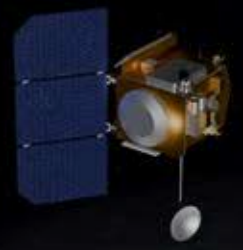
4. **It is common practice to spell out all acronyms the first time they are stated within a paper. Is it an expectation that NASA also be included under this precedent?**
    a. No – the judges will know what you mean by “NASA."

OPEN CALL FOR ADDITIONAL QUESTIONS



Use the "Raise Hand" function to be called on or type your question in the Chat.

UPCOMING DEADLINES



PHASE 1:
March 4, 2027
Proposal Package
Submission Deadline

April 7, 2027
Teams Notified of
Selection Status

June 1, 2027
Technical Paper
Submission Deadline

June 17, 2027
Presentation and Digital Poster
Submission Deadline

June 21-24, 2027
2027 HuLC Forum
in Huntsville, AL

PHASE 2

FUTURE QUESTIONS

Please direct all future questions to the HuLC Program Team at HuLC@nianet.org.
Each question will be responded to directly as well as posted on the FAQs.
https://HuLC.nianet.org/FAQs



SHELLEY SPEARS
Director of Education and Outreach



STACY DEES
Higher Education Challenges Portfolio Manager



VICTORIA "TORI" O'LEARY
HuLC Project Lead



GENEVIEVE "GEN" EBARLE
HuLC Project Coordinator

Thank you, and best of luck to all teams!



HuLC

HUMAN LANDER CHALLENGE