

The background of the slide is a composite image. The upper portion shows a deep space scene with a large, detailed Earth's Moon on the left, a smaller reddish planet (Mars) above it, and a small spacecraft with a bright blue engine glow moving towards the right. The lower portion shows a silhouette of a person's head and shoulders on the right, looking out over a dark, hilly landscape under a twilight sky with soft orange and yellow clouds.

EXPLORESPACE TECH

TECHNOLOGY DRIVES EXPLORATION

Space Resources Roundtable

Jim Reuter | Associate Administrator, Space Technology Mission Directorate | June 8, 2023

SPACE TECHNOLOGY PORTFOLIO

EARLY STAGE INNOVATION AND PARTNERSHIPS

- Early Stage Innovation
 - Space Tech Research Grants
 - Center Innovation Fund
 - Early Career Initiative
 - Prizes, Challenges & Crowdsourcing
 - NASA Innovation Advanced Concepts
- Technology Transfer

SBIR/STTR PROGRAMS

- Small Business Innovation Research
- Small Business Technology Transfer

TECHNOLOGY MATURATION

- Game Changing Development
- Lunar Surface Innovation Initiative

TECHNOLOGY DEMONSTRATION

- Technology Demonstration Missions
- Small Spacecraft Technology
- Flight Opportunities

Technology Drives Exploration

LOW

MID

Technology Readiness Level

HIGH

Tech Highlights

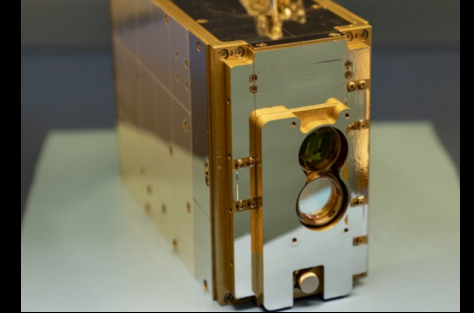
Bernard Kutter LOFTID



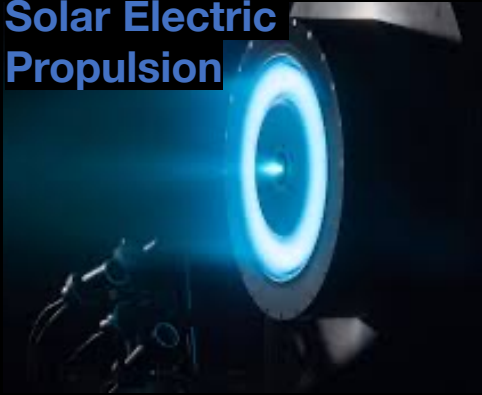
CAPSTONE



TeraByte Infrared Delivery (TBIRD)



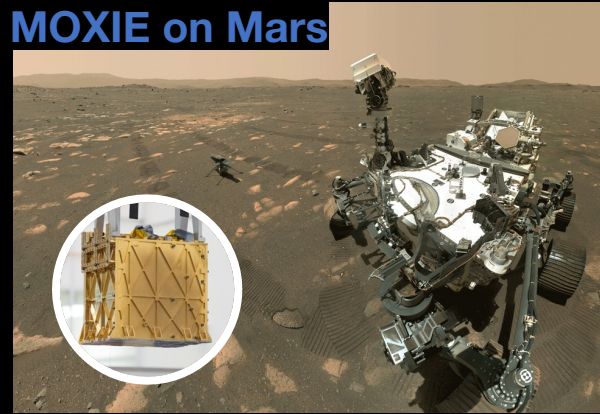
Solar Electric Propulsion



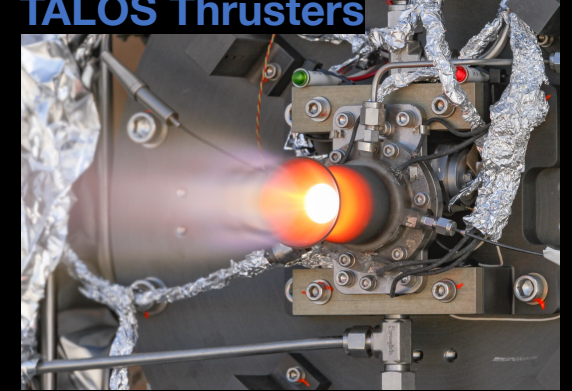
ROSA Infusion



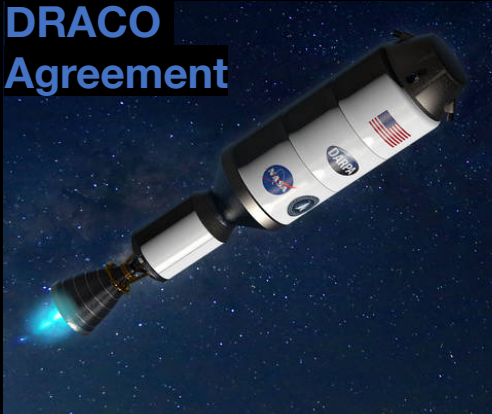
MOXIE on Mars



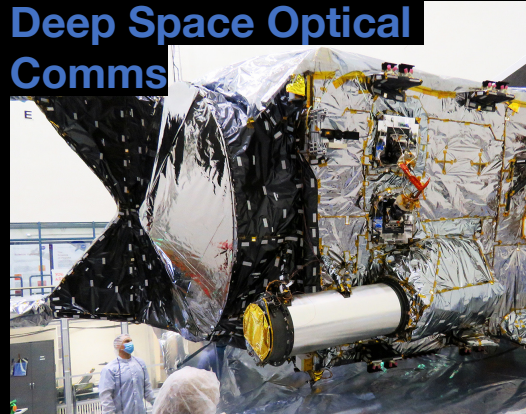
TALOS Thrusters



DRACO Agreement



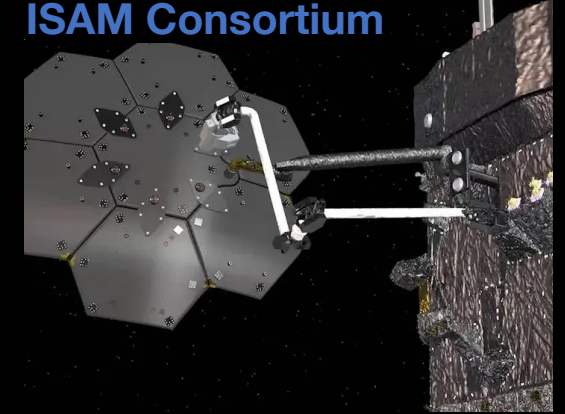
Deep Space Optical Comms



Cryogenic Fluid Management Demos



ISAM Consortium



Near-Term Lunar Technology Demos

Early lunar surface demonstrations with Commercial Lunar Payload Services (CLPS) are opportunities to mature the capabilities required for NASA and industry

Astrobotic Peregrine-1 Mission



Astrobotic Terrain Relative Navigation – Tipping Point

CLPS 19D Mission (Firefly)



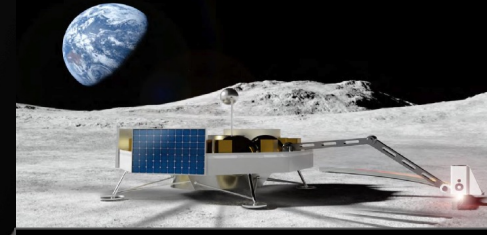
Stereo Camera for Lunar Plume Surface Studies (SCALPSS)

CLPS CP11 Mission (Intuitive Machines)



Cooperative Autonomous Distributed Robotic Explorers (CADRE)

TBD Mission

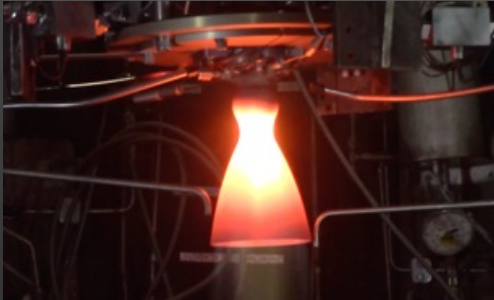


Moon-to-Mars Planetary Autonomous Construction Technology (MMPACT)

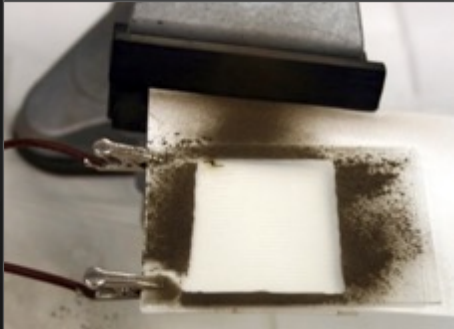
TBD Mission



Planetary and Lunar Environment Thermal Toolbox Elements (PALETTE)



Thruster for Advancement of Low Temperature Operations in Space (TALOS) – Tipping Point



Electrodynamic Dust Shield (EDS)

TBD Mission



Cold Operable Lunar Deployable Arm (COLDArm)

TBD Mission



Vertical Solar Array Technologies (VSAT)

TBD Mission



Space Science Test and Evaluation Facility (SSTE-1) – Tipping Point

Space Technology Demonstrations on Second Intuitive Machines Mission

Nokia 4G/LTE
Communications
System

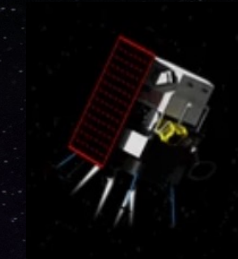


NASA Polar Resources
Ice Mining Experiment 1
(PRIME-1)



Intuitive Machines
Nova-C lunar lander

Intuitive Machines
Micro-Nova Hopper



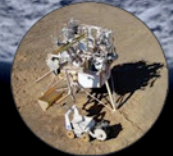
Lunar Surface Technology Demonstration Strategy

ISRU, Power, Autonomy, Robotics, Excavation, Construction

Early lunar surface demonstrations will increase technology readiness for key infrastructure capabilities with opportunities for collaboration with OGAs, industry, academia, and international partners

◆ IM-2 Demo (CLPS IDIQ)

- Polar Resources Ice Mining Experiment (PRIME-1)
- Nokia 4G LTE Communications
- Intuitive Machines (TP) Deployable Hopper (TP)



Oxygen Extraction Ground Demo

◆ CT-1 Space Tech Demo

◆ CT-2 Space Tech Demo

CT-1 & 2 Candidate Technologies

- ISRU
- Power
- Excavation
- Dust Mitigation
- Autonomy & Robotics
- Construction

Volatiles Investigating Polar Exploration Rover (VIPER)
(Science Mission Directorate)

◆ Fission Surface Power Demo

◆ ISRU Pilot Plant

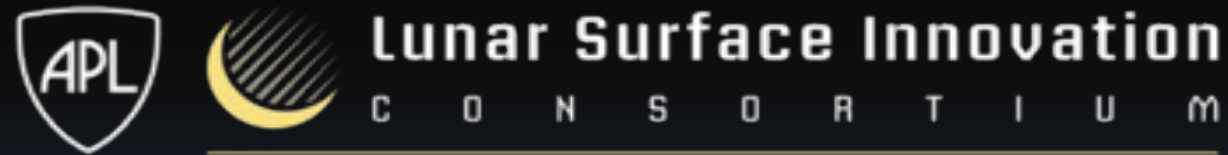
2023

TP = Tipping Point

2033

Lunar Surface Innovation Consortium (LSIC)

Since 2020, the Lunar Surface Innovation Initiative has engaged ~800 organizations across industry, academia, non-profits, and other government agencies from 50 states, D.C., Guam, Puerto Rico and 48 countries through novel NASA collaborations and LSIC



Bi-annual Meetings

- Spring (@ APL) and Fall (@Participant Site)
- 54% at kickoff had not previously worked with NASA Space Tech



~ 800 Organizations working toward one goal

- Monthly newsletters with member spotlights
- Amplify solicitations and opportunities
- LSIC Website & Wiki Resources
- Annual Technology Assessments
- Lunar simulants portal



6 Monthly Focus Groups

- Virtual monthly meetings
- ~40 sub-groups defined and led by members
- Provides feedback and recommendations to NASA
- Collaboration space



Thematic Technical Workshops

- Topics driven by member interest
- Key recommendations published

FIRST WOMAN

NASA'S PROMISE FOR HUMANITY

ISSUE No. 1: DREAM TO REALITY



NASA'S FIRST



XR-ENABLED
(VIRTUAL + AUGMENTED REALITY)
GRAPHIC NOVEL

NASA

TECHRISE

STUDENT CHALLENGE

