



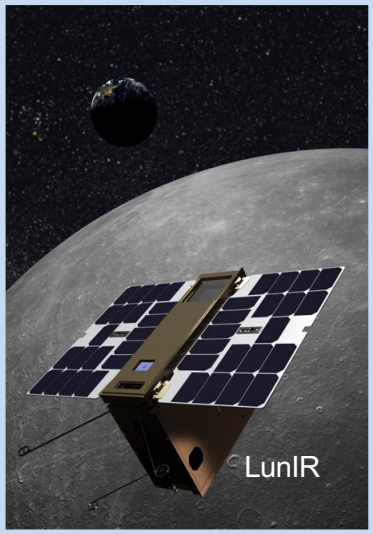
# **Advanced Exploration Systems (AES) Small Spacecraft Missions**

**NASA Town Hall at the 2021 Small Satellite Conference**

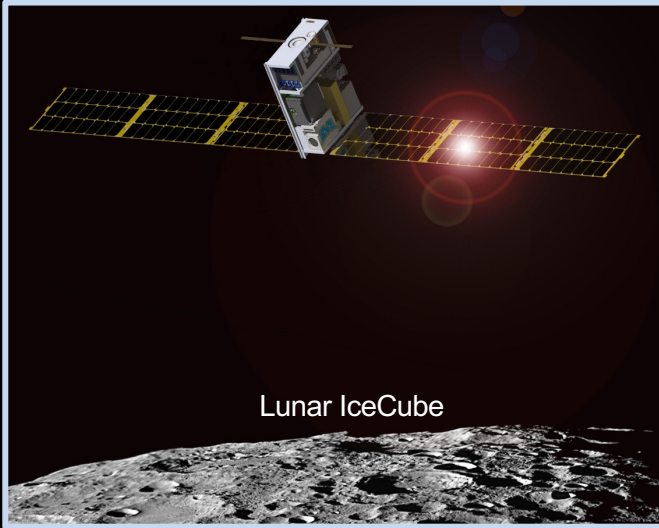
**Andres Martinez, Program Executive, Small Spacecrafts**

**August 9, 2021**

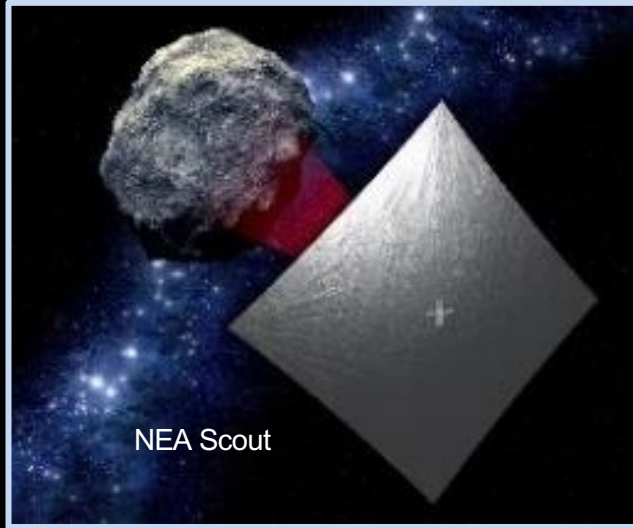
# AES SmallSats Supporting Artemis



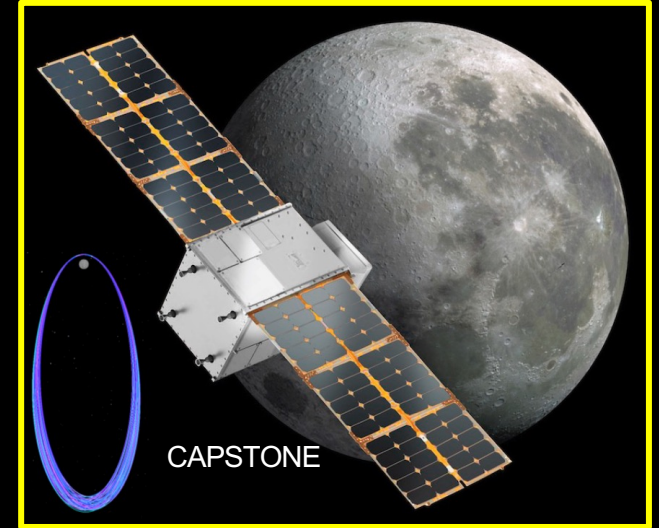
LunIR



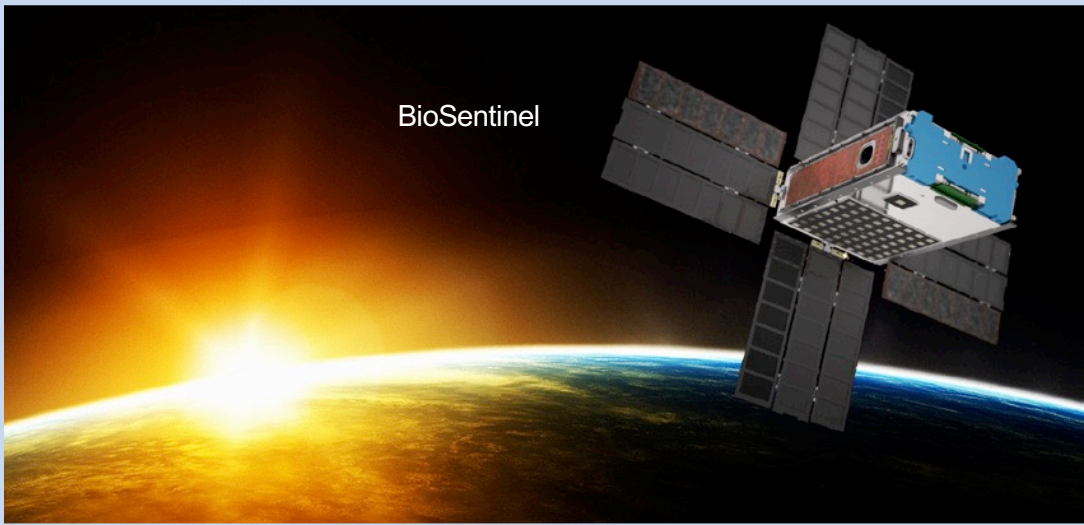
Lunar IceCube



NEA Scout



CAPSTONE



BioSentinel

Enabling interplanetary research with small spacecraft platforms

**MarCO Demonstrations:**

- Downlink Using X-Band Feed and DSN Equipment
- Downlink Using X-Band Feed and MarCO Receiver System
- OMSPA Using X-Band Feed and Custom SDR-based Multiple Receiver System

**First Opportunistic Multiple Spacecraft Per Antenna (OMSPA) Demonstration with a CubeSat**

Develops an operational capability to support Artemis-1 SmallSat missions

Expands DSN capabilities by utilizing non-NASA assets to provide communication and navigation services to small spacecraft missions to the Moon and inner solar system.

**LRO Demonstrations:**

- Routinely Tracking LRO at S-Band
- Intermediate Frequency (IF) Systems and DSN Downlink Equipment (DCO, DTT) Used
- LRO Telemetry Blocks Sent Directly from DSS-17 to SFL DSSCO over the NASA Mission Backbone, verifying DSS-17 Signal Path

**Deep Space Station 17**

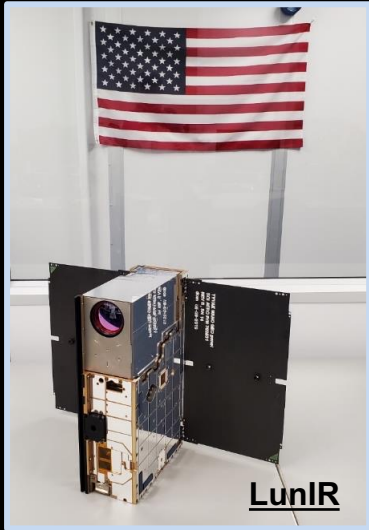
First 5 Demodulated Frames from MarCO OMSPA Demonstration on May 6, 2018 from DSS-17  
 D. Abraham, Z. Towfic, S. Finley (JPL)  
 C. Corney, M. Stratton, R. Kroll (Morehead State)

Mission Ops Center at MSU

*AES SmallSat Missions selected to contribute to key Human Exploration Strategic Knowledge Gaps and to Advance Key Technologies*



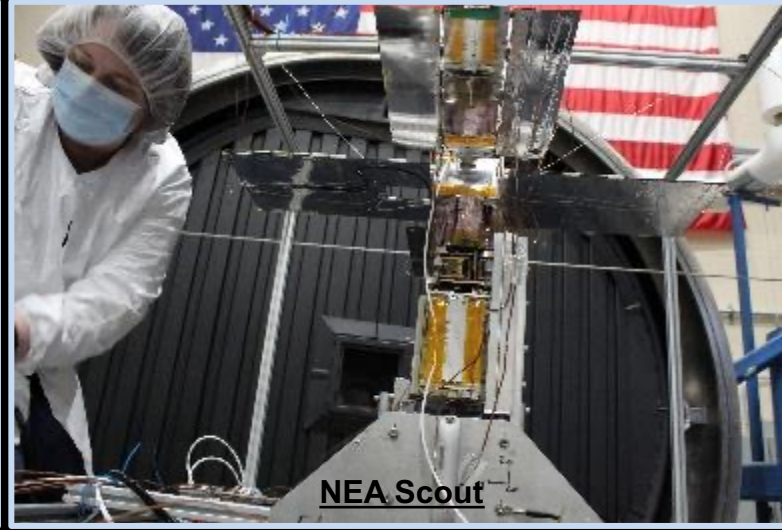
# AES SmallSats Supporting Artemis



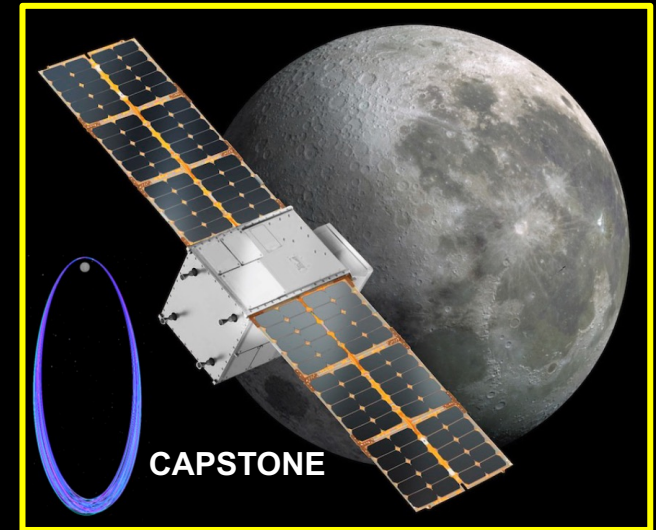
**LunIR**



**Lunar IceCube**



**NEA Scout**



**CAPSTONE**



**BioSentinel**



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ISS Control Unit**

Enabling interplanetary research with small spacecraft platforms

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**LRO Demonstrations:**

- Routinely Tracking LRO at S-Band
- Intermediate Frequency (IF) Systems and DSN Downlink Equipment (DCO, DTT) Verified
- LRO Frequency Beams Sent Directly from DSS-17 to JPL DSS-C over the NASA Mission Backbone - verifying DSS-17 Signal Path

First 5 Demodulated Frames from MarCO OMSPA Demonstration on May 6, 2018 from DSS-17  
D. Abraham, Z. Towfic, S. Finley (JPL)  
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**Deep Space Station 17**

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## **Internal Solicitation Process - Engage NASA Centers through assigned AES POCs**

- Exploration Capabilities Research and Development projects assigned and competed
  - Project Polaris is a new initiative to help our people meet the difficult challenges of sending humans to the Moon and Mars.
    - Project Polaris will create opportunities for our people to strengthen their skills, to gain hands-on experience, and to learn.
    - Project Polaris is focused on filling high-priority capability gaps and on infusing new technologies into human exploration flight programs.
    - Project Polaris builds and tests small flight experiments and conducts other risk reduction activities to rapidly mature critical technologies.
    - Project Polaris consists of small teams of mostly early career employees.
    - Project Polaris encourages leap ahead innovation and collaboration to accelerate technology development.

## **External Solicitation Process**

- Next Space Technologies for Exploration Partnerships - NextSTEP

## **Priorities - HEOMD-405 Guidance**

- Human Exploration and Operations Mission Directorate (HEOMD) Integrated Exploration Capabilities Gap List (HEOMD-405) represents the official set of approved capability gaps and gap-element mappings.
- The gap prioritization listed in HEOMD-405 should be used by HEOMD Programs when planning exploration-forward investments.

# You are the Artemis Generation - Connect with us



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## Thank you