A NEW OPPORTUNITY FOR SMALLSATS

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NASA Space Launch System
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**Overview**

- Initial configuration of vehicle optimized for near-term heavy-lift capability
- Completed Critical Design Review in July 2015

**Utilization**

- Initial demonstration of Space Launch System and Orion capabilities
- Supports launch of Orion into distant retrograde orbit around the moon

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**SLS Block 1**

- **Capability:** >70 metric tons
- **Height:** 322 feet (98 meters)
- **Weight:** 5.75 million pounds (2.6 million kg)
- **Thrust:** 8.8 million pounds (39.1 million Newtons)
- **Available:** 2018
EM-1 SECONDARY PAYLOAD CAPABILITY

Accommodations

- SLS for Exploration Mission-1 will include thirteen 6U payload locations
- 6U volume/mass is the current standard (14 kg payload mass)

EM-1 Trajectory

- Orion will enter Distant Retrograde Orbit around the moon
- Additional cislunar trajectories being studied for future missions
ONE LAUNCH, MULTIPLE DISCIPLINES

Moon
- Lunar Flashlight (NASA)
- Lunar IceCube (Morehead State University)
- LunaH-Map (Arizona State University)
- Omotenashi (JAXA)

Asteroid
- NEA Scout

Sun
- CuSP (Southwest Research Institute)

Earth
- EQUULEUS (JAXA)
- Skyfire (Lockheed Martin)

And Beyond
- Biosentinel (NASA)
- ArgoMoon (ESA/ASI)
- Three Centennial Challenge Winners (TBD)
NASA CENTENNIAL CHALLENGES

Ground Tournaments

• Four Rounds
• Purposes:
  1. Gain insight into competitor’s mission designs
  2. Provide feedback to teams
  3. Award intermediate prizes
• Judging based on technical maturity, compliance with Challenge Rules and with SLS requirements
• GTs culminate in down-select for EM-1 integration and launch
• GTs not required of teams that elect to procure 3rd party launches

In-Space Competitions

• Lunar Derby Prize
• Deep Space Derby Prize (> 4 million km)
RECENT PROGRESS TOWARD LAUNCH

- Core Stage production at Michoud
- Booster testing at Orbital ATK
- Engine testing at Stennis Space Center
- Test stand construction at Marshall
- Stage adapter welding at Marshall
- Upper stage production at ULA
SLS EVOLUTION OVERVIEW

- SLS Block 1
  - 322 ft.
  - 70t
  - No earlier than 2018

- SLS Block 1B Crew
  - 364 ft.
  - 105t
  - No earlier than 2021

- SLS Block 1B Cargo
  - 327 ft.
  - 105t

- SLS Block 2 Cargo
  - 365 ft.
  - 130t

- RS-25 Engines
- Advanced Boosters
- Cargo Fairing
- Exploration Upper Stage
- Interstage
- Core Stage
- Interim Cryogenic Propulsion Stage
- Launch Vehicle Stage Adapter
- Universal Stage Adapter
- Solid Rocket Boosters
- Launch Abort System
- Orion
SLS Benefits

- SLS offers unrivaled mass, volume and departure energy capabilities
- Enables reduced transit to outer solar system

SLS for SmallSats

- Primary payload mission capture enables unique ride-along opportunities to interplanetary destinations
- Trade space for mass and volume
Questions

- Who are the communities of interest for evolved SLS secondary payloads?
- What is optimal size for deep-space secondary payloads? (Cost versus size versus capability)
- What deployment targets are optimal?
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