SPACE LAUNCH SYSTEM

SLS CubeSats: First Flight and Future Opportunities

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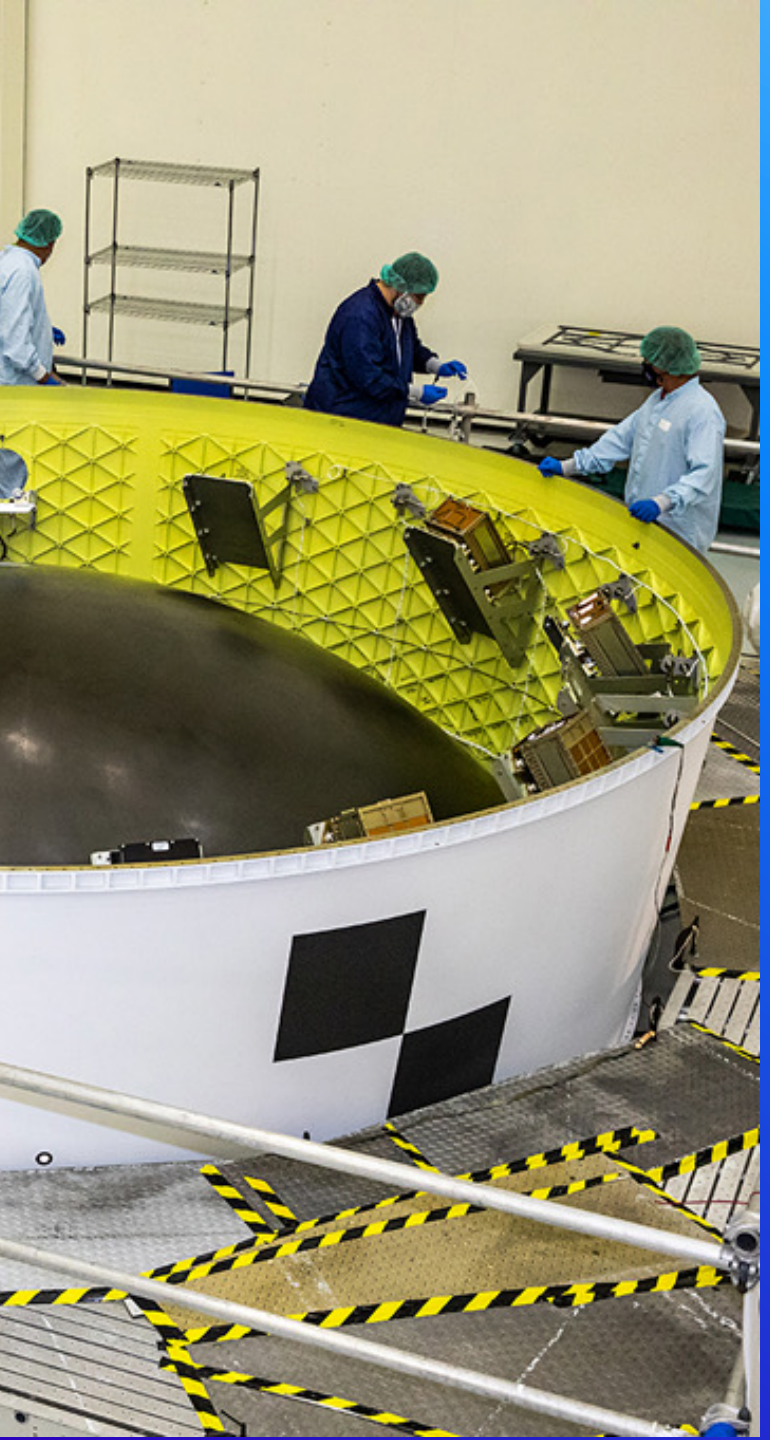
SLS PROGRAM
SSC23-XIII-01

SLS-4492

TESTED | PROVEN | READY

ALL PRELIMINARY POST-FLIGHT DATA INDICATES THAT SLS IS READY TO SUPPORT A CREWED FLIGHT ON ARTEMIS II.

- The SLS core stage inserted ICPS and Orion into an initial Earth orbit at a velocity of 25,579.86 ft./sec – 6.58 ft./sec. off a perfect bullseye
- Orbital insertion apogee was just 2.9 miles shy of the perfect bullseye target
- Insertion velocity was 99.64% accurate: symmetry in motion

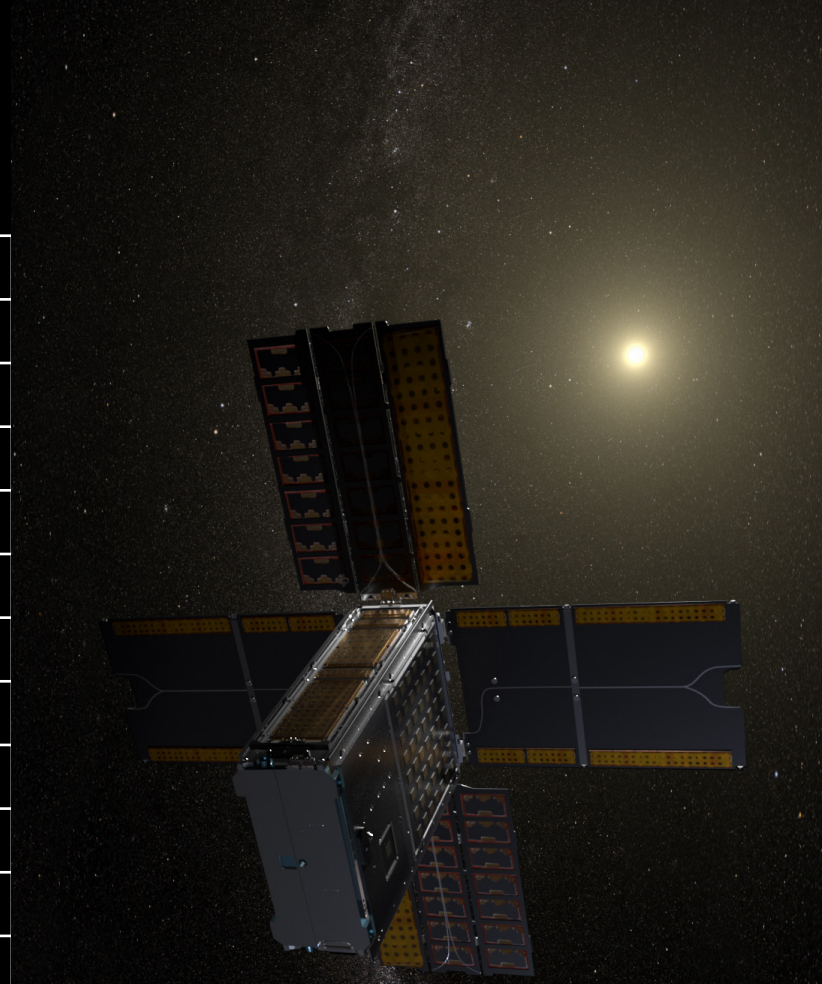


ARTEMIS I SECONDARY PAYLOADS

- Possible 17 dispenser locations
- Due to 1,000 lbs. mass limit for secondary payloads and deployment system, 13 berths prepared
- Only 10 CubeSats made it to KSC for integration
- Payloads meeting battery requirements were provided battery charging in the OSA
- Dispensers mounted on vibration isolation system to mitigate launch vibe forces
- SLS upper stage was pointed at the Sun and placed into 1-rpm roll to provide reasonable thermal conditions
- Bus stops were created to give payload developers a choice in departure time location along the trajectory

ARTEMIS I PAYLOADS

Artemis I Secondary Payloads – Deployed November 16, 2023		
CubeSat	**Developer / Location**	**Destination**
Argo Moon	ASI; Turin, Italy	High Earth / Moon Orbit
BioSentinel	Ames Research Center; Moffett Field, CA	Heliocentric Trajectory
CuSP	Southwest Research Institute (SwRI); San Antonio, TX	Heliocentric Trajectory
EQUULEUS	JAXA; Tsukuba, Japan	Earth-Moon L2
Luna H-Map	Arizona State University (ASU); Tempe, AZ	Lunar Orbit
Lunar IceCube	Morehead State University; Morehead, KY	Lunar Orbit
LunIR	Lockheed Martin Space Systems; Denver, CO	GEO
NEA Scout	Marshall Space Flight Center; Huntsville, AL	Near Earth Asteroid
OMOTENASHI	JAXA; Tsukuba, Japan	Lunar Surface (lander)
Team Miles	Fluid & Reason, LLC; Tampa, FL	Lunar Orbit



RESULTS:

- Payload deployment system performed nominally
- 80 percent of payloads confirmed contact with developers post-deployment
- Half of the Artemis I payloads experienced at least partial mission success

ARTEMIS II

FIRSTS:

- Crewed integrated flight test of the Space Launch System (SLS) rocket, Orion spacecraft, and EGS at Kennedy
- Demonstration of Orion life support systems
- Collection of human data in lunar orbit, transit to and from the Moon, and through reentry and splashdown

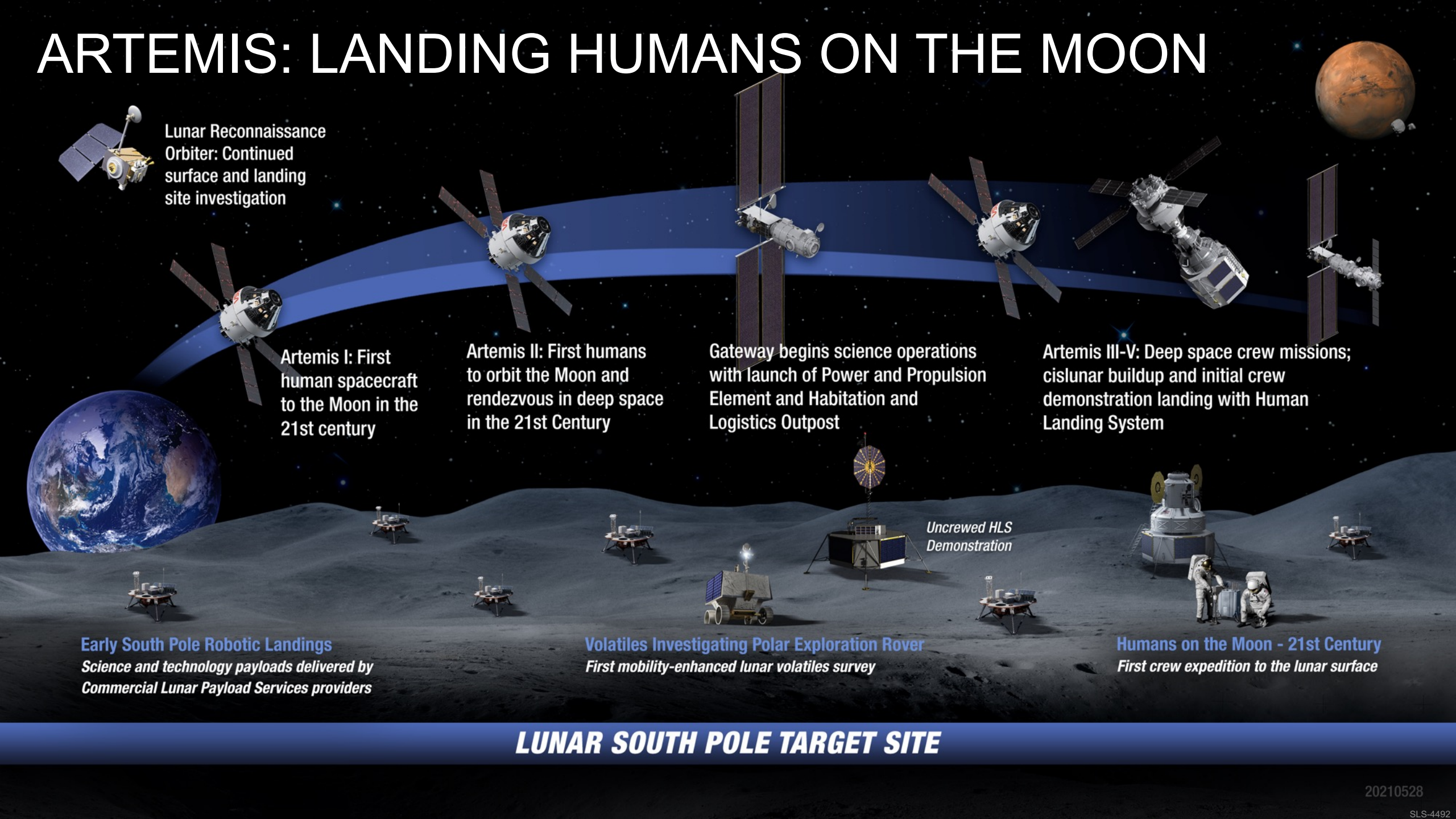
NEW ELEMENTS:

- Orion life support systems
- Launch Complex 39B emergency egress system for crew and new liquid hydrogen system

COMMON ELEMENTS:

- SLS rocket Block 1 configuration
- Orion crew spacecraft
- Mobile Launcher 1 and upgraded ground systems

ARTEMIS: LANDING HUMANS ON THE MOON



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ENABLING DISCOVERY

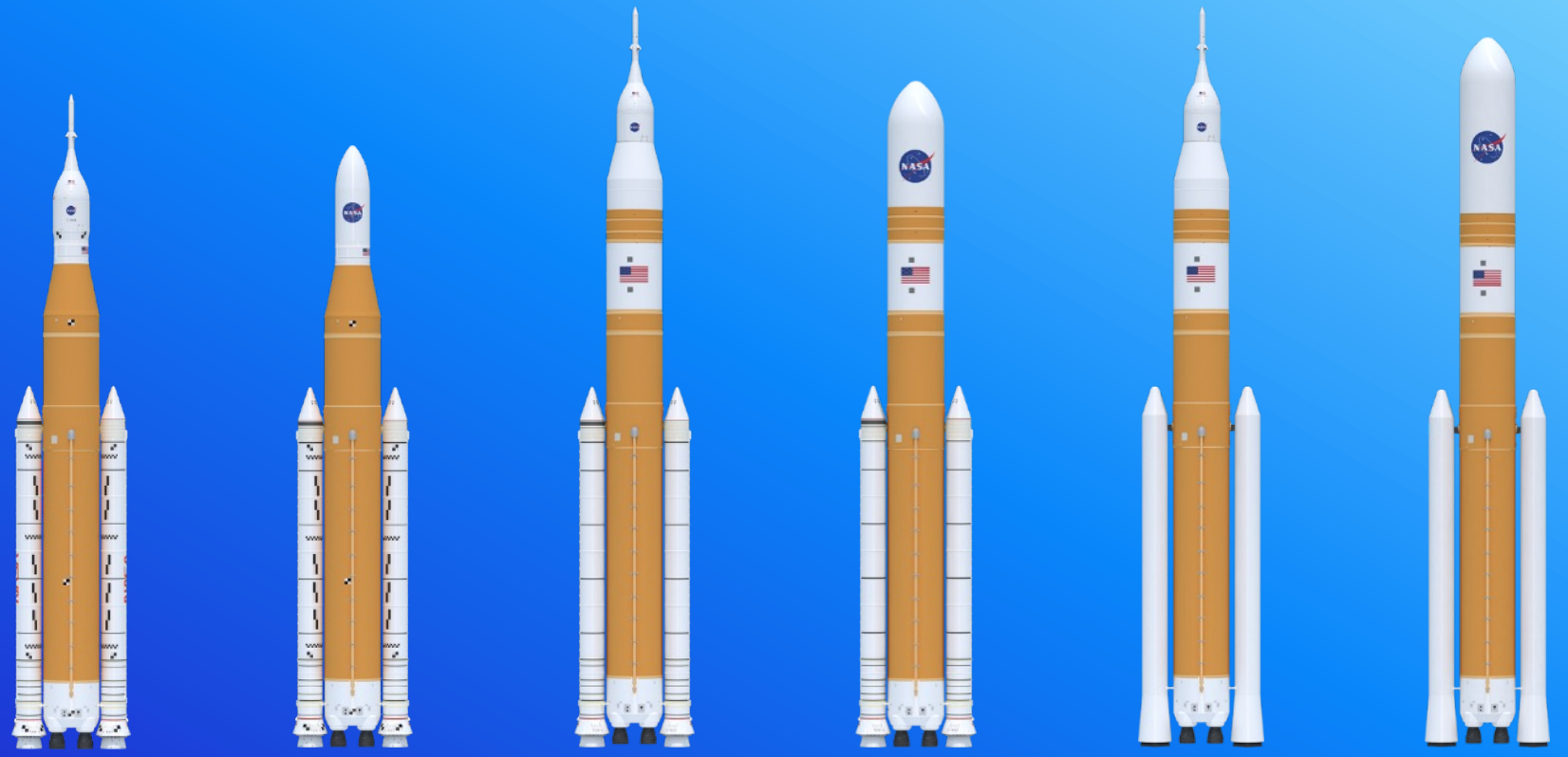
FOUNDATION FOR A GENERATION OF DEEP SPACE EXPLORATION

	SLS Block 1 Crew	SLS Block 1 Cargo	SLS Block 1B Crew	SLS Block 1B Cargo	SLS Block 2 Crew	SLS Block 2 Cargo
Payload to LEO	95 t (209.4k lbs.)	95 t (209.4k lbs.)	105 t (231.4k lbs.)	105 t (231.4k lbs.)	130 t (286.6k lbs.)	130 t (286.6k lbs.)
Payload to TLI/Moon	> 27 t (59.5k lbs.)	> 27 t (59.5k lbs.)	38 t (83.7k lbs.)	42 t (92.5k lbs.)	> 43 t (94.7k lbs.)	> 46 t (101.4k lbs.)
Payload Volume	516 ft³ (14.6 m³)	8,118 ft³ (229.9 m³)	10,100 ft³ (286 m³)**	21,930 ft³ (621.1 m³)	10,100 ft³ (286 m³)**	34,910 ft³ (988 m³)

Low-Earth Orbit (LEO) represents a typical 200-km circular orbit at 28.5 degrees inclination.

Trans-Lunar Injection (TLI) is a propulsive maneuver used to set a spacecraft on a trajectory that will cause it to arrive at the Moon. A spacecraft performs TLI to begin a lunar transfer from a low circular parking orbit around Earth.

The numbers depicted here indicate the mass capability at the TLI point.



** Not including Orion/Service Module volume

Maximum Thrust	8.8 M lbs.	8.8 M lbs.	9.2 M lbs.	9.2 M lbs.	9.5 M lbs.	9.5 M lbs.

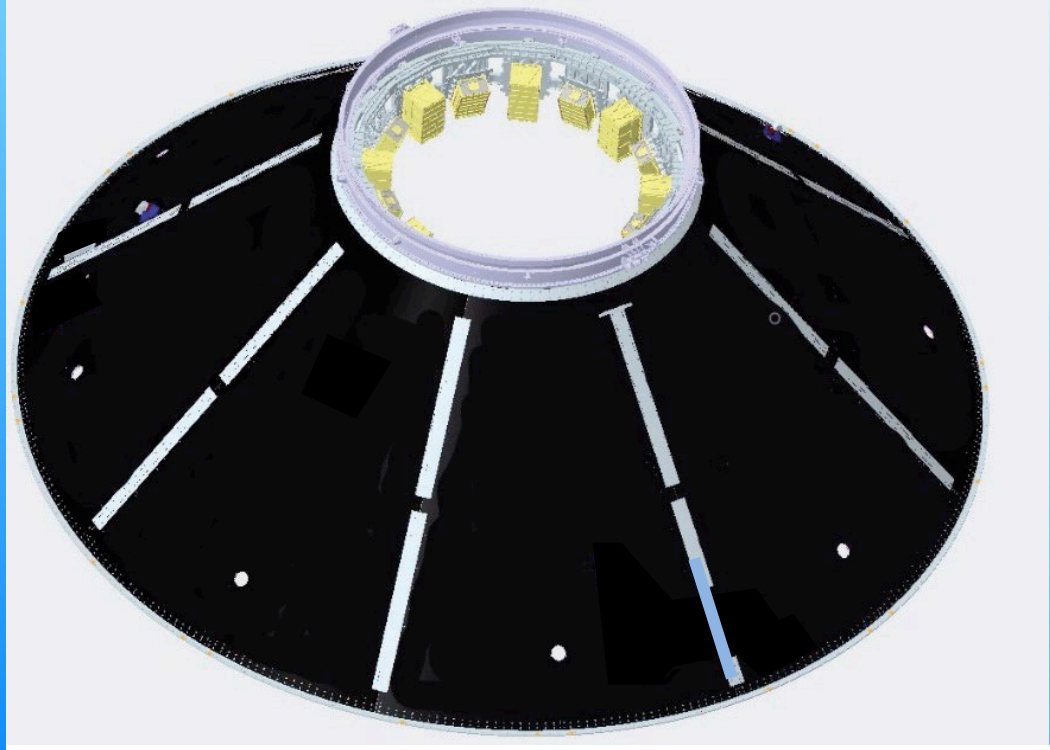
ARTEMIS V AND BEYOND

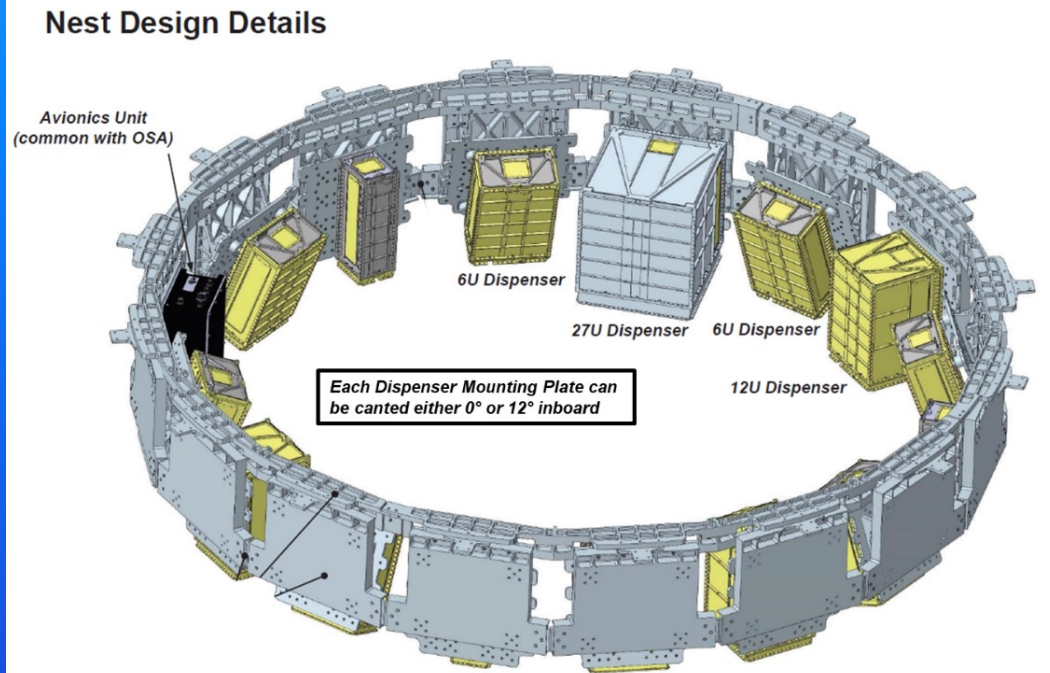
ARTEMIS V PAYLOAD COMPLEMENT:

- Secondary payloads housed under a primary or co-manifested payload
- 15 mounting locations for dispensers
- Accommodate 6U, 12U, & 27U CubeSats

DEPLOYMENT CAPABILITIES:

- CubeSats released straight out or at a 20° angle
- 6U dispensers can be stacked two deep (provided sufficient mass allocation from SLS)
- Deployment positive feedback will be available



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