



5...4...3...2...1...

SPACE LAUNCH SYSTEM

A NEW CAPABILITY FOR DISCOVERY

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SLS CAPABILITY AVAILABILITY

SLS Block 1 As Early As 2019

Provides

Initial Heavy-Lift Capability

Enables

Orion Test

SmallSats to Deep Space

SLS Block 1B Crew As Early As 2022

Provides

105 t lift capability via Exploration Upper Stage

Co-manifested payload capability in Universal Stage Adapter

Enables

Deep Space Gateway

Larger CubeSat- and ESPA-Class Payloads

SLS Block 1B Cargo As Early As 2022

Provides

8.4-meter fairings for primary payloads

Enables

Europa Clipper/Lander

Deep Space Transport

Ice or Ocean Worlds Missions

Large-Aperture Space Telescopes

SLS Block 2 As Early As 2028

Provides

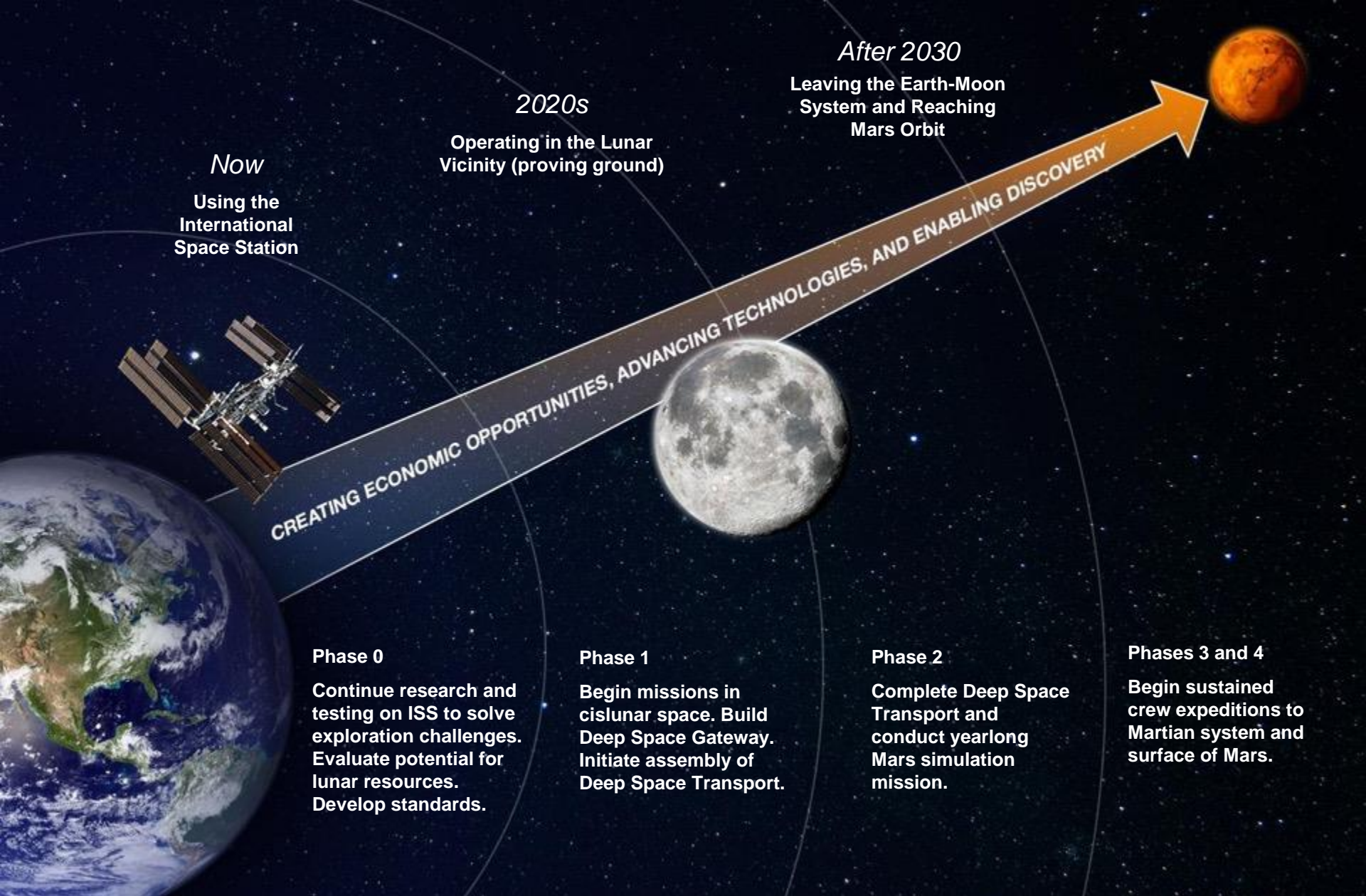
130 t lift capability via advanced boosters

10-meter fairings for primary payloads

Enables

Crewed Mars Orbit Missions

Crewed Mars Surface Missions



A PHASED APPROACH TO HUMAN SPACEFLIGHT

SLS PLAYS A KEY ROLE INTO THE 2030s

BOOSTER PROGRESS



CORE STAGE PROGRESS



ENGINE PROGRESS



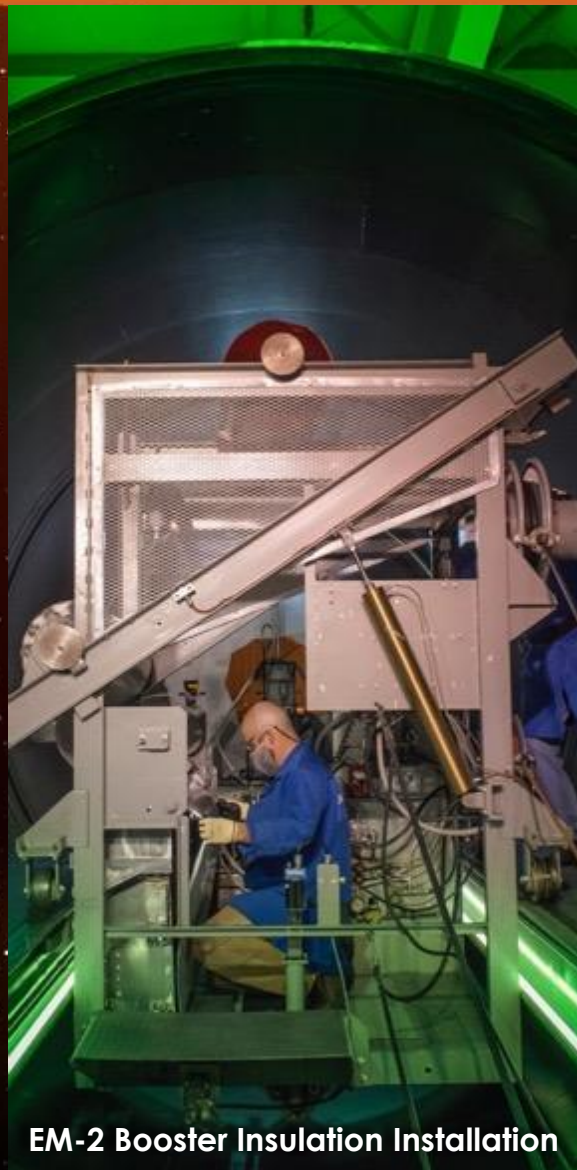
IN-SPACE STAGE AND ADAPTER PROGRESS



PROGRESS TOWARD EM-2/BLOCK 1B



EM-2 Core Stage Welding



EM-2 Booster Insulation Installation



EM-2 Flight Engine Testing



EUS Development Panel Forming



Universal Stage Adapter Contract

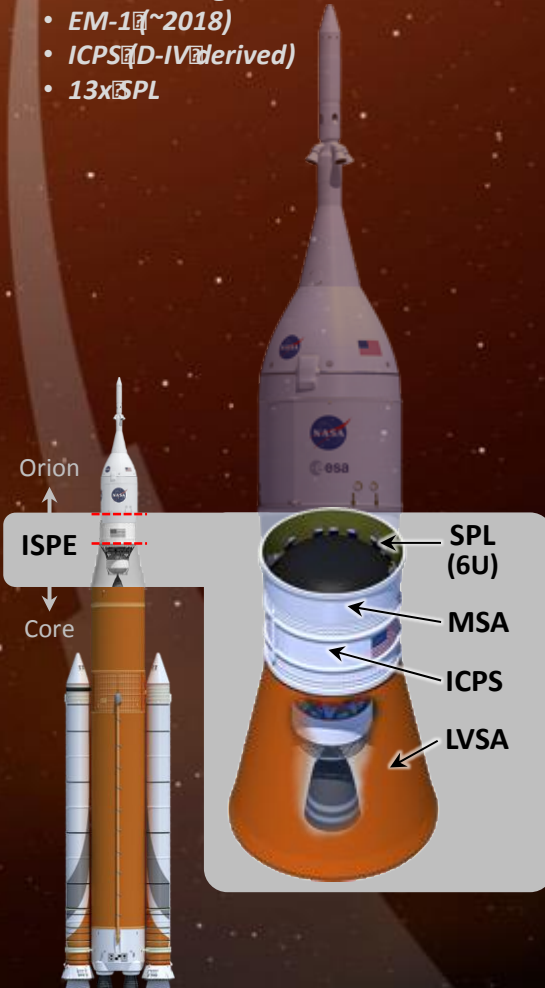
SLS Spacecraft/Payload Integration & Evolution (SPIE)

ISPE Hardware Development & Payload Integration for SLS Missions

SLS Block 1

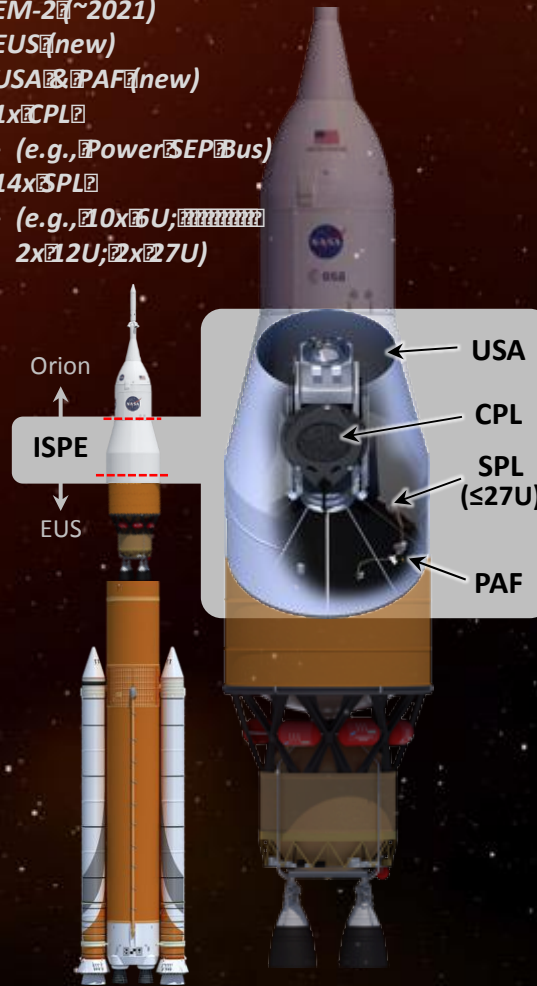
Test Flight

- EM-1 (~2018)
- ICPS (D-IV derived)
- 13x SPL



Crew

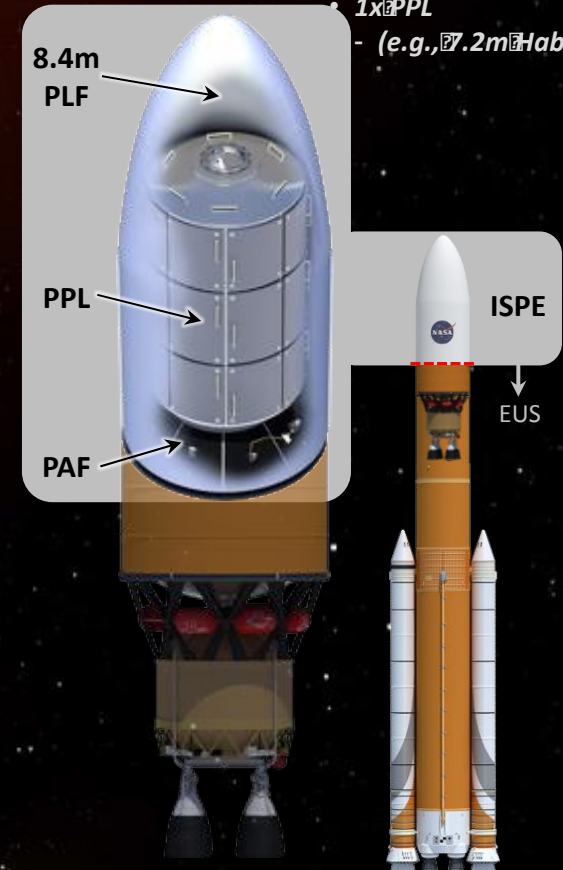
- EM-2 (~2021)
- EUS (new)
- USA & PAF (new)
- 1x CPL
- (e.g., Power SEP Bus)
- 14x SPL
- (e.g., 10x 5U, 2x 12U, 2x 27U)



SLS Block 1B

Cargo

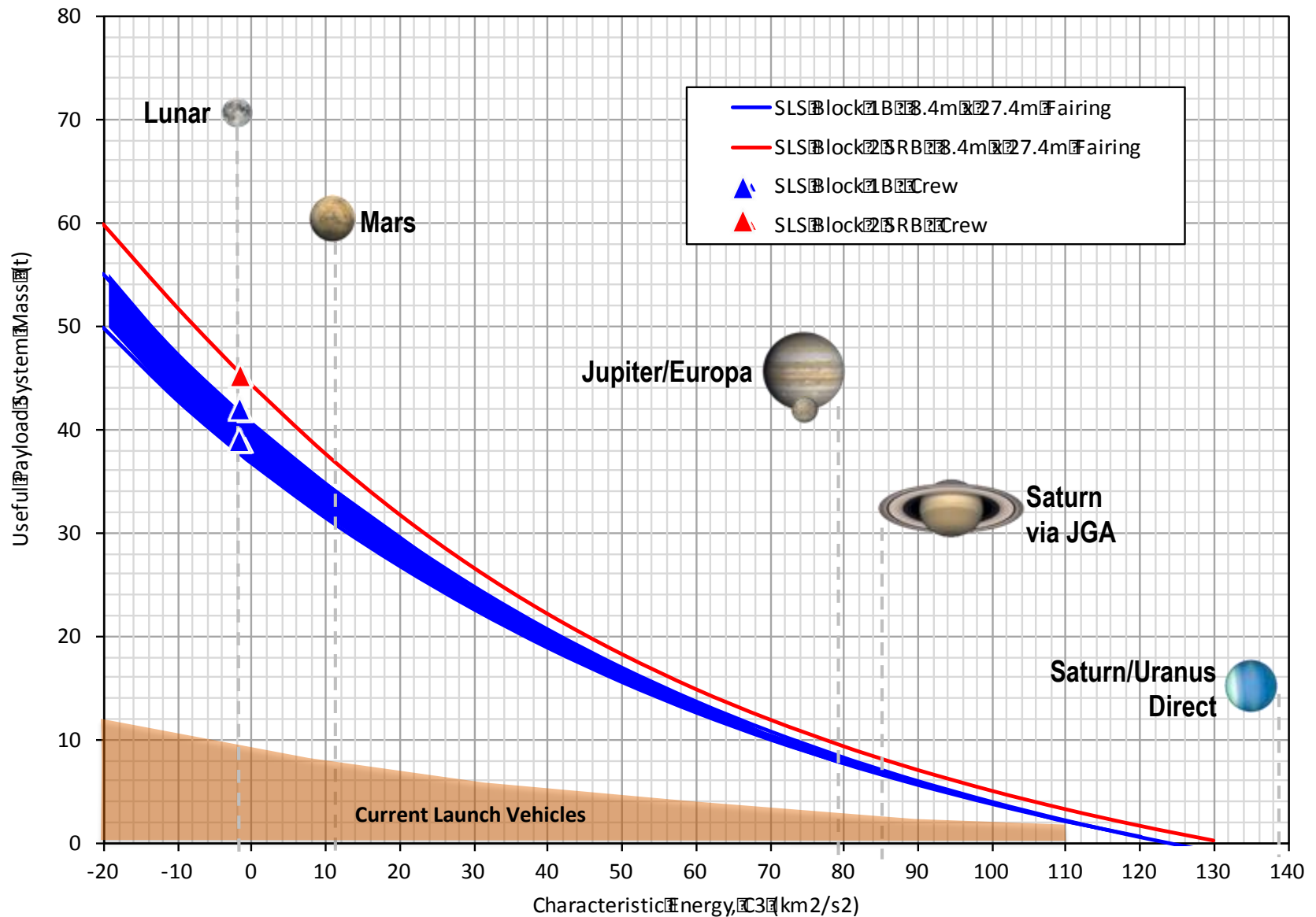
- EM-7 (~2027)
- EUS
- PLF (new)
- 1x PPL
- (e.g., 7.2m Habitat)



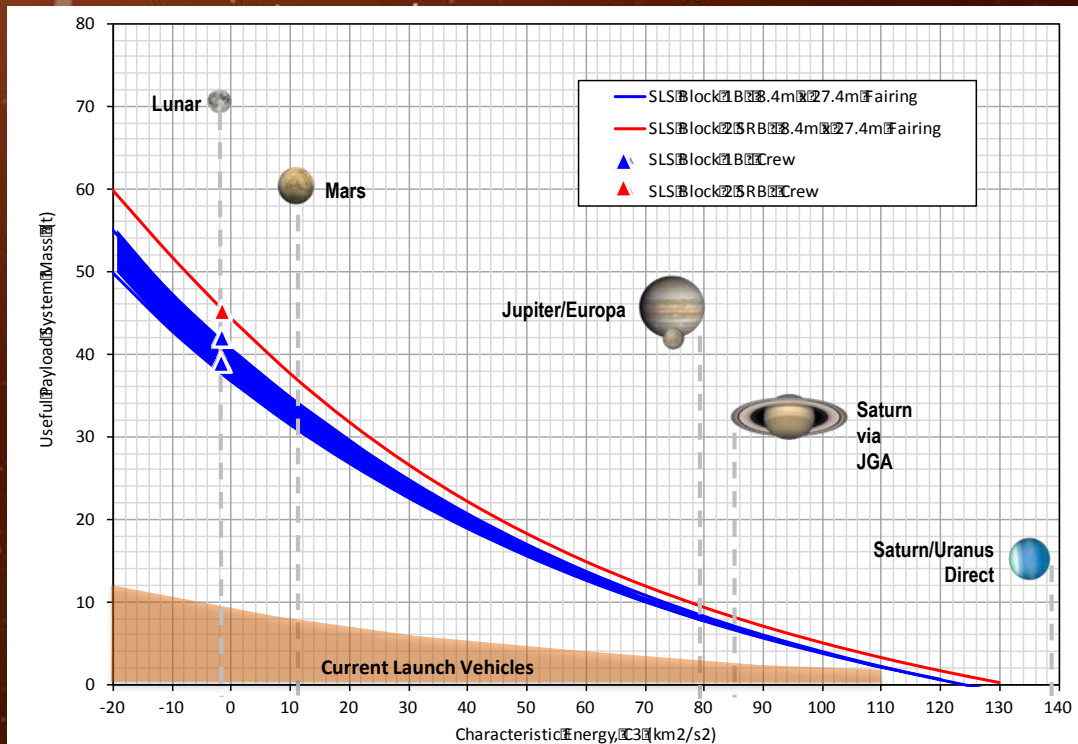
Notes: ISPE – Integrated Spacecraft Payload Element SPL – Secondary Payload MSA – MPCV Stage Adapter ICPS – Integrated Cryogenic Propulsion Stage LVSA – Launch Vehicle Stage Adapter EUS – Exploration Upper Stage USA – Universal Stage Adapter CPL – Co-manifested Payload PAF – Payload Attachment Fitting PLF – Payload Fairing PPL – Primary Payload

----- ISPE Separation Plane

SLS PAYLOAD MISSION CAPTURE

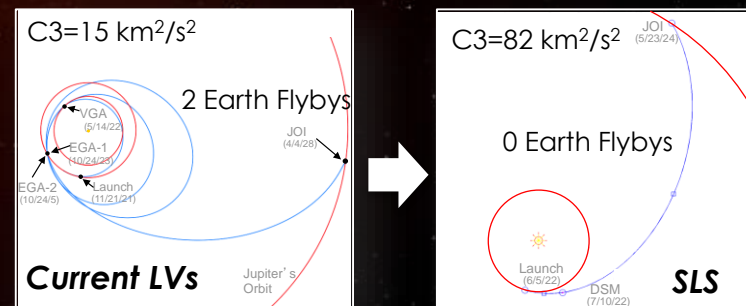


SLS TIME TO DESTINATION



Europa Clipper

- Desired launch date of June 2022
- Jovian system transit time reduced by 65% over existing launch vehicles
- Reduced mission operations cost over time



Earliest Launch

- *Period: 6/4/22 – 6/24/22 (SLS)
- *Period: 6/18/22 – 7/8/22 (Atlas)

Cruise:

- 2.5 Years (SLS)
- 7.4 Years (Atlas)

Jupiter Orbit Insertion

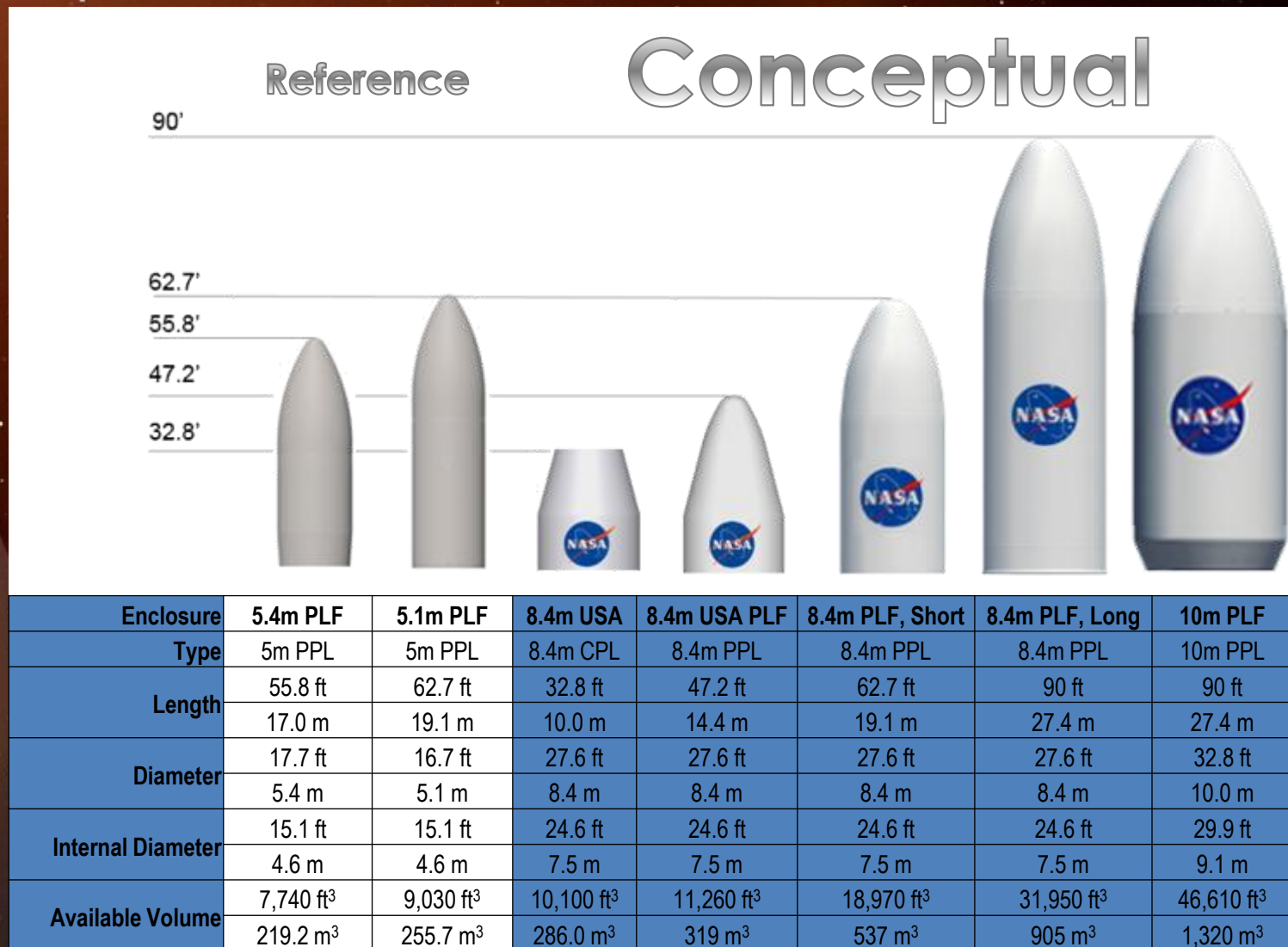
- 12/24/24 or 5/1/25 (SLS)
- 11/26/29 (Atlas)

Jovian System Operations

- Prime Europa Flyby
- Campaign: 36 months



RANGE OF PAYLOAD ENCAPSULATION



Block 1B

Block 2



COTS: Commercial Off-the-Shelf

CPL: Co-manifested Payload

PPL: Primary Payload

PLF: Payload Fairing

www.nasa.gov/sls

SLS MASS TO DESTINATION

◆ Up to 5 times greater mass to orbit capability than current launch systems

- Increases payload mass margins
- Offers range of injection propulsion options

◆ New Horizons

- SLS would have doubled delivered payload mass to Pluto

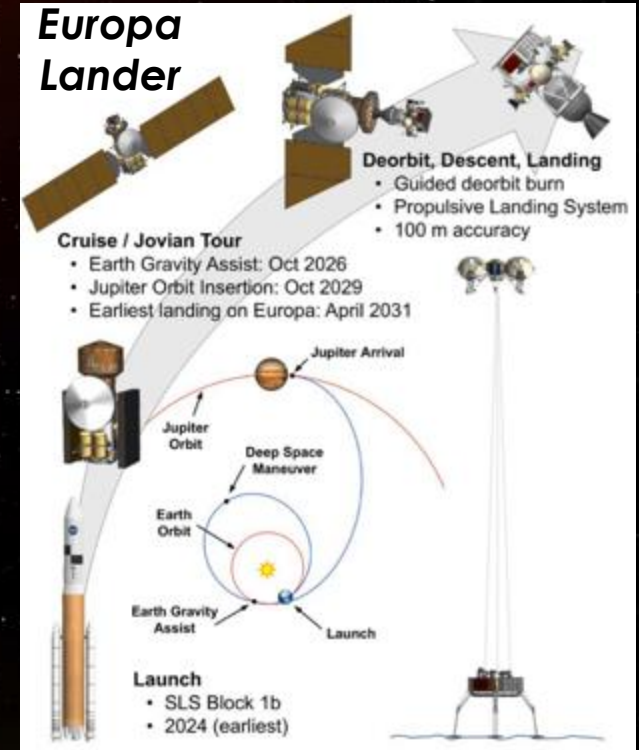
◆ Europa Lander

- 16 mT delivery to outer planets (with margin)

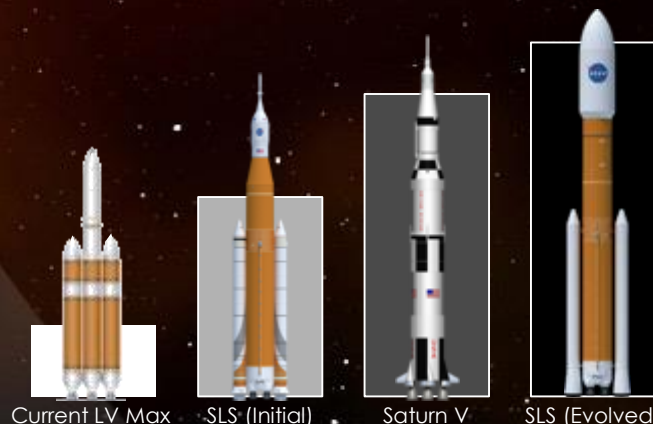
New Horizons



Europa Lander



Payload Lift Comparison



SLS COST TO DESTINATION

B1 B1B B2



Representative Timeline

Launch Date	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
SLS Opportunity	EM-1 ▽			EM-2 ▽C	Europa ▽	EM-3 ▽C	EM-4 ▽C	EM-5 ▽C	EM-6 ▽C	EM-7 ▽C	EM-8 ▽C	EM-9 ▽C	EM-10 ▽C

Crew Block1 Block1B Block2

- ◆ **Plan to fly at least 1 crewed SLS per year**
 - System has capability to fly up to 3 SLS's per year
- ◆ **Orion Co-manifested Payloads cost limited to launch vehicle integration activities**
 - More volume than Shuttle Payload Bay
 - Up to 10 mT of payload to cis-lunar space
- ◆ **Multiple payload combinations possible**
 - New 8.4m class (w/COTS separation systems)
 - ELV 5m class (w/COTS separation systems)
 - ESPA ring class (w/COTS separation systems)
 - Up to 27U Cubesats (w/COTS dispenser systems)



Largest existing
5m fairing

Orion Co-manifested
Payload (8.4m USA)

THE ADVENTURE BEGINS NOW.



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