Apollo 11 50th Anniversary, AIAA LA-Vegas Section,
July 13th, Santa Monica, California

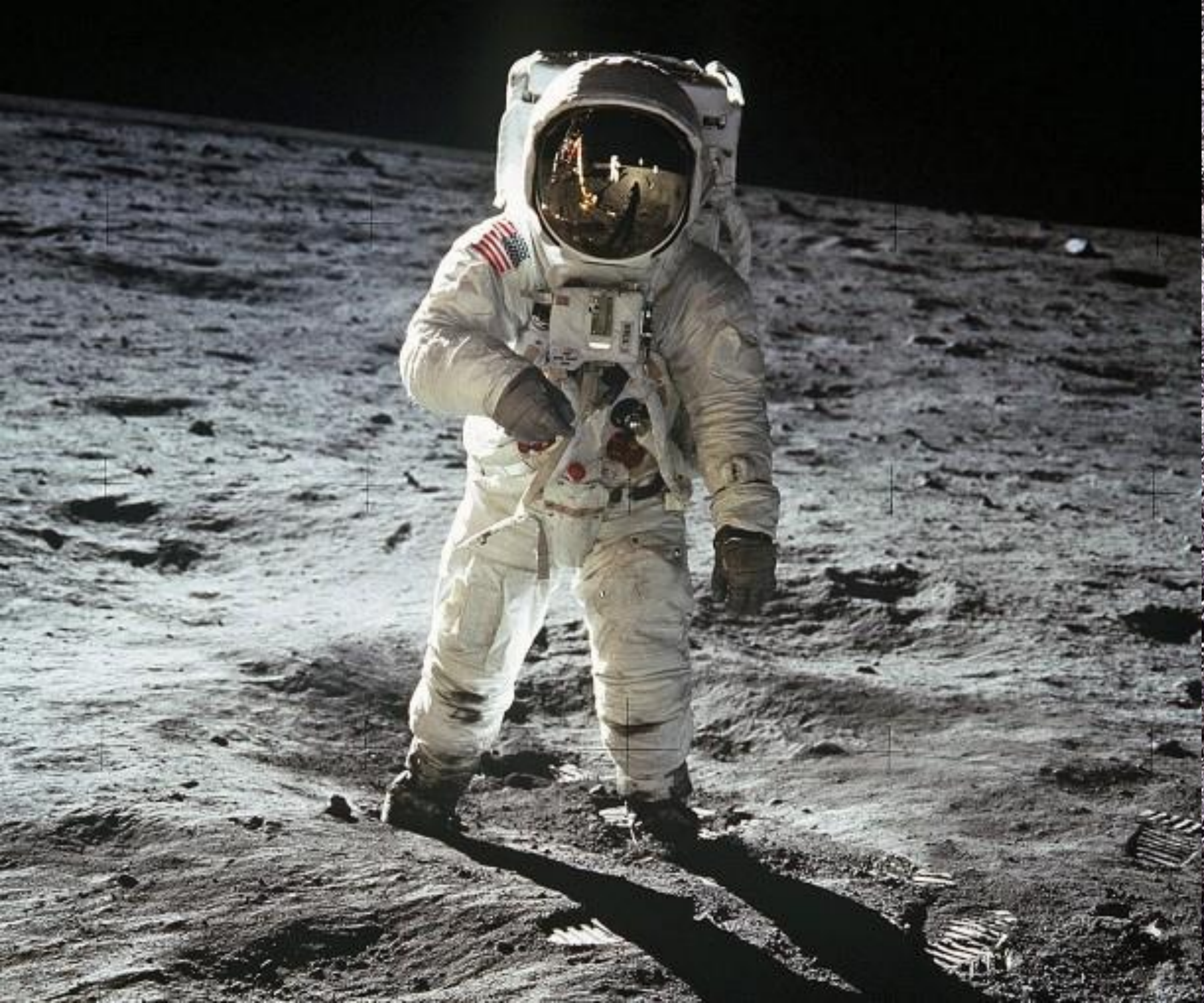
ARTEMIS

EVE & ADAM Mission Return to the Moon

A Concept To Ponder

M.Thangavelu, USC


ARMSTRONG
COLLINS
ALDRIN
NASA





NASA
NASA
SEAL OF THE PRESIDENT OF THE UNITED STATES

Space Policy Directive SPD -1

"Lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and to bring back to Earth new knowledge and opportunities. Beginning with missions beyond low-Earth orbit, the United States will lead the return of humans to the Moon for long-term exploration and utilization, followed by human missions to Mars and other destinations;".

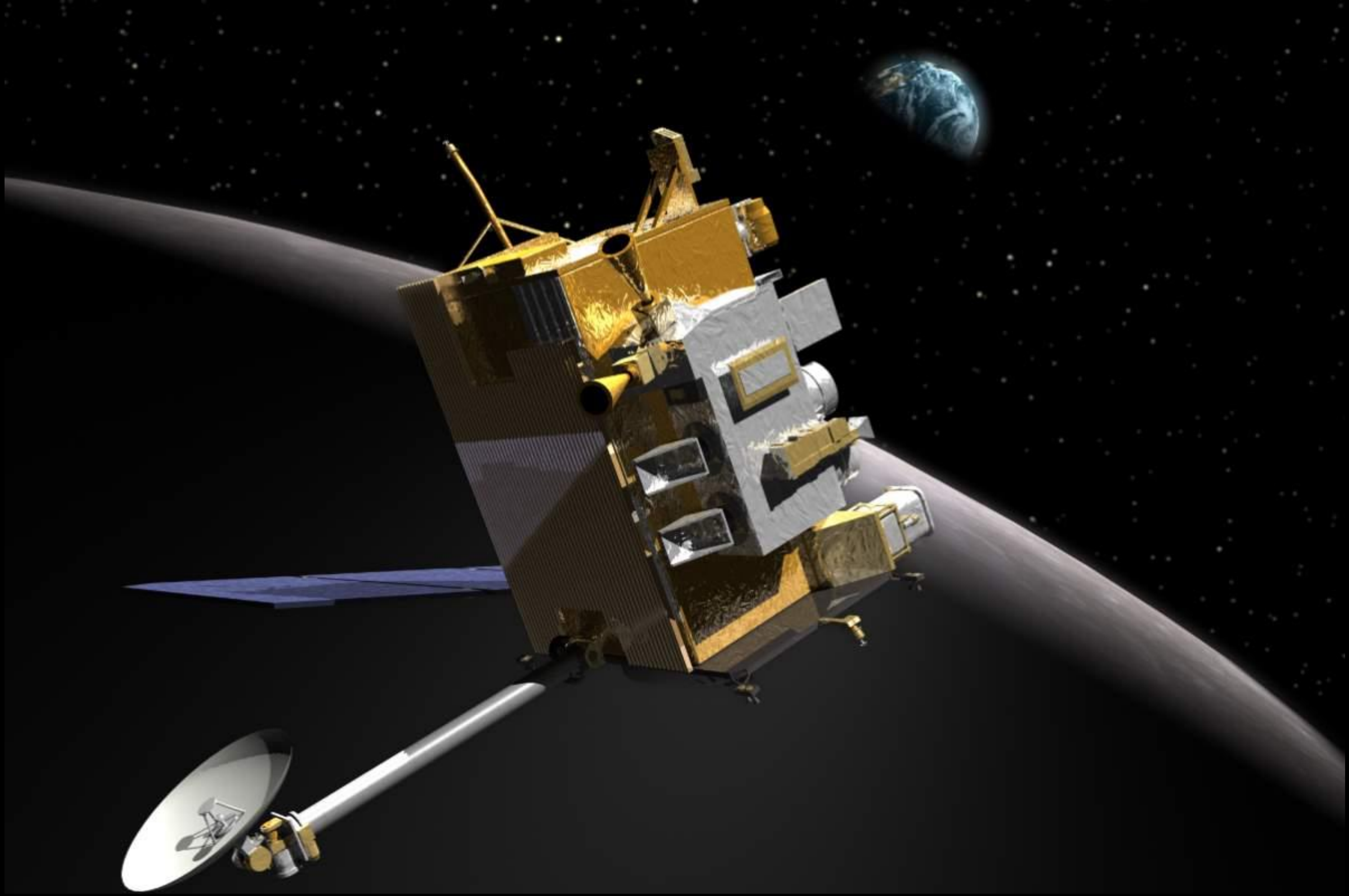
Take People to the Moon and then to Mars and Beyond.

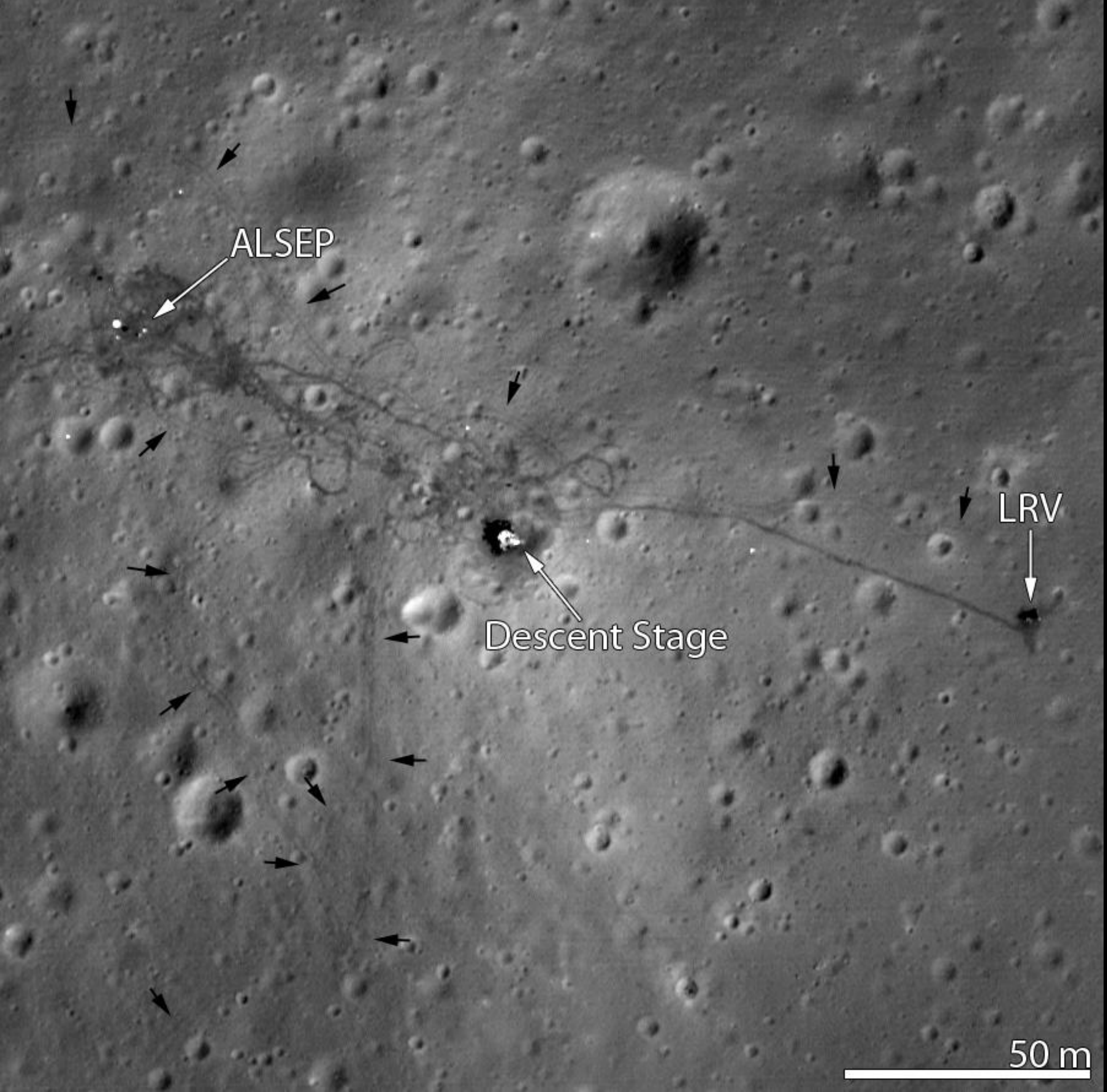
December 11th 2018 – The USC ADAM Project

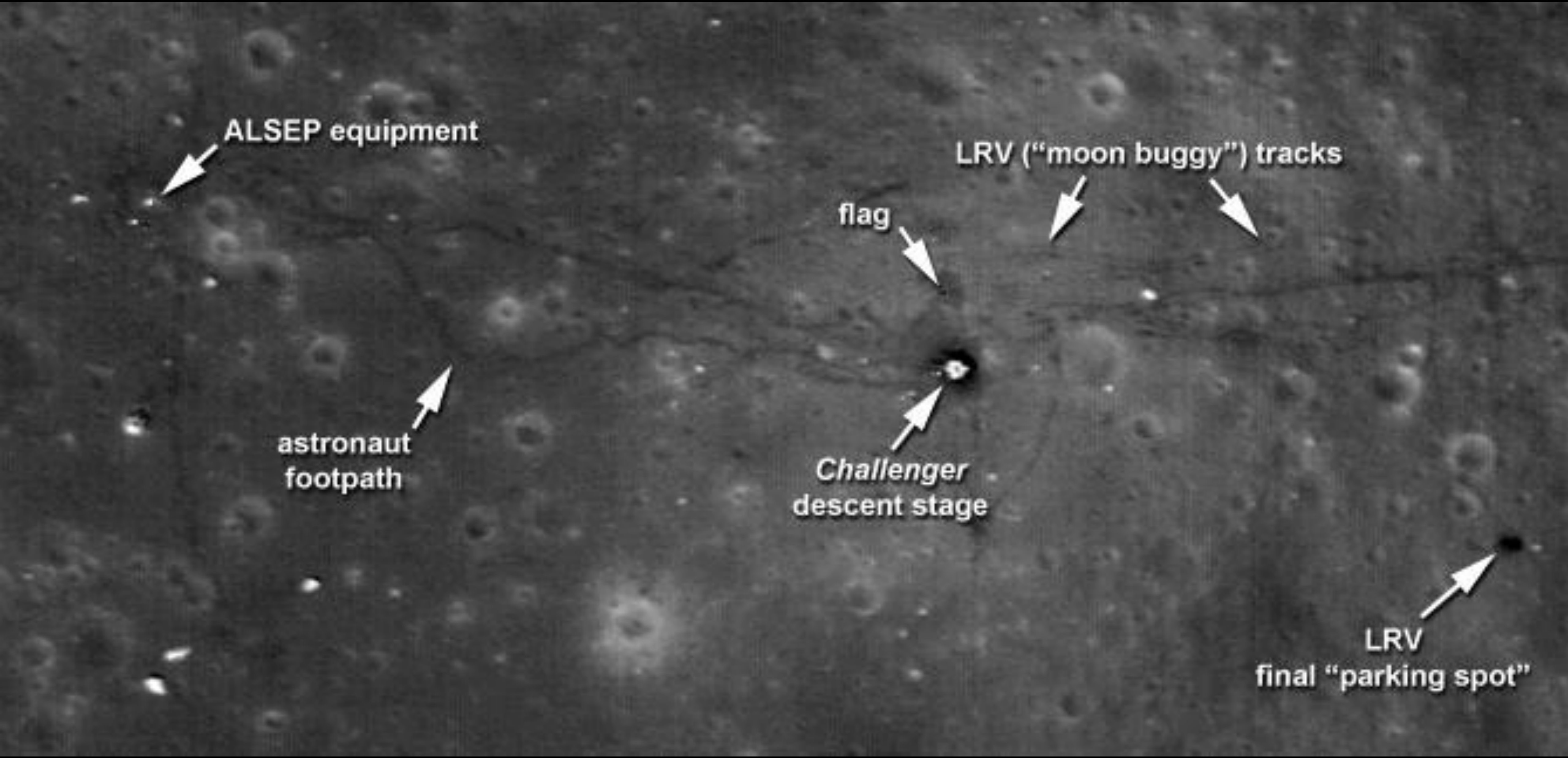

958
Alice

Look Up USC ADAM2018 Slides
Google: ASTE527

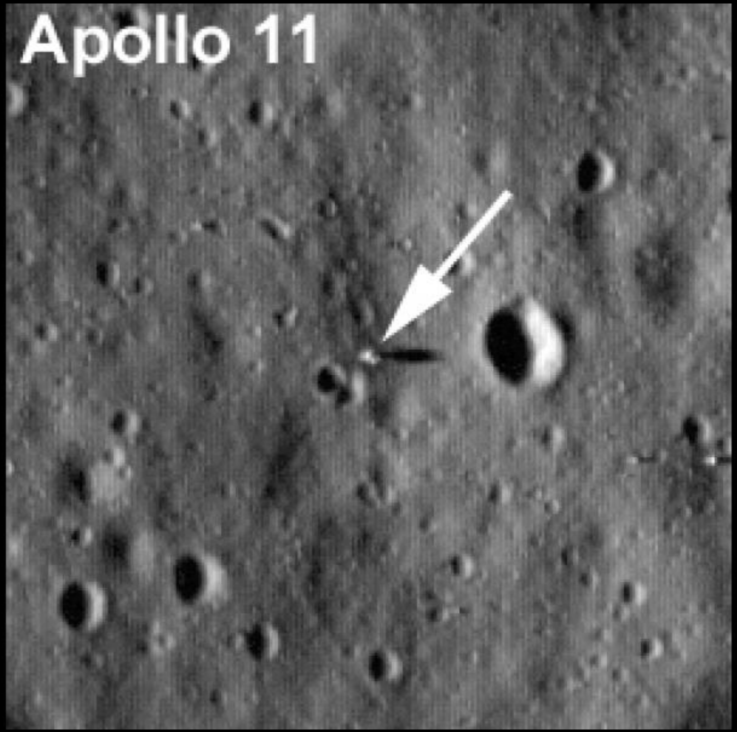
Thank you



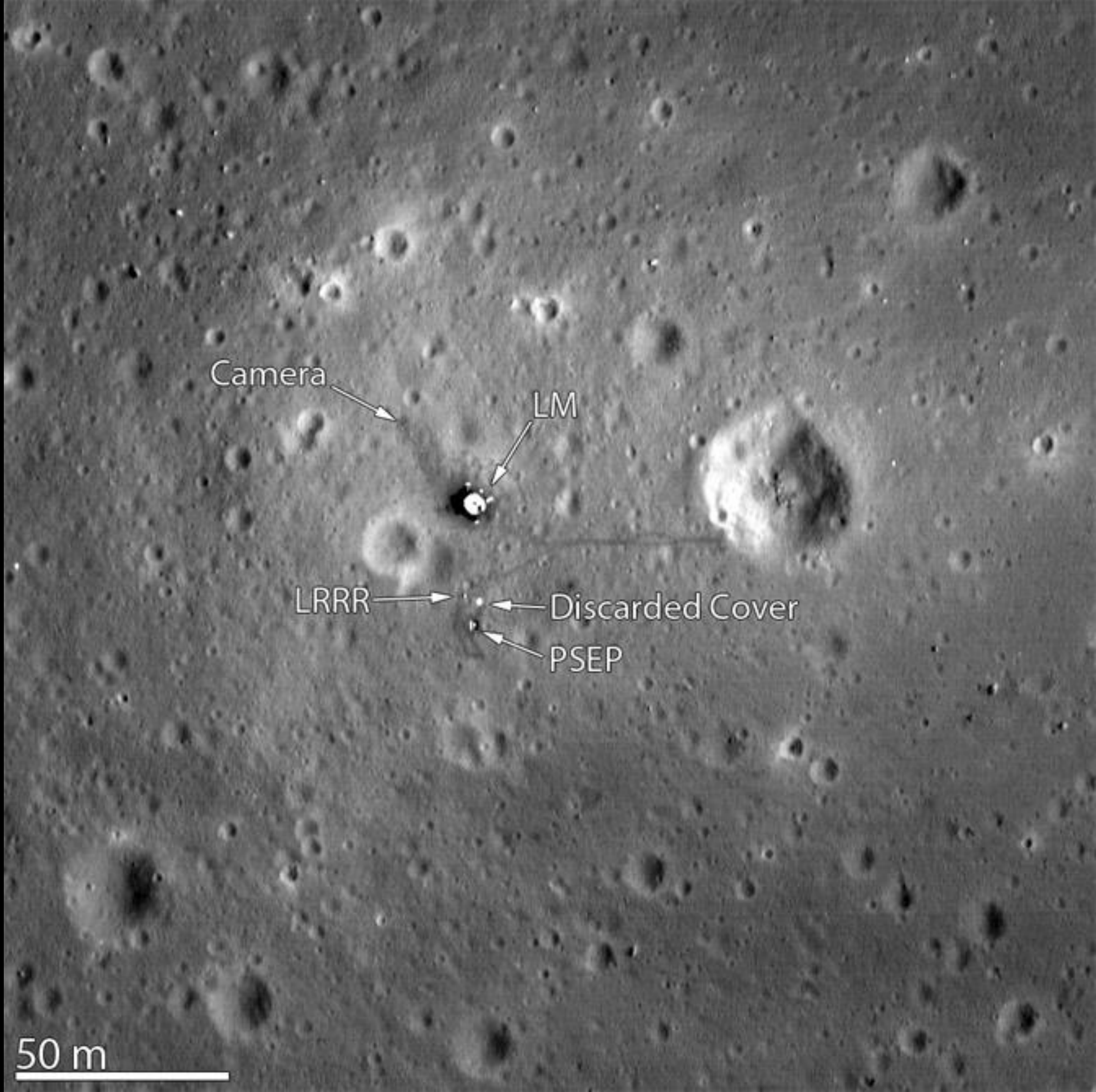

ALSEP
LRV
Descent Stage
50 m


ALSEP equipment
LRV ("moon buggy") tracks
flag
astronaut footpath
Challenger descent stage
LRV final "parking spot"

LROC Apollo 11 Site



- Apollo 11 landing site captured from 24 km (15 miles) above the surface by
- NASA's Lunar Reconnaissance Orbiter.
- Credits: NASA Goddard/Arizona State University



Lunar Return Concept: A Mission with a Vision

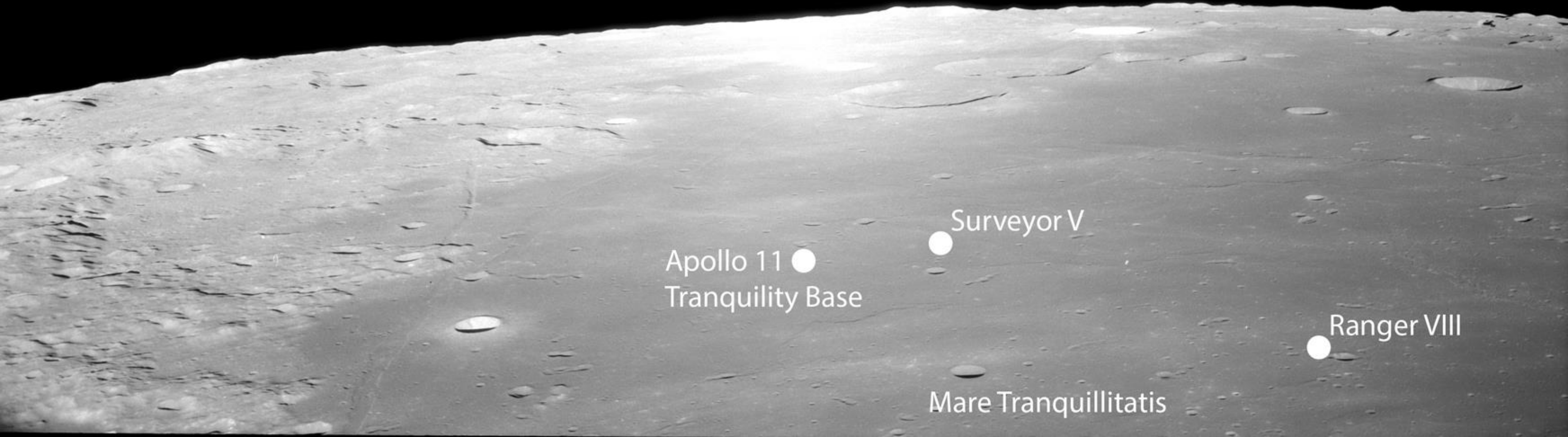
- Vision2022
  - Policy : Follow SPD#1 + Return to Lunar Surface by 2024
  - Goal : Reaffirm US preeminence in Human Space Activity
  - Land a Woman and a Man and return them to Earth safely
  - Collaboration : Engage Private and International Partners

Lunar Return Concept:A Mission with a Vision

•Mission2022

- Land a Woman and a Man at Mare Tranquillitatis and return them safely back to Earth in the 2022-2024 timeframe.
- To observe the effect of time on both the Apollo 11 Eagle lander descent stage and various exposed payloads left there.
- And to observe close up, how the first human footprints on our Moon have weathered over the last fifty some years.(while vacuum helps preservation, micrometeoritic bombardment and diurnal thermal cycling may have already taken a toll on first human footprints.)
- Place cameras at the site that can continually image both the site and footprints as well as install one to continually point toward Earth disc.(just as we watch the Moon, perhaps the time has come to give our Moon eyes to watch over us, you think ?)
- Alternatively, use state of the art technologies and emplace systems to shield these footsteps from further degradation.
- Take holographic images of these footprints for preservation that can then be 3D printed to scale, for museums on Earth
- Finally, an exploration campaign to study the pits in the Mare Tranquillitatis region that we now know exist through LROC images
- Most of all, such a mission would follow the free return trajectory of past Apollo missions, while we evolve ever more reliable cislunar transportation systems.
- Use existing and proven capabilities - launch vehicles, space vehicles, landers, spacesuits and advanced robotics

Mare Tranquillitatis



Modular Assembly in Low Earth Orbit –ISS Legacy

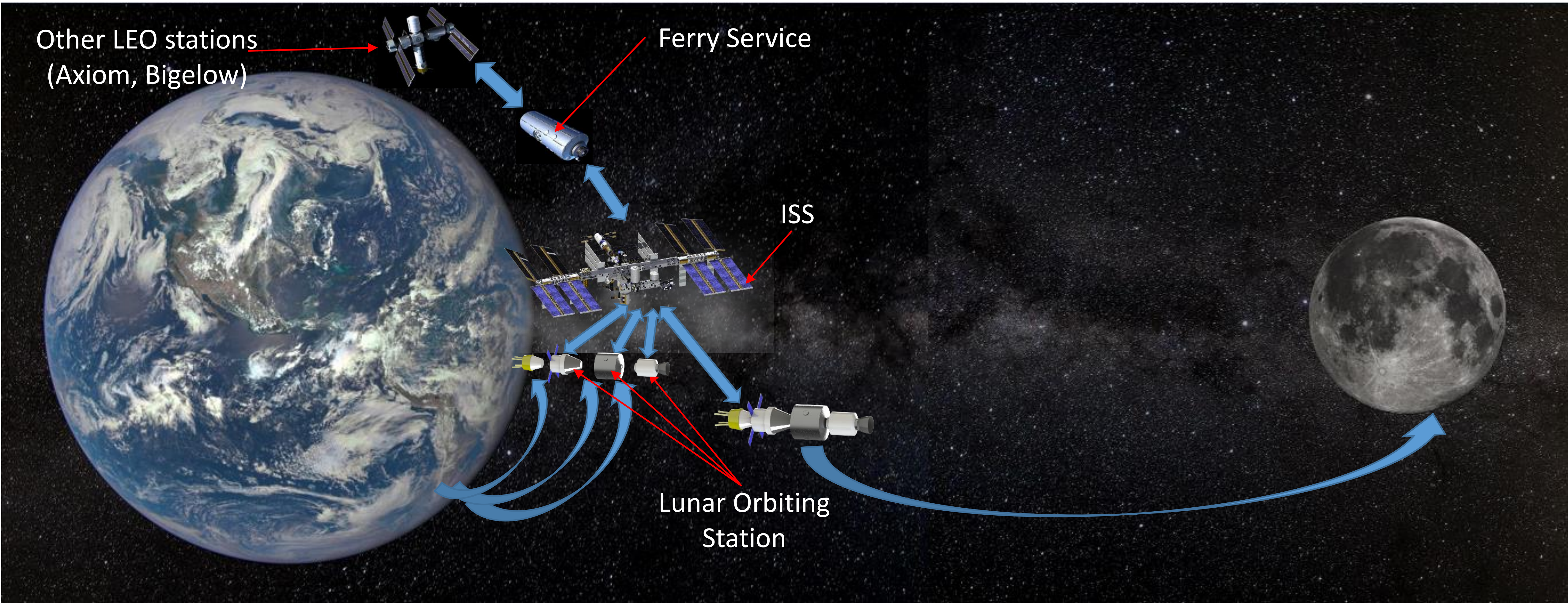
- Use existing launchers to build up TLI stack in LEO
- Clustered, reusable TLI upper stage in LEO
- Assembly & check out before TLI

- Advantages
- 1. Better control of mission operations
- 2. Expanded globally capable partners

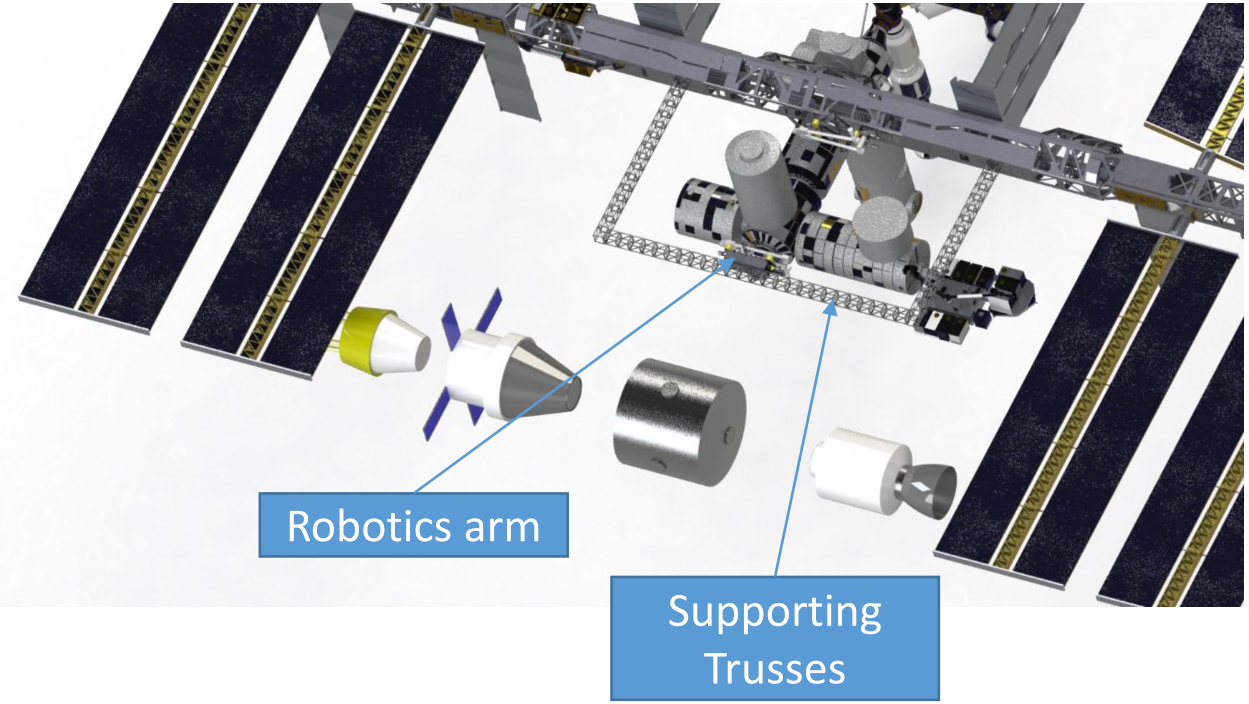
Lunar Orbiting Station
Modular Assembly in Low Earth Orbit
(LOS MALEO)

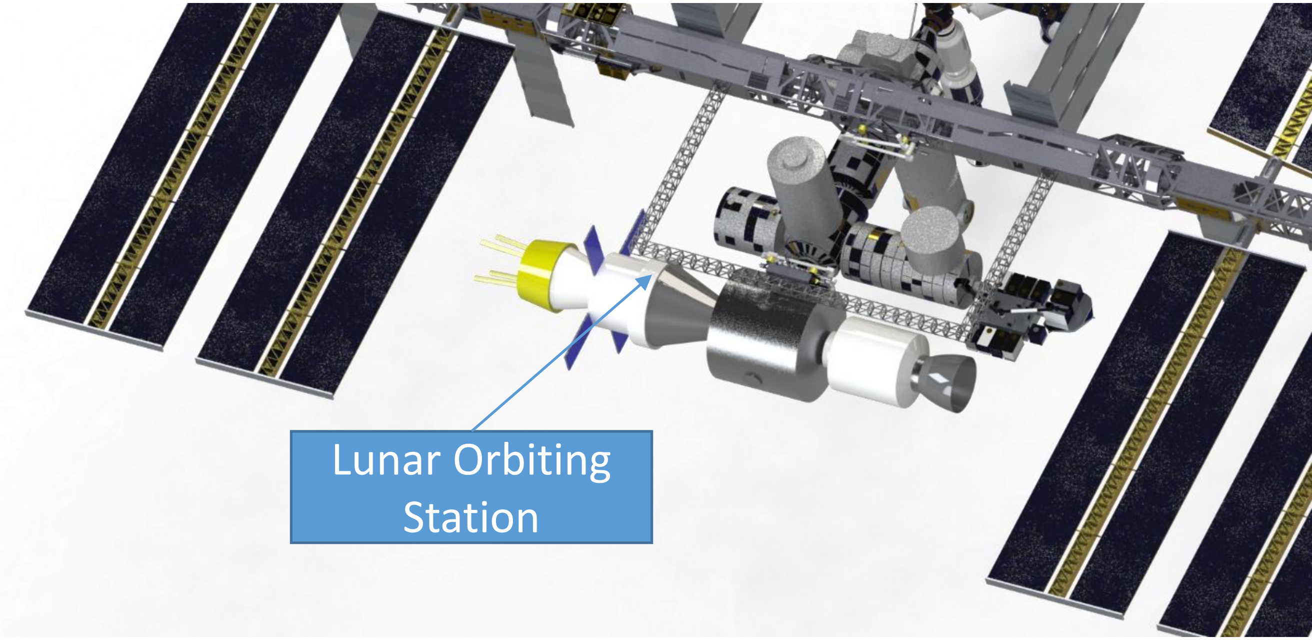
Duy Nguyen
ASTE 527 Final

MALEO - Assembly Concept for Speedy Lunar Return



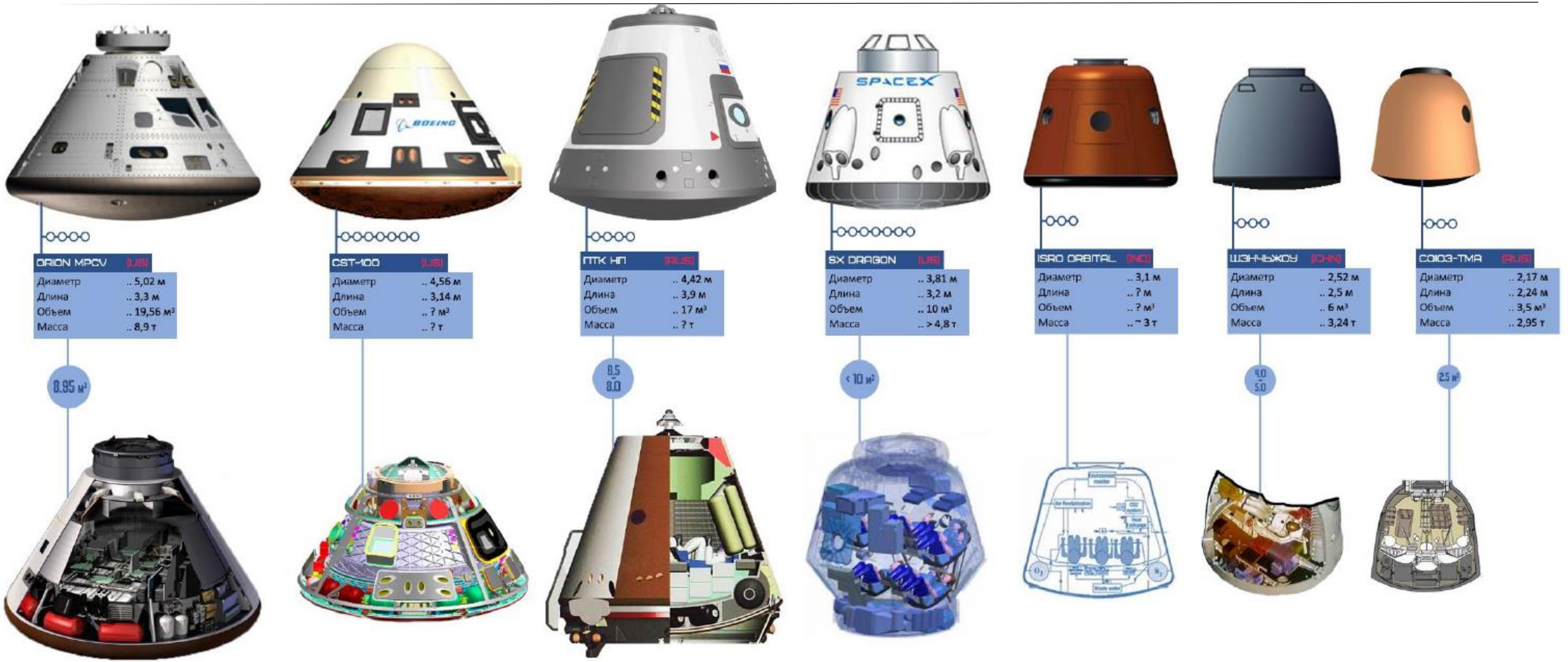
Concept: ISS Assembly Depot



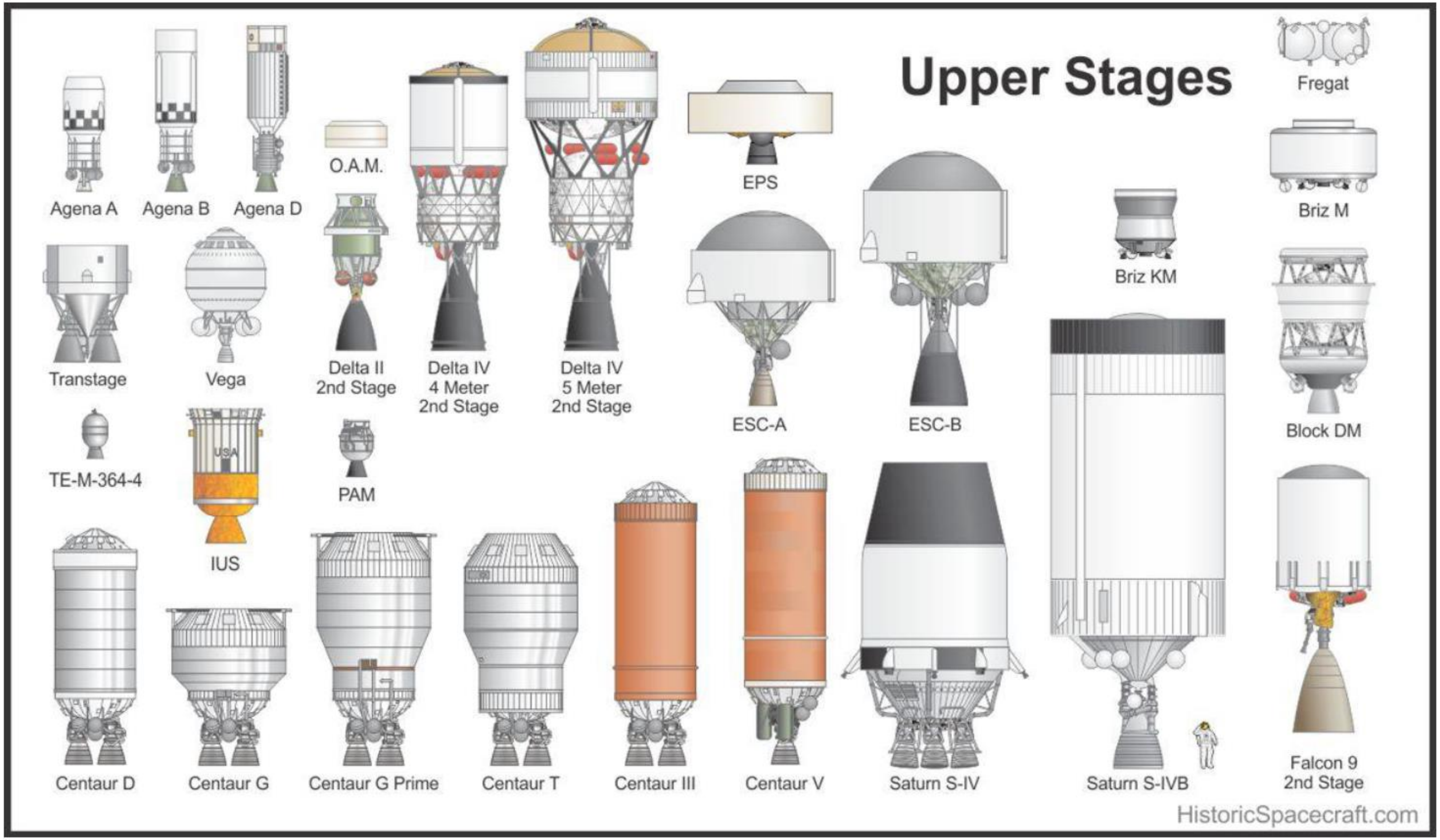


- Supporting trusses will be served as a mounting platform for any robotics arms. In addition, they will support astronauts' movement and allow them to have full access to the Lunar Orbiting Station for assembly and inspection.
  - Trusses can be extended for larger build (e.g., Mars Expedition Vehicle)

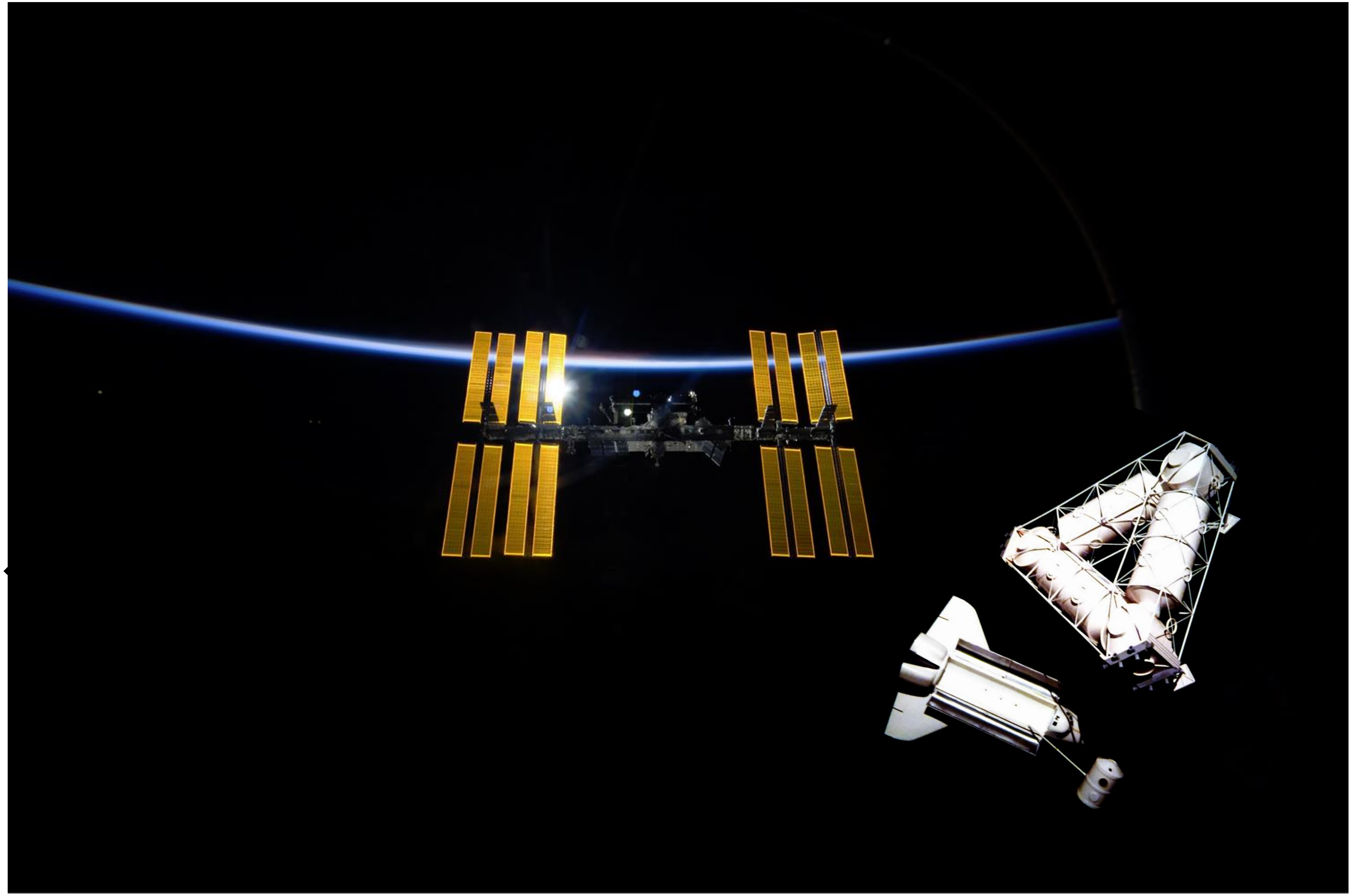
More options for LOS Command Module



More options for **Clustered** LOS Upper Stage



MALEO: **M**odular **A**ssembly in **L**ow **E**arth **O**rbit



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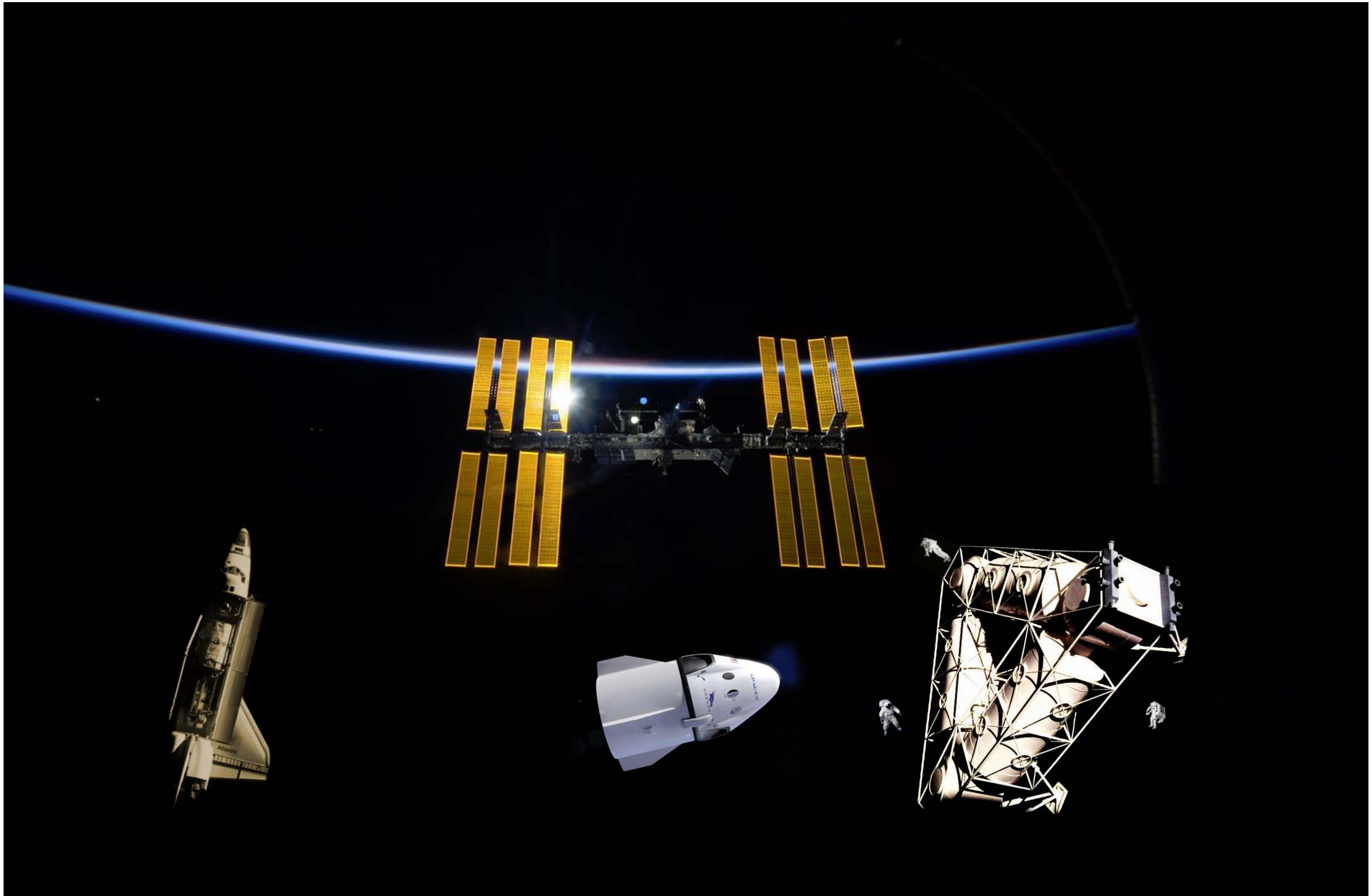
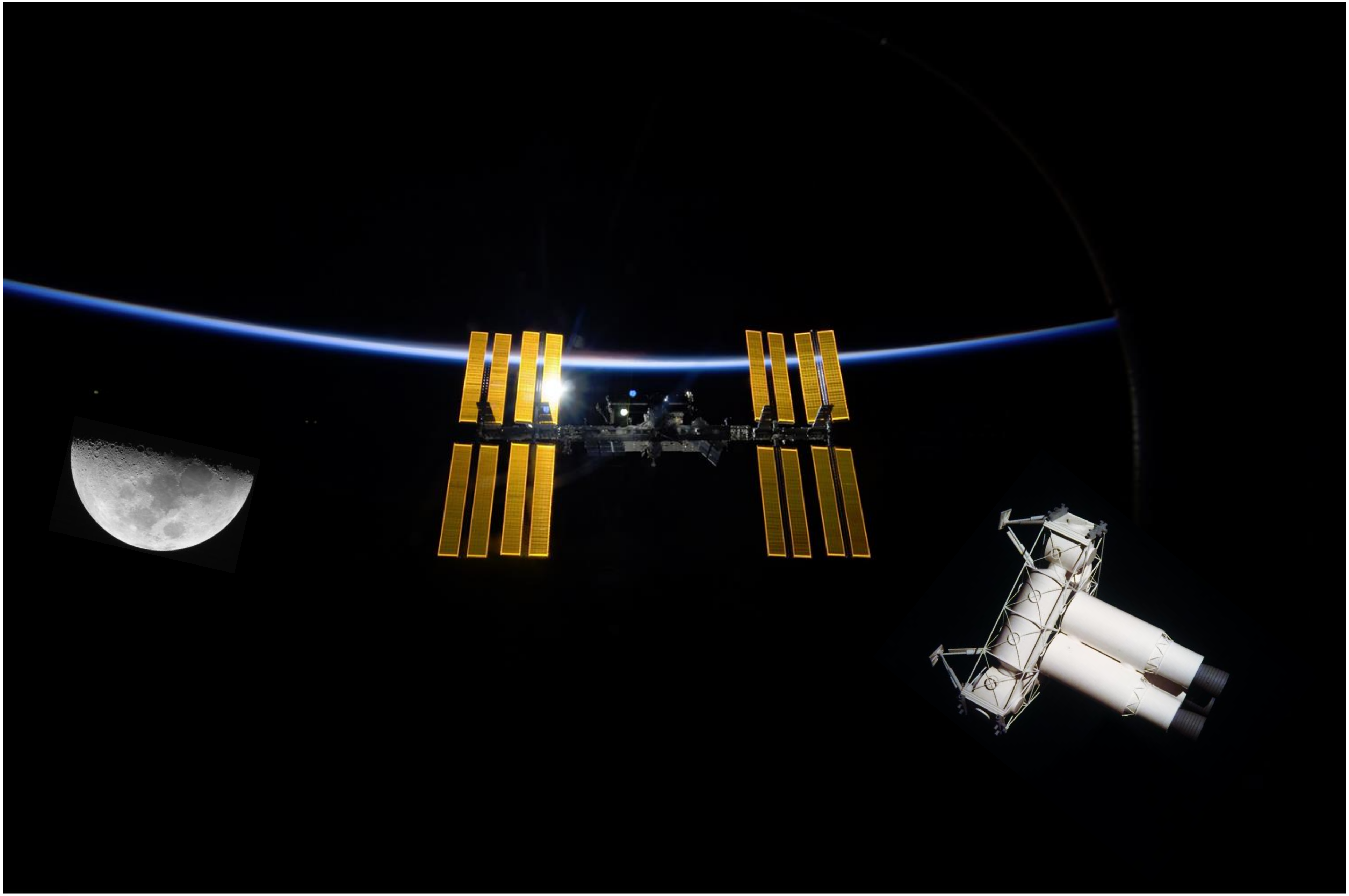
MALEO Assembly with ISS Crew – Note Spacex Dragon



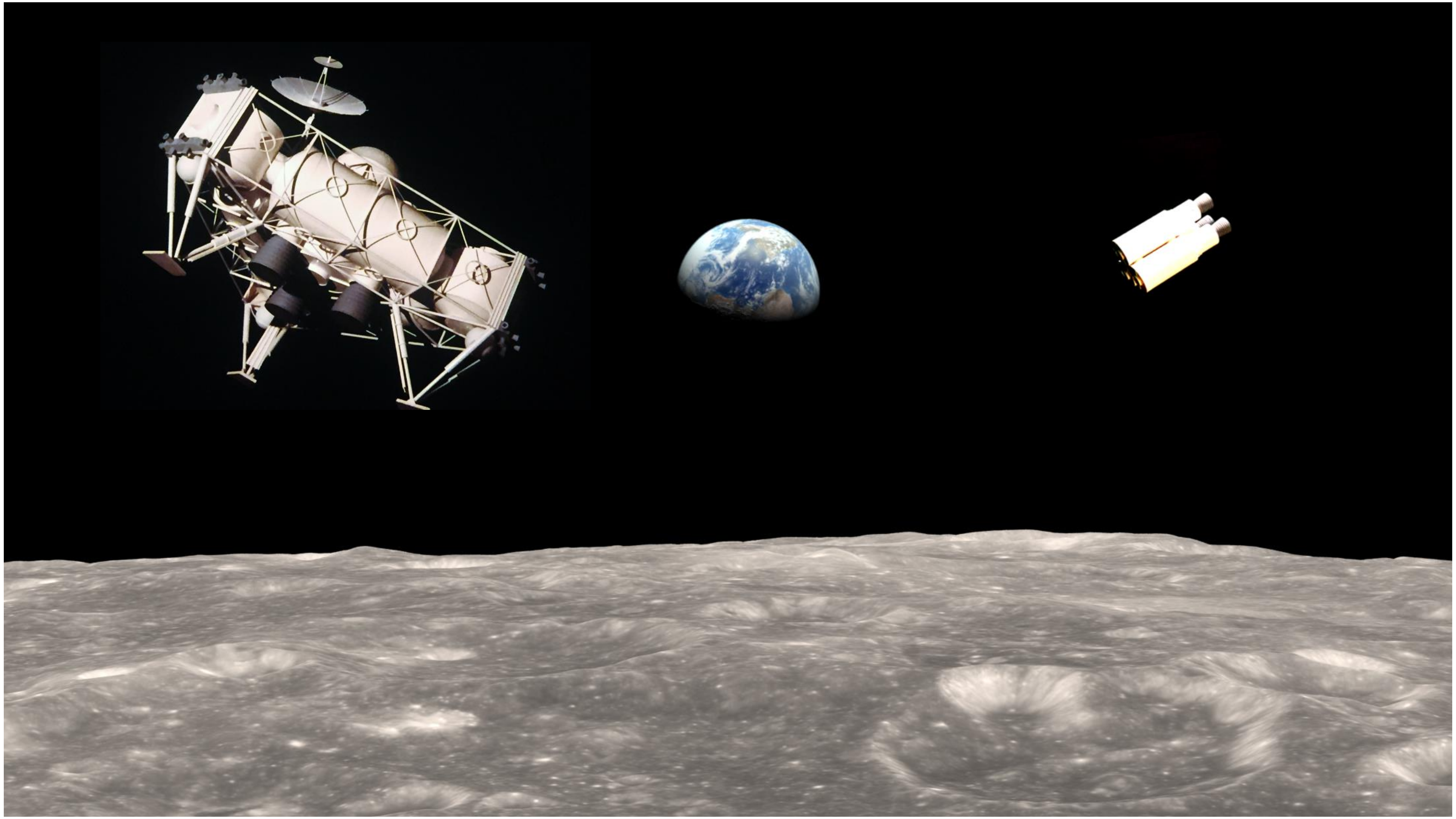
MALEO Translunar Injection from ISS



MALEO Lander Propulsion Rendezvous

Module Assembly In LEO MALEO

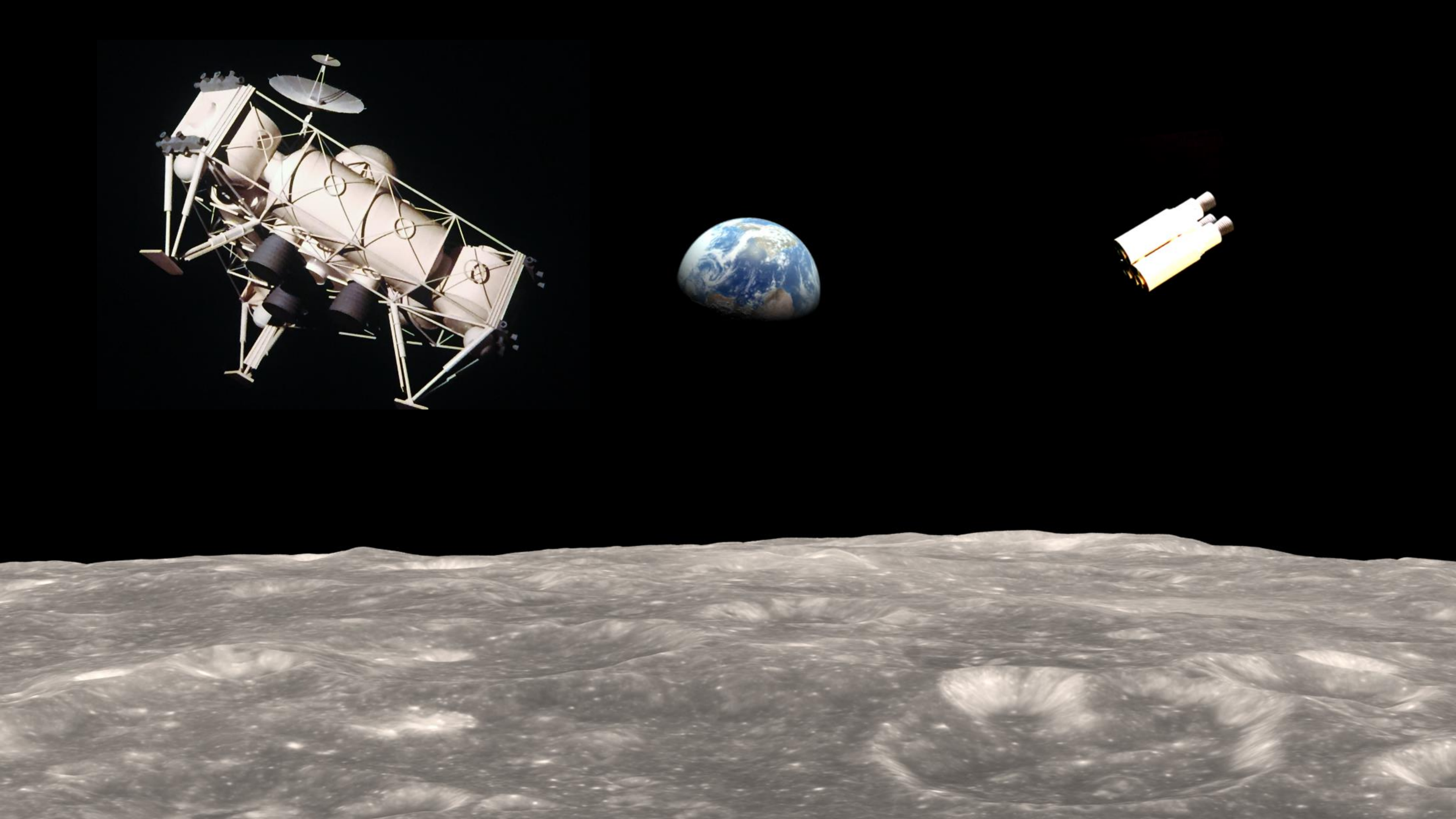
MALEO Lunar Deorbit & Landing



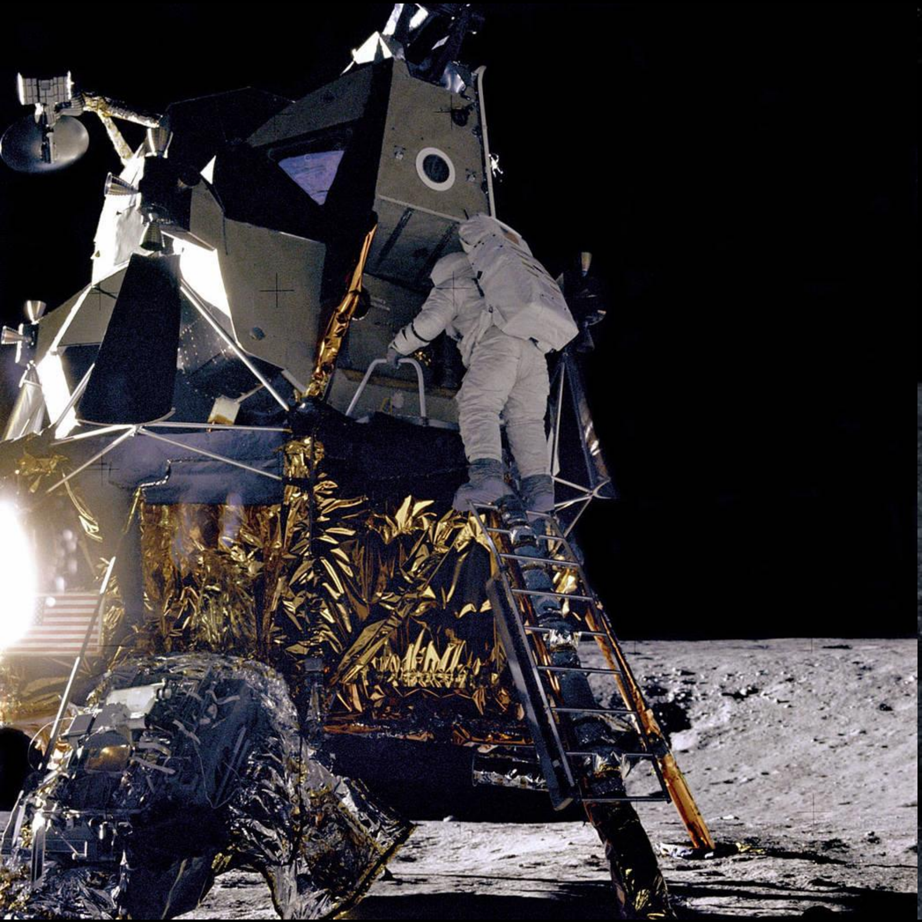
MALEO Site Office Touchdown

Commercial MALEO - 2012

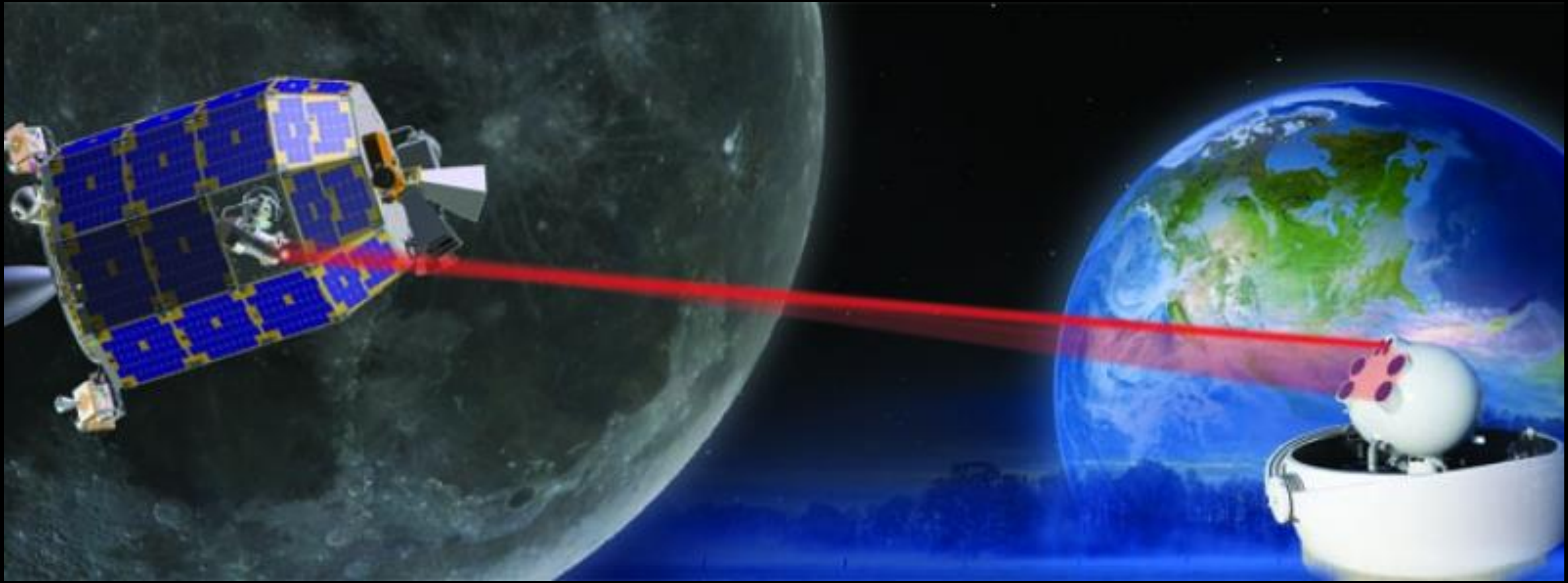
MALEO:Modular Assembly in Low Earth Orbit, Coke Nation Corpora Lunar Lander   Artwork by Chloe Saras Thangavelu 2012



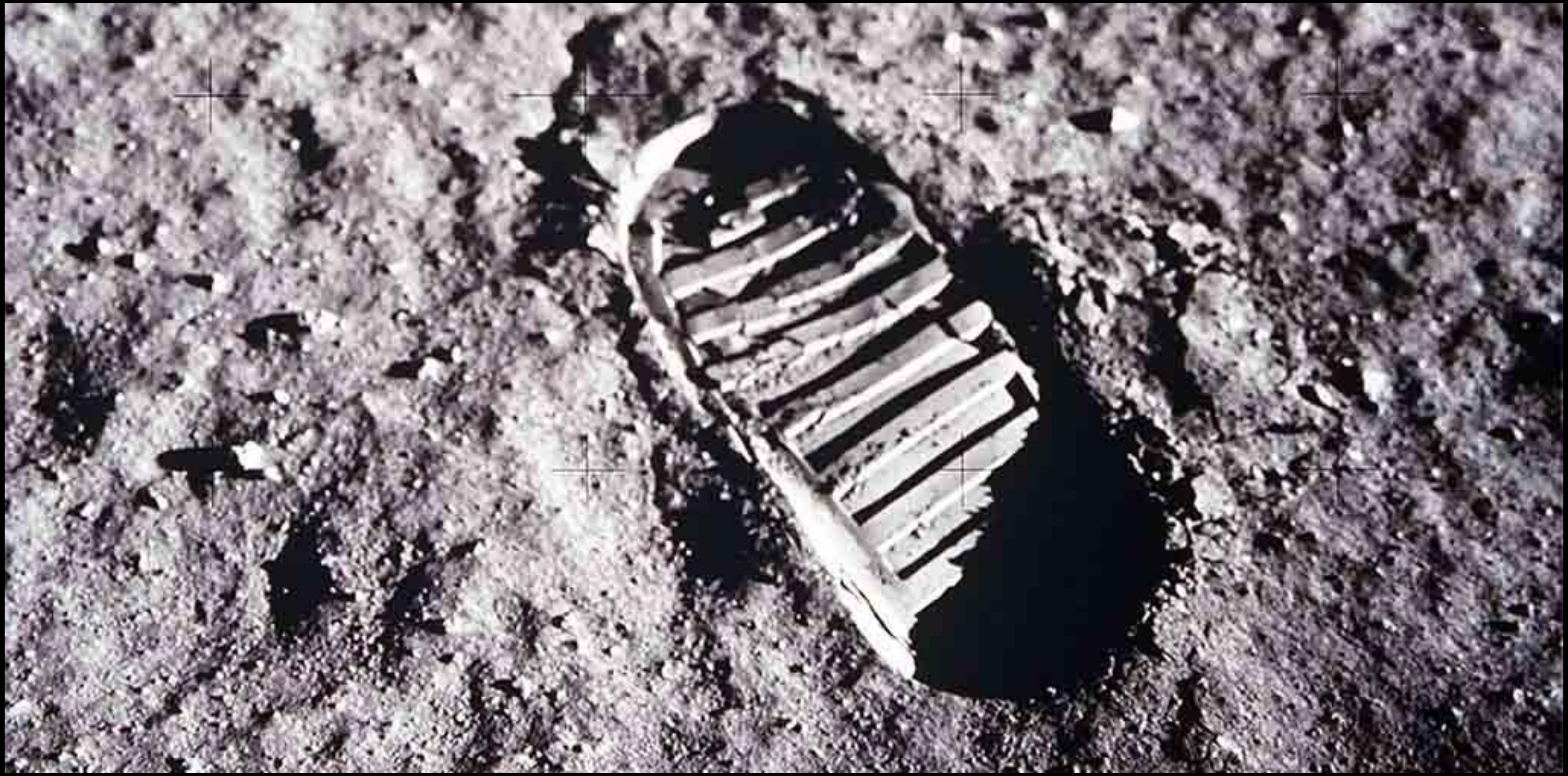
Mission 2022: Land a Woman and a Man in The Sea of Tranquility near Apollo 11 Site(carefully !)



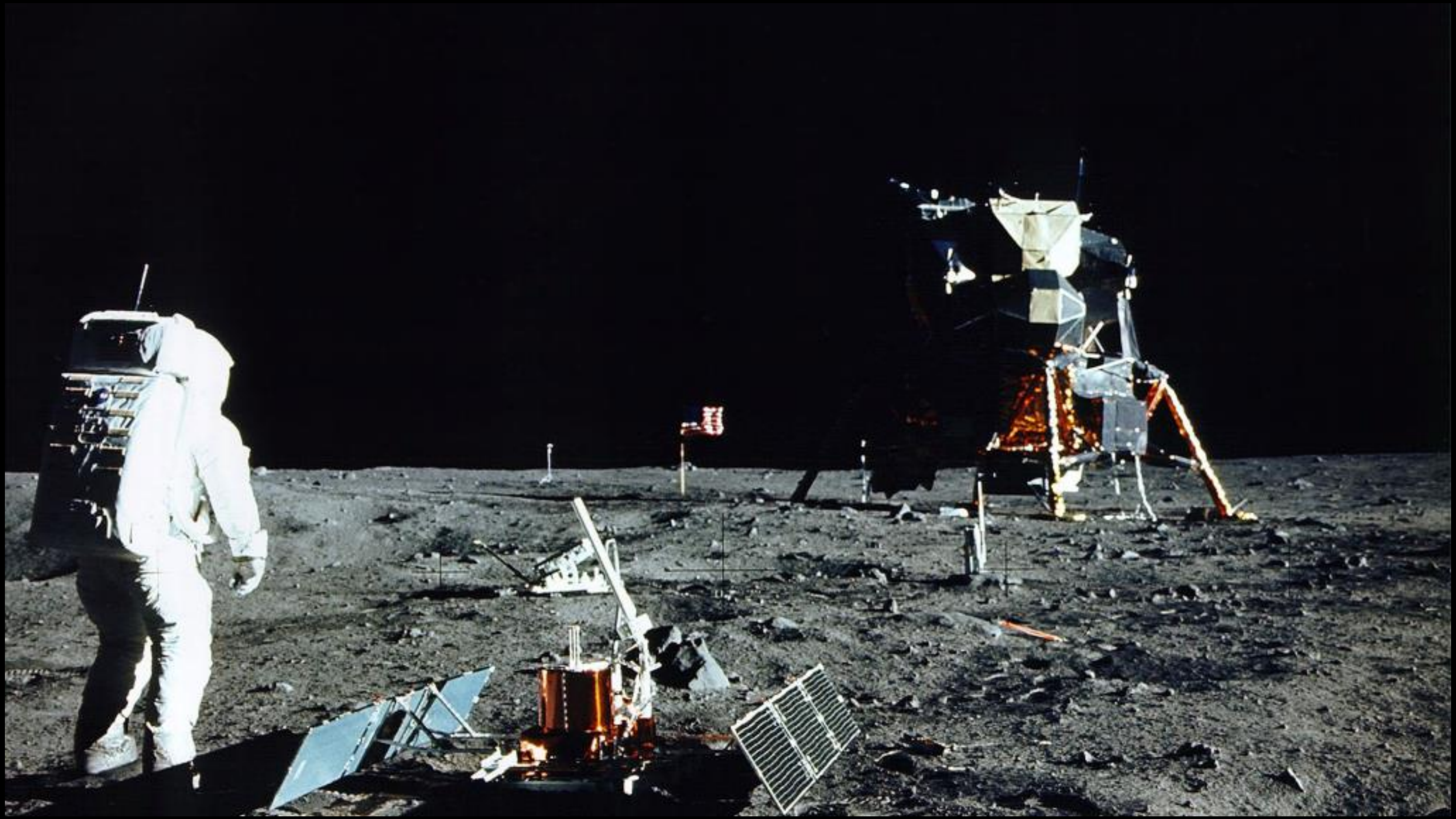
Direct Earth-Moon Laser Communication Link



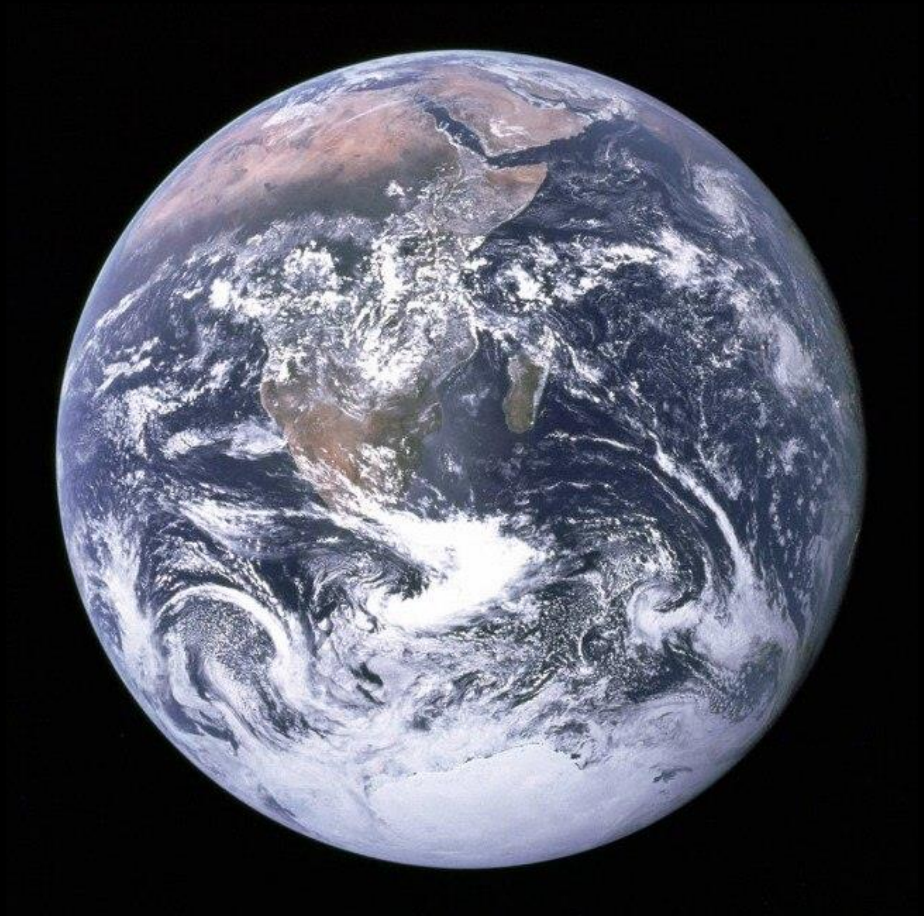
Mission2022: Observe and Stabilize the First Human Footprints and Make Hi-Res Holographic Copies



Mission2022: Observe and Record Apollo 11 Descent Stage & Exposed Payload State – Environmental Effects

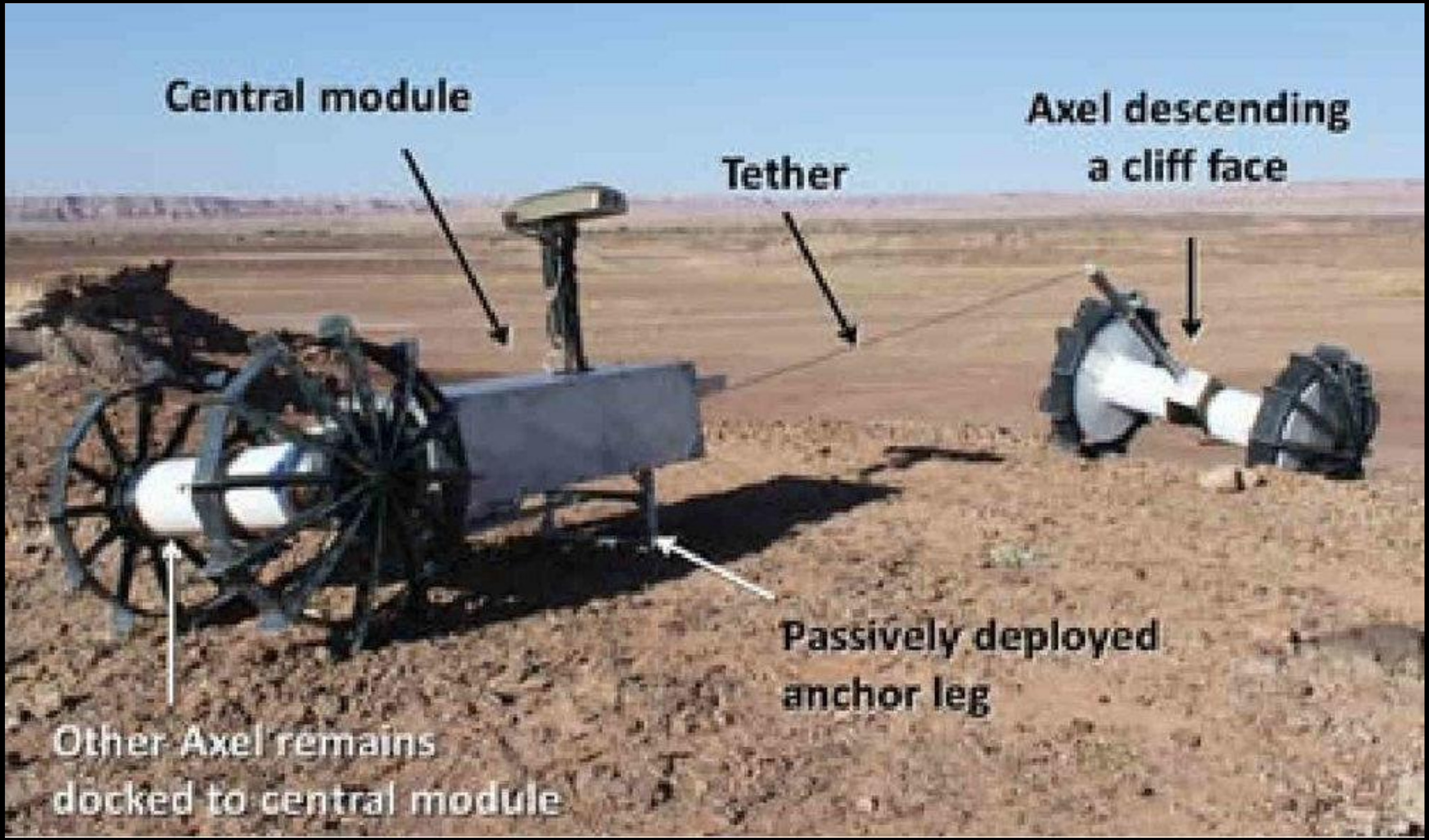


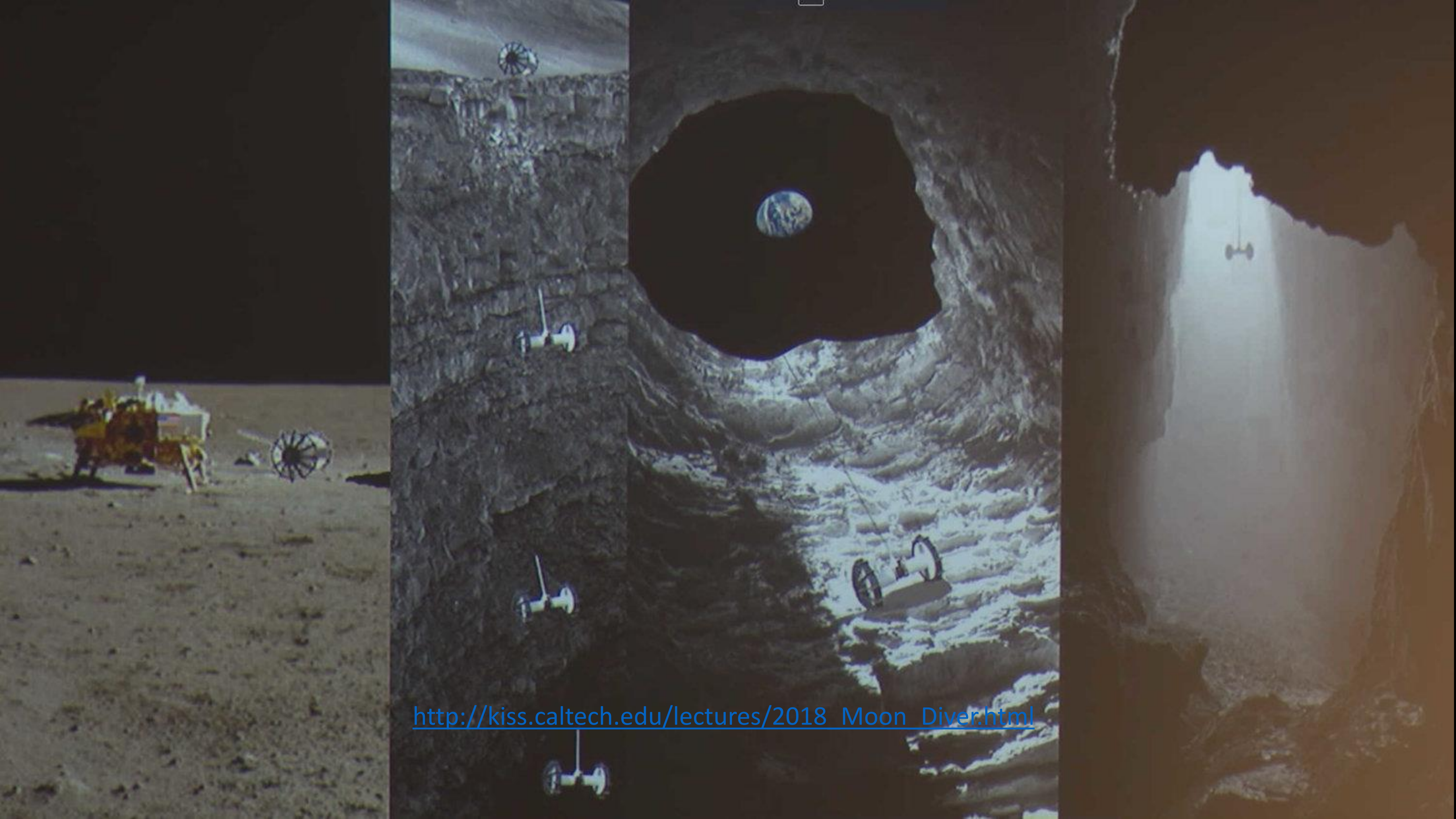
Deploy Telescopes, High Resolution Cameras for Apollo 11 Site and Earth Observation – Selene Eyes



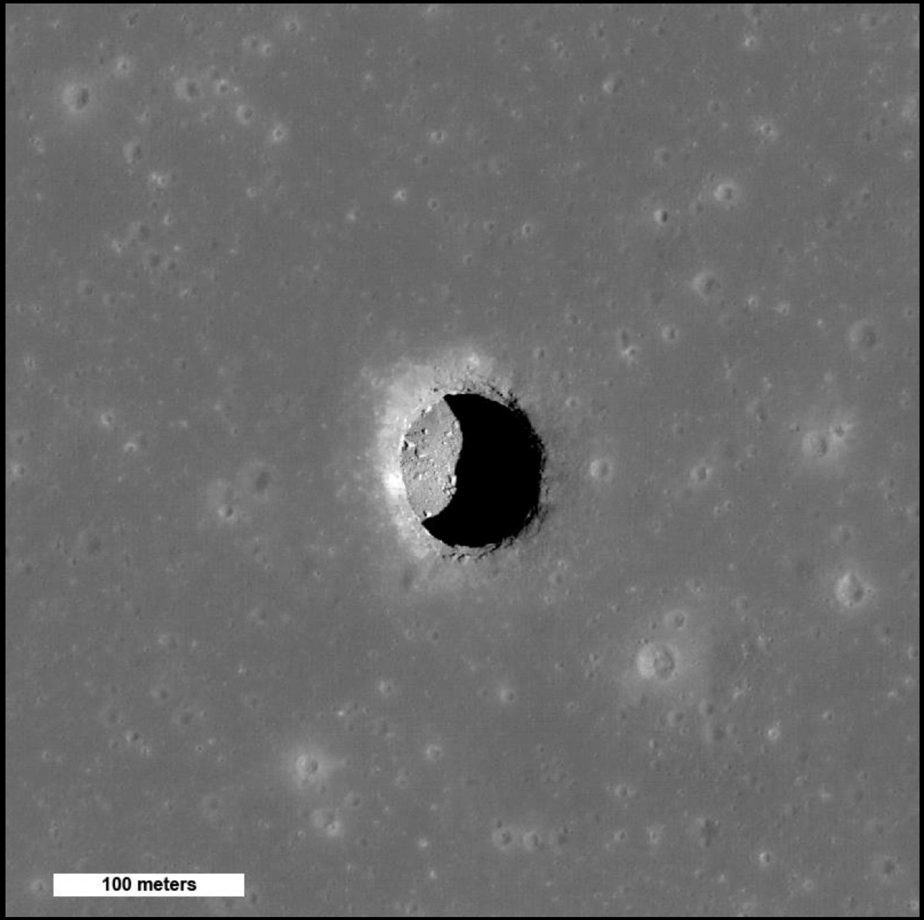
Deploy MSL-Class Telerobotic Rovers adapted for Moon and operate them from Lunar Lander Cabin

Piggyback Tethered Lava Tube Exploration System

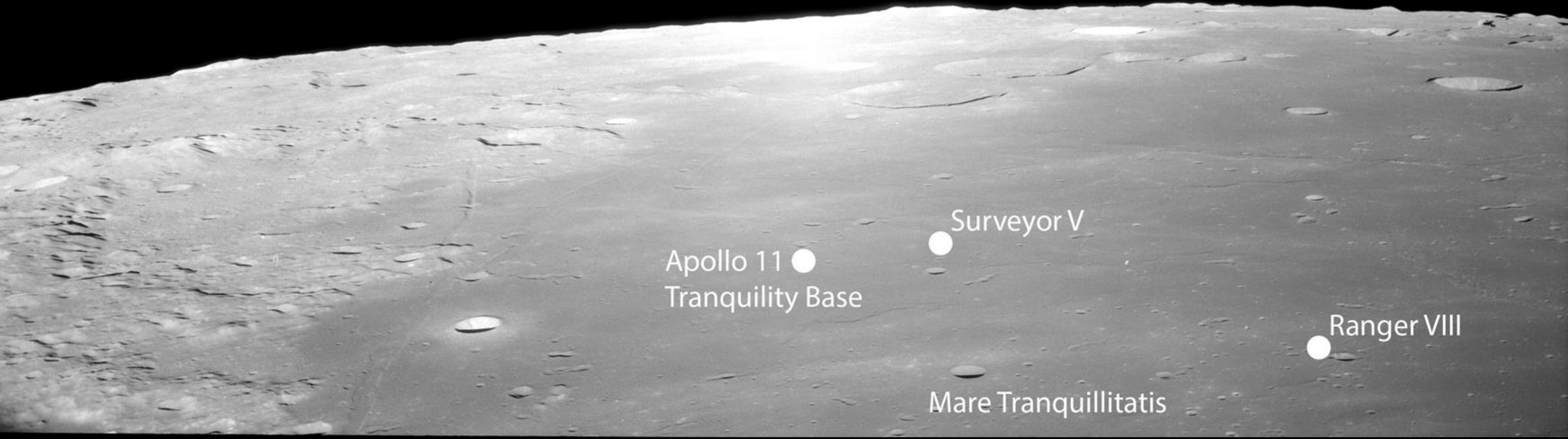



http://kiss.caltech.edu/lectures/2018_Moon_Diver.html

Mission2022: Astronaut-Assisted Telerobotic Exploration of Mare Tranquillitatis Pits



Mare Tranquillitatis



Return the Crew Safely back to Earth


NASA

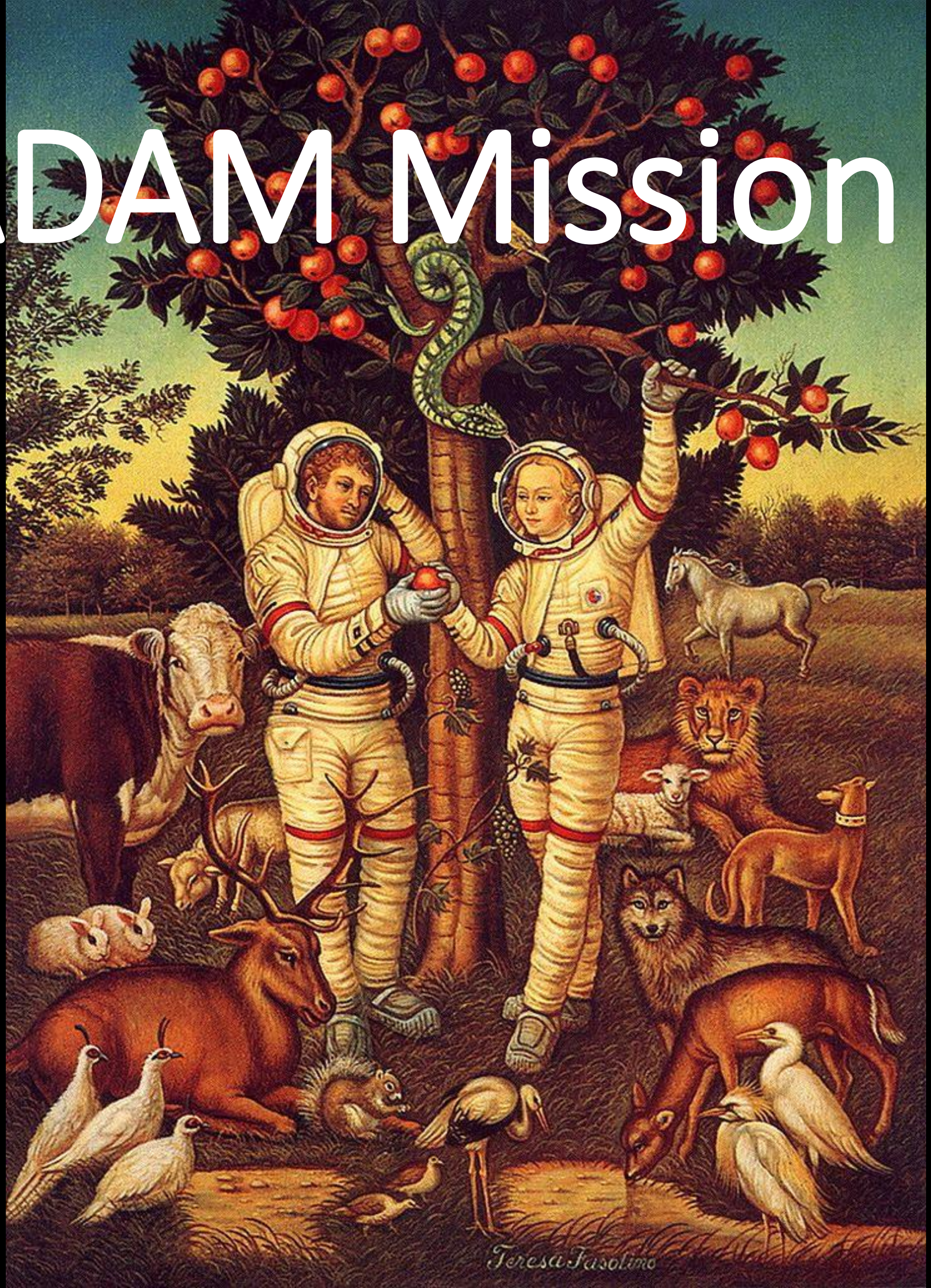

NASA

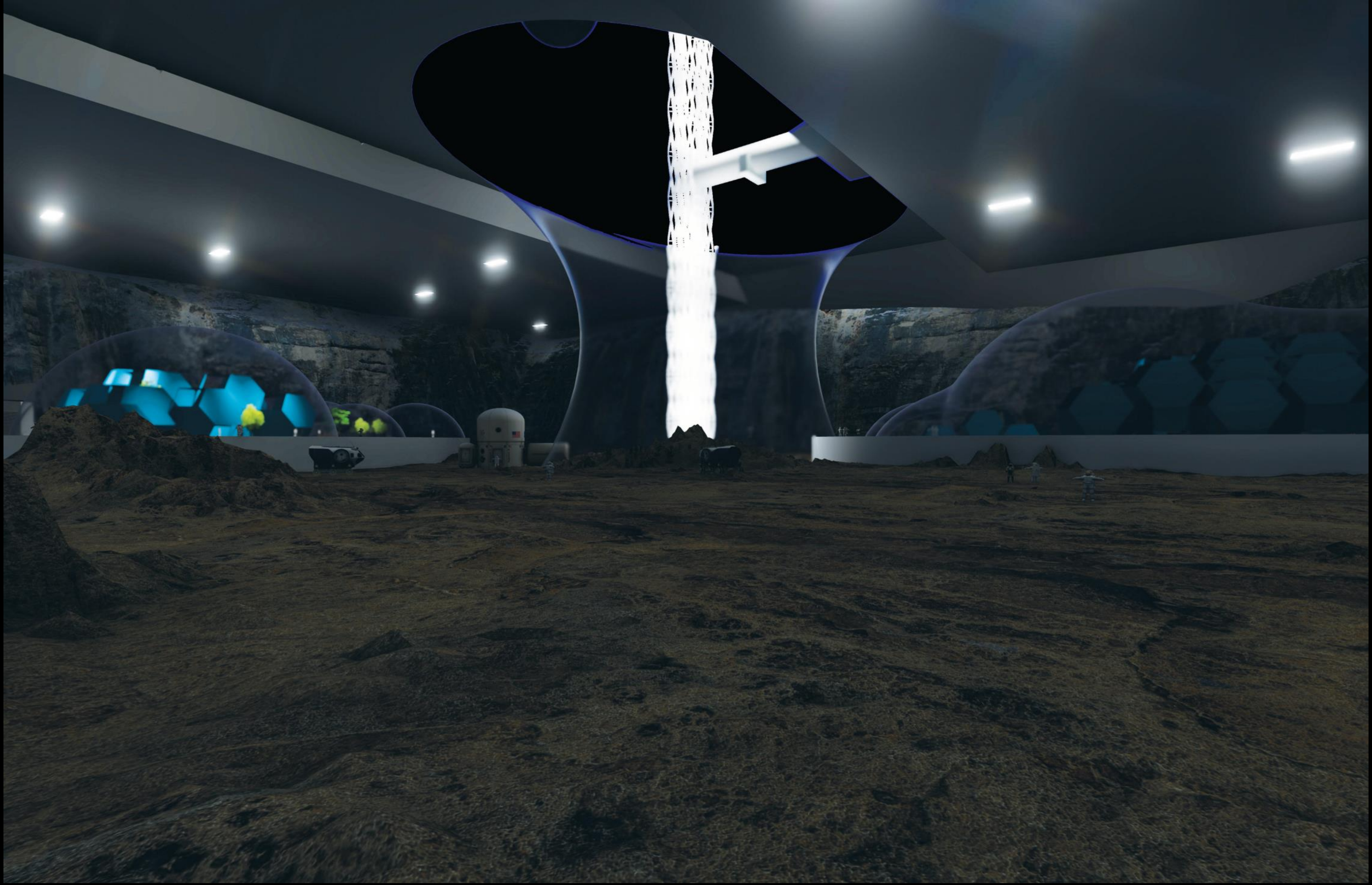
Who might the lucky couple be

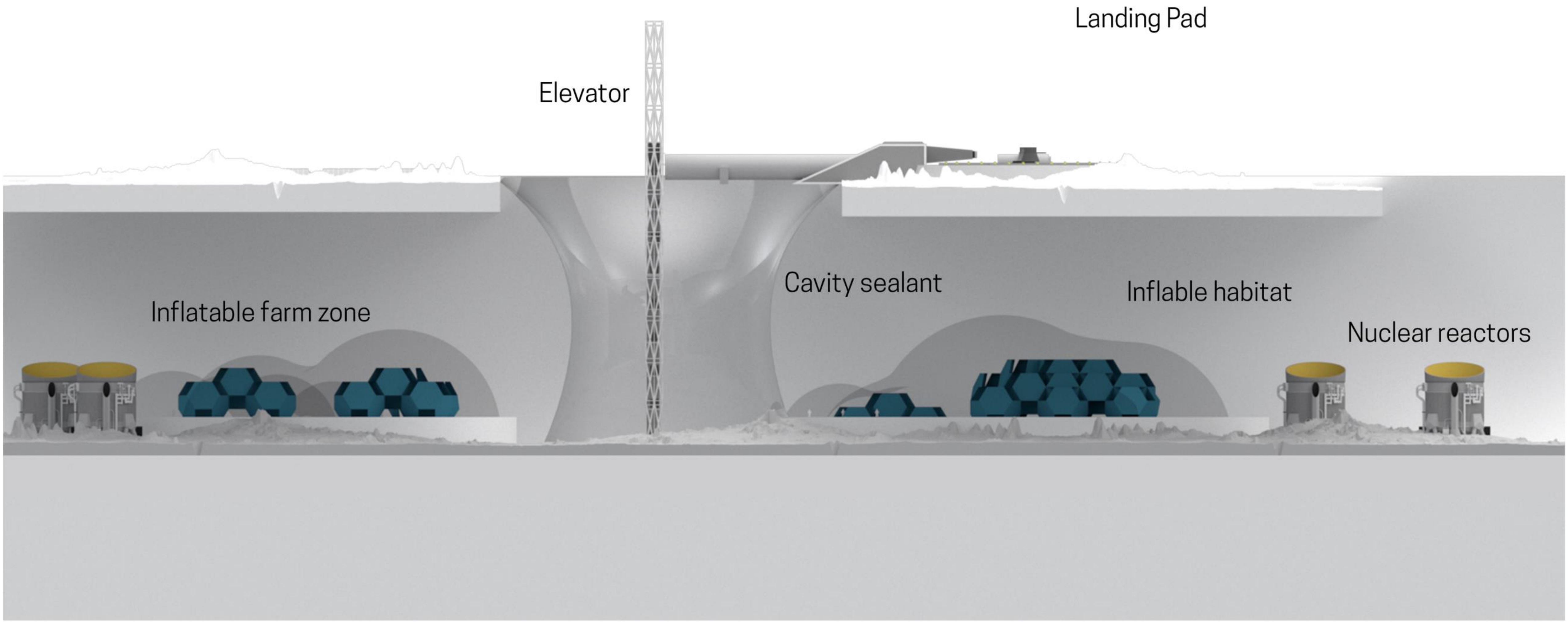
$$$? $$$

- Active Astronauts
- https://www.nasa.gov/astronauts/biographies/active

EVE & ADAM Mission 2022






Landing Pad
Elevator
Cavity sealant
Inflable habitat
Inflatable farm zone
Nuclear reactors

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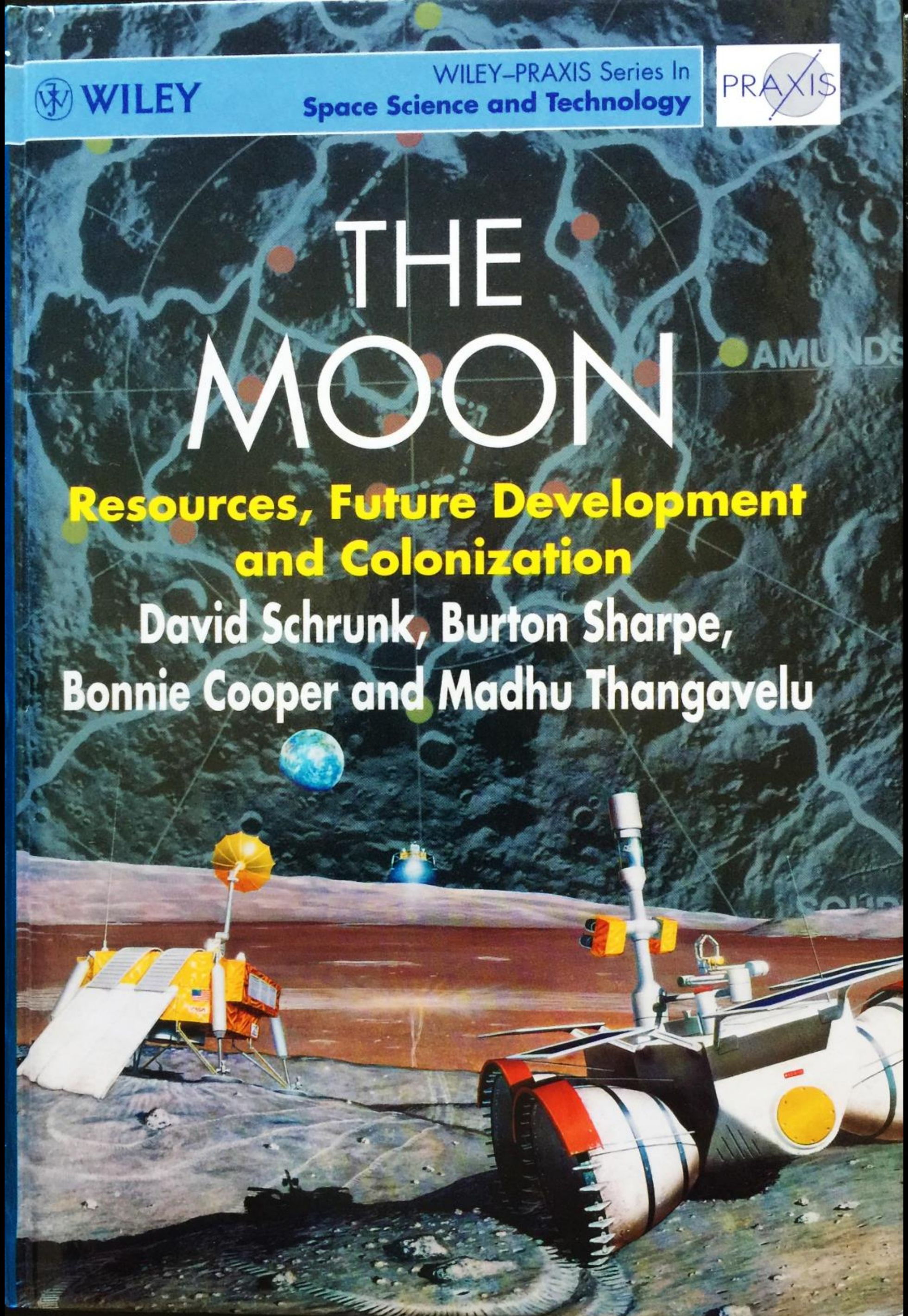
Google: ASTE527

Thank you

Google : Planet Moon Madhu Ultimate Vacation

- https://www.youtube.com/watch?v=L1wgKVZVp-o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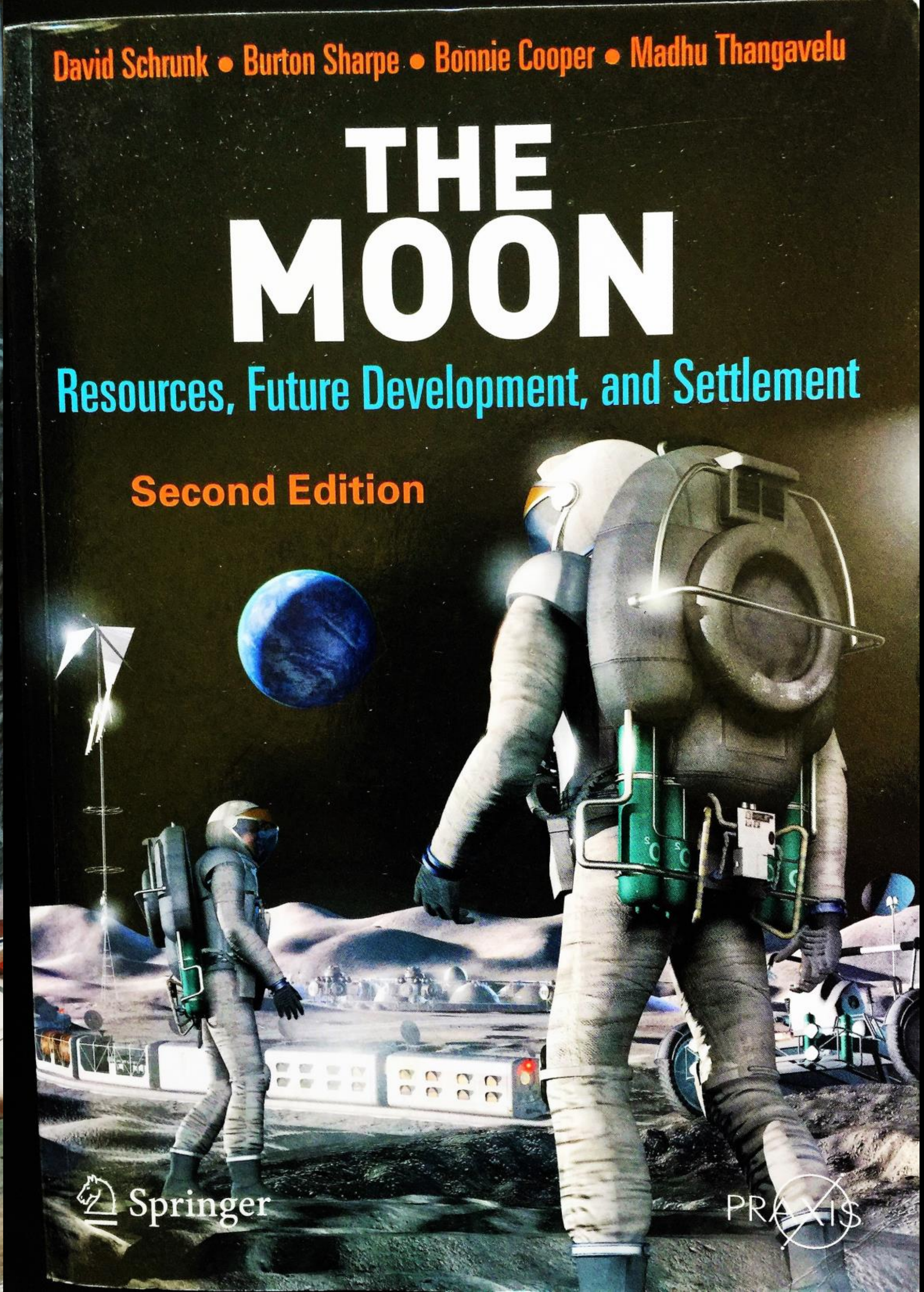
PRAXIS
THE MOON
Resources, Future Development and Colonization
David Schrunk, Burton Sharpe, Bonnie Cooper and Madhu Thangavelu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