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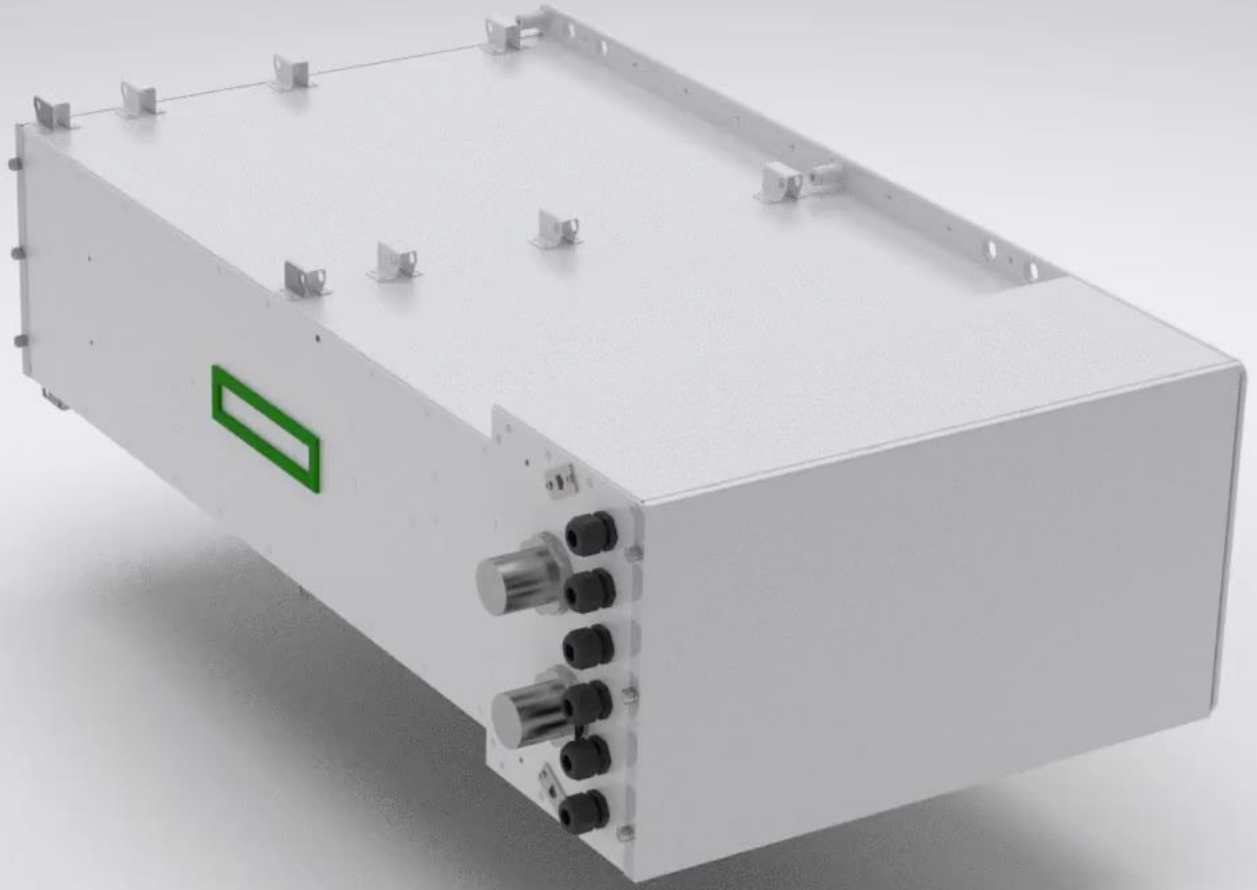
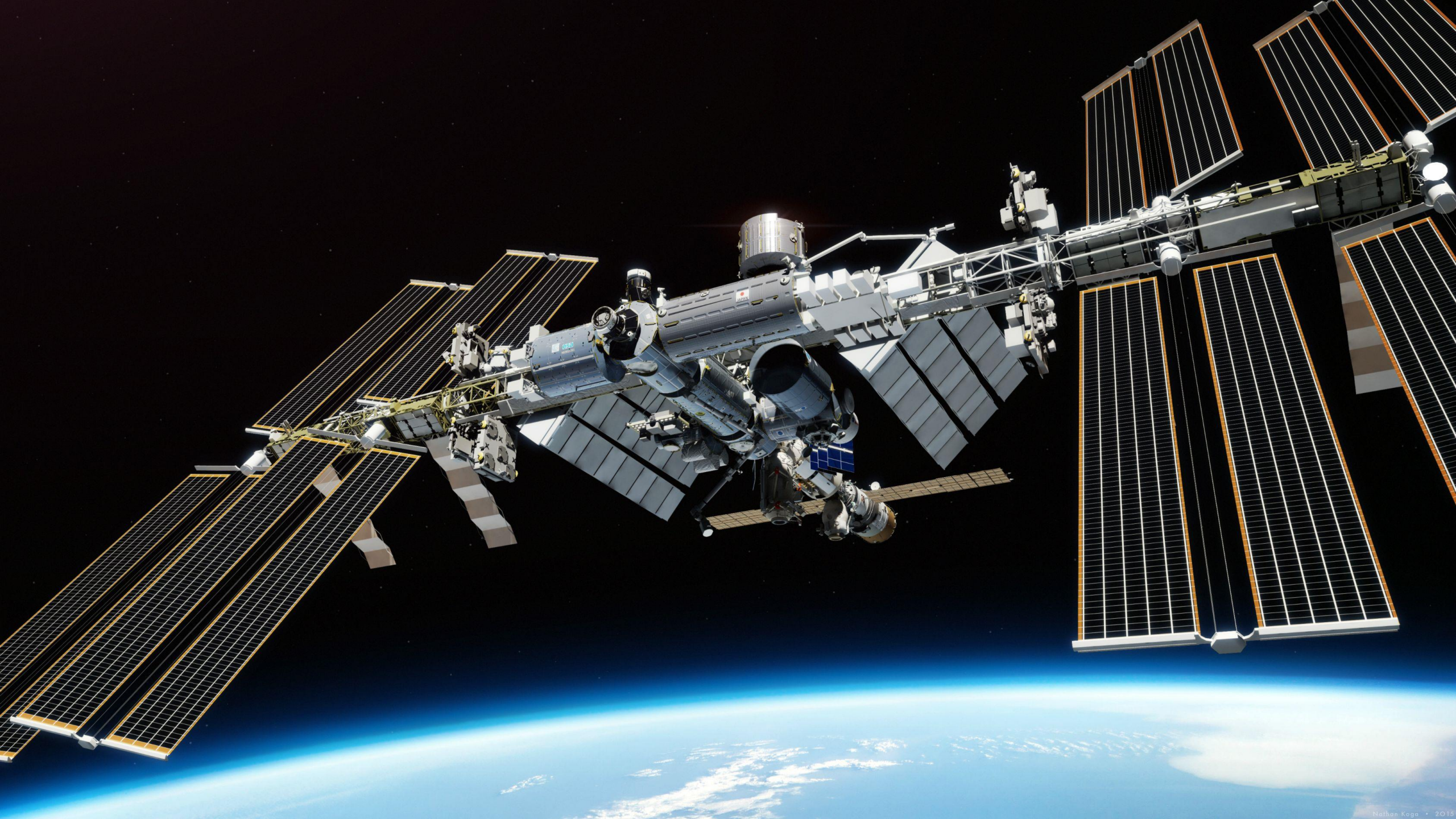
The issues of deep space comms, how you can use AI and computers to help overcome the latency OR Spaceborne – a journey into the unknown

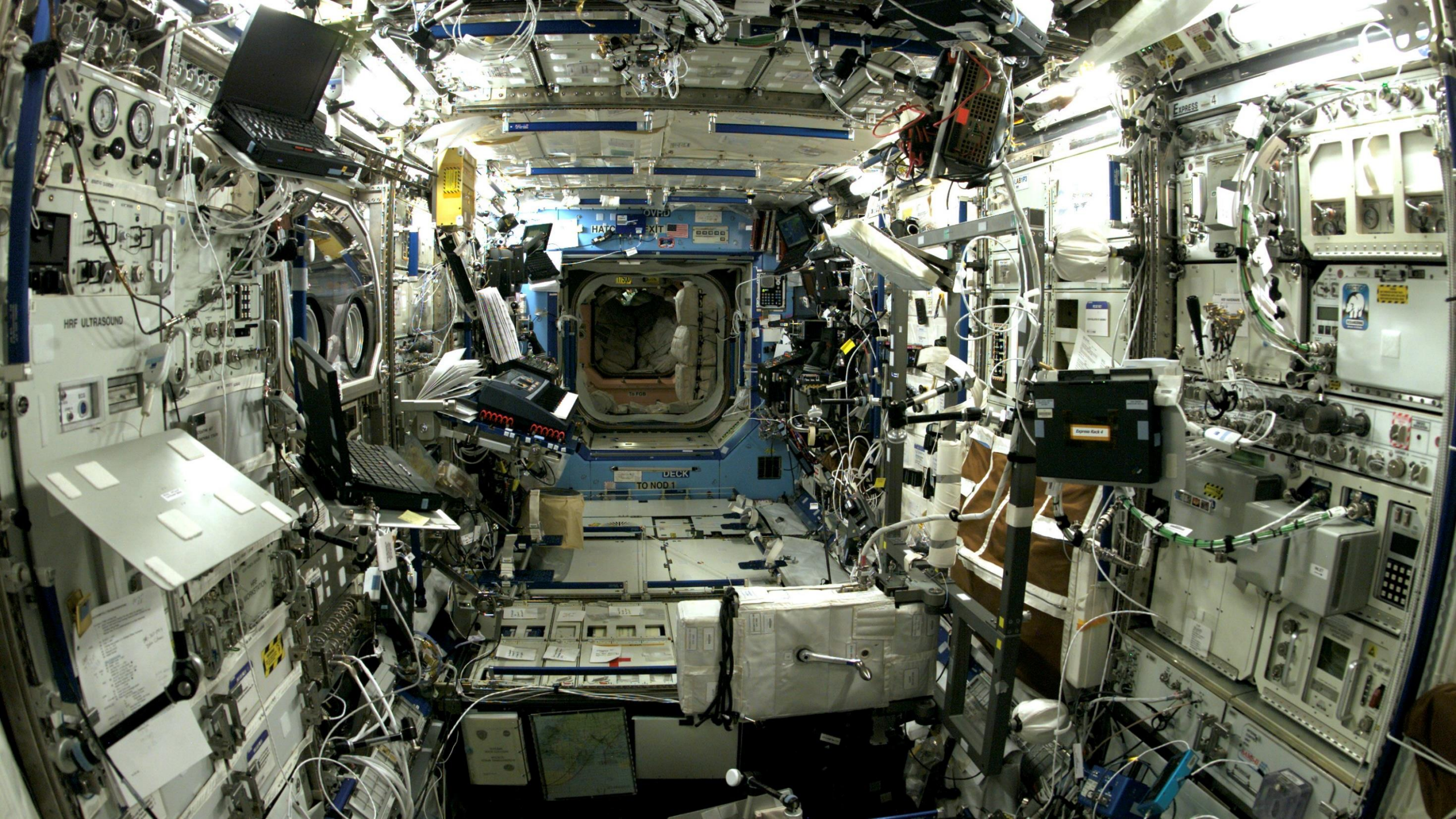
Jeremy Bright – HPE Chief Technologist
Slides authored by Dr Ben Bennett
Director, HPC Strategy

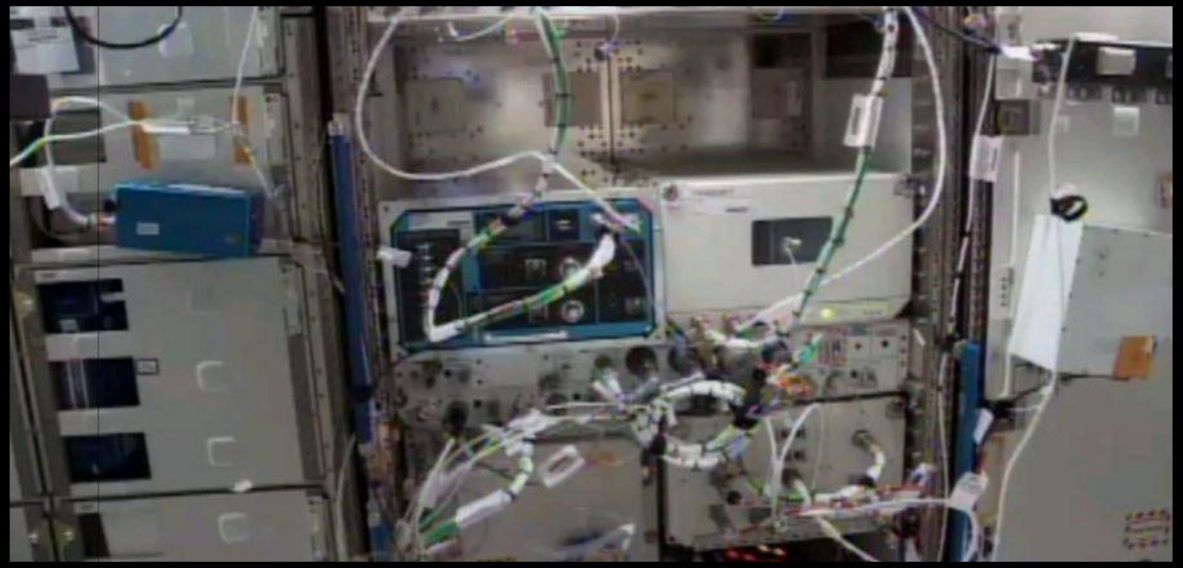
18th September 2019


T- 00:00:12
UPCOMING
LIFTOFF
STARTUP
THE FALCON 9 FLIGHT COMPUTERS HAVE TAKEN CONTROL OF THE COUNTDOWN
LAUNCH: CRS-12
STARTUP
LIFTOFF
MAX-Q
MAIN ENGINE CUTOFF
STAGE 1 BOOSTBACK
STAGE 1 ENTRY BURN
STAGE 1 LANDING
SECOND STAGE ENGINE CUTOFF
DRAGON DEPLOY
ARRAY DEPLOY
SPACEX

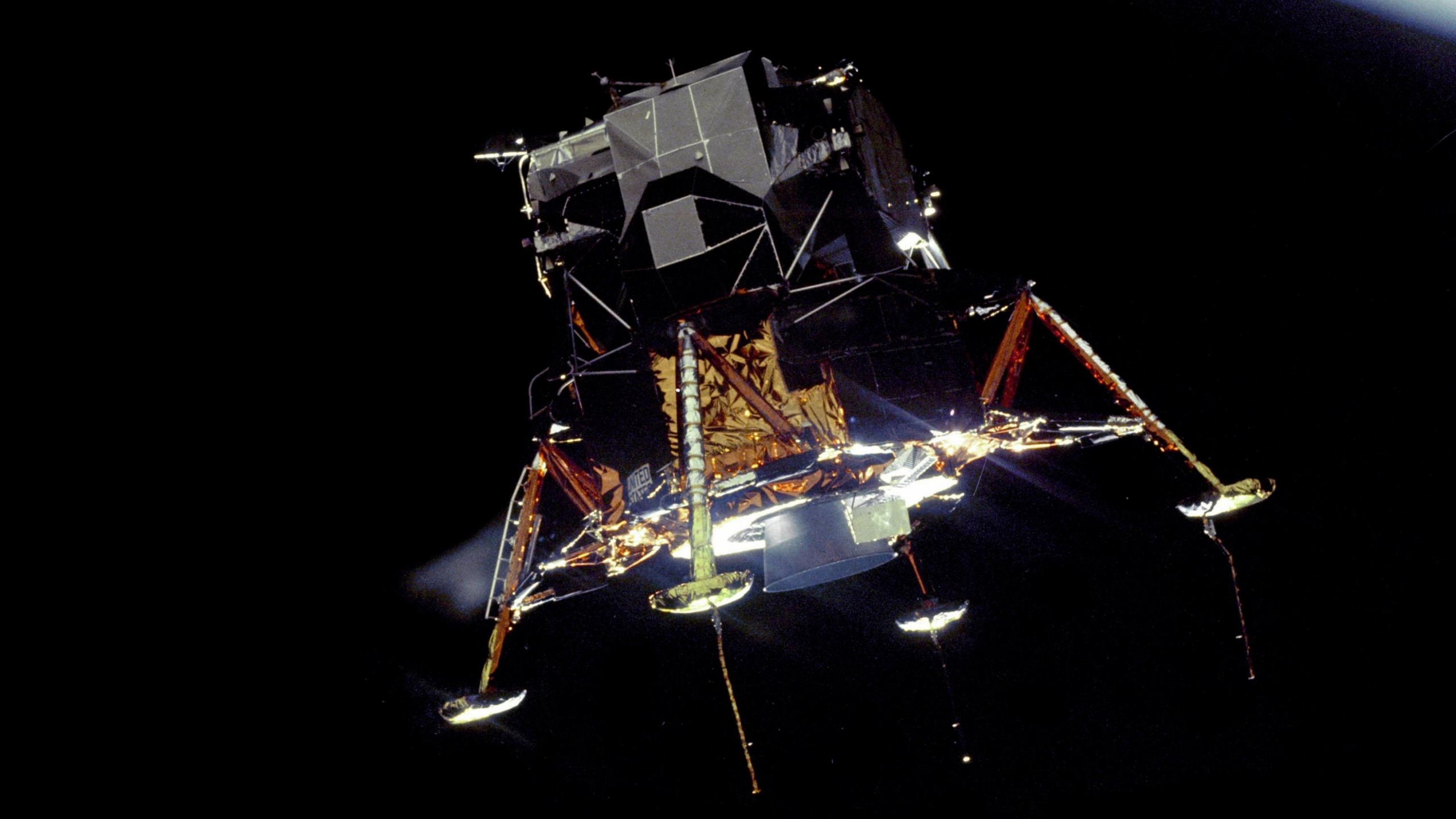


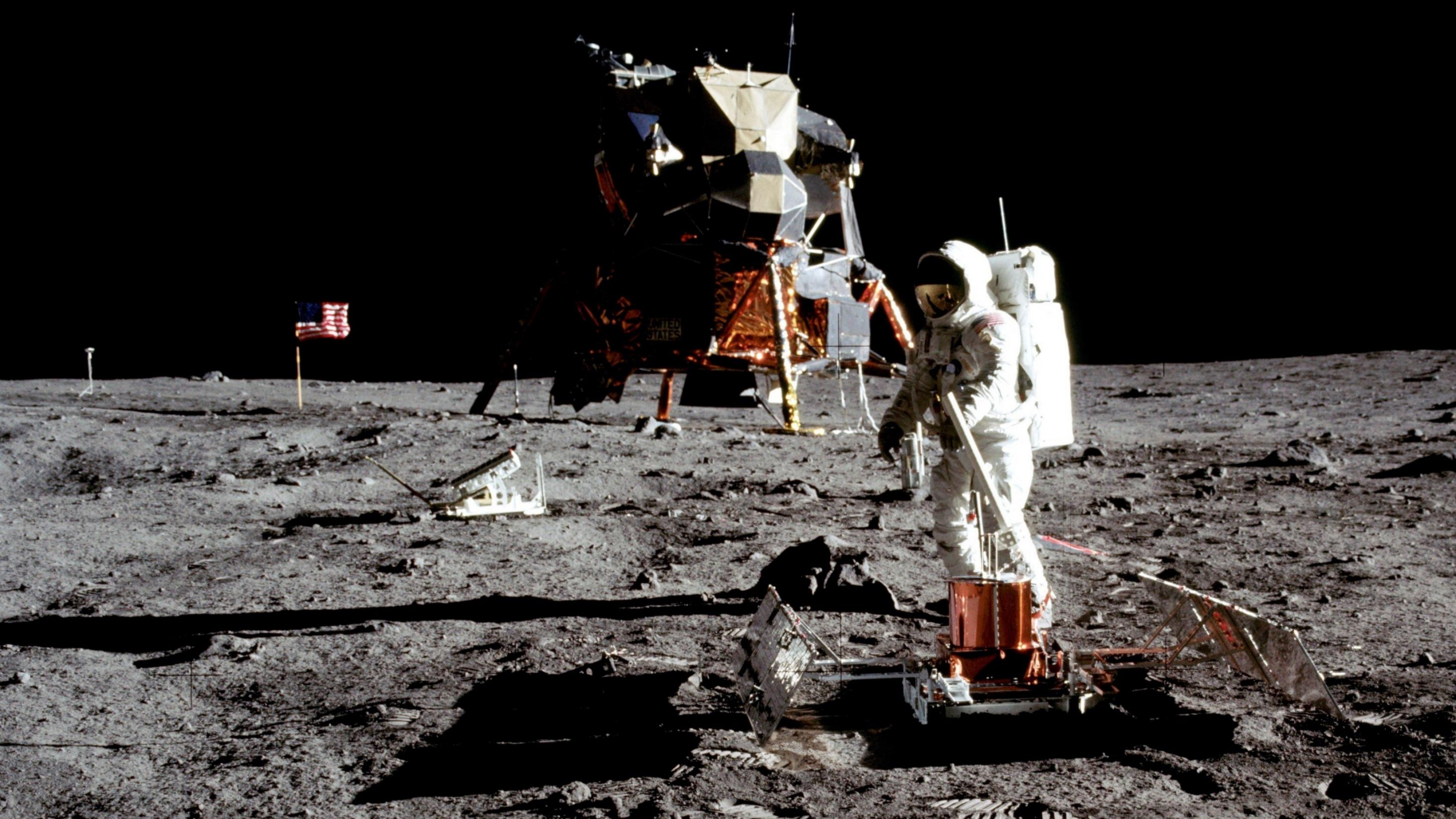

JAPAN
Nathan Koga • 2015


HRF ULTRASOUND
EXPRESS 4
DECK
TO NOD 1



The obvious question is why?




UNITED
STATES

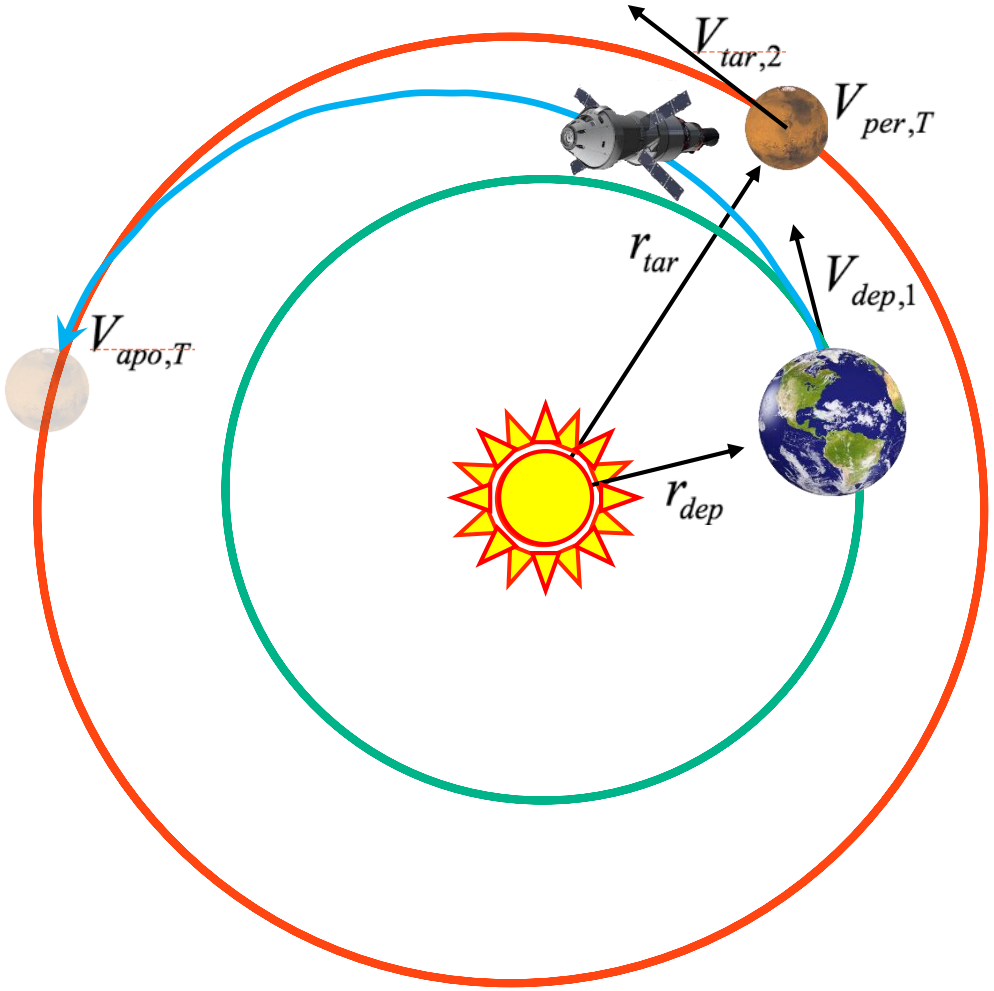
The Hohmann transfer - or how to get from Planet A to Planet B

$$a_T = \frac{1}{2}(r_{dep} + r_{tar})$$

$$V_{\infty,1} = V_{per,T} - V_{dep,1} = \sqrt{\mu_{Sun}\left(\frac{2}{r_{dep}} - \frac{1}{a_T}\right)} - \sqrt{\frac{\mu_{Sun}}{r_{dep}}}$$

$$V_{\infty,2} = V_{tar,2} - V_{apo,T} = \sqrt{\frac{\mu_{Sun}}{r_{tar}}} - \sqrt{\mu_{Sun}\left(\frac{2}{r_{tar}} - \frac{1}{a_T}\right)}$$

$$T_{transfer} = \frac{1}{2}T_T = \pi\sqrt{\frac{a_T^3}{\mu_{Sun}}}$$



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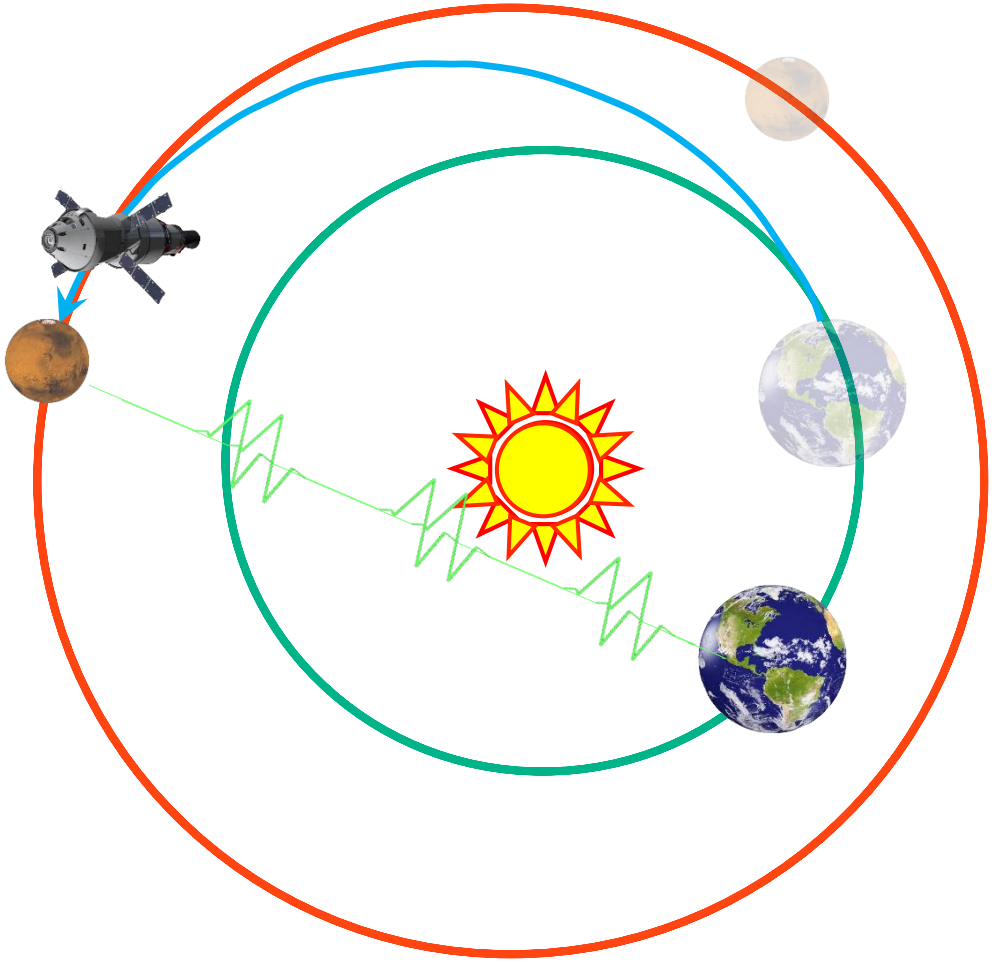
The Hohmann transfer - or how to get from Planet A to Planet B

- and why timing matters

Closest possible approach:
182 seconds, or 3.03 minutes

Closest recorded approach:
187 seconds, or 3.11 minutes
Farthest approach:
1,342 seconds, or 22.4 minutes



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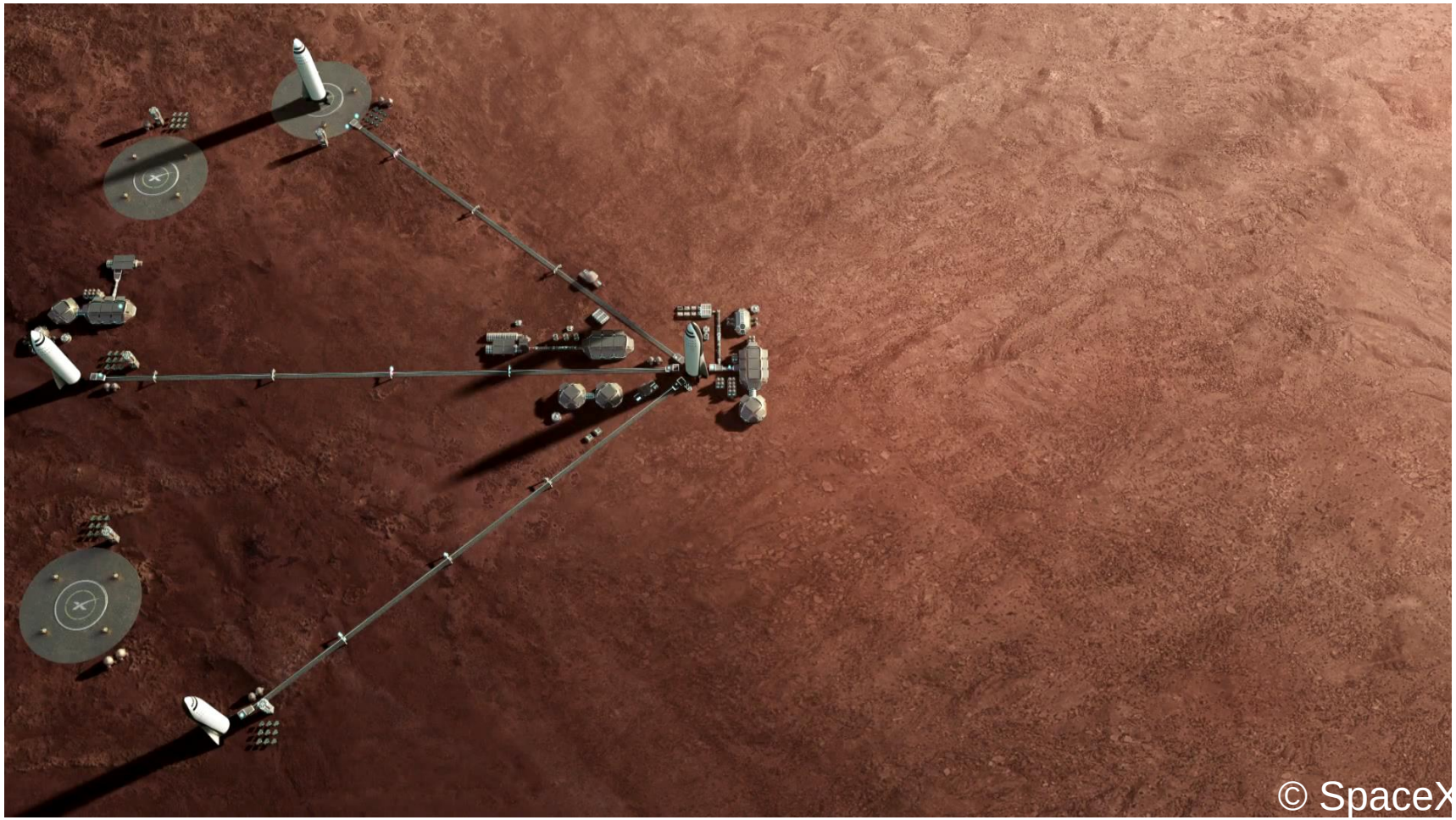
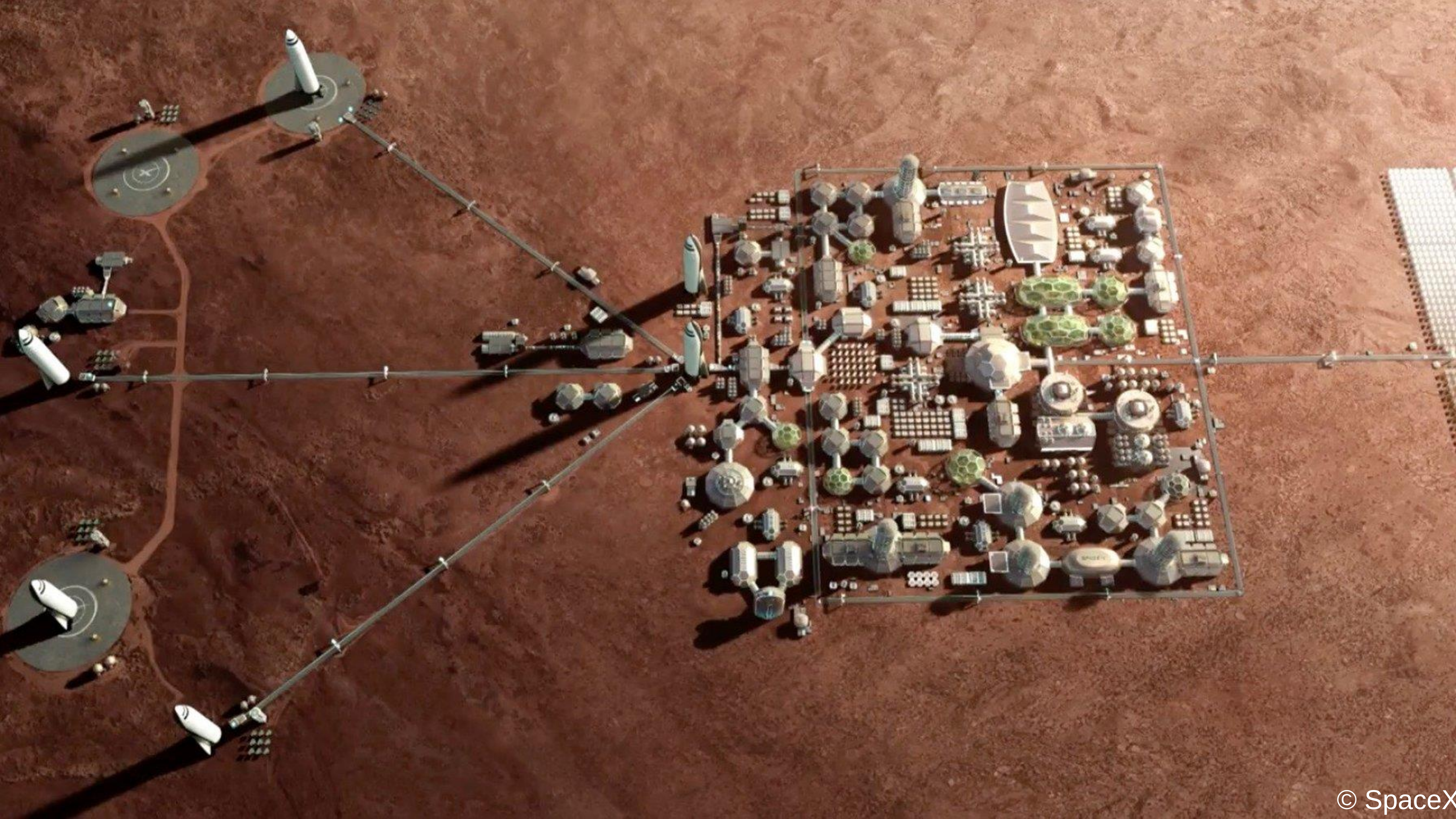
Apollo 17 was not just the end of an era, but the start of one.

We take learnings on Earth…

Learnings on Mars...

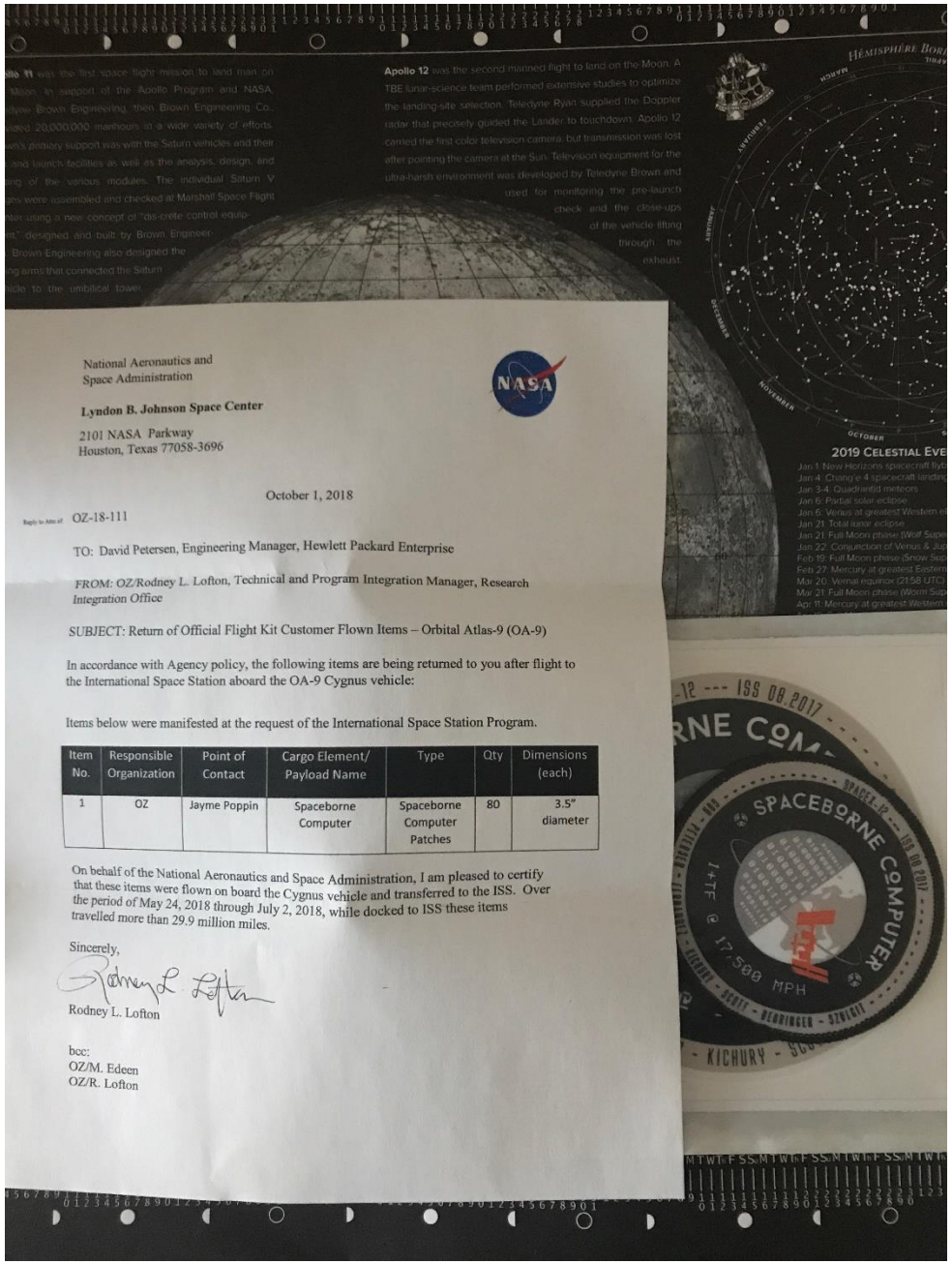
By 2030





Apply learnings on Earth...

And finally……



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center

2101 NASA Parkway
Houston, Texas 77058-3696

October 1, 2018

Reply to Attn of: OZ-18-111

TO: David Petersen, Engineering Manager, Hewlett Packard Enterprise

FROM: OZ/Rodney L. Lofton, Technical and Program Integration Manager, Research Integration Office

SUBJECT: Return of Official Flight Kit Customer Flown Items – Orbital Atlas-9 (OA-9)

In accordance with Agency policy, the following items are being returned to you after flight to the International Space Station aboard the OA-9 Cygnus vehicle:

Items below were manifested at the request of the International Space Station Program.

Item No.	Responsible Organization	Point of Contact	Cargo Element/ Payload Name	Type	Qty	Dimensions (each)
1	OZ	Jayme Poppin	Spaceborne Computer	Spaceborne Computer Patches	80	3.5" diameter

On behalf of the National Aeronautics and Space Administration, I am pleased to certify that these items were flown on board the Cygnus vehicle and transferred to the ISS. Over the period of May 24, 2018 through July 2, 2018, while docked to ISS these items travelled more than 29.9 million miles.

Sincerely,

Rodney L. Lofton

Rodney L. Lofton

bcc:
OZ/M. Edeen
OZ/R. Lofton