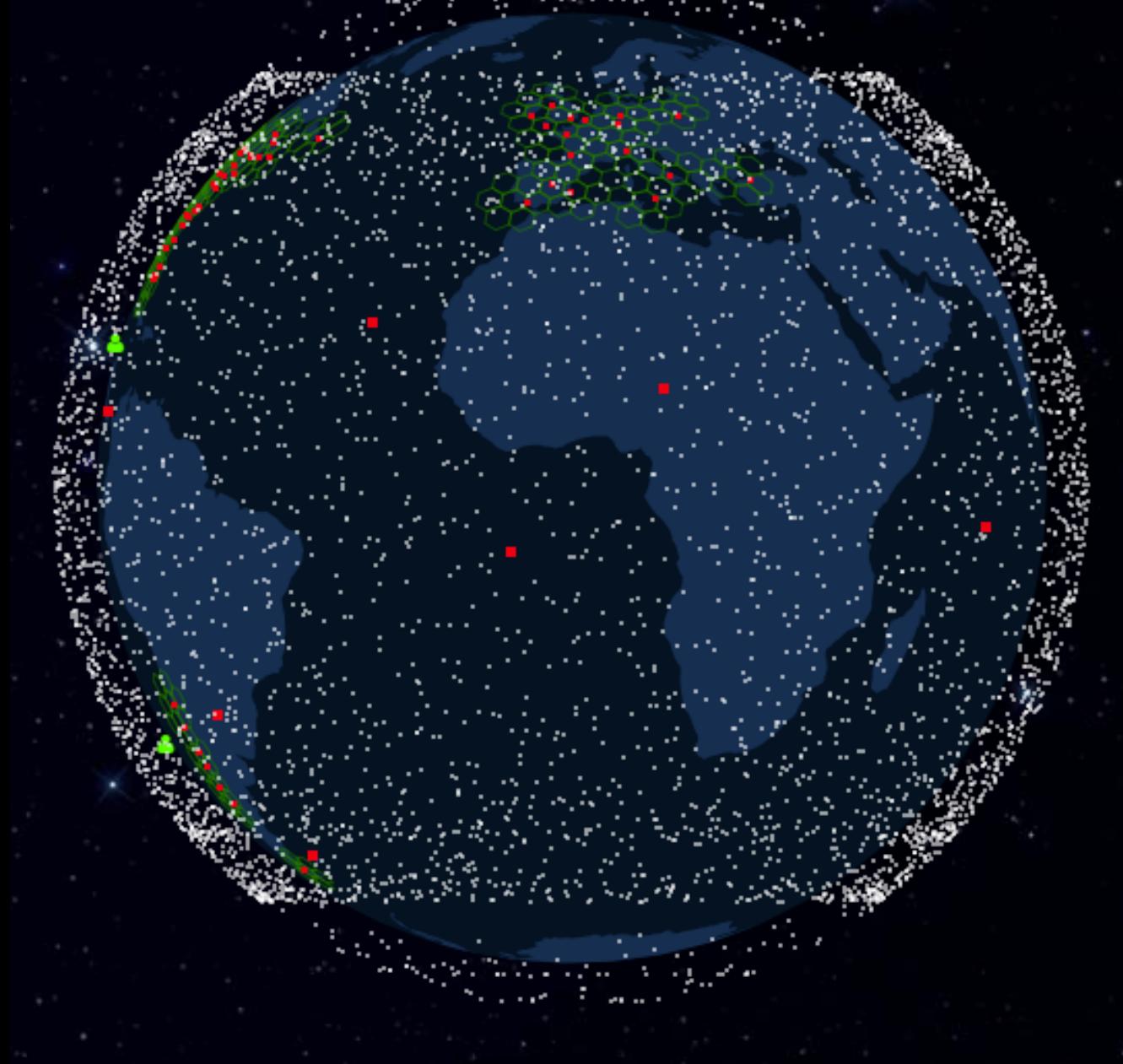
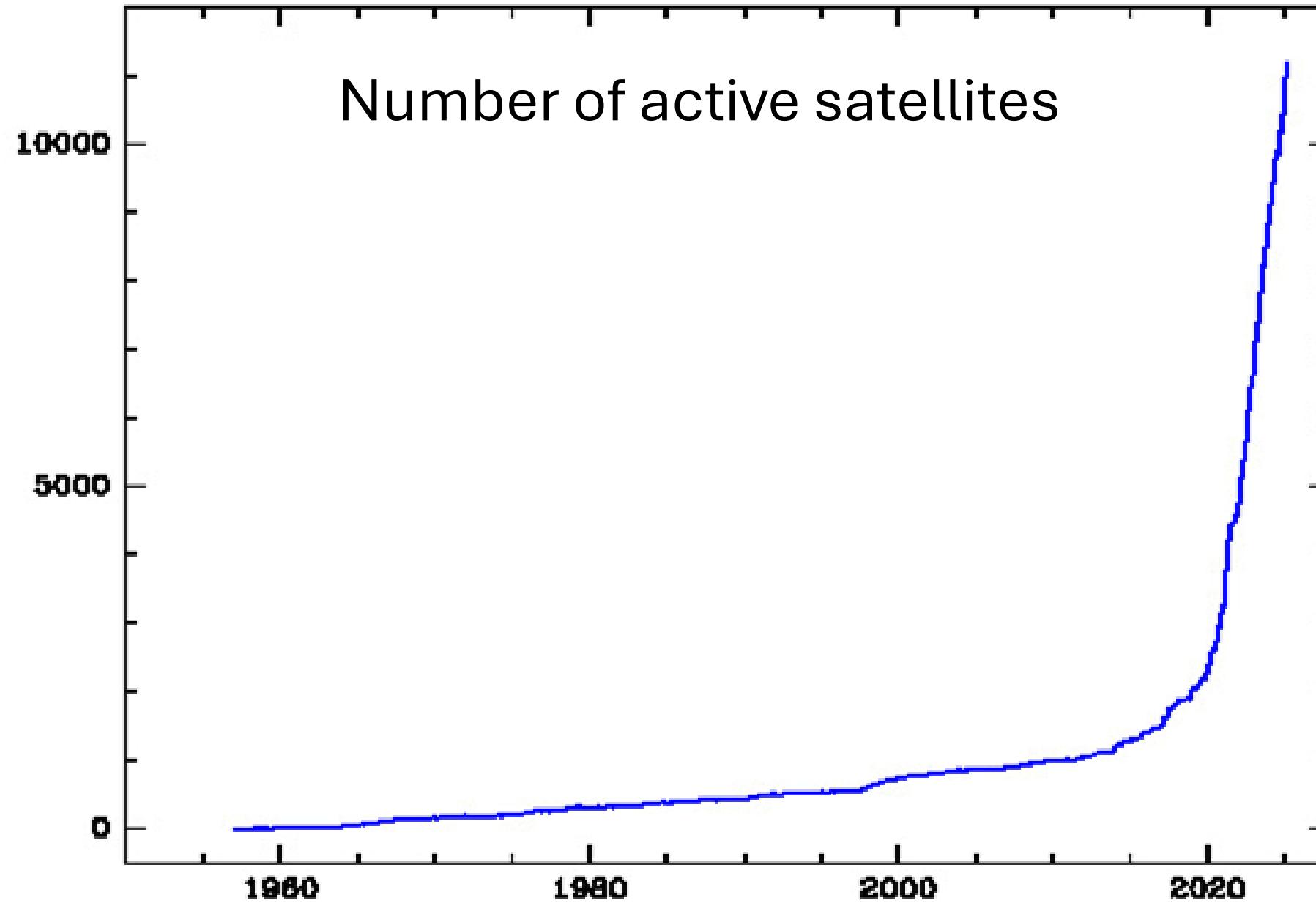


<https://satellitemap.space/>

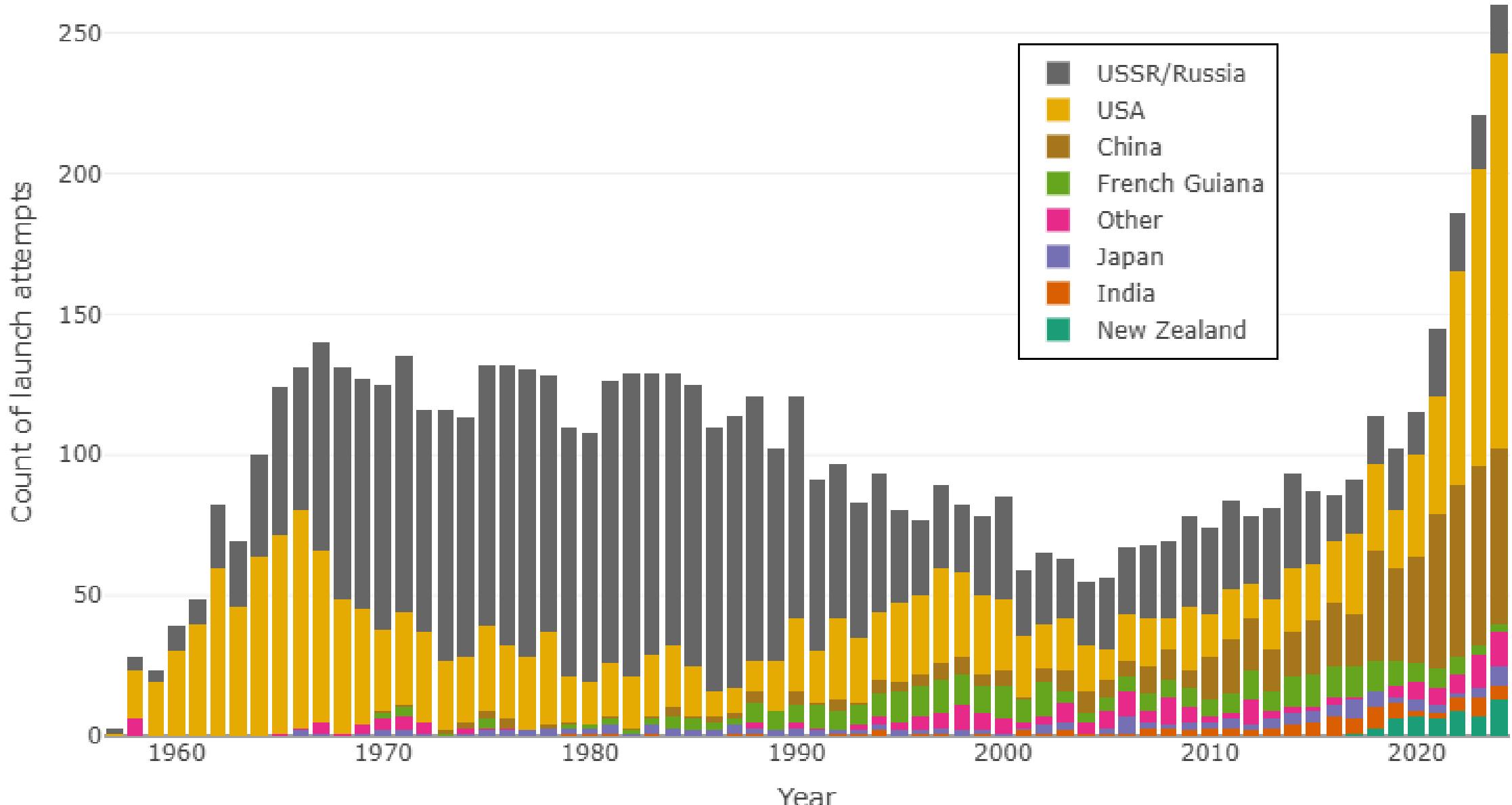




All Satellite Launches 1957-2024, by Launch Provider Type



All Orbital Rocket Launches 1957-2024, by Country of Launch Site



Analysing the trends

Space launch capabilities have become international and commercial

As a consequence, we are sending more stuff into space than ever before

What might be some pros and cons to this increased access to space?

From Sputnik to Starlink

A Brief History of
Putting Stuff in Space

Daniel Wrench
SPCE101
February 2025



A Nuclear Rivalry becomes a Race to Space





Let's go to the Moon
for knowledge and
peace!

Please, let's
beat the Soviets
at something

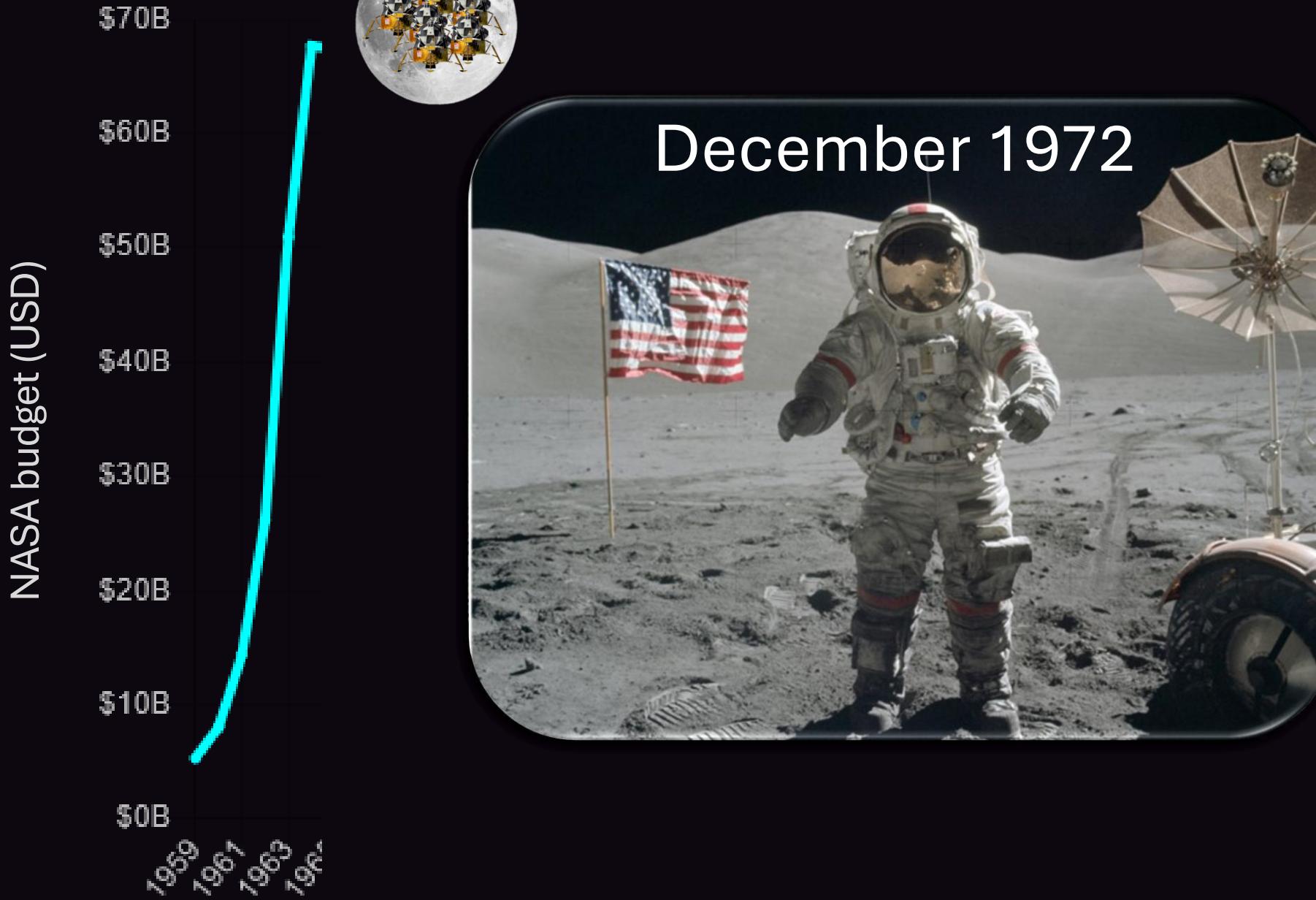
...
And do it before
the decade is out!



1962

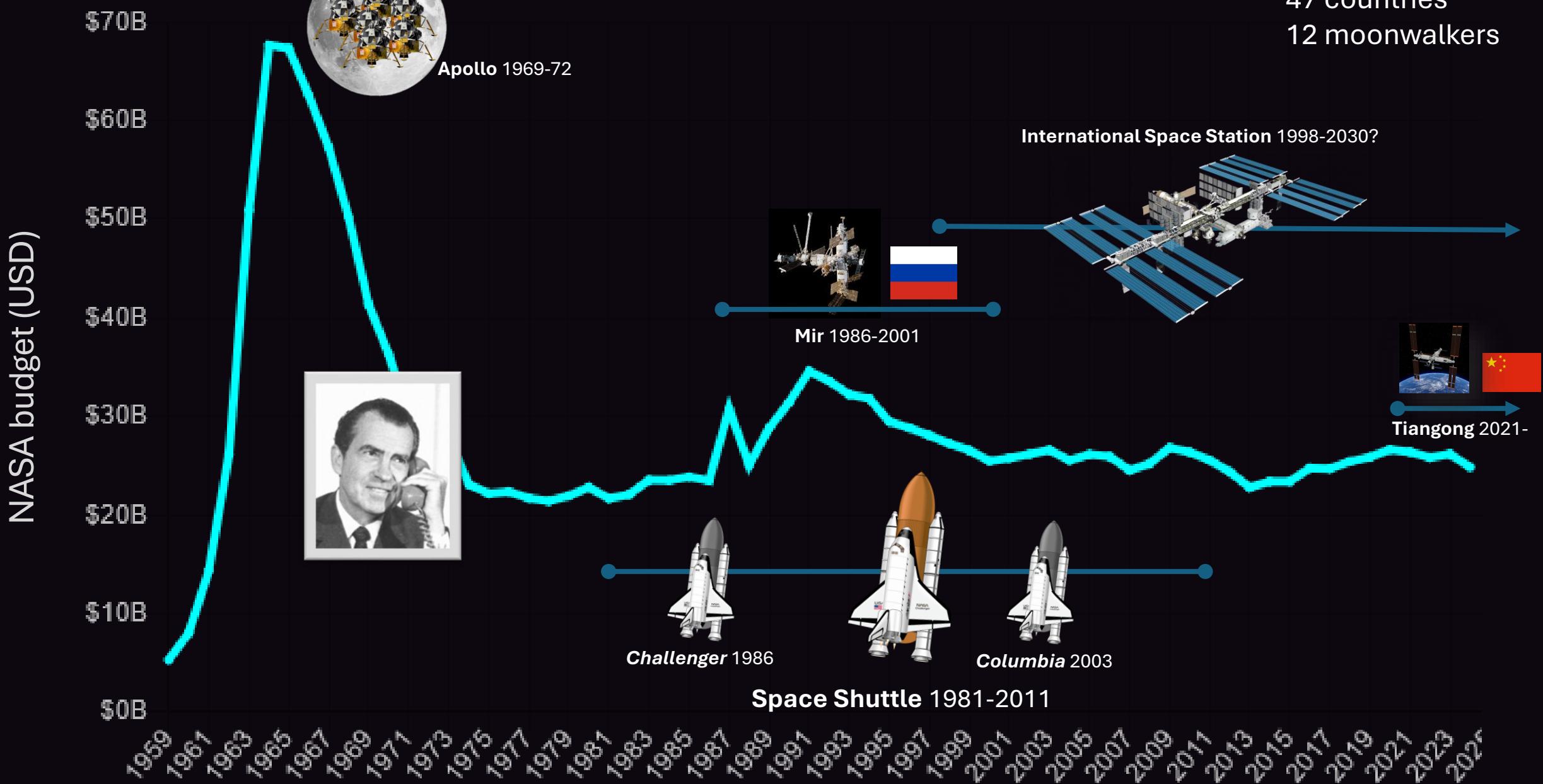
The seal of the President of the United States is a circular emblem. It features a central shield with a eagle holding an olive branch and arrows. Above the shield is a stars and stripes pattern. The words 'PRESIDENT OF THE UNITED STATES' are written around the top edge of the seal, and 'UNITED STATES' is written at the bottom.

History of humans in space

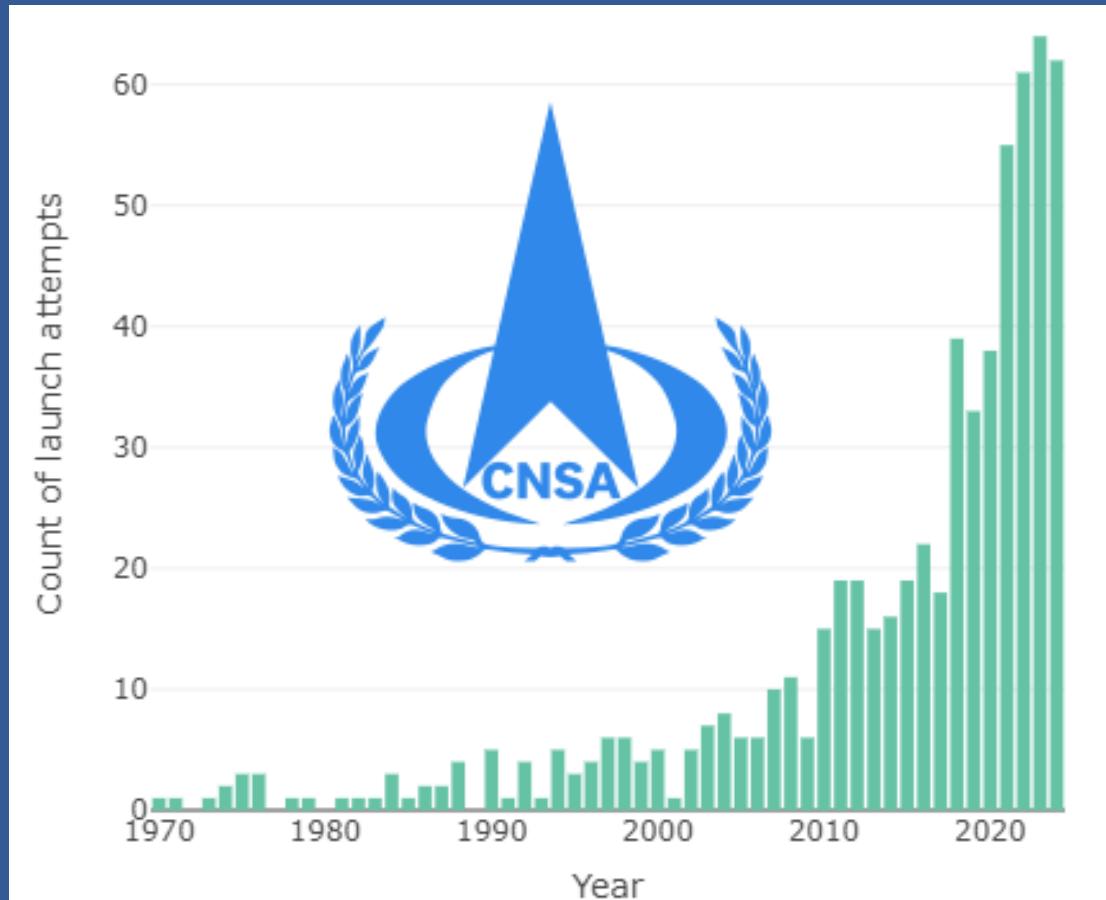


History of humans in space

~700 people
47 countries
12 moonwalkers



The Rise of China



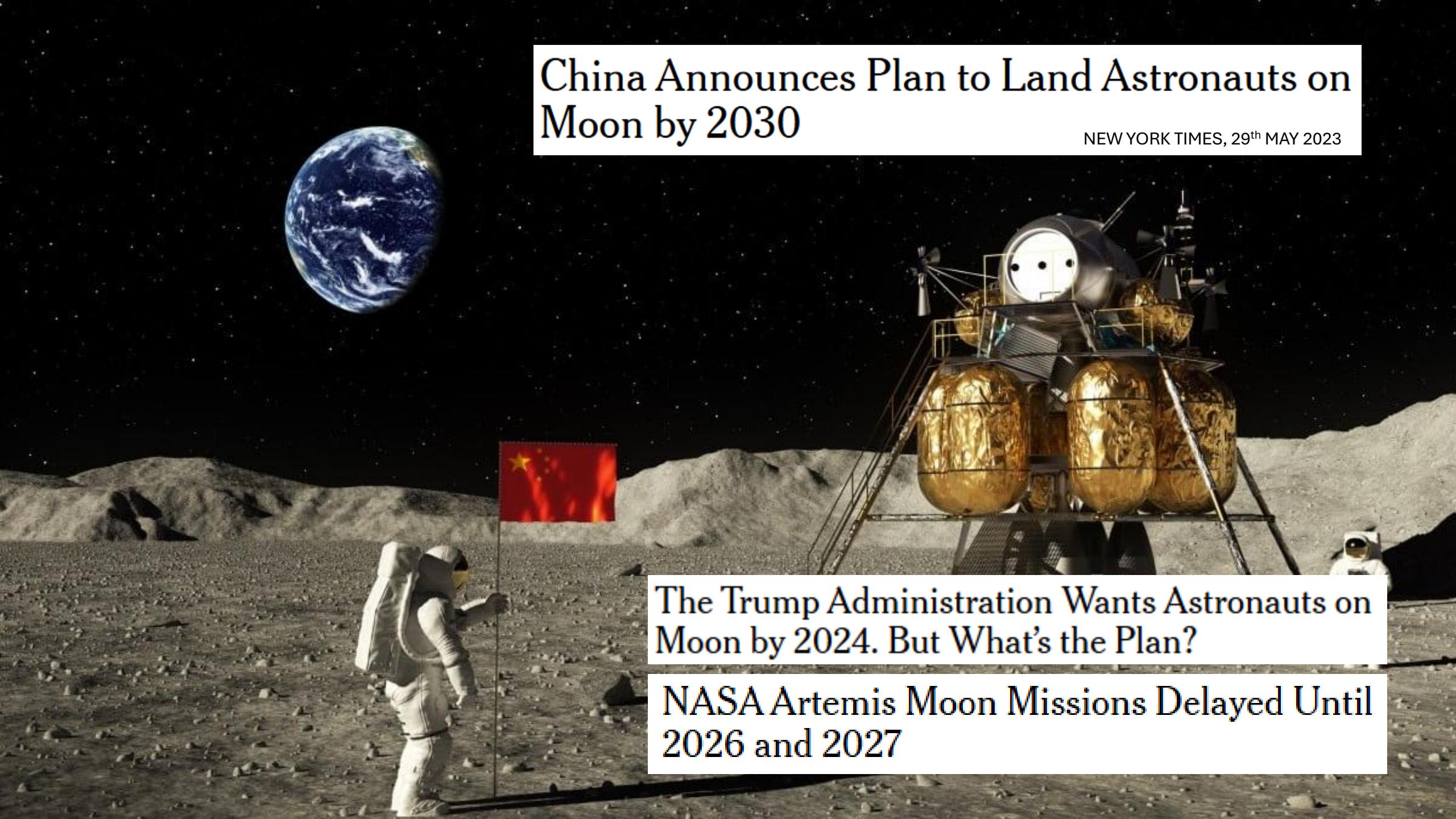
Tiangong space station



Chang'e 6 lunar lander



China Becomes First Country to Retrieve Rocks From the Moon's Far Side



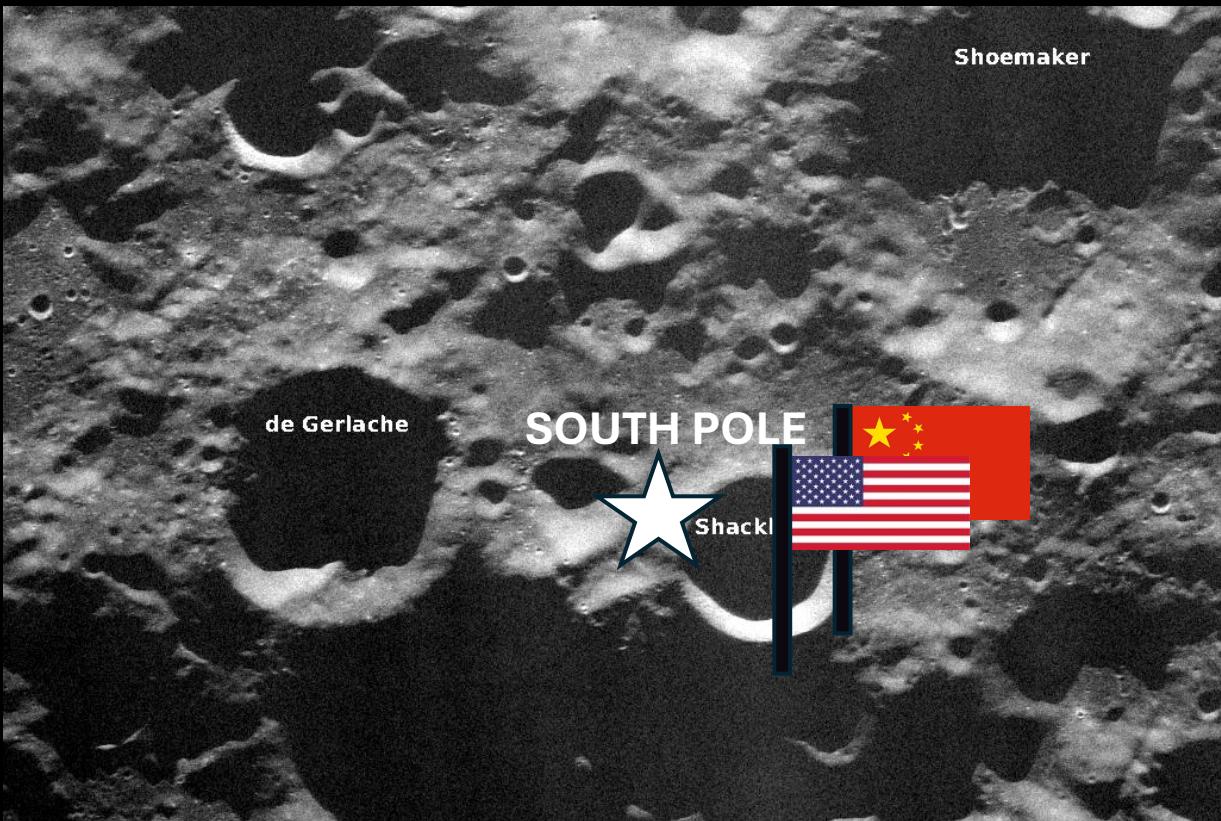
China Announces Plan to Land Astronauts on Moon by 2030

NEW YORK TIMES, 29th MAY 2023

The Trump Administration Wants Astronauts on Moon by 2024. But What's the Plan?

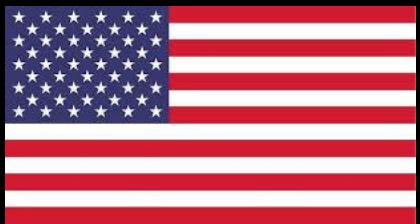
NASA Artemis Moon Missions Delayed Until 2026 and 2027

The Moon is Cool Again

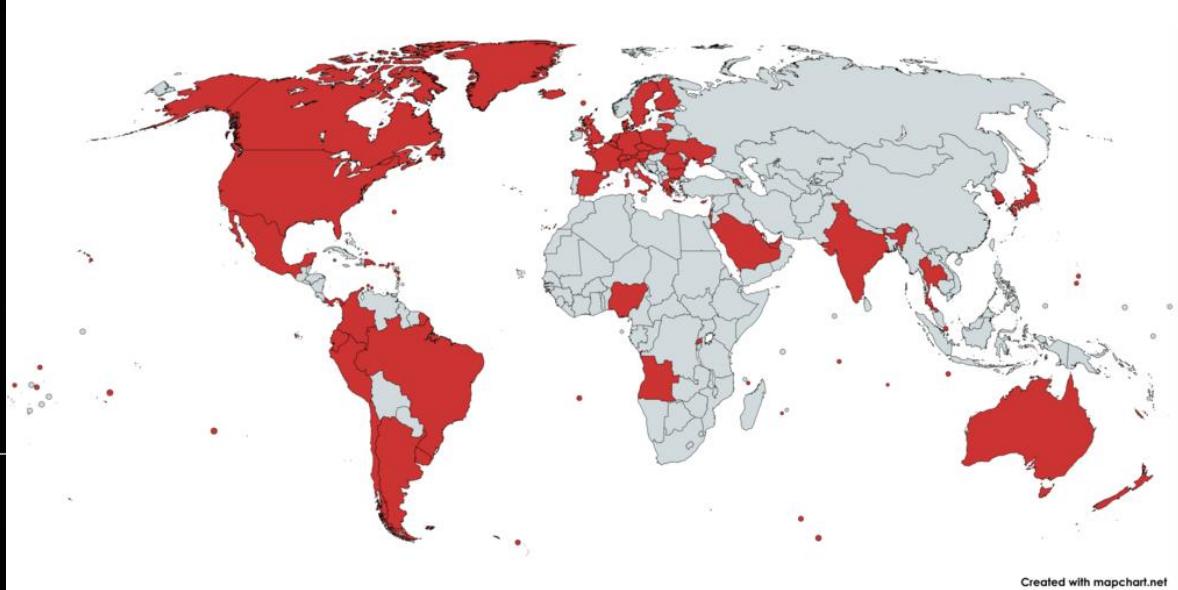


21st century space race?

International cooperation *and* competition



ARTEMIS ACCORDS



International Lunar Research Station



Space! What is it good for?

For making your country look cool

For spying on your enemies

For studying the Earth, Solar System, Universe

For making money???



THE COMMERCIAL LAUNCH REVOLUTION

Buy yourself a ride to space with...

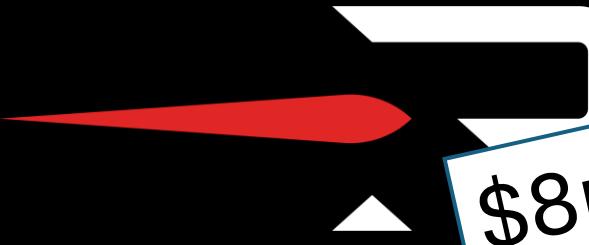
SPACE X

\$60mill

BLUE ORIGIN

\$500,000-1 mill

 GALACTIC



\$8mill

ROCKET LAB

 DAWN
AEROSPACE



Kea Aerospace



and controlled descent

THE RISE OF SPACE X

- Only rockets to re-use first stage, decreasing \$/kg to orbit by 80%
- 4-year (and counting) monopoly on launching humans from US
- Currently developing a fully and rapidly re-usable super-heavy lift vehicle...
- ... for transporting humans beyond low-Earth orbit

America Chooses to Go to the Moon... for better reasons this time?



Nationalism:
One-up the USSR
by the end of the decade



- Nationalism
 - Beat China
 - Go with international partners
 - **Put first woman and person of colour on the Moon**
- Scientific discovery
- Ice mining?
- Create a long-term presence... **and use as a stepping stone to Mars**



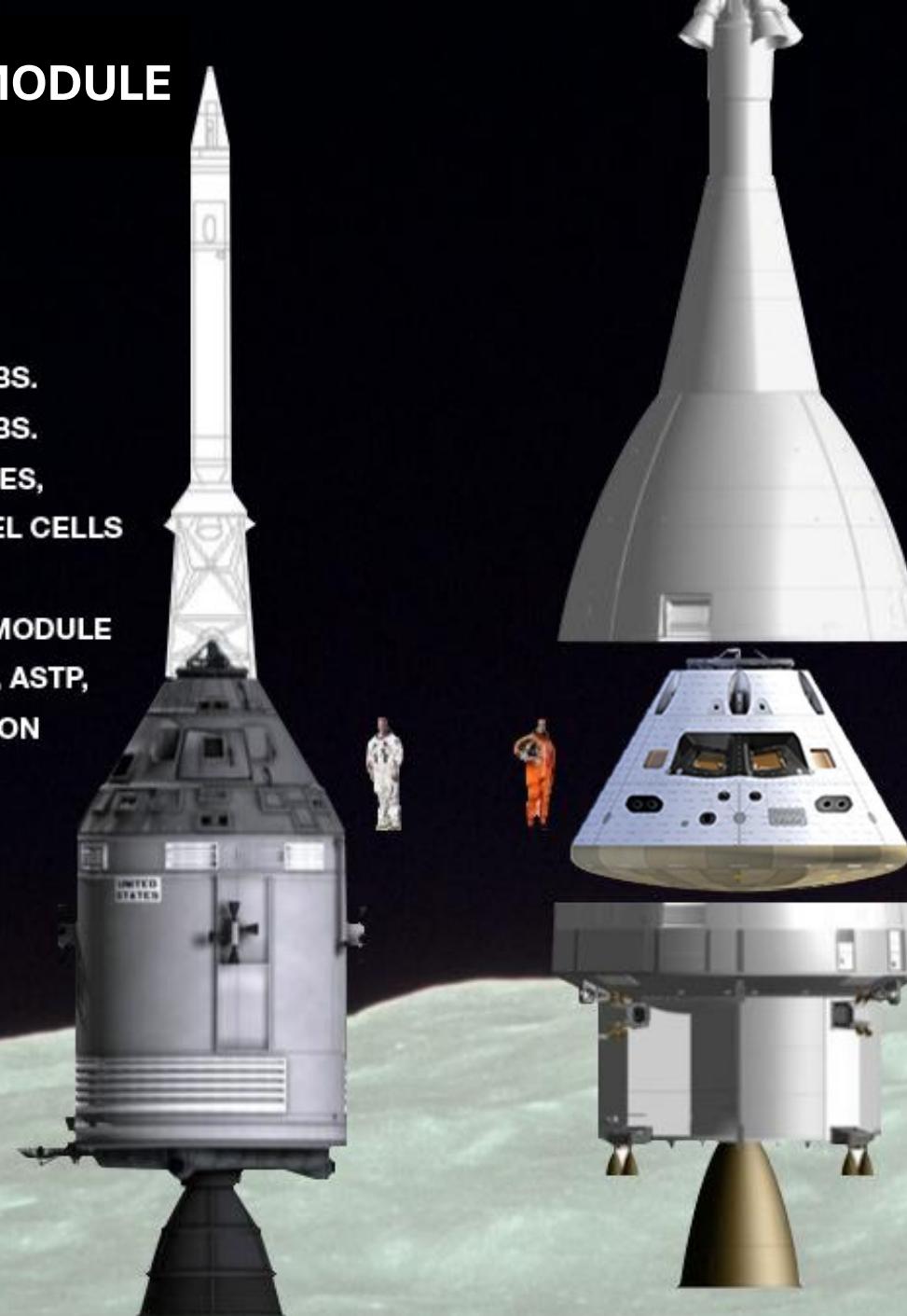
SATURN V 1971



2022 Space Launch System

COMMAND AND SERVICE MODULE

CREW MODULE DIAMETER: 12.8 FT.
CREW SIZE: 3
SERVICE MODULE DIAMETER: 13 FT.
SERVICE MODULE LENGTH: 24.5 FT.
SERVICE MODULE MASS: 54,000 LBS.
SERVICE MODULE THRUST: 20,500 LBS.
POWER: BATTERIES,
 FUEL CELLS
LANDING: WATER
DOCKING: LUNAR MODULE
DESTINATION: SKYLAB, ASTP,
 MOON



ORION

CREW MODULE DIAMETER: 16.5 FT. ▲
CREW SIZE: 4 (6 TO ISS) ▲
SERVICE MODULE DIAMETER: 16.5 FT. ▲
SERVICE MODULE LENGTH: 15.7 FT. ▼
SERVICE MODULE MASS: 27,500 LBS. ▼
SERVICE MODULE THRUST: 7,500 LBS. ▼
POWER: SOLAR ARRAYS,
 BATTERIES
LANDING: WATER
DOCKING: MULTI PURPOSE
DESTINATION: MARS, ASTEROIDS



LUNAR LANDERS

APOLLO LEM

7 m
[23 ft]



9.4 m
[30.5 ft]

LUNAR LANDERS

SPACEX
STARSHIP

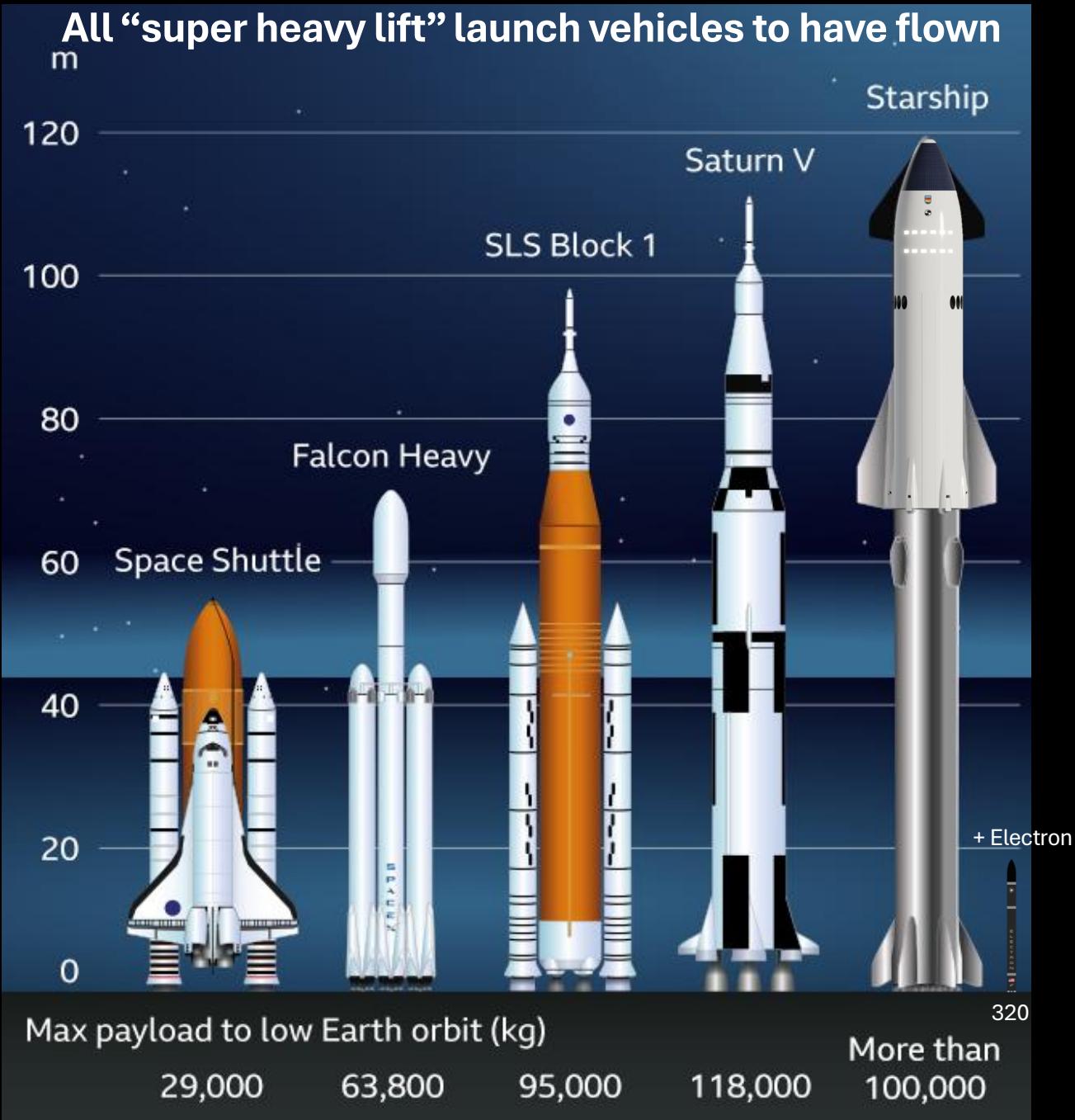
~50 m
[164 ft]

APOLLO LEM

7 m
[23 ft]

9.4 m
[30.5 ft]

Over 9 m
[29.5 ft]





**First catch of 70m-tall
Super Heavy booster
October 2024**



Artemis III 2027?



2030s and beyond?

- Habitats
- Pressurised rovers
- Lunar space station “Gateway”
- **Ice mining operation**



...if we manage to solve:

- Radiation shielding
- Dust management
- Living in 1/6th gravity
- **Space law??**

SPACE LAW: VAGUE AND OUTDATED

Outer Space Treaty (1967)

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies

Article II

Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

SPACE LAW: VAGUE AND OUTDATED

Artemis Accords (2020)

Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes

2. The Signatories emphasize that the extraction and utilization of space resources, including any recovery from the surface or subsurface of the Moon, Mars, comets, or asteroids, should be executed in a manner that complies with the Outer Space Treaty and in support of safe and sustainable space activities. The Signatories affirm that the extraction of space resources does not inherently constitute national appropriation under Article II of the Outer Space Treaty, and that contracts and other legal instruments relating to space resources should be consistent with that Treaty.

10. The Signatories commit to respect reasonable safety zones to avoid harmful interference with operations under these Accords, including by providing prior notification to and coordinating with each other before conducting operations in a safety zone established pursuant to these Accords.



More space = more good?

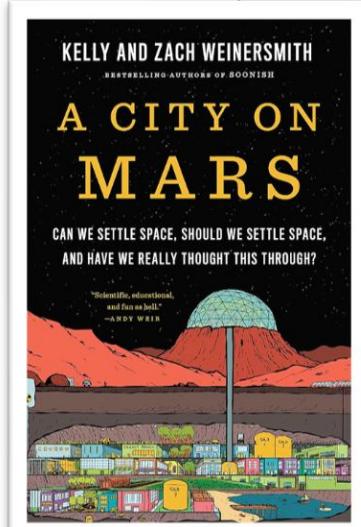
Good things

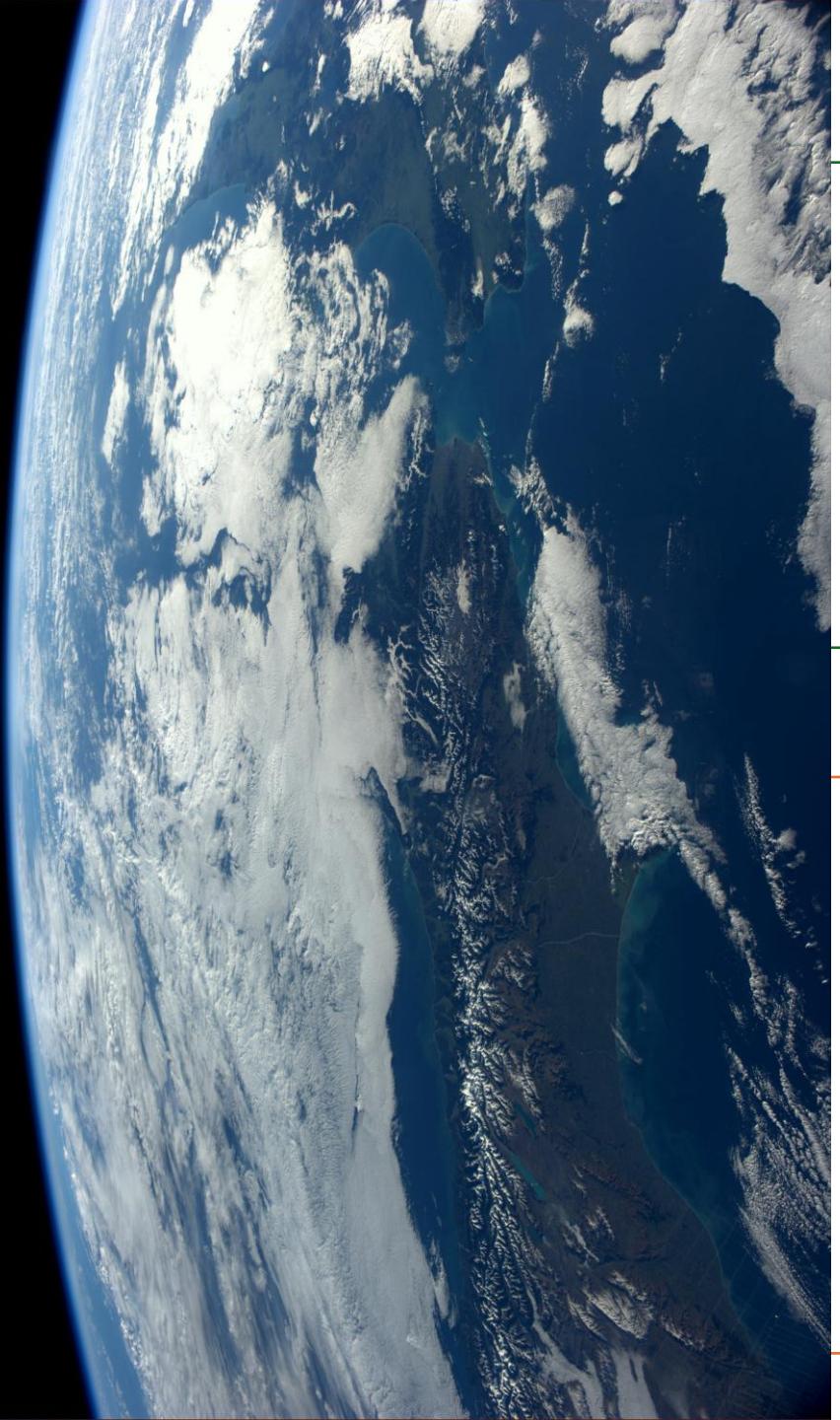
- More connected world
- More science and technology
- More inspiration



Bad things

- Environmental impact
- Potential for conflict
- Over-enthusiasm for Martian colonies: see great book →





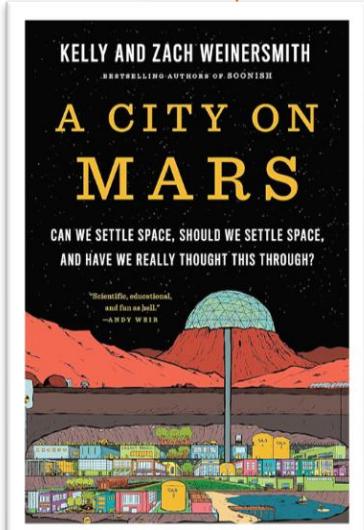
Good things for NZ?

- More connected world
- More science and technology
- More inspiration



Bad things for NZ?

- Environmental impact
- Potential for conflict
- Over-enthusiasm for Martian colonies: see great book →





John F. Kennedy
Rice University, Texas, 1962

“We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people.”

“For space science, like nuclear science and all technology, has no conscience of its own.”

Watch spacecraft launch to the Moon

Thursday 1pm

- Watch launch live on NASA YT channel
- Falcon 9 booster landing 8min after launch
- Robot landing on Moon one week later

