



Space Security

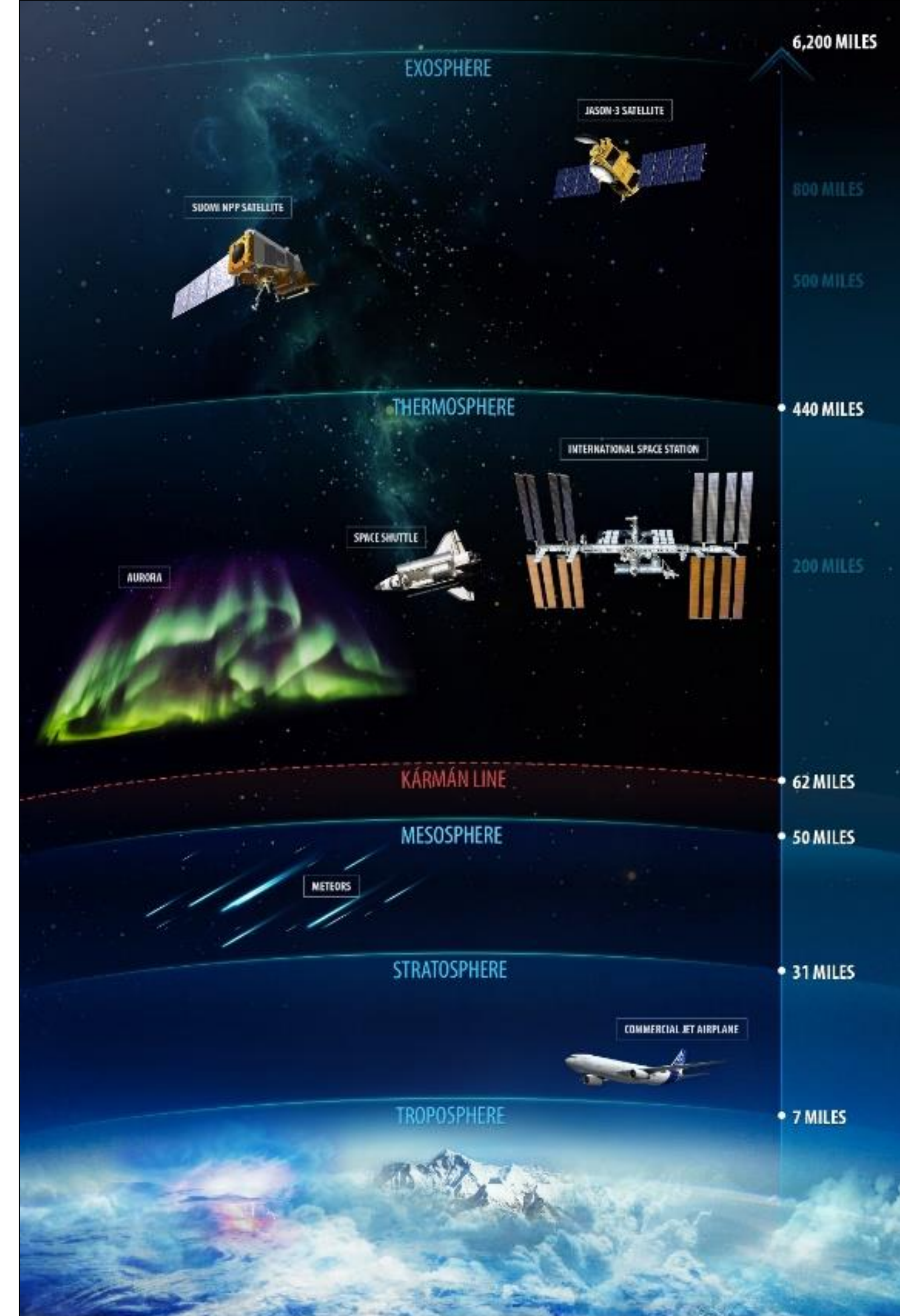
**Strategic Studies Center
Senior Security Studies Program
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Where does “space” begin?

- No official internationally-agreed definition
- Most nations use the Karman Line (100 km)
 - Aircraft cannot fly beyond 100 km
 - Below is sovereign airspace
- Under annual discussion by UN Space Working Group
- Future proposals:
 - Orbiting Line: space begins at lowest perigee of orbiting satellite
 - Distance Rule: simple fixed upper-altitude boundary (e.g. Exosphere)
 - Status quo: Karman Line



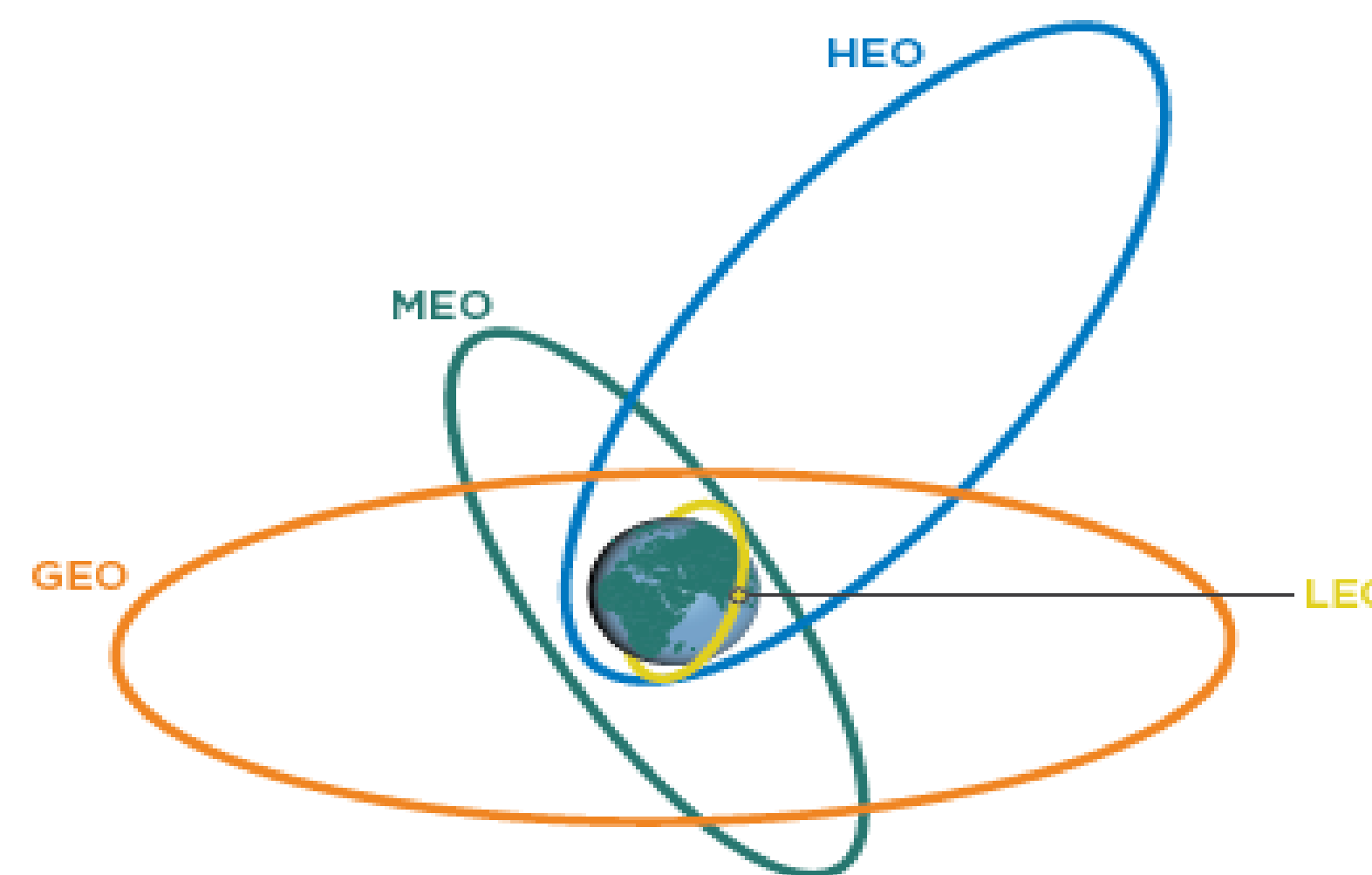


Space Applications

Orbit types and uses

- Civil
 - Science & technology research; remote sensing; telecoms; navigation, etc.
- Commercial
 - Earth-based: business & financial operations; transport; logistics, etc.
 - Space economy: space launch & recovery; space exploration & resource development; space-based energy, manufacturing, agriculture & health sciences; human habitation, etc.
- National security
 - Command & control; intelligence, precision strike, movement & maneuver; protection; sustainment; information, etc.
- The Future?
 - Convergence of artificial intelligence, cyber, quantum computing, 5/6G, and space...

Orbit Types and Uses ^{32,33}



Orbits are notional and for illustrative purposes only.

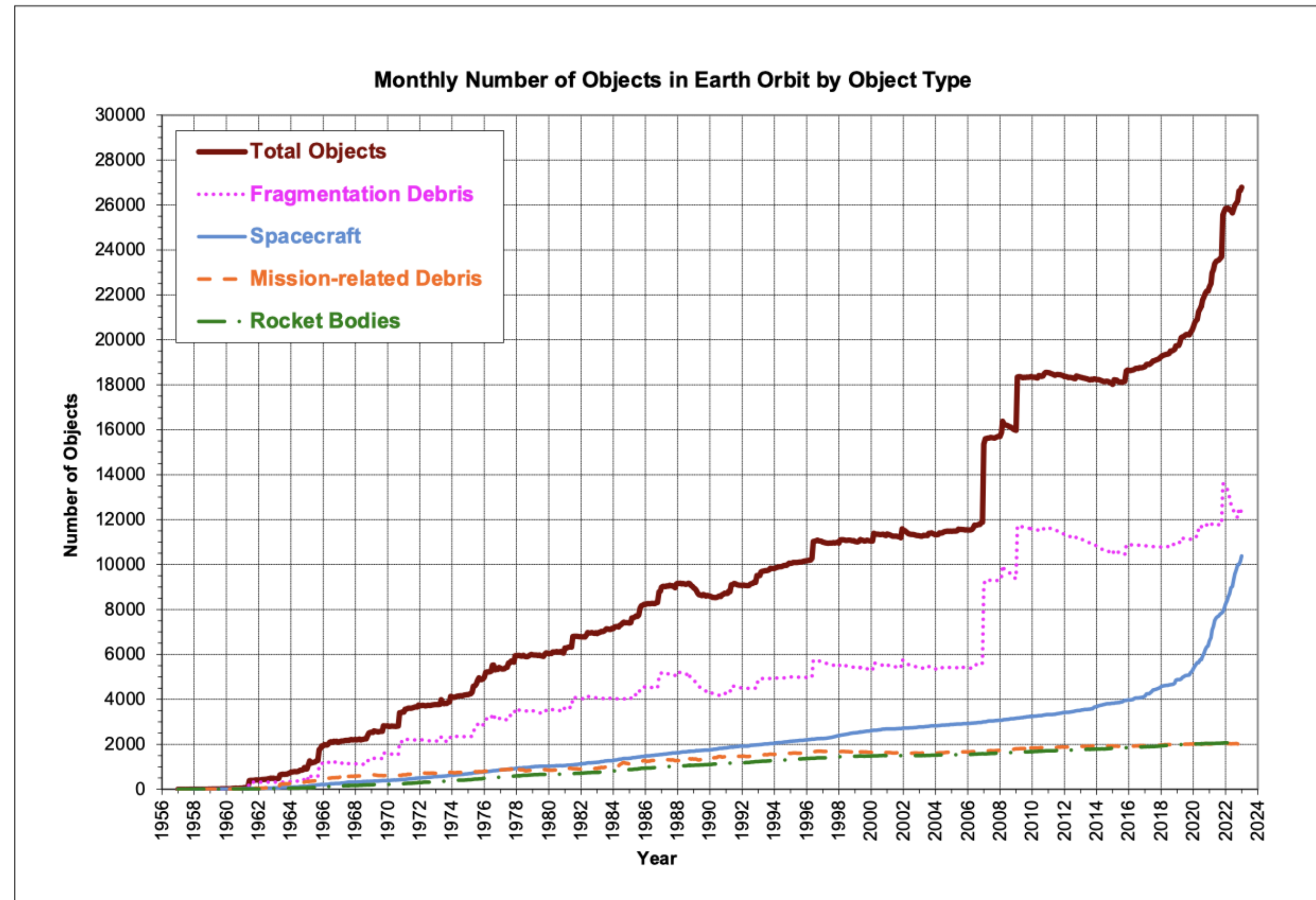
ORBIT	ALTITUDE ⁺	USES
Low Earth Orbit (LEO)	Up to 2,000 km	- Communications - ISR - Human Spaceflight†
Medium Earth Orbit (MEO)	Approx. 2,000 to 35,000 km	- Communications - Position, Navigation, and Timing
Highly Elliptical Orbit (HEO)	LEO altitudes at perigee (nearest to Earth) Approx. 40,000 km at apogee (farthest from Earth)	- Communications - ISR - Missile Warning
Geosynchronous Earth Orbit (GEO)	Approx. 36,000 km	- Communications - ISR - Missile Warning



Characterizing space

Crowded, Competitive, Contested

- Crowded
 - State and non-state players
 - Orbital debris
- Competitive
 - Between states
 - Among commercial actors
 - Over resources, spectrums, launch/orbital slots, territorial rights, etc.
- Contested
 - Space diplomacy
 - Space economies
 - Space technology, science, innovation
 - Militarily - “new space arms race”?



<https://orbitaldebris.jsc.nasa.gov/quarterly-news/pdfs/odqnv27i1.pdf>



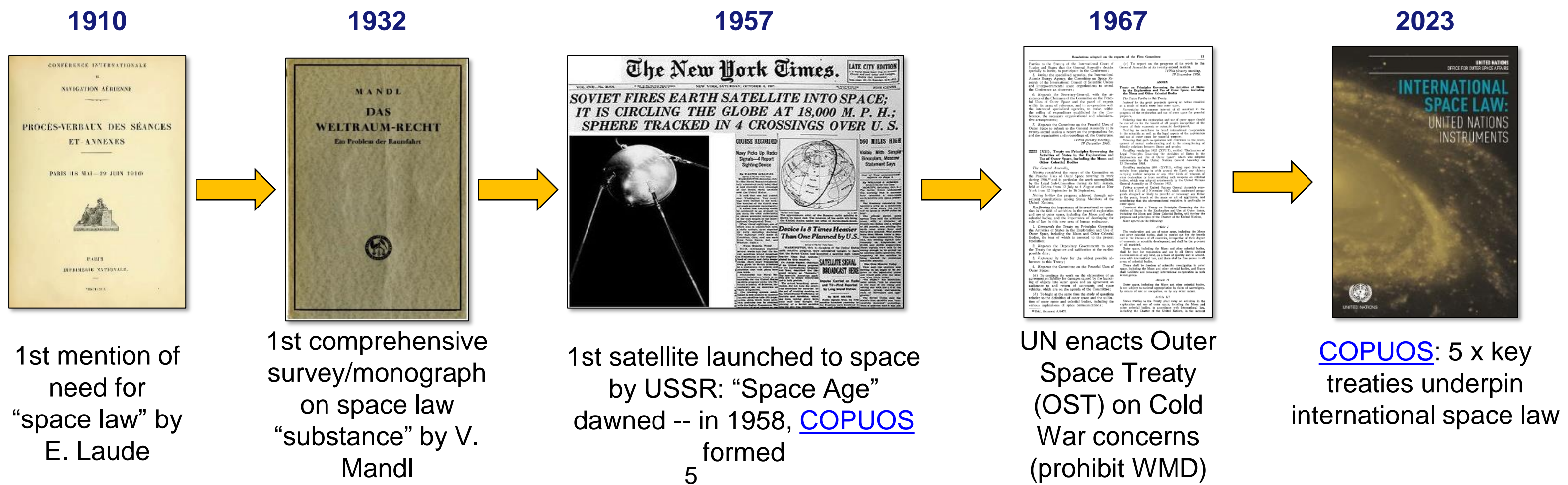
Space Governance

The Outer Space Treaty and instruments



https://www.spacefoundation.org/space_brief/international-space-law/

- The Outer Space Treaty
- The Rescue Agreement
- The Moon Agreement
- The Liability Convention
- The Registration Convention





“...in spite of decades spent trying to update the Outer Space Treaty of 1967, efforts have largely failed.”

Mai'a K. Davis Cross, Director of the Center for International Affairs and World Cultures, Northeastern University.

<https://today.duke.edu/2023/07/tensions-earth-dont-have-affect-outer-space-diplomacy>



“Space policy is more fragmented today than when “universal” treaties were designed for all countries. It reflects more and more geopolitical tensions, and this is creating a different type of diplomatic approach to traditional treaties and agreements.”

[Giovanni Zanalda](#), Director of the Rethinking Diplomacy Program, Duke University.



The imperative to act

A business perspective

CHAPTER 5

Crowding and Competition in Space

5
number of new government-developed space stations by 2030

70,000
estimated number of satellites to launch in coming decades

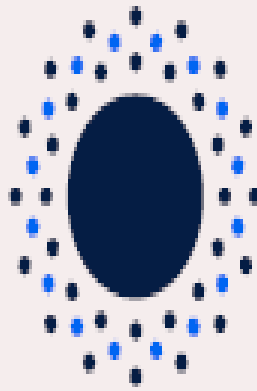
28
nations with domestic space regulation

1 million
estimated number of debris pieces 1 centimetre and larger

REUTERS/ROSCOSMOS

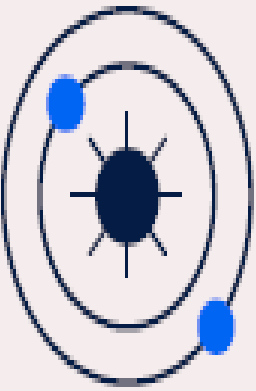
The Global Risks Report 2022 70

Shocks to Reflect Upon



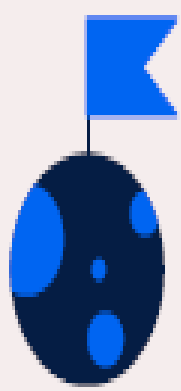
Kessler Collapse

What if a cascading chain of collisions between near-Earth objects and space debris result in a saturated Low Earth Orbit that renders space practically unusable for further commercial development?



Solar Disruption

What if a massive solar event or geomagnetic storm disrupts satellite-based services and functions, causing massive, cascading economic and societal consequences on Earth?³⁰



Property in Space

What if violations of the Outer Space Treaty—such as mineral resources being claimed in a Moon "gold rush"—are carried out without meaningful consequences?

The Global Risks Report 2022 76

Towards cooperation in space

Although space represents yet another realm in which geopolitical and commercial tensions will play out, important traditions of cooperation in this arena should not be forgotten.

- ***Voluntary norms of behavior progressing to more formal governance...***

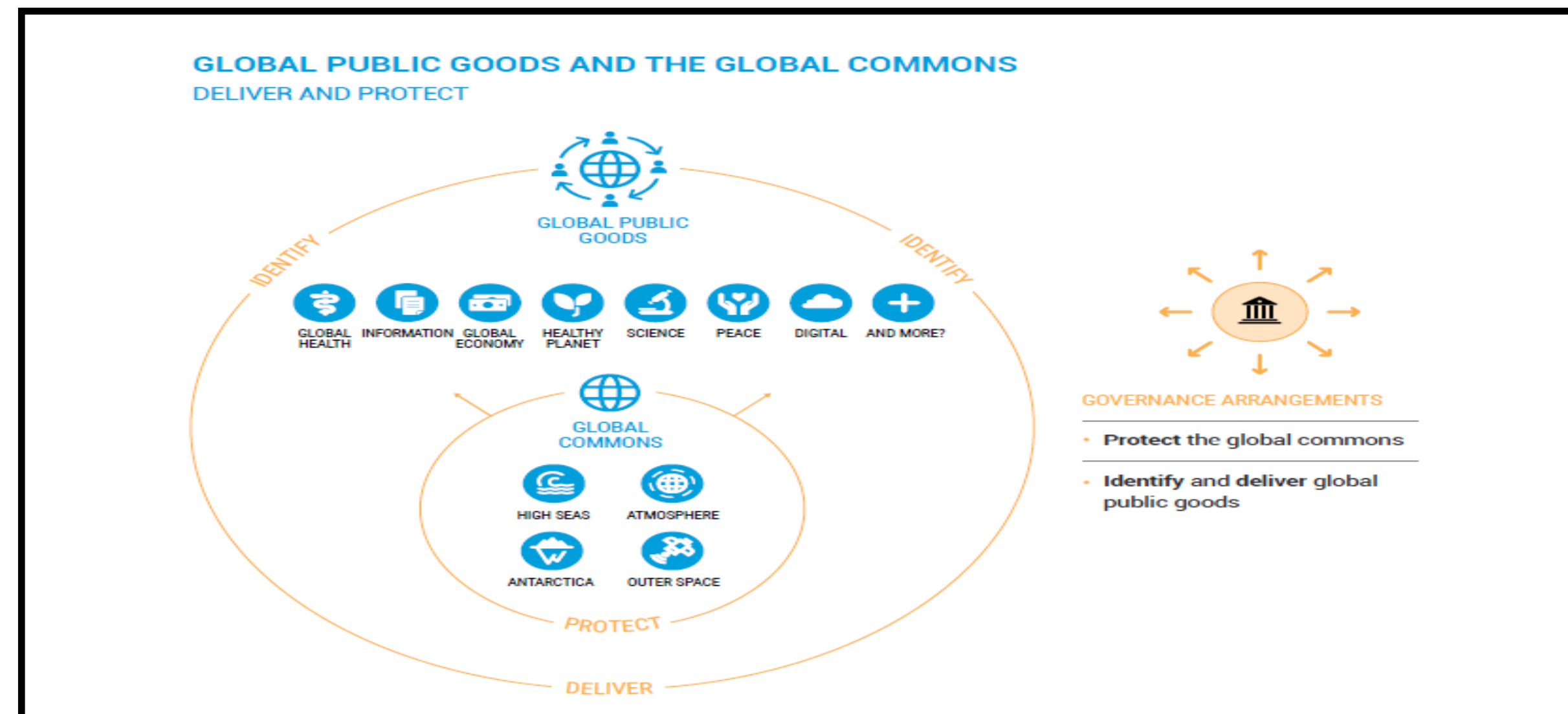
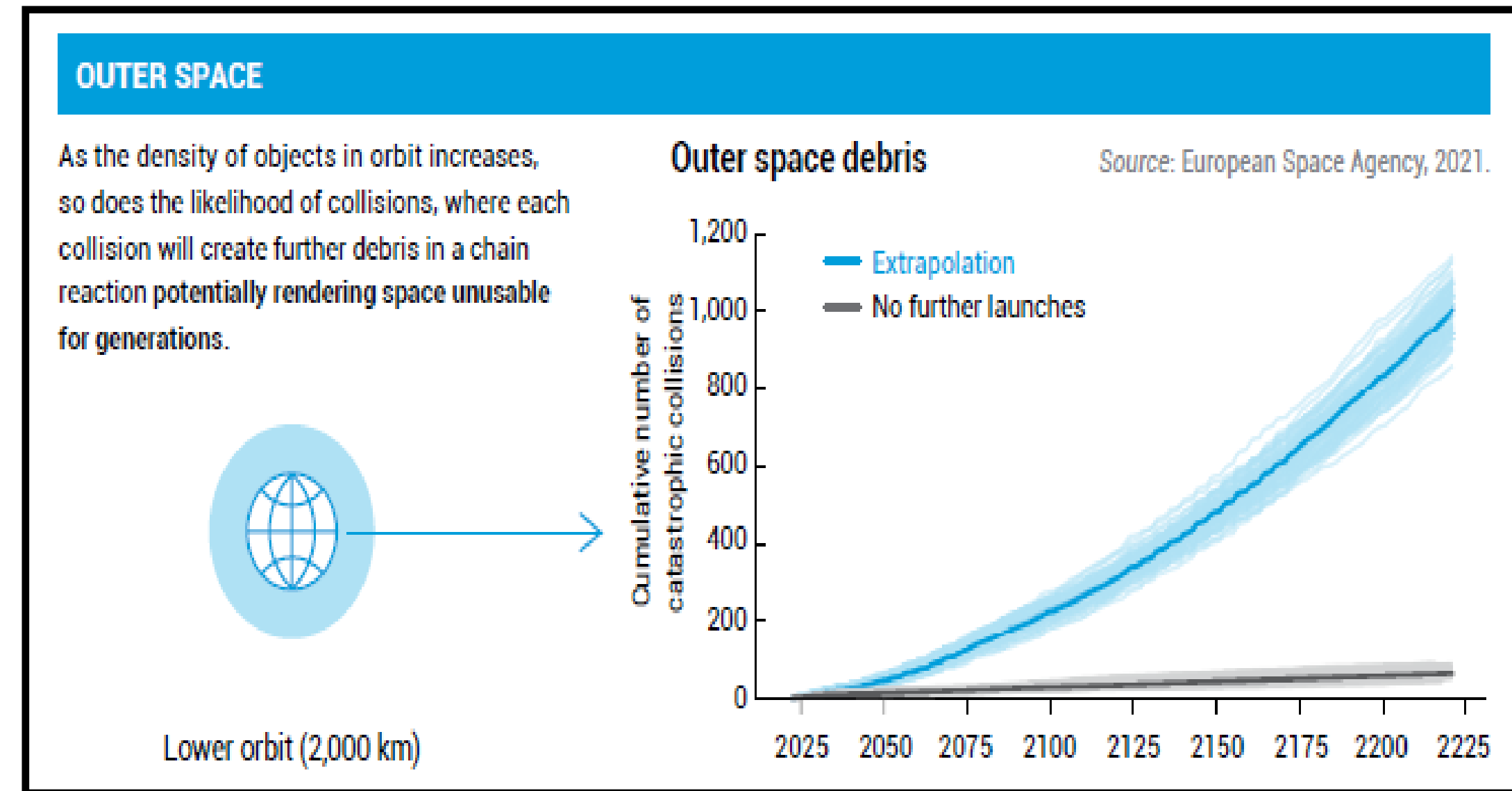
The imperative to act

A UN perspective



OUR COMMON AGENDA
Report of the Secretary-General

United Nations



Peaceful, secure and sustainable use of outer space

Outer space has traditionally been acknowledged as a global common, beyond the jurisdiction of any one State. The potential for its peaceful, secure and sustainable use would benefit all humanity today and into the future.

- **Governance and regulatory regimes**
- **Binding and non-binding norms**
- **Multi-stakeholder dialogue on outer space**

UN, Our Common Agenda, 2021, pp.61.

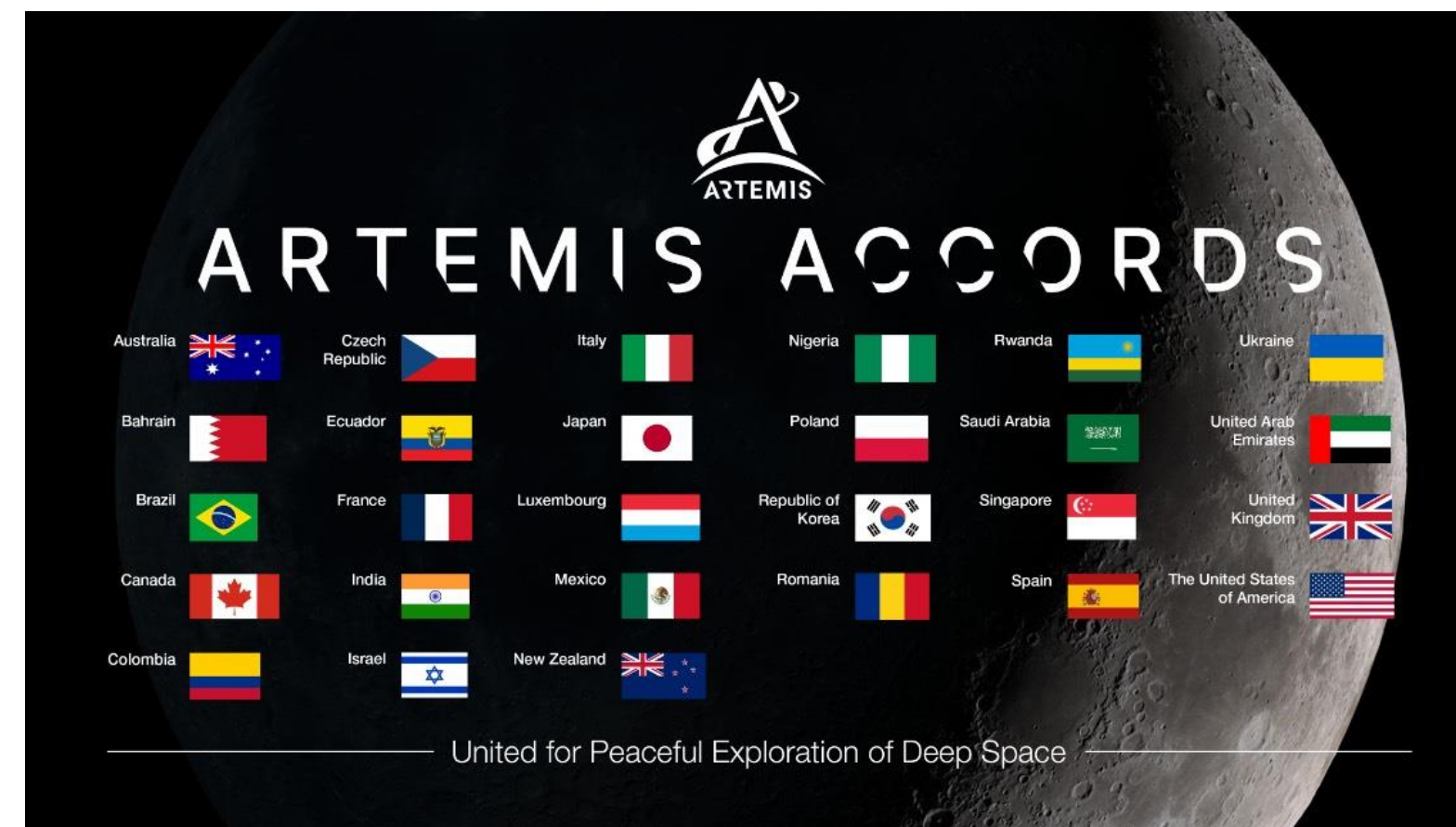


Additional Pathways?

- UN Open Ended Committee on Space Norms, Rules and Behaviors
- Artemis Accords
- Bilateral/multilateral science, technology & commercial relationships
- Advancing regional space diplomacy (e.g. Asia-Pacific Regional Space Agency Forum)
- Enhancing military space interactions



<https://breakingdefense.com/2022/05/un-talks-on-space-norms-surprisingly-collegial-but-fireworks-to-come-sources/>





Concluding thoughts

- Space security: the ability to access, operate and benefit from space activities.
- All of us have something to lose if current trends continue and space security is placed at increasing risk.
- “Failure is not an option.”*



*Attributed to NASA Flight Director Gene Kranz, Apollo 13 Moon landing mission.



Mahalo!