

EPFL Space Sustainability

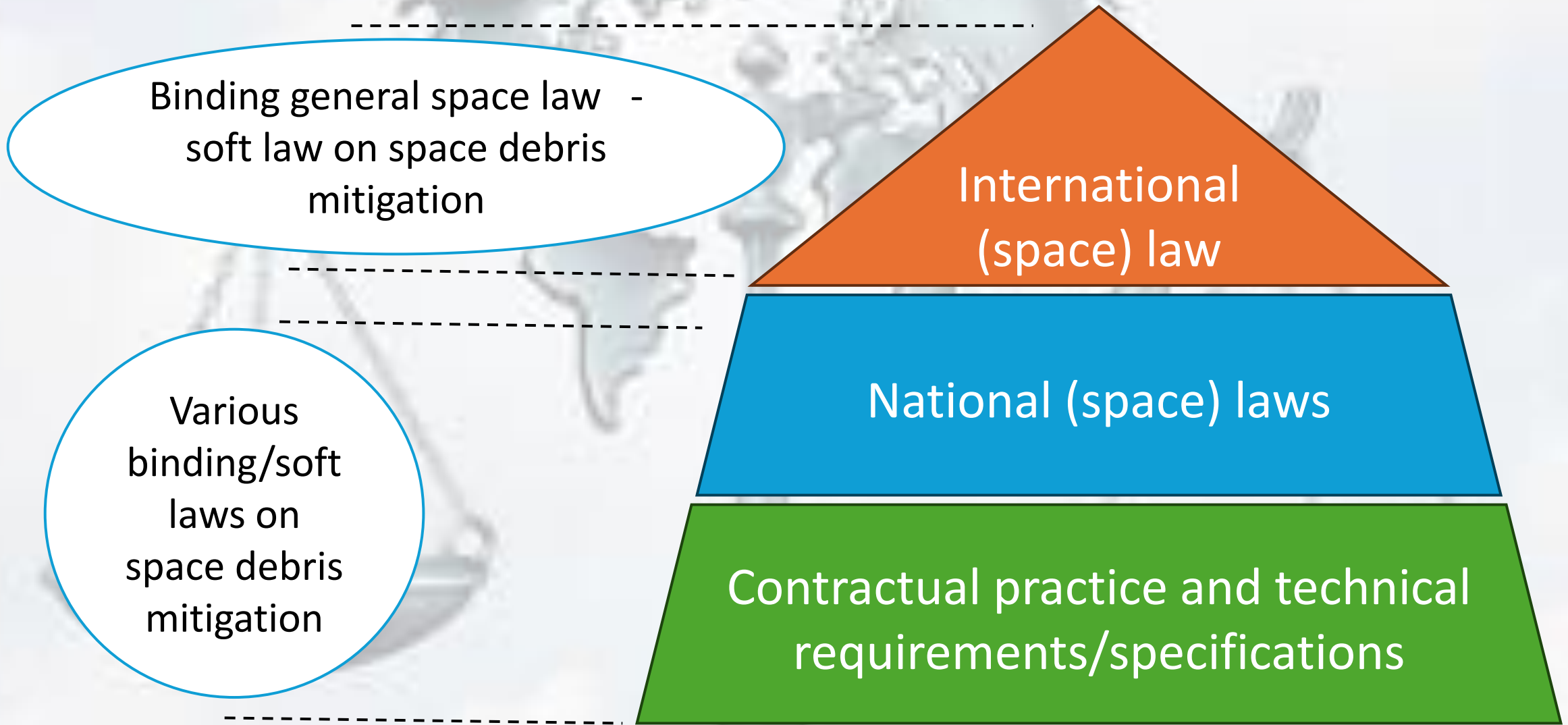
« Geopolitics and regulation of space sustainability »

Dr Benjamin Guyot, EPFL, 24/02/2025

Agenda

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I. Overview





II. International legal framework and geopolitics

A. International forums

United Nations: Committee on the Peaceful Uses of Outer Space (**COPUOS/UNOOSA**), International Telecommunication Union (ITU), World Meteorological Organization (WMO), etc.

Regional space agencies: European Space Agency (**ESA**), EU Agency for the Space Programme (EUSPA), Asia-Pacific Space Cooperation Organization (APSCO), Intersputnik, etc.

Non-governmental organizations: International Astronautical Congress (IAC), Global Satellite Operator's Association (GSOA), Geneva Center for Security Policy (GCSP), etc.

II. International legal framework and geopolitics

B. Binding international law:

- The Outer Space Treaty 1967 /OST (Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies)
- The Rescue Agreement 1968 (Agreement on the Rescue of Astronauts, the Return of Astronauts and Return of Objects Launched into Outer Space)
- The Liability Convention 1972 (Convention on International Liability for Damage Caused by Space Objects)
- The Registration Convention 1974 (Convention on Registration of Objects Launched into Outer Space)
- The Moon Agreement 1978 (Agreement Governing the Activities of States on the Moon and Other Celestial Bodies)



II. International legal framework and geopolitics

C. Soft law

- Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting.
- Principles Relating to Remote Sensing of the Earth from Outer Space.
- Principles Relevant to the Use of Nuclear Power Sources in Outer Space.

...



II. International legal framework and geopolitics

C. Soft law

→ About space debris

- Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space.
- ESA Guidelines on the mitigation of space debris, ESA Zero Debris Booklet.
- European Code of Conduct for Space Debris Mitigation.
- NASA Safety Standard, Guidelines and Assessment Procedures for limiting Orbital Debris.
- IADC Space Debris Mitigation Guidelines (Inter-Agency Space Debris Coordination Committee).
- ...

→ On SSR : Report of the Scientific and Technical Subcommittee (COPUOS) 2018; Report of the COPUOS 2016.



II. International legal framework and geopolitics

D. Main principles

Art. I OST:

*The exploration and use of outer space (...) shall be carried out for the **benefit and in the interests of all countries** (...) and shall be the province of all mankind.*

*Outer space (...) shall be **free for exploration** and use by all States without discrimination of any kind (...) and there shall be free access to all areas of celestial bodies.*

*There shall be **freedom of scientific investigation** in outer space (...).*





II. International legal framework and geopolitics

D. Main principles

Art. II OST: *Outer space (...) is **not subject to national appropriation** (...).*

Art. IV OST: *States Parties to the Treaty undertake **not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction** (...). (...) **exclusively for peaceful purposes** (...).*

Art. V OST: *(...) astronauts as envoys of mankind (...).*

II. International legal framework and geopolitics

D. Main principles

Art. VI OST: *States Parties to the Treaty shall bear **international responsibility** for national activities in outer space (...) **whether such activities are carried on by governmental agencies or by non-governmental entities** (...). The activities of non-governmental entities in outer space (...) shall require **authorization and continuing supervision** by the **appropriate State Party to the Treaty**. (...).*



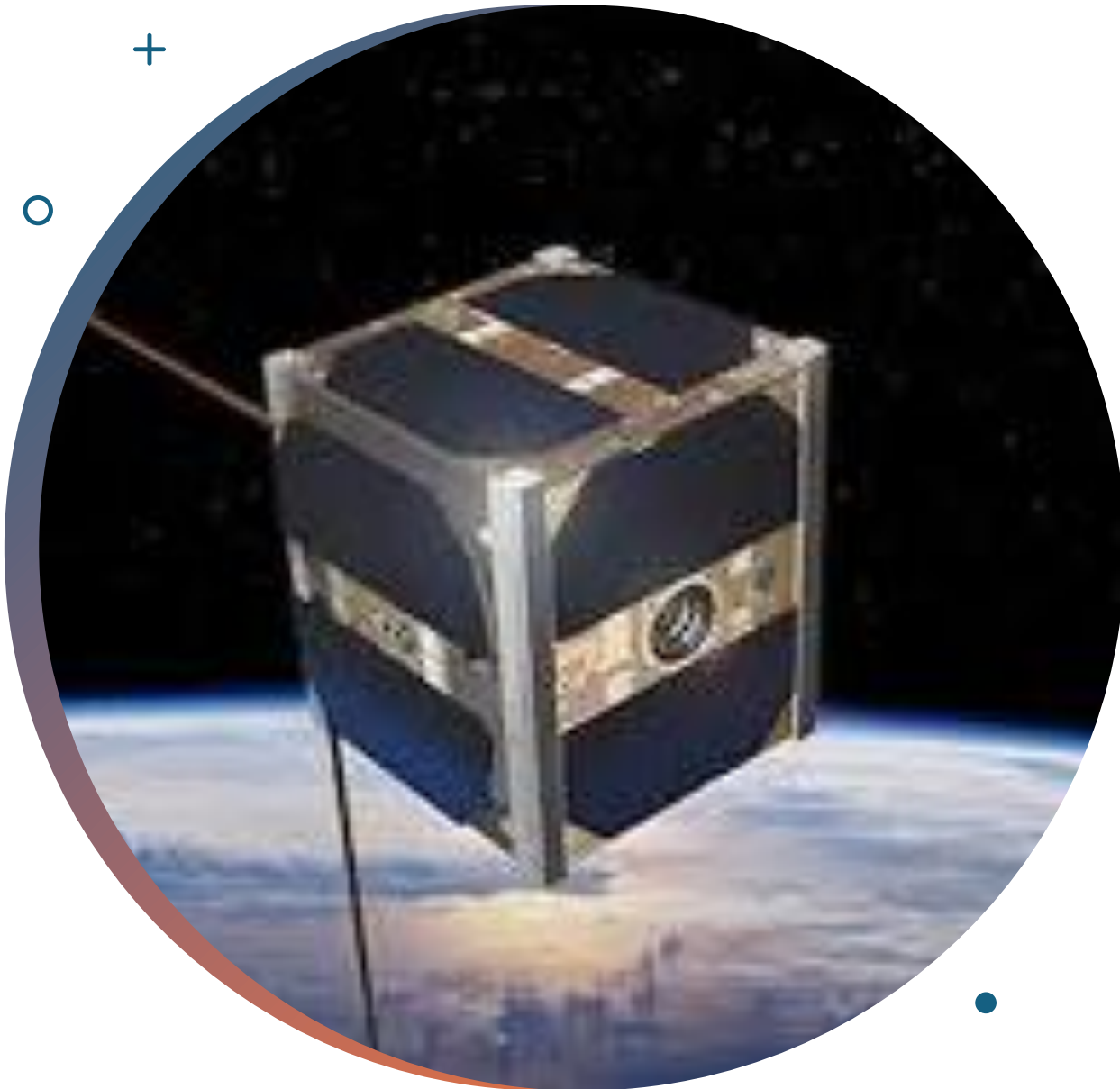
II. International legal framework and geopolitics

D. Main principles

Art. VII OST: *Each State Party to the Treaty that **launches or procures the launching of an object** into outer space (...) and each State Party **from whose territory or facility an object is launched**, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space (...).*

→ Definition of the Launching State of the Liability Convention.





II. International legal framework and geopolitics

D. Main principles

Art. VIII OST: A State Party to the Treaty on **whose registry** an object launched into outer space is carried **shall retain jurisdiction and control over such object**, and over any personnel thereof, while in outer space or on a celestial body. (...).

II. International legal framework and geopolitics

D. Main principles

Art. IX OST: *In the exploration and use of outer space (...), States Parties to the Treaty shall be guided by the **principle of cooperation and mutual assistance** and shall conduct all their activities in outer space (...) with **due regard** to the corresponding interests of all other States Parties to the Treaty. (...). If a State Party to the Treaty has reason to believe that an activity or experiment planned by it or its nationals in outer space (...) would **cause potentially harmful interference** with activities of other States Parties in the peaceful exploration and use of outer space (...) it shall undertake **appropriate international consultations** before proceeding with any such activity or experiment.*

+ Art. XI: inform UN

→ duty to coordinate space maneuvers? Duty to share orbital data?
Breach/fault in case of absence of coordination?



II. International legal framework and geopolitics

D. Main principles

Convention on International Liability for Damage Caused by Space Objects (SLC)

Art. II: A launching State shall be **absolutely liable** to pay compensation for damage caused by its space object **on the surface of the Earth** or to aircraft in flight.

Art. III: In the event of damage being caused **elsewhere than on the surface of the Earth** to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be **liable only if the damage is due to its fault** or the fault of persons for whom it is responsible.



Cosmos 954

II. International legal framework and geopolitics

D. Main principles

The above mentioned treaties and agreement are part of international public law and therefore **applicable between subjects of international public law** (States, international organizations).

They are not directly applicable to private individuals (=physical persons) or legal entities (=companies, associations, foundations).

→ **States must implement national legislation(s)** for complying with their international commitments and regulate their national space activities.



III. National space laws and Swiss space law

A. National space laws: USA (Acts since 1958, 1984, ...), France (Loi spatiale 2008), UK (Outer Space Act 1986, ...), Russia (1993, ...), China (administrative regulations), Germany (?), Italy (?), etc.

B. Swiss space law: project dated 29.01.2025 under consultation.

The « ordonnance » (application rules) still to come.



III. B) Swiss space law



Who is in charge?

- **No Swiss space agency, but a Swiss Space Office (SSO) under the State Secretariat for Education, Research and Innovation (SEFRI).** → in charge of the Swiss space law for DEFR.

Taking however into account that:

- Federal Department of Foreign Affairs (FDFA) is in charge of Swiss representation at the COPUOS (UN)
- Federal Office of Communication, under the Federal Department of the Environment, Transport, Energy and Communication (DETEC), is in charge of Swiss representation at ITU (UN)
- Swiss armed forces, under the Federal Department of Defence, Civil Protection and Sport (DDPS), are in charge of security in Outer Space.

III. B) Swiss space law



► Purpose (Art. 1)

This Act governs:

- a. the conduct of space operations falling within Swiss sovereignty;*
- b. the supervision of such operations;*
- c. the maintenance of a Swiss national register of space objects (space register);*
- d. liability for damage to persons and property caused by space operations;*
- e. international cooperation within its scope of application.*

III. B) Swiss space law

► Objective (Art. 2)

This Act aims to:

*a. implement **binding** international space law for Switzerland, taking into account Swiss space policy;*

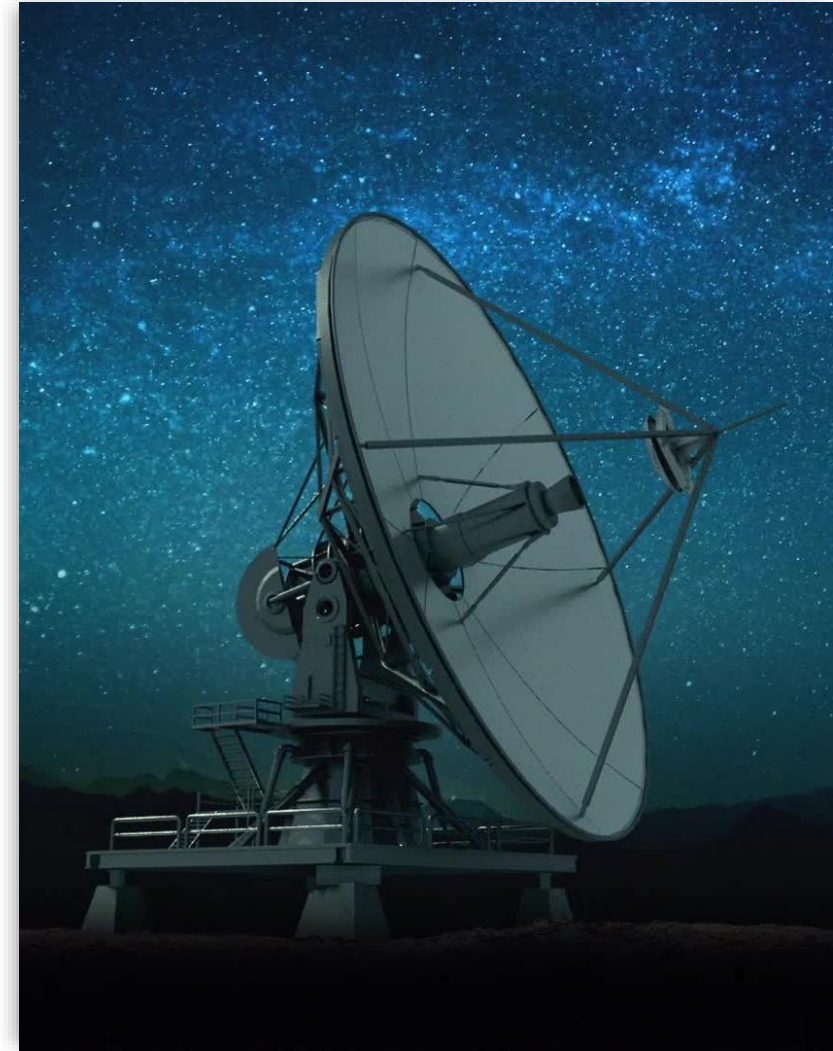
*b. **guarantee** that damage to persons and property is avoided as far as possible during space operations;*

*c. **contribute** to ensuring that:*

*1. space activities (Art. 3, let. c) are **viable** [FR: viables; DE: nachhaltig; IT: sostenibili] in the long term and that environmental impacts on Earth and in space are avoided,*

*2. long-term access to space for future generations and its peaceful use are **guaranteed**;*

*d. to establish **competitive framework conditions for private space companies** in international comparison, so that private space operations can develop optimally.*



III. B) Swiss space law

► Definitions (Art. 3)

space operation: the launch, positioning, operation, guidance, and control of a space object until its return to Earth, its complete disintegration in the atmosphere, or the return to Earth of any remaining fragments of said object after partial disintegration;

space object:

1. any object launched or intended to be launched into space that moves or is intended to move in an orbit around the Earth or other celestial bodies, or on a trajectory to reach destinations in deep space, or that is located on a celestial body, including its components and any fragments resulting from the destruction of said object,
2. the launch vehicle used to launch a satellite or other space object from Earth or the airspace into space;





III. B) Swiss space law

► Scope of Application (Art. 4)

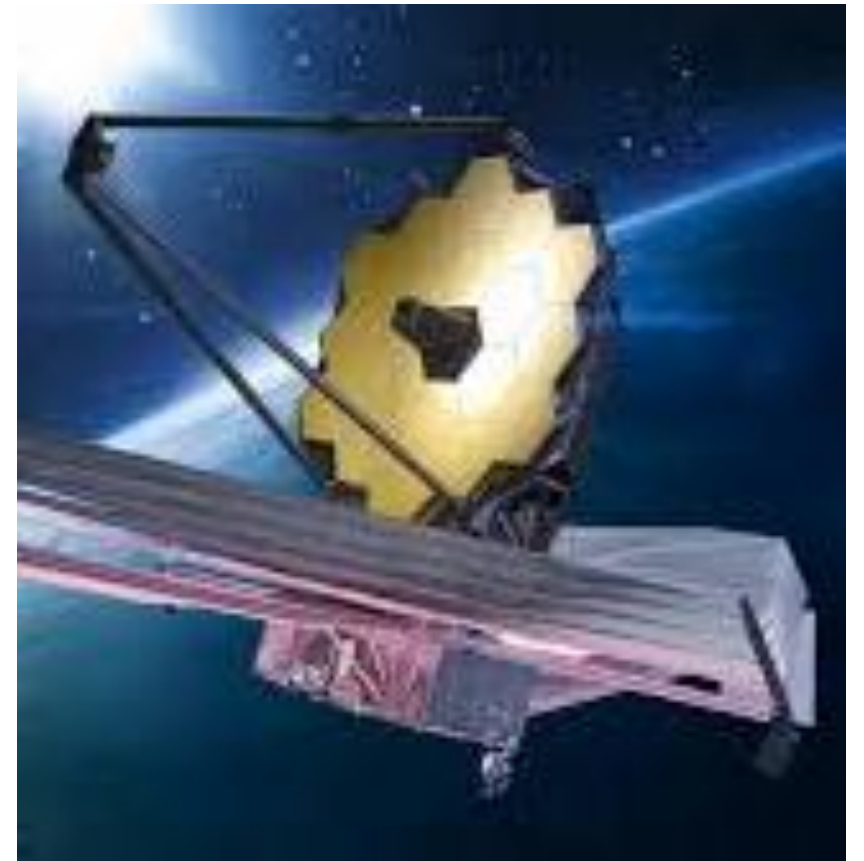
The Act applies to space operations that are carried out:

- a. on Swiss territory;*
- b. on ships, floating platforms, or aircraft registered in Switzerland;*
- c. outside Swiss territory by companies headquartered in Switzerland.*

III. National space laws and Swiss space law

► Application of Swiss Law to Space Objects (Art. 6)

Swiss law applies to space objects that, on the basis of a permit issued under this Act or an international agreement, are registered in the space register.





IV. Main practices in space contracts

► Cross-waiver of liability (e.g. ESA General Clauses and Conditions):

*The Parties shall have **no claim and no recourse** against each other and against the other Party's Sub-contractors, including the Agency's consultants and/or agents involved in the execution of the Contract (...).*

*The cross-waiver shall not be applicable in case a claim for injury to staff or damage to goods (...) is based on **gross negligence or willful misconduct** of the other Party.*

IV. Main practices in space contracts

► **Hold-harmless** (e.g. ESA General Clauses and Conditions):

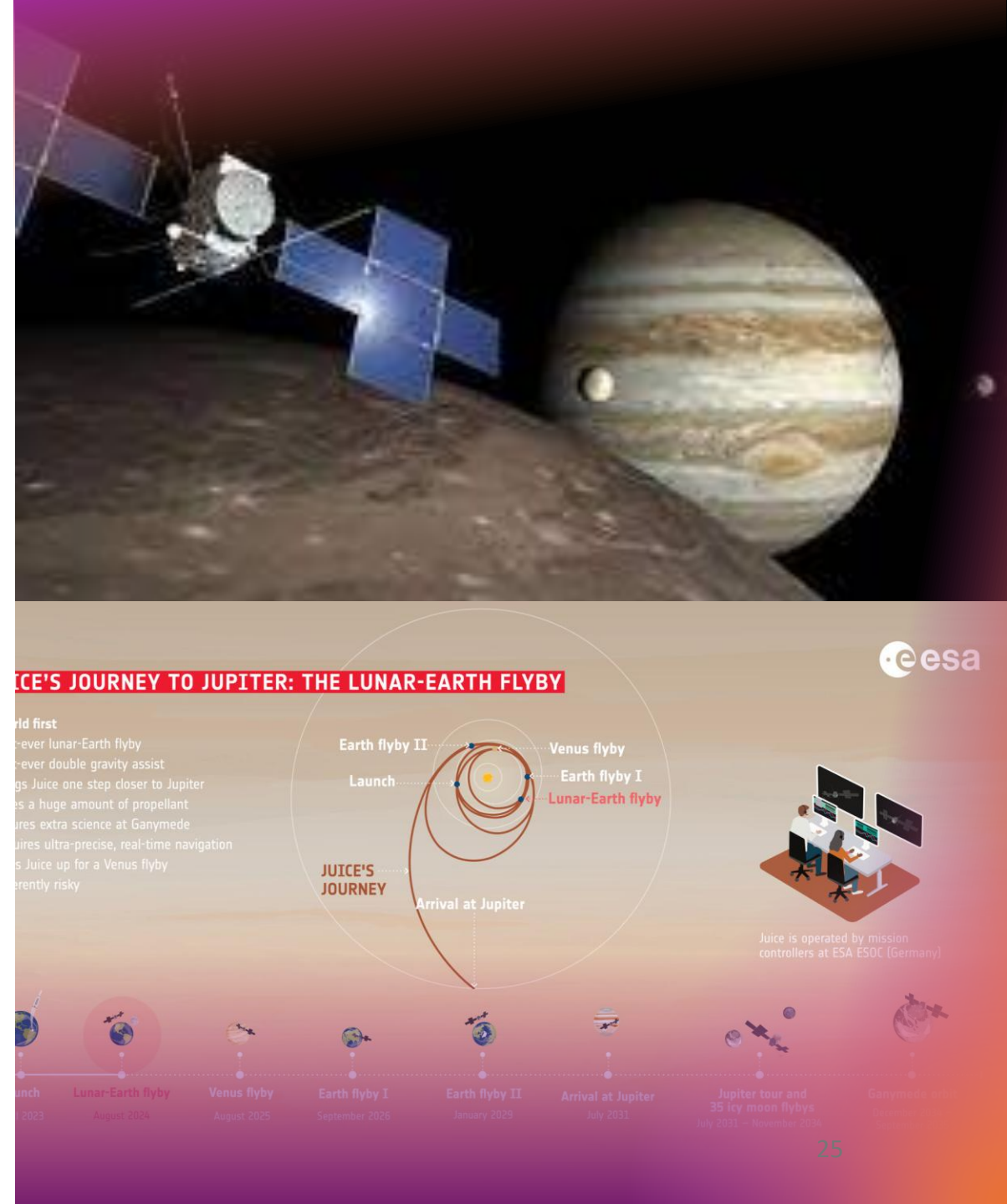
The Contractor shall indemnify and hold harmless and defend the Agency from all claims, damages, losses, and expenses (including legal fees and expenses) raised by its own and/or its Subcontractors' employees, involved in the execution of the Contract, against the Agency, for bodily injury, sickness or disease except in case of gross negligence or willful misconduct of the Agency.



IV. Main practices in space contracts

► Other common provisions:

- Insurance subrogation waiver
- Flow-down in the contractual chain
- Little warranty
- ITAR (US restriction on exportation)
- Particular care on Intellectual property rights (IPR)
- Arbitration for conflict resolution



V. Main principles of space debris mitigation

What?	Where?
1) Registration of space objects	Binding international law (Reg. Convention)
2) Authorization and continuing supervision	Binding international Law (OST)
3) No weapon of mass destruction	Binding international Law (OST)
4) Avoid potentially harmful interference and undertake appropriate international consultations → duty to coordinate and share orbital data?	Binding international Law (OST)
5) void intentional destruction and other harmful activities	Binding international law + Soft Law (guidelines, code of conduct, technical requirements, etc.)
6) Limit the long-term presence of spacecraft and launch vehicle orbital stages in the low-Earth orbit (LEO) region after the end of their mission → less than 25 years → less than 5 years (USA-FCC29/09/2022)	Soft Law (guidelines, code of conduct, technical requirements, etc.) Binding US national law USA-FCC29/09/2022 Binding international law in case such behavior would be qualified as a «fault»? (OST + SLC)

V. Main principles of space debris mitigation

What	Where
7) Limit debris released during normal operations	Soft Law (guidelines, code of conduct, technical requirements, etc.)
8) Minimize the potential for break-ups during operational phases	Soft Law (guidelines, code of conduct, technical requirements, etc.)
9) Limit the probability of accidental collision in orbit $\leq 1/10'000$.	Soft Law (guidelines, code of conduct, technical requirements, etc.)
10) Minimize potential for post-mission break-ups resulting from stored energy → passivation	Soft Law (guidelines, code of conduct, technical requirements, etc.)
11) Use nuclear source of energy for space object only for specific cases	Soft Law (Principles)
12) Space Sustainability Rating (SSR)	Practice in accordance with international soft law + UN recommendation