



Current Challenges in Space Law and Regulation

Governance and Ethics for new Frontiers (beyond Earth)

Patterns of Dialogue and factors influencing regulatory issues in space (as seen) between sovereign nations



Treaty-making era



**Impact of Policy
Directives - Back to the
Moon**



**post Millenium space
ecosystem - commercial
space- new frontiers -
cislunar and beyond**



**Interface to pressing
regulatory issues of access
to space, sustainability and
climate change**



Image Source: Artur Debat

I. Legal tensions

The five space treaties and the principles enshrined within them provide the fundamental frame-work for the **peaceful use and exploration** of outer space. Nevertheless, the rapid evolution of space activities, encompassing **commercial enterprises, artificial intelligence in space activities,** and human life beyond Earth, **require a comprehensive and consistent interpretation of these provisions.** Resilience and security have become absolute requirements in field driven by dual use and increasing interdependencies between civilian and (non-reactive) military sectors.

Current issues under Space Treaty law

- Key principles remain enshrined in **1967 Outer Space Treaty** (equal access, peaceful, state responsibility, non-weaponisation, non-contamination)
- **BUT no formal binding principles** against deterioration of outer space environment
- Outer space environment lacks **legal personality**
 - Debris as well as deterioration of upper atmosphere through re-entries
- Concept of **due regard** (next era of lunar activities)
- Standards for **planetary protection**
 - Incl. Moon and other celestial bodies (lunar graveyard??)
 - Committee of Space Research, COSPAR



First Era: Five UN Space Treaties (1963-1979)
Second Era: trend towards GA Resolutions and institutional Guidelines (1980's-2010)
Third Era: accommodating ISAM, SSA, STM, cislunar habitats, lunar resources, sovereign security, resilience, along side deep-space exploration

01

Outer Space Treaty 1967
preceded by GA Declaration of Legal Principles 1963

02

Rescue and Return Agreement 1967

03

Convention on International Liability for Damage from Outer Space Activities 1973

04

Registration Convention 1974

05

Moon Agreement 1979

06

Change in trends towards consensus building

07

Long-term sustainability Guidelines LTSG

08

Debris Mitigation Guidelines 2010

Importance of the Existing Framework

- The five space treaties still form the bedrock for the **comprehensive and coordinated regulation** of outer space exploration
- The accusation of “**outdatedness**” often levelled against the space treaties is **incorrect**; they are **not outdated** in the establishment of comprehensive rights and obligations
- **Evoluteive interpretation required** to account for the new – endangered - space environment





Image Source: Arthur Peabat

II.

National space legislation

Level playing field – national space law (statute)

Art VI OST

“Global competition between legal orders”

?

Providing for sophisticated regulatory systems - proficient agencies - efficiency - transparency

- **USA**
- For **NASA procurement**, see <https://www.nasa.gov/procurement/>
- **LSC Side Meeting: Getting to Yes: How the United States Proposes to Authorize New Commercial Activities in Space**
- **France** (Space Summit 9-10.09.2026)

Europe - ESA, EU and respective member states

- **European Space Agency ESA.**
 - Programmatic & research funding
- **EU**
 - R&D funding, plus own space programmes
 - Draft EU Space Act?
- **Sovereign capabilities of e.g.**
 - Germany
 - Scandinavian countries (NO, S, Dk)
 - UK
 - Austria
 - Italy etc.

Focus on authorisation of space activities; technical requirements; Ongoing supervision?

- **Germany:** Specialist space data security statute in German law; draft national space law underway (WRG)
- **France:** *Loi spatiale* 2008 and accompanying regulations (LOS); strong focus on technical standards
- **Great Britain:** UK Space Industry Act 2018 and Regulations; Space Industries (Indemnity) Act 2025 Act; Outer Space Act 1986
- **USA.** various provisions, predominantly *Commercial Space Launch Act* 2015, as revised
- **20+** nations with statutes transposing space treaties into national law; varying degrees; divergencies at national level





III. UN COPUOS STSC and LSC



- Agendas e.g.
 - Space2030
 - Sustainability
- **Operationalising space sustainability** through global space law project
- Legal and policy aspects of **space traffic management** (STM)
- SSA
- Governance and International Cooperation in the Context of **Lunar Activities**
- Challenges for **dark and quiet skies**

= Managing an evolutive and multilateral framework

- **Implementation and application** of the existing frameworks
 - Long-Term Sustainability Working Group
 - Five Treaties Working Group
 - WG on Legal Aspects of Space Resource Activities
- **New processes** to account for emerging opportunities and challenges
 - Action Team on Lunar Activities Coordination (ATLAC)
 - Pact for the Future





Image Source: GDIT / Getty Images

IV. Elements of the evolving framework

The emerging new challenges in implementation are vast, ranging from **international standardization**, **licensing regimes**, **planetary protection**, **insurance** and **risk management**, to the role of **AI** in space governance.

PLUS: ensuring **security** and **resilience**

a) International standard setting

- Way forward through technical regulation
- Ranging from **IADC; ITU; debris mitigation** guidelines to **various other bodies and soft law**
- ISO standard 24113 on Space Systems
- **Level of frustration visible in litigation and complaints** initiated by various, i.a.
 - International Astronomical Union (IAU);
 - Dark and Quiet Skies
 - See also, submissions in form of CPRs at STSC;



b) EU Draft Space Act and the outer space environment

- Art 4(3)e T.E.U.: **EU general environmental competence**
- Approval of space activities and requirement to **assess pollution in advance** of agreeing technical standards and securing licensing equivalences with third countries
(Art.6; Art 105 Space Act).
- Space debris, not recognised by international space treaty law, is noted in the **definitions clause Art. 5.45 of Draft Act** . It is residual particle waste from spacecraft debris.
- Consideration to be given to **independently validated international standards** (see above, ISO)
- **Harmonising standards for all operating in EU**
- **Current amendments incl. foreign inward investment control**



c) Harmful interference: Relevant ITU provisions (jamming/spoofing)



Article 45 of the ITU Constitution: “...All stations, .. must be established and operated ...s not to cause harmful interference to the radio services or communications of other Member States or of recognized operating agencies, or of other duly authorized operating agencies which carry on a radio service, and which operate in accordance with the provisions of the Radio Regulations.”



Article 47 of the ITU Constitution: “to take the steps required to prevent the transmission or circulation of false or deceptive distress, urgency, safety or identification signals, and to collaborate in locating and identifying stations under their jurisdiction transmitting such signals.”



RR No. 15.28: Recognizing that transmissions on distress and safety frequencies and frequencies used for the safety and regularity of flight (see Article 31 and Appendix 27) *require absolute international protection and that the elimination of harmful interference to such transmissions is imperative, administrations undertake to act immediately when their attention is drawn to any such harmful interference.*”

d) Detecting Interference?

- **Response time:** Spoofed systems have longer Time of arrival (ToA) than unaltered system
- **Electronic warfare**, besides in Ukraine war, is currently most notable in Baltics from neighbouring state; First reported case July 2025 Ukraine
- **Immense and intense impact on navigation, aviation and maritime:** *“AIS is a key maritime safety system used to track vessel movements. Nearly 100 naval ships may have had their AIS position altered, environmental groups SkyTruth and Global Fishing Watch found.”*
- ICAO Working Paper: “MITIGATING GNSS VULNERABILITIES IN AVIATION: STRENGTHENING RESILIENCE AND OPERATIONAL CONTINUITY”
- **EU measures**, The Cybersecurity Act 2 - COM(2026) 11, 20.1.2026.
- **NIS2 update**; Critical infrastructure Directive CFI 2022/255 still in force
- **Jamming-resistant technology**



e) Artificial Intelligence in Space Operations

- **Increasing usage of AI** in space exploration, both in upstream and downstream applications
 - **Issue of Liability:** lack or opaqueness of “meaningful human control”
 - **Issue of Responsibility:** “authorization and continuing supervision” in Art VI OST
- No need for new treaty, but **implementation guidelines** for existing principles



f) Challenges of Space Commercialization

- Space exploration is increasingly **congested**, **contested**, and **commercialized** (C³)
- Need for a **comprehensive Commercial Framework** building on existing standardization systems known in other areas of private international law (feasible for e.g. STM)
- “**Smart law**” approaches (contracts) could integrate AI and automated governance tools to facilitate adaptability in multi-jurisdictional environments
- New commercial code for ISAM/ISOS?





V. Further thoughts

- Host of highly relevant bi- and multilateral agreements (Artemis, Gateway, inter-Agency etc)
- Holistic approach to regulation and use of outer space,
 - from new space operations, private sector engagement,
 - Emerging ethical, environmental, and liability concerns.
- Art IX OST due regard
- Upper atmospheric metallic pollution
- Cf. Advisory Opinion ICJ

Environmental Impact of Space on Earth

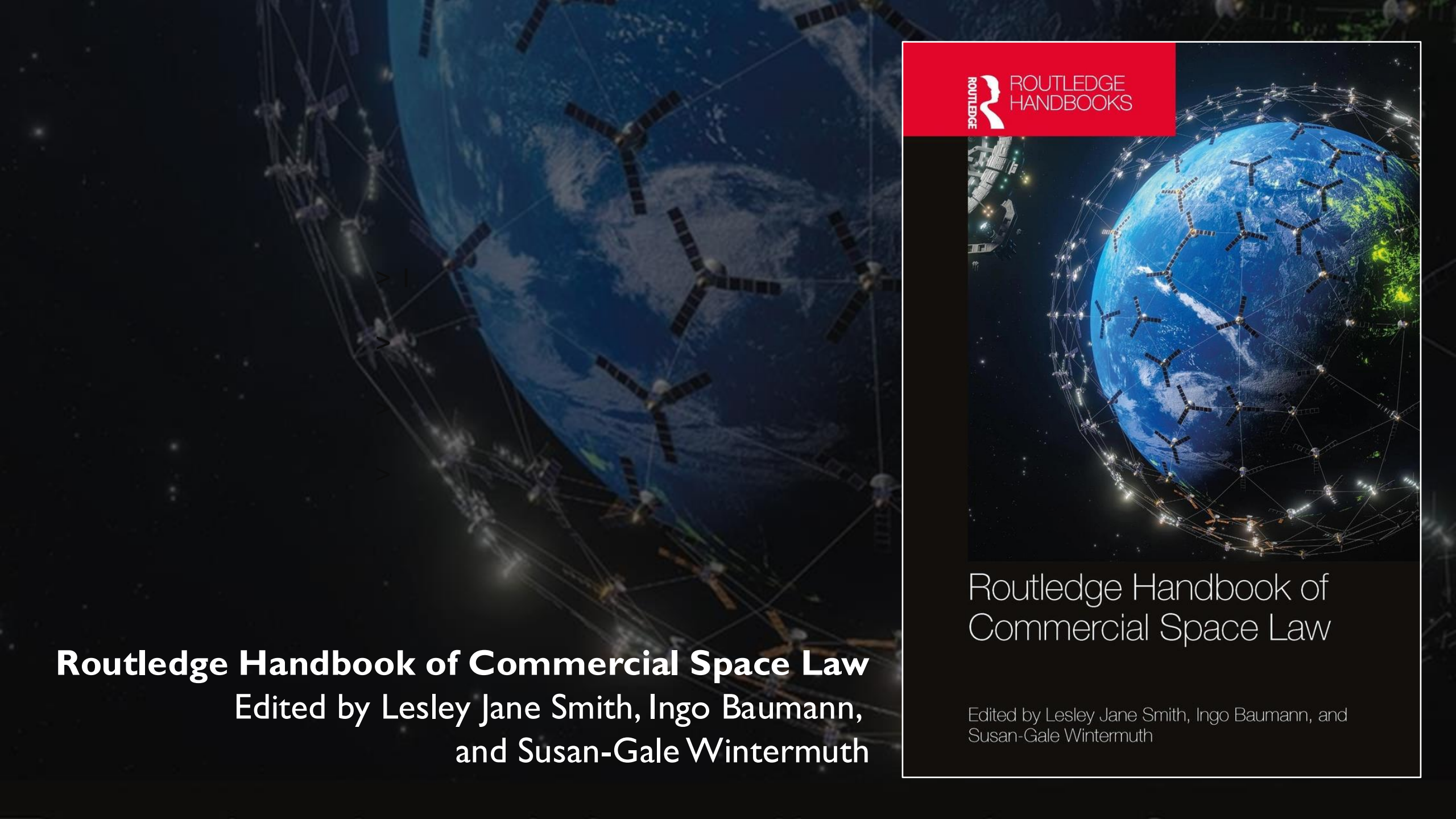
- Space data is **fundamental** to fighting climate change and improving life on Earth
- Environmental impact of *inter alia*, space launches poses an **unsolved problem, despite ongoing efforts towards re-use**
- Need for **equitable and universal accessibility** of earth observation data for effective monitoring and assessment
 - Recognition of EO Data as **Common Heritage of Mankind**, as next moot step



NB: General Principles of Customary International Law

- Breach of a **legal obligation** beyond treaty law possible
 - International Customary Law (**Art 38 (1) (b)** ICJ Statute)
 - General Principles of law (**Art 38 (1) (c)** ICJ Statute)
- Climate protection only now becoming classified as *ius cogens*
 - ICJ Advisory Opinion July 2025: **Obligations of States in respect of Climate Change**
- **Equitable burden-sharing regimes** for greenhouse gases (GHG) reduction





Routledge Handbook of Commercial Space Law

Edited by Lesley Jane Smith, Ingo Baumann,
and Susan-Gale Wintermuth



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Susan-Gale Wintermuth



Space Law: Cutting Edge Issues in Space Governance

International Institute of Space Law

London, 1st October

<https://www.aerosociety.com/events-calendar/iisl-space-law-conference/>