European Integration Studies, Volume 20, Number 2 (2024), pp. 213-240.
https://doi.org/10.46941/2024.2.9

KATARZYNA MALINOWSKA**

Space defence legal regime in the service of sustainable development**

ABSTRACT This article examines the challenges and opportunities of military space activities in the context of the sustainable development of space exploration. It investigates the legal frameworks governing military use, focusing on the need for regulations to address risks such as space debris caused by anti-satellite testing, as well as space governance issues. It analyses the role of international, regional (EU), and national laws and policies in achieving a sustainable and responsible exploration of outer space. The role of international and regional bodies such as the UN and EU in achieving sustainability goals is analysed in terms of the synergy between civil and military uses of space.

KEYWORDS: space militarisation, space law, sustainability, responsible behaviour, EU space law, space defence strategy.

1. Introduction

An increasing number of nations are incorporating space into their defence strategies, as evidenced by the intensifying deployment of military satellites. By the term "military use of space", the author means its use for purposes permitted by international law (i.e. security and defence purposes), excluding the offensive use of space. However, among space's military purposes, this study analyses aspects of space use that, although not explicitly prohibited by international law, raise numerous ethical and legal questions, such as those concerning anti-satellite (ASAT) tests.

As military space operations escalate, so do the accompanying challenges. Chief among these is navigating the application of space laws to

** University Professor, Director of the Centre for Space Studies, Leon Kozminski University, Poland. katarzynamalinowska@kozminski.edu.pl.
This article came about within the framework of Academic Excellence Hub – Digital Justice Center carried out under Initiative of Excellence – Research University at the University of Wrocław.
** The research and preparation of this study was supported by the Central European Academy.

governmental military activities and, by extension, adhering to sustainability principles outlined in international agreements and domestic space regulations. Key concerns include conducting ASAT tests and properly registering military space assets.[1] The intersection of military operations in outer space with sustainability concerns presents a multifaceted dynamic that merits careful examination. While initially appearing akin to civilian applications, the military's involvement introduces unique considerations. Depending on the perspective adopted, the escalating military utilisation of outer space may be construed as either a formidable challenge or an opportunity to bolster sustainability within the space domain.

The challenges concern the application of space regulations and standards. Although commercial operators are subject to routine adherence to established rules, the regulatory landscape governing military space activities is more obscure. Interpretations of regulations often hinge on the specific requirements and priorities of spacefaring nations, leading to ambiguity in their application.[2] Thus, the goal of sustainability may face mounting obstacles. Specifically, a growing challenge is presented by regulatory frameworks, prompting questions regarding the integration of military elements into space law and their alignment with established principles. Furthermore, rapid advances in military and defence applications for space exploration raise governance concerns at the international, national, and (for Europe) regional levels, including within the EU framework.

Sustainability has recently emerged as a pivotal principle guiding space strategies, laws, and legal endeavours. This principle finds expression at various levels, including in the UN, the EU, and national space strategies and legislation enacted in recent years. The concept of sustainable development in outer space extends to both civilian and military applications, although current legal frameworks emphasise requirements for commercial operators. Whereas this alignment with civilian laws seems intuitive, uncertainties arise concerning the military utilisation of outer space, which is often excluded from conventional licensing regimes, leading to questionable adherence to technical standards aimed at mitigating space debris and ensuring overall sustainability in space exploration. Consequently, international space law exhibits significant gaps concerning

[1] Jakhu et al., 2018.

[2] For example, the notion of the peaceful exploration of outer space and military purposes. See Lyall and Larsen, 2018.

military activities in space, particularly from the sustainability perspective. One such gap pertains to the application of sustainability principles to both civil and military space exploration. To address that gap, sustainability has been introduced into soft law measures, such as the UN Guidelines for long-term sustainability, indicating the need for a careful consideration of its application to military space activities.

The proliferation of space activities in the context of defence and security entails the institutionalisation of activities and the separation of responsibilities between bodies that govern military and commercial space matters. This proliferation, especially at the national level, may affect how norms of responsible behaviour are applied.

The doubts and gaps described above raise several fundamental questions. What is the roadmap for applying sustainability postulates to the military use of space, and how can these postulates be made enforceable? How can the challenges of making military activities sustainable be turned into an opportunity leading to enhanced peace and security?

This issue has several important dimensions. This article focuses on three. First, it discusses ASAT tests, their permissibility, and the efforts made to stop them at the international and European levels. Second, it discusses the regime for space activity licensing and its inclusion of military space activities, focusing on the international and national levels of space law. Finally, the article discusses the governance of military space activities and the role of space agencies. The analysis investigates international and national "hard laws", as well as acts of political will in areas not covered by binding laws. International initiatives are also considered, with their potential to shape international standards, good practices, and binding custom (as a source of international law).[3]

2. Sustainability defined and why it concerns military space activities

It is essential to examine the concept of sustainability within the current legal framework to determine its potential applicability to military space endeavours. If it is deemed applicable, the next step is to ascertain how this objective can be enforced effectively.

Sustainability is a mature concept, though not yet embedded in all sectors of industry. It was used initially in relation to environmental issues, but its scope has always been much broader. It was popularised by the 1987

[3] Art. 138 of the statute of the ICJ.

Brundtland Report, "Our Common Future", and the 1992 UN Conference on Environment and Development (the "Earth Summit"). The Brundtland Report asserted the need for the integration of economic development, environmental protection, and social justice and inclusion.[4]

The report described sustainable development as the pursuit of development that fulfils the requirements of the current generation while safeguarding the capacity of future generations to satisfy their own needs. It encompassed two fundamental concepts: the notion of "needs", prioritising the basic needs of the impoverished global population; and a recognition of the constraints imposed by technological advancements and societal structures on the environment's capacity to meet both current and future needs. A comparable concept has been embraced by the EU, as outlined in the Strategy for Sustainable Development: Sustainable development means that the needs of the present generation should be met without compromising the ability of future generations to meet their own needs. […] It is about safeguarding the earth's capacity to support life in all its diversity and is based on the principles of democracy, gender equality, solidarity, the rule of law and respect for fundamental rights, including freedom and equal opportunities for all. It aims at the continuous improvement of the quality of life and well-being on Earth for present and future generations.[5]

The common principles of sustainable development have been recognised as inherently related to environmental limits and comprised of integrated decision making (policy and legislation working complementarily); good governance that is democratic, transparent, inclusive, participatory, and accountable; and the responsible use of robust and credible scientific evidence in decision-making. Of particular interest is the concept of boundaries, which represent global Earth systems and processes within which there is a safe living space for humans and wildlife. It is argued that overstepping one or more of these boundaries could create a tipping point by which the global Earth system would shift to a permanently less-hospitable state. There are nine recognised thresholds, but none relates

[4] The Earth Summit was followed by such revolutionary documents as the Rio Declaration. It contained 27 principles of sustainable development, including the precautionary and polluter pays principles, Forest Principles, the Convention on Biological Diversity, and the Framework Convention on Climate Change, as well as Agenda 21, which was a voluntary SD plan of action for implementation by national, regional, and local governments; Pisani, 2006; Bohlmann and Petrovici, 2019.

[5] The Renewed EU Sustainable Development Strategy as adopted by the European Council on 15/16 June 2006, Brussels, 26 June 2006, 10917/06.

directly to space.[6] It was therefore considered necessary to design an architecture of sustainability that would respond to the specificities of space exploration.

The notion of sustainable development for the space domain aims to provide a response to the burgeoning growth of the space sector. Consequently, it should encompass both the civilian and military utilisation of outer space. The primary assertion made during the Stockholm Conference in 1972, albeit focusing on Earth's environment, is relevant for the repercussions of the human exploitation of Earth's orbits:

A point has been reached in history when we must shape our actions throughout the World with a more prudent care for their environmental consequences. Through ignorance or indifference, we can do massive and irreversible harm to the earthly environment on which our life and well-being depend. Conversely, through fuller knowledge and wiser action, we can achieve for ourselves and our posterity a better life in an environment more in keeping with human needs and hopes. To defend and improve the human environment for present and future generations has become an imperative goal for mankind.[7]

The first works on the sustainability concept applied the outer space exploration were undertaken a few years ago, along with active debris removal initiatives.[8] Though their ideas are unstructured, space stakeholders have started considering how to stop and reverse the exploitation of outer space without due regard to future generations. An analysis of the attempts to regulate this issue in the space sector reveals numerous documents that focus on space debris. The concept of the sustainable use of outer space can be found in the Outer Space Treaty[9]: art. I establishes outer space as a province of mankind; art. III imposes an obligation to act in accordance with

[6] These are as follows: climate change, change in biosphere integrity (biodiversity loss and species extinction), stratospheric ozone depletion, ocean acidification, biogeochemical flows, land-system change (e.g. deforestation), freshwater use, atmospheric aerosol loading (microscopic particles in the atmosphere that affect climate and living organisms), and the introduction of novel entities (e.g. organic pollutants, radioactive materials, nanomaterials, micro-plastics); Sustainability Guide, *Planetary Boundaries*, [Online]. Available at: https://sustainabilityguide.eu/sustainability/planetary-boundaries/ (Accessed: 30 April 2024).

[7] United Nations, as quoted in Pisani, 2006, p. 91.

[8] Toussaint and Dumez, 2022.

[9] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies (1967) [referred to as "Outer Space Treaty"].

international law, including the Charter of the United Nations, in order to maintain international peace and security and promote international cooperation and understanding; and art. IX makes the environmental protection of outer space integral to the implementation of all space activities:[10]

State Parties shall pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter.

Art. III appears pertinent to the concept of sustainability, though it is not mentioned. The earliest document that explicitly addresses sustainable development as an imperative seems to be the European Code of Conduct, proposed in 2004. It sought to foster an understanding among the public of the gravity of the threat and the need to ensure sustainable development in near-Earth space. Although unsuccessful, it marked the inception of discussions regarding the necessity for cohesive measures in this regard. No definition of "sustainability" was provided by the draft Code of Conduct, the Space Debris Mitigation Policy for Agency Projects adopted by the European Space Agency (ESA) on March 28, 2014,[11] the Space Debris Mitigation Guidelines issued by the Inter-Agency Space Debris Coordination Committee (IADC),[12] the COPUOS 2010 Space Debris Mitigation Guidelines,[13] or Recommendation ITU-R S.1003.2 on the environmental protection of the geostationary-satellite orbit S series.[14] Nevertheless, the direction set in those documents gradually led to a more comprehensive approach (i.e. beyond just space debris) taken by the UN and European and national legislators.

The first international-level document that directly addressed the concept of sustainability seems to be the proposal of the Committee on the Peaceful Uses of Outer Space, adopted at the 59th session (June 8–17, 2016),

[10] Yang, 2023, p. 4.

[11] ESA/ADMIN/IPOL(2014)2, [Online]. Available at: https://www.iadc-home.org/documents_public/file_down/id/4150 (Accessed: 30 April 2024).

[12] IADC, Available at: https://orbitaldebris.jsc.nasa.gov/library/iadc-space-debris-guidelines-revision-2.pdf (Accessed: 30 April 2024).

[13] UNOOSA, [Online]. Available at: https://www.unoosa.org/pdf/publications/st_space_49E.pdf (Accessed: 30 April 2024).

[14] Recommendation ITU-R S.1003.2 (ITU), [Online]. Available at: https://www.itu.int/dms_pubrec/itu-r/rec/s/R-REC-S.1003-2-201012-I!!PDF-E.pdf (Accessed: 30 April 2024).

which provided the first set of guidelines and a renewed work plan for the Working Group on the Long-term Sustainability of Outer Space Activities of the Scientific and Technical Subcommittee.[15] This was followed by the Guidelines for the Long-term Sustainability of Outer Space Activities, which define sustainability as the ability to maintain the conduct of space activities indefinitely into the future in a manner that realizes the objectives of equitable access to the benefits of the exploration and use of outer space for peaceful purposes, in order to meet the needs of the present generations while preserving the outer space environment for future generations.[16]

The guidelines are based on the idea that the interests and activities of states and international intergovernmental organisations in outer space, insofar as they have or may have implications for defence or national security, should be consistent with the preservation of outer space for peaceful exploration and use, as well as with its status under the Outer Space Treaty and relevant principles and norms of international law.[17] That idea became the main concept governing the modern regulation of space activity. Although none of these documents mentioned military space activities explicitly, neither did they exclude them or limit their application to civil space exploration. They may and should exert considerable influence in those domains. It is imperative to ascertain their applicability to military activities and determine whether there is any reason to exempt such activities from these regulations, should they acquire the force of customary law.

---

[15] These guidelines were followed by Resolution No. 75/36 of 7 December 2020, A/RES/75/36, where the UN COPUOS expressed a 'desire that all Member States reach a common understanding of how best to act to reduce threats to space systems in order to maintain outer space as a peaceful, safe, stable and sustainable environment, free from an arms race and conflict, for the benefit of all, and consider establishing channels of direct communication for the management of perceptions of threat'.

[16] COPUOS, Guidelines for the Long-term Sustainability of Outer Space Activities, 27 June 2018, 5A/AC.105/2018/ CRP.20. It must be noted that the guidelines are voluntary and not legally binding under international law, but any action taken towards their implementation should be consistent with the applicable principles and norms of international law. [Online]. Available at: https://www.unoosa.org/documents/pdf/PromotingSpaceSustainability/Publication-_Final_English_version.pdf (Accessed: 30 April 2024).

[17] See the Report and Annex II thereto on LTS. [Online]. Available at: https://www.unoosa.org/res/oosadoc/data/documents/2019/a/a7420_0_html/V1906077.pdf (Accessed: 30 April 2024).

The Guidelines cover several of the most important aspects of space exploration that impact sustainability. Those relevant to military space operations include the guidelines enumerated in Table 1.

Table 1 *Extract from the Guidelines of long-term sustainability of Outer Space (LTS) (by author, on the basis of LTS Guidelines)*

Guideline A.1	Adopt, revise, and amend, as necessary, national regulatory frameworks for outer space activities: "States should adopt, revise or amend regulatory frameworks to ensure the effective application of relevant, generally accepted international norms, standards and practices for the safe conduct of outer space activities"
Guideline A.2	Consider a number of elements when developing, revising, or amending, as necessary, national regulatory frameworks for outer space activities
Guideline A.5	Enhance the practice of registering space objects
Guideline B.8	Design and operate space objects regardless of their physical and operational characteristics
Guideline B.9	Take measures to address risks associated with the uncontrolled re-entry of space objects
Guideline B.10	Observe measures of precaution when using sources of laser beams passing through outer space

One of the most recent document worth citing with respect to sustainability is the Opinion of the European Economic and Social Committee.[18] It asserts that the management of space traffic, including debris, is the highest priority and calls for the implementation of a space

[18] Opinion of the European Economic and Social Committee on the Proposal for a Regulation of the European Parliament and of the Council establishing the Union Secure Connectivity Programme for the period 2023–2027 (COM(2022) 57 final–2022/0039 (COD)) and Joint Communication to the European Parliament and the Council: An EU Approach for Space Traffic Management–An EU contribution addressing a global challenge; (JOIN(2022) 4 final), *OJ C 486*, *21.12.2022*, pp. 172–184.

situational awareness system to ensure the long-term sustainability of space for all Member States. Finally, the plans of the EU Space Law (EUSL) are based on preserving the security, resilience, and sustainability of space activities and operations. The sustainability pillar of the EUSL aims to ensure the long-term sustainability of space operations and thus the EU's ability to rely on space as a key enabler of services and economic growth. This goes hand-in-hand with the Joint Communication of 10 March 2023, on an EU Space Strategy for Security and Defence to increase the security and resilience of space operations and services in the EU, as well as their safety and sustainability. An EU Space Act is being prepared with a view to promoting the development of resilience measures in the EU, information exchange for significant incidents, and cross-border coordination and cooperation.[19]

As the preceding analysis shows, the concept of sustainability is not tied to a specific category of space activities, but applies equally to both civilian and military utilisation. However, certain activities pose greater threats to sustainability goals than others. A prime example is the ASAT testing conducted by governments of spacefaring nations, which are inherently linked to military operations in outer space. Military space missions have followed a distinct trajectory for a long time, existing outside established regulatory frameworks. This trajectory is encapsulated in the remarks of a US Secretary of Defense, who said "for decades, the U.S. military conducted space activities with little regards for how they polluted orbits with debris that posed threats to existing and future space-based assets", and in the past, the focus was primarily on achieving military objectives, with not much consideration given to the long-term sustainability of the space environment.[20]

Based on what it had learned, the United States became the first country to adopt a moratorium on the destructive testing of direct-ascent anti-satellite missile systems in April 2022. In July 2021, the US Department of Defense adopted the "Tenets of responsible behaviour in space" in a Memorandum for Secretaries (of 7.07.2021), which include limiting the creation of long-lasting debris. The Tenets include the following: operating in, from, to, and through space with due regard to

[19] Cesari, Developing an EU Space Law: the process of harmonising national regulations, [Online]. Available at: https://www.mcgill.ca/iasl/article/developing-eu-space-law-process-harmonising-national-regulations (Accessed: 30 April 2024).
[20] Erwin, 2023.

others and in a professional manner; limiting the generation of long-lived debris; avoiding harmful interference; maintaining a safe separation and trajectory; and communicating and providing notifications to enhance the safety and stability of the domain.[21]

3. ASAT tests and sustainability

One of the most pertinent issues related to the sustainability of outer space activities are ASAT tests.[22] ASATs are space weapons designed to target, destroy, disable, or impair satellites. These systems can be directed towards both military and civilian satellite networks, serving both offensive and defensive purposes. [23] The technology can also be employed for ballistic missile defence purposes. [24] There are two main types of ASATs: kinetic and non-kinetic. Kinetic systems utilise direct ascent methods, employing ballistic missiles to propel an interceptor onto a trajectory to destroy the target through sheer kinetic force. By contrast, space-to-space co-orbital systems (i.e. the non-kinetic type) require a space launch vehicle to position an interceptor in orbit, which then collides with or passes by the target, utilising explosives to destroy the target. Another category of anti-satellite weapon employing "directed energy" in the form of laser beams, sub-atomic particles, radio frequencies, or microwave generators may emerge in the future and play a significant role.[25]

[21] Memorandum for Secretaries of the military departments Chairman of the Joint Chiefs of Staff under Secretaries of Defense Chiefs of the military services, Commanders of the Combatant Commands, General Counsel of the Department of Defense, Directors of Defense Agencies of 7th July 2021. Although the Tenets seem to be in line with the postulates of sustainability, some differences in approach should be noted. They concern the notion of "responsible behaviour" and its content in relation to space debris mitigation (i.e. the Memorandum's focus on limiting the generation of long-lived debris, rather than all debris).

[22] Bittencourt, 2013; Cassotta, 2019; Williams, 2008; Cuddihy, 2000.

[23] Towards ASAT Test Guideline, [Online]. Available at: https://unidir.org/wp-content/uploads/2023/05/en-703.pdf (Accessed: 30 April 2024).

[24] U.S. Congress, Office of Technology Assessment, Chapter 5: ASAT Arms Control: History in: "Anti-satellite Weapons, Countermeasures and Arms Control: Summary", U.S. Government Printing Office, Washington 1984, p. 94, [Online]. Available at: https://www.princeton.edu/~ota/disk2/1985/8502/850207.PDF (Accessed: 30 April 2024).

[25] Kinetic ASATs must physically strike an object in order to destroy it. Examples of kinetic ASATs include ballistic missiles, drones that drag an object out of orbit or detonate explosives in proximity to the object, and any item launched to coincide with the passage of a target satellite. Thus, any space asset, even a communications satellite, could become an

ASAT tests have been conducted by four countries (the Russian Federation, the United States, China, and India), who have conducted approximately 80 tests in total. Comprehensive studies mapping the proliferation of various types of ASAT weapons show that numerous states possess kinetic ASAT weapons designed to physically impact a target.[26] The United States, Russia, China, and India have conducted tests involving such weapons on their own satellites, resulting in the generation of significant space debris orbiting the Earth. Spacefaring countries have also developed other counter-space capabilities apart from the ASAT with potential military utility. These can be divided into five categories: direct-ascent, co-orbital, electronic warfare, directed energy, and cyber.[27] Among them, ASAT as a destructive counter-space capability seems to be the most important to assess from the sustainability point of view.

The primary outcome of ASAT tests is the generation of space debris. This exacerbates the risk of the Kessler syndrome, in which a high density of objects encircling the Earth increases the likelihood of collisions, with each collision generating additional debris, amplifying the risk of further collisions. Since the inaugural ASAT test in 1968, destructive tests have produced over 6,300 fragments of debris, as reported by the Secure World Foundation, which monitors developments in space security.[28]

However, the prevailing view of scholars is that the Outer Space Treaty and other binding space legislation do not prohibit ASAT tests. For

---

ASAT if it were used to physically destroy another space object. A non-kinetic ASAT can use a variety of non- physical means to disable or destroy a space object, such as frequency jamming, blinding lasers, or cyberattacks. These methods can also render an object useless without causing the target to break up and fragment, absent additional forces intervening. Strobeyko, 2019; Koplow, 2009, p. 1201.

[26] Peperkamp, An Arms Race in Outer Space? Atlantisch Perspectief, 44(4), [Online]. Available at: https://www.jstor.org/stable/48600572 (Accessed: 30 April 2024); Weeden and Samson (eds), 2020, Global Counterspace Capabilities Report, Secure World Foundation Available at: https://swfound.org/media/206955/swf_global_counterspace_april2020.pdf (Accessed: 30 April 2024); Harrisson, Space Threat Assessment, Center for Strategic & International Studies. [Online]. Available at: https://www.csis.org/analysis/space-threat-assessment-2020/ (Accessed: 30 April 2024).

[27] Secure World Foundation 2024, Global Counter Space Capabilities – Report [Online]. Available at: https://swfound.org/media/207826/swf_global_counterspace_capabilities_2024.pdf (Accessed: 30 April 2024).

[28] Op. cit.

example, Art. IV of the OST prohibits only the placement of nuclear weapons in space. There is also no prohibition against testing, developing, or deploying (nuclear) weapon systems for use in space or against space objects. However, in view of the destructive effects of ASATs, work has begun to stop their deployment. In this context, the UN General Assembly Resolution and the moratorium announced by the United States should be mentioned in particular.[29]

In April 2022, the United States announced a unilateral moratorium and pledged not to test any more destructive direct ascent anti-satellite missiles. Vice President Kamala Harris announced that the United States commits:

…not to conduct destructive, direct-ascent anti-satellite (ASAT) missile testing, and that the United States seeks to establish this as a new international norm for responsible behaviour in space.

This commitment was followed by a call for other nations to make similar commitments and work together to establish this as the norm, arguing that such efforts benefit all nations. Since then, several countries have made pledges, beginning with Canada in May 2022 and most recently Costa Rica and Norway in October 2023, bringing the total number of participating countries to 37.

Soon after the Moratorium, on 7 December 2022, the UN General Assembly adopted Resolution A/RES/77/41 in support of a moratorium on destructive DA-ASAT testing.[30] The Resolution does the following:

1. Calls upon all States to commit not to conduct destructive direct-ascent anti-satellite missile tests.
2. Considers such a commitment to be an urgent, initial measure aimed at preventing damage to the outer space environment, while also contributing to the development of further measures for the prevention of an arms race in outer space.
3. Calls upon all States to continue discussions in the relevant bodies and to establish and develop further practical steps that could be taken, in order to

[29] Wei Sooi, WSF, Direct-Ascent Anti-Satellite Missile Tests: State Positions on the Moratorium, UNGA Resolution, and Lessons for the Future, [Online]. Available at: https://swfound.org/media/207711/direct-ascent-antisatellite-missile-tests_state-positions-on-the-moratorium-unga-resolution-and-lessons-for-the-future.pdf (Accessed: 30 April 2024).

[30] In total, 155 states voted in favour, with 9 voting against and 9 abstentions. Notably, the United States, India, China, and Russia are the only states that have demonstrated a destructive direct-ascent anti-satellite missile capability.

enable risk reduction, prevent conflict from occurring in outer space and prevent an arms race in outer space; such steps could include, inter alia, transparency and confidence-building measures and additional moratoriums, which could contribute to legally binding instruments on the prevention of an arms race in outer space in all its aspects.

Both these documents, although not legally binding and adopted voluntarily, represent significant developments, particularly given the broader context of stalemate in space security negotiations, such as those concerning the prevention of an arms race in outer space (PAROS).[31]

4. Role of national laws in promoting sustainable military space operations

ASAT testing, although one of the most important issues, is only a symptom of the broader problem, which concerns the overall regulatory framework for military space operations. In this respect, the words of Kamala Harris regarding the ASAT ban seem symptomatic:

Without clear norms we face unnecessary risk in space… The United States will work with commercial industry and allies to lead in the development of new measures that contribute to the safety, stability, security, and long-term sustainability of space activities. Through this new commitment and other actions, the United States will demonstrate how space activities can be conducted in a responsible, peaceful, and sustainable manner. It's an attempt to lead by example and demonstrate we're willing to make this commitment ourselves and then encourage others to follow.

These words should be applied not only to civil space activities but also to military ones. Although this seems obvious, it is not clear from the practices of States. Under Art. VI of the Outer Space Treaty, supervision and control through authorisation for space activities apply only to non-governmental activities: The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty.

Thus, the treaty does not oblige states to introduce norms for the authorisation and ongoing supervision of military (usually governmental) space operations. This gap may seem insignificant from a political and legal point of view, as States are liable and responsible for any damage caused by

[31] Sooi, 2023.

either governmental or non-governmental space missions. However, most space laws enacted by spacefaring nations are vague regarding the rules for conducting military space operations.

An example can be seen in the French approach to military space activities. France's Space Defence Strategy, announced in 2019, develops mainly through the competence of the respective authorities. Though well-established, French space law is focused on commercial applications and sets no requirements for governmental military space activities. Consequently, according to Article 26 of the French space law,[32] the law does not apply to the launch and control of space objects required for national defence, the trajectories of which pass through outer space, such as ballistic missiles. Moreover, the activities of the Ministry of Defence, acting as primary space-based data operator, are not subject to the provisions of Title VII (which means that they are not obliged to report their activities to the public administration).

Another example is US space law. The US Commercial Space Act adopted in November 2023 is aimed at regulating non-governmental space activities. Thus, military activities, such as efforts at preserving sustainability in space, are not subject to transparent regulations. The bill designates the Department of Commerce Office of Space Commerce (DOC/OSC) as the sole authority responsible for the authorisation and supervision certification process. It also grants the OSC sole authority and responsibility for making determinations and placing conditions on certifications to ensure compliance with international obligations. The military component of space activities is excluded from the application of the regulatory measures in the Act.

Circumstances are similar regarding space legislation in the United Kingdom, where significant strides have been made at the regulatory level. This progress began in 1986 with the adoption of the Outer Space Act 1986, which has since been amended by the Space Industry Act 2018 and complemented by the Space Industry Regulations of 2021.[33] The legal

[32] Law No. 2008-518 of June 3, 2008, regarding Space Operations (as amended by Law No. 2013-431 of May 28, 2013).

[33] The Spaceflight Activities (Investigation of Spaceflight Accidents) Regulations 2021 establish a spaceflight accident investigation body and provide for the conduct of accident investigations, [Online]. Available at: https://www.legislation.gov.uk/uksi/2021/793/contents/made (Accessed: 30 April 2024); the Space Industry (Appeals) Regulations 2021 outline the decisions made by the CAA that

framework established in the United Kingdom focuses on civilian and industrial space missions. Military space affairs fall under the jurisdiction of the Ministry of Defence, which operates a Space Directorate. This directorate collaborates closely with the UK Space Agency and is responsible for the MoD's space policy and international coordination. The United Kingdom's military space program is overseen by UK Space Command, which was established in April 2021 and given overall command and control functions.

Conversely, the distinctiveness of Russian space legislation lies in its explicit regulation of space activities conducted for defence and security purposes within the Russian Federation, as outlined in Article 7. Russia's Ministry of Defence is responsible for overseeing these activities, as well as coordinating with other ministries and departments to implement long-term programmes and annual plans for the development and utilisation of both military and civilian space technologies.

The examples discussed above show that it is crucial to recognise the disparity between the political commitments made by states on the international stage and their governance of military space missions at the national level. Although international declarations hold significant importance, they lack binding authority, whereas national laws enact regulations that increasingly impose sustainability obligations, primarily targeting civilian missions. This is achieved by confining space laws to non-governmental missions or by distributing responsibilities among various authorities at the governance level. A potential remedy for this gap could involve partially integrating military government space operations into the framework of technical safety regulations, thereby enhancing the sustainability of outer space exploration efforts.[34] This goal could be tackled through the forthcoming EU Space legislation, which constitutes one of the initiatives aimed at realising the objectives outlined in the EU Space and Defence Strategy. The concept of the EU space regulatory framework was introduced in late 2022 through a communication from the Social Economic Committee,[35] which stated that one of the main goals of establishing

may be appealed and set procedures and timescales for making and deciding appeals; https://www.legislation.gov.uk/uksi/2021/816/contents/made (Accessed: 30 April 2024).

[34] An example of such an approach may be seen in the Polish draft of the space law. Though it excludes governmental missions from authorisation and insurance obligations, it ensures that they are conducted in accordance with technical regulations.

[35] Opinion of the European Economic and Social Committee on the Proposal for a Regulation of the European Parliament and of the Council establishing the Union Secure

consistent space law for the whole EU is to enhance the level of security and resilience of space operations and services in the EU, as well as their safety and sustainability, the Commission will consider proposing an EU Space Law. It will encourage the development of resilience measures in the EU, foster information-exchange on incidents as well as cross-border coordination and cooperation.

Thus, safety and sustainability are directly related and should be extended to military space activities. With space recognised as a strategic domain, additional measures are required to fortify the EU's strategic posture and autonomy in space through regulatory interventions. Consequently, ongoing analysis and consultations aim to delineate the necessary scope of European space law. Preliminary considerations indicate a focus on safety, security, and sustainability. It is crucial to strike a balance between the civilian and commercial dimensions of space and the defence aspects of space activities, without encroaching upon the internal laws of Member States.[36]

Regarding regulatory approaches to military space operations at the international, regional, and national levels, it is important to recognise the significance of academic initiatives. For example, two manuals on warfare in the space domain are being developed by expert groups: the Woomera Manual on the International Law of Military Space Operations, led by the University of Adelaide and Exeter University;[37] and the Manual on International Law Applicable to Military Activities in Space (MILAMOS) by McGill University (Canada). Although these manuals lack strict enforceability, their influence is widely acknowledged, and they are relied upon by governments and armed forces. They have the potential to shape space policy and military doctrines and help prevent the hostile use of space weapons.

Connectivity Programme for the period 2023–2027 (COM(2022) 57 final — 2022/0039 (COD)) and Joint Communication to the European Parliament and the Council: An EU Approach for Space Traffic Management — An EU contribution addressing a global challenge; (JOIN(2022) 4 final), *OJ C 486, 21.12.2022, pp. 172–184.*

[36] See The Strategic Compass for Security and Defence and called for an EU Strategy for security and defence. [Online]. Available at: https://consilium-europa.libguides.com/strategic-compass/EUpublications (Accessed: 30 April 2024).

[37] The Woomera Manual On The International Law Of Military Space Operations, [Online]. Available at: https://law.adelaide.edu.au/woomera/system/files/docs/Woomera%20Manual.pdf (Accessed: 30 April 2024).

The MILAMOS, launched in May 2016, aims to develop widely accepted fundamental rules for the military use of outer space.[38] The authors state as follows:

The MILAMOS Project was initiated with a vision of contributing to a future where all space activities are conducted in accordance with the international rules-based order, without disrupting, and preferably contributing to, the sustainable use of outer space for the benefit of present and future generations of humanity.[39]

The Manual clarifies the application of international and national space laws to military space operations. Its provisions include the following:

Rule 109: All space activities, including military space activities, shall be carried on in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding.

Rules 110: A State may not rely on its national law as justification for failure to comply with its international obligations related to its space activities, including military space activities

Rule 111: An international organisation that carries on space activities, including military space activities, shall comply with general international law, constituent instruments and other rules of that organisation, and international treaties in respect of which it has expressed its consent to be bound

Rule 124: When a space object, including a space object used in military space activities, is launched into Earth orbit or beyond, a launching State shall register the space object by means of entry in its appropriate national registry.

Rule 129: International law does not contain explicit rights and obligations regarding the creation of space debris. However, to the extent necessary to comply with other rules of international law, States and

[38] The Milamos Group of Experts Arrived at a Consensus on Key Issues Reflected In 52 Rules, Which Are Set Out in This Manual. Volume I Covers a Variety of International Law Issues Particularly Relevant to Current and Potential Military Uses of Outer Space, [Online]. Available at: Https://Www.Mcgill.Ca/Milamos/Files/Milamos/Mcgill_Manual_Volume_I_-_Rules_Final_0.Pdf (Accessed 30 April 2024).

[39] Mcgill Manual On International Law Applicable To Military Uses Of Outer Space. [Online]. Available at: Https://Www.Mcgill.Ca/Milamos/Files/Milamos/Mcgill_Manual_Volume_I_-_Rules_Final_0.Pdf (Accessed: 30 April 2024).

international organisations shall limit the creation of space debris when carrying on space activities, including military space activities.

5. Governance of military space activities: A remedy for responsible behaviour

Outer space activities remain anarchic in terms of governance, primarily in their lack of an overarching authority.[40] The deficiencies in this regard extend beyond the regulatory framework and include the governance structure. At the global, regional (e.g. EU), and national levels, there is a complex matrix of authorities vested with competencies concerning space defence. This section conducts a vertical analysis of the roles and regulations related to the governance of military operations. At the national level, the analysis considers France and the United Kingdom because their advanced space legislation and policy can serve as an example of the way forward.

At the global level, the role of the UN is constrained, limiting its ability to preserve the foundational principles governing outer space exploration, particularly in light of the diminishing scope for the peaceful use of space endeavours. Given prevailing geopolitical tensions, there is a pervasive scepticism regarding the UN's efficacy as a policymaker and rule-setter. Consequently, coordination of defence and military matters on the international stage is more appropriately conducted within military and political alliances, such as NATO.

Although the efforts of the international community to introduce sustainability goals and responsible behaviour should not be ignored, they are not of great importance from a governance perspective. Many voices are calling for the establishment of an intergovernmental organisation (similar to the IADC) with responsibilities for coordinating sustainability measures for both civil and military space applications.[41]

Conversely, within the EU at the regional level, implementing a space defence strategy necessitates a restructuring of space governance. From an

[40] Tepper, 2022, p. 490.

[41] See, for example, the Montreal Recommendations on Aviation Safety and Uncontrolled Space Object Reentries by the Outer Space Institute. Its Recommendation no. 1 proposes that 'states should establish a new international body or build upon an existing one to provide a focus on the safety implications of uncontrolled reentries'; [Online]. Available at: https://outerspaceinstitute.ca/osisite/wp-content/uploads/Montreal-Recommendations-on-Aviation-Safety-and-Uncontrolled-Space-Object-Reentries.pdf (Accessed: 30 April 2024).

institutional point of view, EU-level space administration is very diverse and relies on several institutions due to the integration of both supranational and national elements.[42] The European space sector is governed by three main actors: the ESA, the EU (through the European Commission), and the European Union Agency for the Space Programme (EUSPA), the operational agency in charge of the Space Programme. The ESA is excluded from this analysis because of its independence from the EU and its technological nature. The publication of the EU Space Strategy for Security and Defence was a milestone in the process of unifying space activities at the EU level.[43] The Strategy emphasises the role of the European Commission in synchronising and coordinating activities in critical space technologies together with the European Defence Agency (EDA) and ESA, as well as the EUSPA.[44] The Directorate-General for Defence Industry and Space leads the European Commission's activities in the defence and space sectors.

Although the EUSPA oversees civilian programs, in recognition of their dual-use potential, the EDA assumes a central role. The EDA's activities span various facets of the space domain, including prioritisation and planning to bolster space capability development, engaging in research and technology (R&T) activities pertaining to space, and identifying common military requirements and defence user needs for space-based systems. This encompasses collaborative capability development and alignment with broader EU space policy objectives. The newly established Defence in Space Forum, under the purview of the EDA, plays a pivotal role

[42] The European space ecosystem consists of 22 members of the ESA: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom. Latvia, Lithuania, and Slovenia are Associate Members. The ESA signed European Cooperating States Agreements with Bulgaria, Cyprus, and Slovakia and cooperation agreements with Croatia and Malta, as well as 27 other members of the EU, often with separate national space agencies and space strategies.

[43] EU Space Strategy for Security and Defence for a stronger and more resilient European Union. [Online]. Available at: https://defence-industry-space.ec.europa.eu/eu-space-policy/eu-space-strategy-security-and-defence_en (Accessed: 30 April 2024).

[44] The EU Council on approved the Council Conclusions on the EU Space Strategy for Security and Defence on 13 November 2023; EU Space Strategy for Security and Defence, p. 5; Joint communication to the European Parliament and the Council on the EU Space Strategy for Security and Defence, March 10, 2023, p. 5.

in identifying military requirements, delineating capability priorities, and fostering cooperation in space among EU Member States.

Owing to the circumstances and threats that have emerged over the past few years,[45] the EDA has become increasingly important in the context of space activities. Security and defence would be at risk without the provision of a resilient space infrastructure. Therefore programmes coordinated by the EDA are coming up against several challenges as they fill the gaps of European defence capabilities. The EDA also focuses on broader areas. Its role includes the development of R&T[46] capabilities and engaging in other activities in the space sector; the planning and prioritisation of space development and capabilities;[47] and the identification of the needs of Member States in the space domain, including the mapping of training and education activities to assist public administration in the field of space security and defence, as well as the exchange of best practices in developing space-related skills.

The Defence and Security Strategy underscores collaboration between the European Commission, supported by the EUSPA, and the EDA and ESA.[48] Additionally, the governance of the EU Space Programme is defined by a clear allocation of tasks and responsibilities among the entities involved in implementing each of its components and measures. This includes the Member States, the Commission, the EUSPA, the ESA, and EUMETSAT. These allocations are based on their respective competences, to prevent any overlap in tasks and responsibilities.[49]

It appears that the sphere of military space operations is typically beyond the purview of national agencies. The authority of military administration tends to prevail when defence and security issues arise in the context of civilian space missions. Furthermore, military space operations typically fall under the exclusive control of the armed forces, often

[45] For example, Russia's aggression against Ukraine and the increased development of counterspace capabilities and threats in the form of DA-ASAT tests and cyberattacks on space infrastructure.

[46] The Capability Technology Group Space (CapTech Space) was established in 2022 by the EDA Research and Technology Steering Board, which is focused on strengthening and coordinating R&T for space defence in Europe.

[47] EDA, Defence in Space, [Online]. Available at: https://eda.europa.eu/news-and-events/spotlight/spotlight-of-the-month/defence-in-space-how-is-eda-providing-support-to-the-eu-s-wider-strategy (Accessed: 30 April 2024).

[48]; See Council Conclusions, 2023.

[49] Article 26 of Regulation (EU) 2021/696.

involving the establishment of specialised divisions for space command, as exemplified in the cases of the United States and United Kingdom. It is crucial to emphasise, however, that most national space laws lack clarity regarding the delineation of administrative tasks and powers within this domain. It would be worthwhile considering those among the many spacefaring countries that have well-established approaches. It would also be interesting to examine how space governance, especially space agencies, operate in EU and non-EU countries, particularly in the context of possible relations with the EU space administration.

France is an interesting example. Space administration in France traces its origins to 1958, when several space research committees were established. This was followed by the creation of the Comité d'études spatiales in 1959 and the Centre national d'études spatiales (CNES) in 1961.[50] The CNES is France's national space agency, operating under the supervision of the Ministry of Economy, Ministry of Higher Education and Research, and Ministry of Defence. This cross-sectoral approach to space management in France can also be seen in the use of satellite frequencies, for which the competent body is the French National Frequency Agency created in 1997 and operating under the supervision of the Minister responsible for telecommunications, although its powers do not extend to government programmes.[51]

The role of the CNES is defined in the Research Code (L-331-1 - L 331-6), according to which the CNES is responsible for defining and implementing French space policy in five main areas: launchers, science, Earth observation, telecommunications, and defence.[52] Regarding the latter, close cooperation between the CNES and the Ministry of Defence is envisaged on the basis of the French Space Defence Strategy (SDS) announced in 2019.[53] In particular, the SDS foresees new forms of interaction between the Ministry, through the Space Command, and the CNES. The position of the CNES is more specific than that of other

[50] Act no 61-1382 of 19 December 1961 establishing the National Center for Space Studies (French Official Journal, 20.12.1961).
[51] Achilleas, 2010, p. 113.
[52] Achilleas, 2010, p. 110.
[53] French Space Defence Strategy (2023), [Online]. Available at: https://www.frstrategie.org/en/publications/notes/implementing-french-space-defence-strategy-towards-space-control-2023; French Ministry for the Armed Forces (2019). Stratégie spatiale de défense, rapport du groupe de travail "espace". (Accessed: 30 April 2024).

European space agencies, because of the role of France in European space activities. Thus, the CNES has been entrusted with certain powers relating to the safety management of the spaceport in French Guyana, as delegated by the French government following the signing of two agreements between France and the ESA on 11 April 2002. This responsibility was also confirmed in the Research Code.[54]

Concerning civil programmes, in addition to the Research Code, the powers of the CNES derive from the provisions of the French Space Act. The basic powers (e.g. the authorisation of space activities) are vested in the Ministry of the Economy; in practice, however, the supervision of licences and authorisations is largely delegated to the CNES and its legal and technical experts. [55] Within the Ministry, some related tasks are carried out by the General Directorate for Research and Innovation, which assists the Ministry in examining applications and exercising its responsibilities under the space law. As has been noted in sec. 4, French space law does not apply to the launch and control of space objects for the purposes of national defence with trajectories that pass-through space, such as ballistic missiles. The activities of the Ministry of Defence, as the primary operator of space data, are not subject to the provisions of Title VII, which means that France's civil and military space administrations operate in parallel.

The United Kingdom presents another interesting example. The UK National Space Strategy 2021 outlines the country's approach to space governance, characterised by a cross-governmental framework; various bodies operate at different levels to ensure its execution. In 2019, the government introduced the National Space Council, a cabinet committee chaired by the prime minister, tasked with providing strategic direction for the cross-governmental approach to space and formulating a strategy. Additional entities include the Department for Business, Energy and Industrial Strategy, which serves as the central department responsible for coordinating civil space policy and sponsors both the UK Space Agency and UK Space Command, alongside the Ministry of Defence. At the implementation level, key bodies include the UK Space Agency (UKSA), the Civil Aviation Authority (CAA), and Space Command.

[54] Achilleas, 2010, p. 110.
[55] Couston, 2014, p. 129.

A parallel line of space governance covers the defence aspects of space. [56] For this purpose, the UK Space Command has been established as the defence lead for space operations, the space workforce, and space capabilities, based on the Defence Space Strategy. It is co-ordinated by the Ministry of Defence and also works with the UKSA to deliver a common national space capability in line with the National Space Strategy. This includes the establishment of a combined military and civilian National Space Operations Centre.

As far as the Central Eastern Europe (CEE) space governance model is concerned, most countries rely on joint coordination between several ministries and various related public agencies. Considering the concept of space governance in Western European countries, the new space countries of the CEE seem to be following the same path. The question that deserves more attention is whether the increasing dependence on space technologies and applications in the civil and military fields may require a rethinking of the role of space agencies. Should they not be given more independence and coordination powers, rather than being subordinated to various ministries? An examination of existing approaches suggests that national space agencies could play a coordinating role in both the civil and defence spheres, in cooperation with rather than subordination to ministries, while also ensuring a consistent implementation of space programmes, strategy, and regulations. Such an approach could be beneficial by fostering a consistent approach to different types of space missions, while increasing the potential for the sustainable development of space exploration.

An examination of the strategies used by the EU and individual Member States as well as space legislation at the international, regional, and national levels reveals a current trend for the development of strategic documents that are specifically tailored to the space domain. This trend involves formalising activities and delineating competencies among bodies responsible for space, particularly in the context of military applications versus commercial space activities. The role of space agencies, typically operating under civilian government administration, lacks clarity concerning the application of space legal provisions. Although legal regulations for space use are being developed, primarily at the national level and for civilian applications, the role of space agencies is well-defined in these

[56] Defence Space Strategy: Operationalising the Space Domain. [Online]. Available at: https://assets.publishing.service.gov.uk/media/61f8fae7d3bf7f78e0ff669b/20220120-UK_Defence_Space_Strategy_Feb_22.pdf (Accessed: 30 April 2024).

contexts. However, the situation becomes more ambiguous when military missions are involved. Regulations pertaining to space law that could apply to military matters often exist in a regulatory grey area, where licensing is not required, and are consequently lacking clear adherence to technical standards, including those aimed at preventing space debris and ensuring the sustainability of space exploration. The authority of space agencies in certifying space activities is therefore uncertain.

6. Conclusion

An analysis of space strategies and legislation across international, regional, and national levels reveals an ongoing development of strategic documents tailored specifically to the space defence domain. This process involves institutionalising activities and delineating competencies between bodies responsible for space military issues and commercial space activities. Although legal regulations for space use are also being developed, primarily at the national level and for civilian applications, regulations pertaining to space law that could apply to military matters often remain in a regulatory grey area. They are not subject to licensing and consequently lack clear adherence to technical standards, particularly concerning space debris prevention and sustainability, as observed in civilian missions.

International legal acts that are binding on states, regardless of mission purpose, contain either very general regulations subject to inconsistent interpretations or are non-binding, such as UNGA resolutions. This lack of a comprehensive regulatory framework for military applications poses a significant threat to the future of human activities in space, in terms of both the security of space assets and ground security as a last resort.

Among the many regulatory grey zones that require attention, one of the most important is the need to provide a coherent application of regulatory measures for ensuring responsible behaviour in outer space, thus fostering sustainable development. Achieving this will require such fundamental objectives as imposing a universal ban on ASAT testing and preventing the generation of space debris. Neither of these issues, which are so crucial for sustainable development, has any chance of being regulated by mandatory standards at the international level. However, progress can be made in small steps through unilateral commitments by states, such as the Moratorium initiated by the United States in 2022, as well as the comprehensive approach to the space sector proposed by the EU. This also

means that the United States and the EU could eventually play a leading role as promoters of legal arrangements governing sustainability in all types of space activities, even if only by promoting binding documents on the basis of national adherence. Legal frameworks in this realm could be established through decisive, coordinated, and harmonised technical standards, as well as clear requirements for both governmental and private entities.

Bibliography

[1] Achilleas, P. (2010) Regulation of Space Activities in France. in Jakhu, R. S. (ed.), *National Regulation of Space Activities*. Springer, pp. 109-122.

[2] Bittencourt, O. (2013) Defining the Limits of Outer Space for Regulatory Purposes. Springer.

[3] Bohlmann, U., Petrovici, A. (2019) Space sustainability, long-term sustainability of space activities. in Froehlich A (ed.), *Sustainability of Outer Space Activities*, Springer, pp. 13-28.

[4] Cassotta, S. (2019) The Paris Agreement vis-à-vis climate change in outer space law. In A. Froehlich (Ed.), *Sustainability of Outer Space Activities*, Springer, pp. 211-226.

[5] Couston, M. (2014) *Droit spatial* [Space Law]. Ellipses.

[6] Cuddihy, R. (2000) 'Law of anti-satellite weapons', *Air & Space Power Journal*, 14(4), pp. 100-121.

[7] Erwin, S. (2023) 'Pentagon to adopt tenets of responsible behavior in space'. *SpaceNews*, [Online]. Available at: https://spacenews.com/pentagon-to-adopt-tenets-of-responsible-behavior-in-space/ (Accessed 30 April 2024).

[8] Harrison, T. (2020) Space threat assessment 2020. Center for Strategic & International Studies. [Online]. Available at: https://www.csis.org/analysis/space-threat-assessment-2020/ (Accessed: 30 April 2024).

[9] Jakhu, R. S., Pelton, J. N., Nyampong, Y. O. M. (2018) *Space mining and its regulation*. Springer. https://doi.org/10.1007/978-3-319-39246-2.

[10] Koplow, D. A. (2009) 'ASAT-isfaction: Customary international law and the regulation of anti-satellite weapons', *Michigan Journal of International Law*, 30(4), pp. 1187-1272.

[11] Lyall, F., Larsen, P. B. (2018). *Space law: A treatise* (2nd ed.). Routledge. https://doi.org/10.4324/9781315610139.

[12] Peperkamp, J. (2020) 'An arms race in outer space?' *Atlantisch Perspectief*, 44(4), pp. 7-12.

[13] Pisani, J. A. D. (2006) 'Sustainable development – historical roots of the concept' *Environmental Sciences*, 3(2), pp. 83-96. https://doi.org/10.1080/15693430600688831.

[14] Strobeyko, P. (2019) 'Theoretical approaches to modern international conflicts: How to define and study 'hybrid warfare', *Yearbook of the Institute of East-Central Europe*, 17(4), pp. 101-118.

[15] Tepper, E. (2022) 'Space governance in the 21st century', *Journal of Space Law*, 46(2), pp. 487-521.

[16] Toussaint, M., Dumez, J. (2022) 'The case for the development of a comprehensive legal regime for active debris removal', *Journal of Space Law*, 46(2), pp. 257-289.

[17] Weeden, B., Samson, V. (Eds.) (2020) Global counterspace capabilities report. Secure World Foundation. [Online]. Available at: https://swfound.org/media/206955/swf_global_counterspace_april2020.pdf (Accessed 30 April 2024).

[18] Williams, M. (2008) 'Anti-satellite missile test by China', *Strategic Comments*, 14(2), pp. 1-2.

[19] Yang, H. (2023) 'Sustainability in outer space: A practical approach to the implementation of the long-term sustainability guidelines', *Air and Space Law*, 48(1), pp. 1-30; https://doi.org/10.54648/AILA2023030.

[20] Defence Space Strategy: Operationalising the Space Domain. [Online]. Available at: https://assets.publishing.service.gov.uk/media/61f8fae7d3bf7f78e0ff669b/20220120-UK_Defence_Space_Strategy_Feb_22.pdf (Accessed: 30 April 2024).

[21] European Council (2006) The renewed EU sustainable development strategy as adopted by the European Council on 15/16 June 2006 (10917/06). Brussels.

[22] Secure World Foundation. (2024) Global counter space capabilities report. [Online]. Available at: https://swfound.org/media/207826/swf_global_counterspace_capabilities_2024.pdf (Accessed: 30 April 2024).

[23] Sooi, W. (2023) Direct-ascent anti-satellite missile tests: State positions on the moratorium, UNGA resolution, and lessons for the future. Secure World Foundation. [Online]. Available at: https://swfound.org/media/207711/direct-ascent-antisatellite-missile-tests_state-positions-on-the-moratorium-unga-resolution-and-lessons-for-the-future.pdf (Accessed 30 April 2024).

[24] The Milamos Group of Experts Arrived at a Consensus on Key Issues Reflected In 52 Rules, Which Are Set Out in This Manual. Volume I Covers a Variety of International Law Issues Particularly Relevant to Current and Potential Military Uses of Outer Space, [Online]. Available at: Https://Www.Mcgill.Ca/Milamos/Files/Milamos/Mcgill_Manual_Volume_I_-_Rules_Final_0.Pdf (Accessed: 30 April 2024).

[25] The Woomera Manual On The International Law Of Military Space Operations, [Online]. Available at: https://law.adelaide.edu.au/woomera/system/files/docs/Woomera%20Manual.pdf (Accessed: 30 April 2024).