

The Future of the Outer Space Treaty – Peace and Security in the 21st Century

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Abstract: This paper analyses the ongoing debate surrounding proposed amendments to the 1967 Outer Space Treaty. The paper aims to outline the multiplicity of suggested amendments and practically reconcile them with the developing geopolitical climate and international legal principles. It assesses the several key aspects of the OST which remain in contention; addressing the economic, national security, and environmental concerns through a holistic approach, considering the relevant articles of the OST and how these articles have been interpreted. It finds that growing access to resources and militarization makes cooperation on certain issues impractical, and that the adoption of transparency and confidence-building measures, coupled with the independent development of opinion juris by subordinate IGOs, represents the most viable opportunity for amendments to be incrementally instituted by consensus. The adoption of transparency and confidence-building measures will facilitate mutual trust and understanding between UN members, reinforce the rule of law, and preclude the possibility of competition and conflict in outer space. This analysis provides an updated insight into developments within international law jurisprudence, and represents an exhaustive record of proposed OST amendments.

Keywords: Space Law, Outer Space Treaty, Arms Race, Space Mining, Space Environment, Diplomacy.

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Introduction

The emergent pattern of disregard for established rules of international law precludes the development of an anarchist order in outer space, one which must be anticipated by continued multilateral cooperation under the OST as the primary instrument for international space affairs. Acknowledging the dynamic nature of the current geopolitical landscape, and exponential proliferation of space technology and activity over the past fifty-years, member states must affirm the stability of the rules-based order in outer space affairs by implementing amendments to the 1967 Outer Space Treaty (OST).¹

The existing international framework on outer space, codified within the OST, has

¹ *1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty)*, adopted 27 January 1967, 610 UNTS 205 (entered into force 10 October 1967).

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proven an increasing inconvenience to governments and private entities.² While the OST appeared suited to the issues and concerns of the Cold War, the instrument is inadequate to address the mass commercialization and use of outer space within the context of the twenty-first century.³ A growing number of state parties invested in outer space, mindful of geopolitical opportunities and anxious to meet national security challenges, have adopted unilateral measures which run contrary to the principal spirit of the OST to preserve outer space for all nations as the “province of all mankind”.⁴ Further, private space companies have exhibited their frustration with government authority and regulations in outer space, and have demonstrated a reckless disregard for the rule of law.⁵

Consequently, the open-ended definitions employed within the language of the OST, and development of a body of precedent within international customary law, has also contributed to the flagrant exploitation of the OSTs deficiencies, ambiguities and loopholes by opportunistic actors to the detriment of others.⁶ States have enacted unilateral efforts to expedite the private exportation and exploitation of natural resources in outer space.⁷ This is combined with the broader State efforts to push at the boundaries of the OST in anticipating their future capabilities in outer space and safeguarding national security.

Where the OST faces challenges on multiple fronts, support for amendments to the OST by UN member States has also increased significantly over the past decade,⁸ and the challenge falls upon the UN and associated International Governmental Organizations (IGOs)⁹ to balance between the cardinal principles of freedom of exploration, freedom of navigation and access, and freedom of scientific investigation; versus traditional concerns of State sovereignty, national security priorities and economic imperatives. Hanging in the balance is the risk of outer space transforming into a conflict zone, and deteriorating into an unparalleled tragedy of the commons.

The criticism levelled, and reforms proposed, upon the OST are concentrated upon its

2 United Nations, ‘Concluding General Debate on Peaceful Uses of Outer Space, Fourth Committee Approves 3 Draft Resolutions, 1 Decision’ on United Nations (17 October 2017) <https://www.un.org/press/en/2017/gaspd642.doc.htm>.

3 Mark J. Sundahl, ‘The Cape Town Convention and the Law of Outer Space: Five Scenarios’ (2014) 3(1) *Cape Town Convention Journal* 111; Ram Jakhu and Tanveer Ahmad, ‘World needs strong space governance system’ (2017) 1(11) *Room – The Space Journal* 31.

4 Taunton Paine, ‘Bombs in orbit? Verification and violation under the Outer Space Treaty’ on *The Space Review* (19 March 2018) <http://thespacereview.com/article/3454/1>.

5 Marina Koren, “Launching Rogue Satellites Into Space Was a ‘Mistake’” on *The Atlantic* (7 September 2018) <https://www.theatlantic.com/technology/archive/2018/09/spacebees-swarm-unauthorized-satellite-launch/569395/>.

6 Joan Johnson-Freese, ‘Build on the outer space treaty’ (2017) 550(7675) *Nature* 182.

7 Jacob A. Reed, ‘Cold War Treaties in a New World: The Inevitable End of the Outer Space and Antarctic Treaty Systems’ (2017) 42(4/5) *Air & Space Law* 465.

8 United Nations, ‘Stronger Rules Must Guarantee Outer Space Remains Conflict-Free, First Committee Delegates Stress, Calling for New Laws to Hold Perpetrators Accountable’ on the United Nations (17 October 2017) <https://www.un.org/press/en/2017/gadis3583.doc.htm>.

9 i.e. the International Telecommunications Union, the UN Committee on the Peaceful Uses of Outer Space, etc.

following key principles that:¹⁰

1. The exploration and use of outer space should be carried out for the benefit of all mankind;¹¹
2. Outer space should be free for exploration and use by all States;¹²
3. State parties are prohibited from placing nuclear weapons or any WMDs in space;¹³
4. Outer space should not be subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means; and¹⁴
5. States shall avoid harmful contamination of space and celestial bodies.¹⁵

Consequently, it has been advanced that the OST and the international community may benefit more by the supplementation and augmentation - rather than outright replacement - of established codified principles within the legally binding agreement. This has been explored through the proposed codification of existing customary law principles, and the inclusion of amendments which anticipate issues of shared concern.

However, determining the feasibility of amendments versus augmentation to the OST requires first interpreting the developing geopolitical climate motivating reform efforts, examining broad proposals for changes to the OST, consideration of nascent legal rights, and analysis of how parties might balance their diverging interpretations and interests.

Accordingly, this shall be addressed via an analysis of recent initiatives to further the OST and its objectives, upon the several core aspects of the OST; economic imperatives, national security motivations, and environmental incentives for reform.

Context

Background of the Outer Space Treaty

The 1967 OST was the second of the “non-armament” international treaties, with its concepts modeled upon its predecessor, the 1959 Antarctic Treaty.¹⁶ The OST sought to prevent “a new form of colonial competition” and the possible damages that self-seeking exploitation might incur. The prevailing intention was to ensure the peaceful exploration and use of outer space and celestial bodies, and to preclude the possibility of military

10 J. Scott Hamilton, *Practical Aviation & Aerospace law* (Aviation Supplies & Academics, 2015) 395; United Nations Office for Outer Space Affairs, ‘Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies’ on United Nations Office for Outer Space Affairs (2018) www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html.

11 Outer Space Treaty, above n1, Art I.

12 Ibid.

13 Ibid, Art Iv.

14 Ibid, Art II.

15 Ibid, Art IX.

16 *The Antarctic Treaty*, adopted 1 December 1959, 402 UNTS 71 (entered into force 23 June 1961).

conflict.¹⁷

To supplement the OST, four additional international treaties arose among and between UN member States, seeking to support the principal objectives of the OST; *The Rescue Agreement* (1968),¹⁸ *The Liability Convention* (1972),¹⁹ *The Registration Convention* (1975),²⁰ and *The Moon Agreement* (1979).²¹

Among these instruments, the Moon Treaty/Agreement represents the most recent UN treaty addressing the issues of property and the exploitation of resources in outer space. The Moon Treaty encompasses eighteen parties out of the existing 193 UN member States,²² providing that the lunar environment should not be disrupted and be used only for peaceful purposes and for common benefit.

Accordingly, no part of the lunar surface can be owned by any entity apart from international organizations,²³ with resources on the Moon being considered as the common heritage of mankind (CHM).²⁴ The Treaty also makes provisions for the creation of a forum to negotiate the rules and process governing the exploitation of natural resources in outer space.

Irrespective of its utility, the principal space powers (i.e. US, Russia, China) decision to neither sign, accede to, nor ratify the Moon Treaty damages its capacity to act as a viable successor to the OST. Where the inclusion of CHM within the treaty was the primary cause of concern, this highlighted the foresight of States to safeguard private industry and resource exploitation.²⁵

International Code of Conduct for Outer Space Activities

The International Code of Conduct for Outer Space Activities (ICOC) represents the most promising spiritual successor to the OST to-date within international soft law.²⁶ The ICOC encourages international cooperation concerning security and engagement in outer space

17 US Department of State, 'Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies' on US Department of State (1 February 2001) <https://www.state.gov/t/isn/5181.htm>.

18 *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Space*, adopted 22 April 1968, 672 UNTS 119 (entered into force 3 December 1968).

19 *Convention on International Liability for Damage Caused by Space Objects*, opened for signature 29 March 1972, 961 UNTS 187 (entered into force 1 September 1972).

20 *Convention on Registration of Objects Launched into Outer Space*, opened for signature 14 January 1975, 1023 UNTS 15 (entered into force 15 September 1976).

21 *Agreement governing the Activities of States on the Moon and Other Celestial Bodies* (Moon Treaty), opened for signature 18 December 1979, 1363 UNTS 3 (entered into force 11 July 1984).

22 United Nations, '2. Agreement governing the Activities of States on the Moon and Other Celestial Bodies' on United Nations Treaty Collection (2018) https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXIV-2&chapter=24&clang=_en.

23 Erik Seedhouse, *Mars via the Moon: The Next Giant Leap* (Springer, 2015) 127.

24 Moon Treaty, above n25, Art 11.

25 Vidvuds Beldavs, 'Simply fix the Moon Treaty' on *The Space Review* (15 January 2018) <http://www.thespacereview.com/article/3408/1>.

26 European Union, 'Security and sustainability in Outer Space' on European Union (14 January 2015) https://eeas.europa.eu/headquarters/headquarters-homepage/8466/security-and-sustainability-outer-space_en.

between European Union (EU) members – originating in 2008 and having undergone revisions in 2010, 2012, 2013 and 2014 respectively.²⁷

The ICOC addresses military and civilian use of outer space and presents voluntary principles for responsible behavior which prioritizes long-term sustainability through safety and security within States' conduct of operations, the pursuit of transparency and confidence-building measures (TCBM) related to their policies and activities in outer space, and which limits the creation of space debris.²⁸

As an international soft law instrument, being non-legally binding, the ICOC has been criticized as being highly unsuited to the nature of disarmament treaties and being manifestly ineffective in stimulating a sense of obligation and legitimacy.²⁹ However, this soft law approach adopted by the ICOC – furthered by the contents of its 2012 revision - has merits in avoiding lengthy time-consuming negotiations associated with treaty agreements, while achieving immediate limited implementation with a high-degree of flexibility in responding to developing international trends.³⁰

Regardless, efforts to replace the OST with the ICOC has suffered from consistent diplomatic “failures to launch” following its presentation before the UN in July 2015.³¹ The proposal was rejected in October 2016 by a considerable number of States who outlined that the Code could not replace the need for a legally binding multilateral instrument which needed to be developed under a mandate authorized by the UN General Assembly.³² While the ICOC provides a platform outside the UN for States and stakeholders to discuss space security issues, the Code remains in a state of suspended animation and its future is uncertain.

Existing Climate

The emergent reluctance of spacefaring States to neither cooperate nor reconcile technical and economic inequalities vis-à-vis other UN member states, and prioritize individual national security interests, has fostered an atmosphere of competition and contributed to the lack of initiative to amend the OST.³³

27 Nikhil Balan, 'EU Initiative for a Code of Conduct in Outer Space: A Critical Analysis' on Skylega (1 July 2017) skylega.com/wp-content/uploads/2017/06/European-Aerospace-Law.pdf 5.

28 Massimo Pellegrino and Gerald Stang, Security Study for Europe – Report No.29 (European Union Institute for Security Studies, 2016) 10.

29 Jack M. Beard, 'Soft Law's Failure on the Horizon: The International Code of Conduct for Outer Space Activities' (2017) 38(2) *University of Pennsylvania Journal of International Law* 335-424.

30 Balan, above n31, 7.

31 Michael J. Listner, 'The International Code of Conduct: Comments on changes in the latest draft and post-mortem thoughts' on The Space Review (26 October 2015) www.thespacereview.com/article/2851/1.

32 United Nations, 'Debating Proposals on Common Principles to Ensure Outer Space Security, First Committee Delegates Call for Adoption of Legally Binding Treaty' on United Nations (19 October 2016) <https://www.un.org/press/en/2016/gadis3557.doc.htm>.

33 Rajeswari Pillai Rajagopalan, 'A new space race in Asia' on East Asia Forum (18 May 2018) <http://www.eastasiaforum.org/2018/05/18/a-new-space-race-in-asia/>; Liu Zhun, 'NASA's China exclusion policy short-sighted' on Global Times (8 October 2013) <http://www.globaltimes.cn/content/816381.shtml>.

As disagreements persist, the capacity for State parties to the OST to negotiate amendments diminishes, and a system of anarchy within international affairs becomes entrenched as more technically capable States move to consolidate and safeguard their resources and economic positions.

During the 40th anniversary of the OST in 2007, the UN apprehended the challenges to security in outer space, regarding the inadequacy of institutional mechanisms to manage geopolitical developments, and in preventing weaponization – seeking to promote security through confidence-building measures. This was compounded by the “lack of a consensus: on reopening the OST or in designing a new international convention to supersede the OST.”³⁴

Following the 50th anniversary of the OST in 2017 there has been minor progress by the UN General Assembly³⁵ on enacting amendments to the OST, as State parties appeared complacent and accepted of the present state of the OST; which is complemented by customary law via the decisions of subsidiary bodies including the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS).

The UN Fourth Committee called upon UNCOPUOS to continue to promote “the widest adherence” to the OST and of its application by States, seemingly fixated on urging all UN member States to incorporate the OST and continuing to promote confidence-building measures between State parties. Doubts also persisted on whether the OST could adequately safeguard the equal and universal access to space technology and outer space for all countries, without regard to size or developmental level.³⁶

Economic Aspects

Articles to Consider

Article I – *“The exploration and use of outer space...shall be the province of all mankind”.*

Under a prima facie interpretation, the exploration of resources in outer space for “private use” by any actor appears impermissible. However, questions persist whether space resources prospected and mined by a private non-State entity from a celestial body and transported to Earth for sale on the international commodities market falls within the ambit of this article, and if so how could resources be apportioned to benefit “all mankind”.

Article II – *“Outer space...is not subject to national appropriation by claim of sov-*

34 United Nations, ‘United States says discussing merits of treaties to prevent “weaponization” of outer space “pointless”. As first committee continues thematic debates’ on United Nations (22 October 2007) <https://www.un.org/press/en/2007/gadis3349.doc.htm>.

35 United Nations, ‘General Assembly Adopts 38 Resolutions, 2 Decisions from Fourth Committee, Including Texts on Decolonization, Israeli-Palestinian Issues’ on United Nations (7 December 2017) <https://www.un.org/press/en/2017/ga11987.doc.htm>.

36 United Nations, above n2.

ereignty, by means or use or occupation, or by any other means.”

This article has been long interpreted as a declaration of *res extra commercium* in outer space and celestial bodies, thus precluding the possibility of *res nullius* or *terra nullius* being applied by a State to seize unclaimed land in outer space to the exclusion of all other parties.³⁷

Drafters of the OST chose to limit this prohibition on appropriation to States, despite advisement that the OST should prohibit “national and private appropriation.”³⁸ However, international customary law has resulted in two distinct interpretations; one where resources cannot be lawfully appropriated outright because they belong to all mankind, and another where the clause solely refers to permanent appropriation by sovereign nations and not the consumption of resources by private actors.³⁹

Two issues must be clarified. Firstly, whether “national” applies to business enterprises with State connections, and whether there exists a legal distinction between these classifications under the OST. Secondly, whether the definition behind “by any other means” covers the exercise of sovereign rights by States through private use, private occupation, and assertions of private exclusive rights to a defined territory in outer space.⁴⁰

There exists ambivalence whether Article 1 para 2 (free exploration and use of celestial bodies) includes the right to take and consume non-renewable natural resources. Objectively, the assertion of private property rights is presently prohibited under Article II, as supported by the existence of sufficient *opinion juris* that a prohibition of private property rights constitutes a principle of customary international law.⁴¹ Conversely, in the absence of a clear prohibition of the taking of resources the use of space resources is de-facto permitted,⁴² a contention established in relation to the scientific use of acquired celestial resources.⁴³

Article VI – “*State 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.*”

States are responsible for the activities of nongovernmental entities, requiring the

37 Han Taek Kim, ‘Fifty Years of Outer Space Treaty: Its retrospect and prospect’ (2017) 50 *Kangwon National University – Kangwon Law Review* 565-566.

38 Austin C. Murnane, ‘The Prospector’s Guide to the Galaxy (2013) 37(1) *Fordham International Law Journal* 262.

39 Adam G. Quinn, ‘The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space’ (2008) 17 *Minnesota Journal of International Law* 481.

40 Ricky J. Lee, ‘Article II of the Outer Space Treaty: Prohibition of State Sovereignty, Private Property Rights, or Both?’ (2004) 11 *Australian Journal of International Law* 136.

41 *Ibid*, 141.

42 International Institute of Space Law, ‘Position Paper on Space Resource Mining’ on International Institute of Space Law (20 December 2015) <http://www.iislweb.org/docs/SpaceResourceMining.pdf> 2.

43 NASA, ‘Lunar Rocks and Souls from Apollo Missions’ on NASA (2018) <https://curator.jsc.nasa.gov/lunar/>.

“authorization and continuing supervision” of space activities by commercial enterprises.⁴⁴ Direct attribution is an exclusive characteristic of space law, as private actors are considered as acting on behalf of the home nation. This inherently makes States more restrictive of commercial space activities owing to the financial liabilities; particularly where the obligation to indemnify can certainly exceed the financial capabilities of the liable space operator and that of any insurer, resulting in national governments often footing the bill.⁴⁵ Accordingly, developing states are unable or reluctant to participate or compete within space activities.⁴⁶

The US⁴⁷ and Luxembourg⁴⁸ have independently adopted space resource laws which provide national frameworks to outline the legal rights and responsibilities for independent entities to extract resources from celestial bodies. It is recognized that there exists a clear dichotomy between claiming ownership of property and recognizing mining and resource rights.

Property and Resource Exploitation

Governments and private entities will inevitably engage in resource exploitation in outer space given its overwhelming economic benefits. A proactive response requires the sustainable regulation of these activities to preempt the emergence of adverse environmental and political consequences. Failure to arrive at an agreement which nominally recognizes States’ rights to accumulate resources jeopardizes the rule of law - where it leads States to deem it more economically beneficial to support their national interests and disregard the OST rather than limit the scope of their activities.⁴⁹ This is alluring as the international community’s scope for enforcement of international instruments - including the OST - are limited vis-à-vis the notion of state sovereignty.

There exist two interpretations of “the province of all mankind” phrase within Article 1, language which alludes to the notion of “common heritage” under international law. The first interpretation sees actors consider that outer space and its resources and benefits should be equitably distributed. The second interpretation sees actors interpret the phrase as aspirational language absent of any limitations.⁵⁰ This duality has facilitated a loophole through distinguishing the rights to mine versus the appropriation of property on celestial bodies, opening the prospect for the unregulated extraction of resources by space actors.

44 Jason Krause, ‘The Outer Space Treaty turns 50. Can it survive a new space race?’ (2017) 103(4) *American Bar Association* 44.

45 Dimitri Linden, ‘The Impact of National Space Legislation on Private Space Undertakings: Regulatory Competition vs. Harmonization’ (2016) 8(1) *Journal of Science Policy & Governance* 5.

46 Priyank D. Doshi, ‘Regulating The Final Frontier: Asteroid Mining and The Need For A New Regulatory Regime’ (2016) 6(1) *Notre Dame Journal of International & Comparative Law* 210.

47 US Congress, H.R.2262 – *US Commercial Space Launch Competitiveness Act*, Sec.51303 (2015).

48 Loi du 20 juillet 2017 sur l’exploration et l’utilisation des ressources de l’espace (Luxembourg) signature 20 July 2017.

49 Linda Dawson, *The Politics and Perils of Space Exploration: Who Will Compete, Who Will Dominate* (Springer 2016) 10.

50 G. Quinn, above n44,480.

Incidentally, China has exploited this loophole by proclaiming mining rights on the moon rather than appropriating property in outer space; announcing plans to establish a base to mine helium-3, despite its present inability to establish a physical lunar presence.⁵¹

A significant roadblock to any amendments on appropriating resources resides within ensuring that less technologically advanced nations are not disadvantaged. The Moon Agreement⁵² stands as the only other authority on the issue, and is one option to incorporate into OST amendments. Herein, any resources acquired from celestial bodies are considered as CMH, *prima facie* requiring its use for the benefit of “all humanity”. However, these onerous burdens and limitations remain a cause for concern for technologically capable nations, its adoption remains highly-improbable.⁵³

An alternative approach exists in amending the non-appropriation principle of the OST.⁵⁴ The phrase “province of all mankind” establishes that no State may establish its sovereignty on a celestial body, yet may peacefully use it for construction, habitation, resource extraction and other peaceful, non-military purposes.⁵⁵ Ideally, this should be revised to the phrase “common property” while maintaining Article II provisions, facilitating the possibility of resource exploitation and property ownership by non-governmental entities while maintaining the existing prohibition on national claims to celestial objects.⁵⁶

While the notion of common property resources places the high-costs of maintaining exclusive rights to a resource upon technologically able states - encouraging free riders – this must be interpreted as a transitive step.⁵⁷ While acquired natural resources are appropriated and distributed to states without access to space this also concentrates access to space among select advanced nations, a position of reliance which will prove increasingly untenable to the national security of less capable states and drive independent development.

Regardless, incremental steps are instrumental in encouraging less capable UN member states towards developing commercial space infrastructure and participating

51 Zhang Huan, ‘China in talks with Europe to collaborate on moon village construction’ on People’s Daily (25 April 2017) <http://en.people.cn/n3/2017/0425/c90000-9207497.html>; Vidya Sagar Reddy, ‘China’s Pursuit of a “Space First”’ on Georgetown Journal of International Affairs (13 September 2016) <http://journal.georgetown.edu/chinas-pursuit-of-a-space-first/>.

52 *1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (The Moon Treaty)*, adopted 5 December 1979, 1363 UNTS 3 (entered into force 11 July 1984).

53 Timothy G. Nelson, ‘The Moon Agreement and Private Enterprise: Lessons from Investment Law’ (2011) 17(2) *ILSA Journal of International & Comparative Law* 396.

54 Fabio Tronchetti, ‘The Non-Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer Space Treaty’ (2008) 23(3) *Air & Space Law* 305.

55 Sara Bruhns, ‘A pragmatic approach to sovereignty on mars’ (2016) 38 *Space Policy* 58; A. Reed, above n9, 465.

56 Ricky J. Lee, ‘Exploitation Rights: Evolving from the “Province of Mankind” to the “Common Heritage of Mankind”’ in Ricky J. Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space* (Springer, 2012) 270.

57 Chika B. Onwuekwe, ‘The Commons Concept and Intellectual Property Rights Regime: Whither Plant Genetic Resources and Traditional Knowledge?’ (2004) 2(1) *Pierce Law Review* 75.

in space exploration. The prospect of less technologically capable nations participating within space activities has been enabled the ever-lowering barriers of entry resulting from decreasing costs of electronics, and constant miniaturisation of technology⁵⁸ under Space 2.0, and will facilitate the mass proliferation of commercial activities in the following decades.

Progress within the codification of legal principles on space assets within a multilateral form is already evident within the Cape Town Convention and the 2012 Space Assets Protocol;⁵⁹ producing the first space treaty regarding private international law. The treaty addressed the rights and obligations of both state and non-state parties engaged within business transactions, harmonizing and unifying the rules on asset-backed finance for mobile equipment in outer space encompassing spacecraft and payloads (i.e. satellites).⁶⁰ This addressed the needs of private financiers, including the priority of secured parties, title to purchased assets, and remedies upon default.⁶¹

However, the treaty only possesses four signatories and is thus not presently in force.⁶² This may be explained by concerns by the US and other prominent space States that the Space Assets Protocol would upset the existing system of international space law, concerning its registry of international interests and possible conflicts with the UN register of space objects.⁶³

Analysis

The codification of international principles advocating sustainability in outer space under the OST must be advanced through TCBMs. There exists active UN movement towards codifying the shared utilization and exploitation of resources. Recent history concerning TCBMs and trust within space sustainability can be traced from the EU ICOC in 2008, and to the 2010 Scientific and Technical Subcommittee of COPUOS and its foundation of a Long-term Sustainability of Outer Space Activities working group (LSOSAWG).⁶⁴

Since its formal establishment in 2010, LSOSAWG has been consistently hindered

58 Gabriele Lania, 'An International Comparison of Space History, Policy and Industrial Capability' on Space Industry Association of Australia (June 2016) <https://www.spaceindustry.com.au/Documents/Paper%20FINAL-5.pdf> 13-14.

59 *Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets*, opened for signature 9 March 2012, UNIDROIT.

60 Pai Zheng, 'Space Asset Under the Space Protocol of the Cape Town Convention' on New York University School of Law (November/December 2014) http://www.nyulawglobal.org/globalex/Space_Asset_Protocol_Cape_Town_Convention.html#_edn3.

61 J. Sundahl, above n3, 109-110.

62 UNIDROIT, 'Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets (Berlin 2012) – Status' on UNIDROIT (9 March 2012) <https://www.unidroit.org/status-2012-space>.

63 Du Rong, *Unifying Space Financing Through Space Assets Protocol to the Cape Town Convention: A desirable effort for the space sector?* (Doctoral Thesis – University of Hong Kong, 2017) 264.

64 *Long-term sustainability of outer space activities – Preliminary reflections*, adopted 8 February 2010, A/AC.105/C.1/2010/CRP.3.

by the rule of decision by consensus.⁶⁵ The issues dealt with by the LSOSAWG include identifying areas of concern for long-term sustainability, proposing measures to enhance sustainability, and formulating voluntary guidelines to reduce sustainability risks.⁶⁶ The LSOSAWG issued its first set of guidelines in June 2016 and additional guidelines in February 2018 addressing the registration and information on space objects, conducting of conjunction assessments for maneuverable space debris, addressing risks of uncontrolled reentry of space objects, and on the use of lasers in outer space.⁶⁷ Contrasted by the ICOC, LSOSAWG presents the broadest participatory forum for engaging all concerned international actors within a multilateral setting, to better incorporate their contentions and consider cogent background information.

The inclusion of CHM within the OST, to facilitate the equitable and sustainable sharing of resources, should be pursued within subsequent TCBMs. The successful implementation of CHM as a legal regime to control mineral resource protection under an international instrument was demonstrated by its presence within the United Nations Convention on the Law of the Sea.⁶⁸ Where outer space contains an abundance of natural resources, this anticipates the growing possibility of a reckless resource race between nations vying for power. The strongest support has emerged from underdeveloped states, who seek greater cooperation in ensuring the primacy of the rule of law and peaceful use of outer space for the benefit of all.⁶⁹ However, the adoption of CHM within the OST or any other substantive treaty continues to face significant opposition from the leading space states.⁷⁰

Finally, the UN must call-out countries seeking to erode longstanding OST *opinio juris*. This includes considering punitive measures against the US and Luxembourg - given their unilateral initiatives to recognize the ownership and alienation of resources in outer space – and as a means to discourage other countries from adopting similar measures. While commentators declare Title IV of the 2015 US Space Act to be a violation of Article II OST and contrary to international space law, little direct action has been taken by the UN to address this matter. This is further complicated by the legalist interpretation that US law does not grant ownership rights in any celestial body (e.g. a real property interest), but rather only recognizes rights to resources extracted from an asteroid (a personal

65 Gerard Brachet, 'The origins of the "Long-term Sustainability of Outer Space Activities" initiative at UN COPUOS' (2012) 28 *Space Policy* 165.

66 United Nations Office for Outer Space Affairs, 'Long-term Sustainability of Outer Space Activities' on United Nations Office for Outer Space Affairs (2018) <http://www.unoosa.org/oosa/en/ourwork/topics/long-term-sustainability-of-outer-space-activities.html>.

67 Guidelines for the long-term sustainability of outer space activities, adopted 23 February 2018, A/AC.105/L.315.

68 *Convention on the Law of the Sea*, adopted 10 December 1982, 1833 UNTS 397 (entered into force 1 November 1994) Article 136; Edward Guntrip, 'The Common Heritage of Mankind: An Adequate Regime for Managing the Deep Seabed' (2003) 4(2) *Melbourne Journal of International Law* IIE.

69 United Nations, above n2.

70 Beldavs, above n29.

property interest). Whilst this conception of personal property interests is consistent with the articles of the OST,⁷¹ the UN and COPUOS must endeavor to apply a more purposeful interpretation of the OST, and assume a proactive stance in preserving the rule of law and international peace and security in outer space.⁷²

National Security

Articles to Consider

Article II – *“Outer space...is not subject to national appropriation by claim of sovereignty”.*

Conflict arises vis-a-vis Article VI as to scope of activities which can be attributed to the State, versus attribution to a private entity. Article VI provides that States bear responsibility for national activities in outer space – including by non-governmental entities under its jurisdiction – mandating a degree of direct government involvement within the activities of private space companies. However, the acceptable degree of state involvement - which does not alter the classification of a private entity into a government entity - remains unspecified, and gives rise to additional uncertainty under Article II where a “supposed” private company explicitly engages in resource acquisition in outer space.

Indeed, ambivalence as to the line between government and private entities has been a longstanding issue among authoritarian and East Asian States. Within China, supposedly private space entities such as ExPace have connections to foundations within state-owned enterprises.⁷³ If left unaddressed, States may consolidate their strategic position by encouraging the appropriation of resources and territory through non-governmental activities; thus establishing State practice and international customary law.

Any amendments must address the scope of Article II's existing prohibition. A lack of clarification here may embolden States to circumvent the article by simply privatizing the contravening activity on the surface, while covertly exerting undue influence.⁷⁴

Article IV – *Parties “undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction.”*

When read in conjunction with Article 3 of the Moon Treaty, Article IV results in two distinct categories of demilitarization; one total and one partial. As “weapon of mass destruction” is not defined within the OST, its meaning is derived primarily from

71 Cristin Finnigan, ‘Why the Outer Space Treaty remains valid and relevant in the modern world’ on The Space Review (12 March 2018) <http://thespacereview.com/article/3448/1>.

72 James E. Dunstan, ‘Mining outer space may be cool but is it legal?’ (2016) 1(7) *Room – The Space Journal* 43.

73 Andrew Jones, ‘Chinese commercial company Expace dispatches second Kuaizhou-1A rocket to launch site’ on gbtimes (11 September 2018) <https://gbtimes.com/chinese-commercial-company-expace-dispatches-second-kuaizhou-1a-rocket-to-launch-site>.

74 J. Lee, above n63, 130.

international jurisprudence which follows the traditional classification of nuclear, biological, toxic and chemical weapons as WMDs, and prohibits their stationing in outer space.

This prohibition does not apply to conventional weapons which have a nuclear power source, nor to nuclear weapons or WMDs which enter outer space as part of the trajectory of an intercontinental ballistic missile.⁷⁵

International Climate

International consensus has emerged that an arms race in outer space should be prevented.⁷⁶ However, the existing legal regime still does not guarantee the prevention of conventional weapons, nor an arms race.⁷⁷ The US has consistently argued that any preemptive resolution addressing the weaponization of outer space would jeopardize its national security interests⁷⁸ and that resolutions to this effect provide the opportunity for rival nations to impose their national view on multilateral politics,⁷⁹ a contention which distinctly conflicts with the majority opinion of the international community.⁸⁰

Every year following 1982 in the UN First Committee and UN General Assembly, resolutions affirming the commitment of the international community to the prevention of an arms race in outer space (PAROS) is introduced and adopted by an overwhelming majority of UN member States.⁸¹ By incorporating subsequent developments in international space law under the ambit of PAROS, this framework affords Articles III and IV of the OST the status of customary law and maintains its relevance amid the dynamic nature of developments in outer space.

Most notably and recently in December 2014 the Russian proposed resolution 70/27 originating from the UN First Committee,⁸² committing member States to preventing an arms race in outer space and codifying the no first placement of weapons (NFP) in outer space, was passed during the UN General Assembly's 70th session with 129 votes

75 Bill Boothby, 'Space Weapons and the Law' (2017) 93 *International Law Studies* 202-203.

76 Nuclear Threat Initiative, 'Proposed Prevention of an Arms Race in Space (PAROS) Treaty' on Nuclear Threat Initiative (2018) <http://www.nti.org/learn/treaties-and-regimes/proposed-prevention-arms-race-space-paros-treaty/>.

77 UNDIR, *UNDIR Space Security Conference 2017* (UNDIR, 2017) 9.

78 United Nations, 'Preventing Outer Space Arms Race would avert grave danger; Possible new verifiable bilateral, multilateral agreements needed, says draft text in first committee' on United Nations (20 October 2008) <https://www.un.org/press/en/2008/gadis3371.doc.htm>.

79 United Nations, 'First Committee Submits Six Drafts to General Assembly, One Calling for Immediate Start of Negotiations on Treaty Preventing Outer Space Arms Race' on United Nations (30 October 2017) <https://www.un.org/press/en/2017/gadis3591.doc.htm>.

80 Reaching Critical Will, 'Outer Space' on Reaching Critical Will (2017) <http://www.reachingcriticalwill.org/resources/fact-sheets/critical-issues/5448-outer-space>.

81 United Nations Office for Outer Space Affairs, Meeting International Responsibilities and Addressing Domestic Needs: Proceedings (United Nations, 2006) 40.

82 United Nations, 'Disarmament Committee Approves Drafts on No First Placement of Arms in Outer Space, Ban on New Types of Mass Destruction Weapons' on United Nations (30 October 2014) <https://www.un.org/press/en/2014/gadis3514.doc.htm>.

in favor and 4 votes against. While the US opposed the draft resolution,⁸³ the support of other major space players (i.e. China and Russia) indicated a growing recognition of TCBMs in forestalling an arms race in outer space.⁸⁴

Another multilateral initiative concerns the attempts by the UN Conference on Disarmament to negotiate a draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT). On 12 February 2008 China and Russia introduced a joint draft treaty⁸⁵ to the Conference on Disarmament, a move which was skeptically denounced by the US as diplomatic ploy by these nations to gain a military advantage.⁸⁶ The opposition of the US to the proposed draft treaty has its foundation within the Bush administration's US National Space Policy document NSPD-49 of 31 August 2006.⁸⁷

“Proposed arms control agreements or restrictions must not impair the rights of the United States to conduct research, development, testing, and operations or other activities in space for US national interests.”

Similar sentiments were evident following updates to the draft treaty on 10 June 2014 by Russia and China, who sought to bind states to the treaty first before facilitating discussions on its scope and enforcement.⁸⁸ Opposition to the revised PPWT was indicated by Australia, Canada, France, and the US; who posit that the lack of a verification mechanism within the draft resolution is concerning, and that the primary motive is not to prevent the weaponization of outer space but limit the capabilities of developed space nations.⁸⁹ Since 2014, the PPWT remains in the drafting stage.

Similar to the EU ICOC, the development of an independent code of conduct

83 United Nations, ‘Item 95(b) Prevention of an arms race in outer space: no first placement of weapons in outer space’ on United Nations (7 December 2015) <https://gafc-vote.un.org/UNODA/vote.nsf/91a5e1195dc97a630525656f005b8adf/573ff9e5cfdb04c085257f16005e84ec?OpenDocument>.

84 Hao Liu and Fabio Tronchetti, ‘United Nations Resolution 69/32 on the ‘No first placement of weapons in space’: A step forward in the prevention of an arms race in outer space?’ (2016) 38 *Space Policy* 64.

85 United Nations, ‘Treaty on the Prevention of the Placement of Weapons in Outer Space, The Threat or Use of Force Against Outer Space Objects’ on Reaching Critical Will (12 February 2008) www.reachingcriticalwill.org/images/documents/Disarmament-fora/cd/2008/documents/Draft%20PPWT.pdf.

86 Alice Slater, ‘Nuclear Disarmament: The Path Forward, Obstacles, and Opportunities’ on Marc Pilisuk and Michael N. Nagler, *Peace Movements Worldwide – History and Vitality of Peace Movements* (Praeger, 2011) 25.

87 John M. Logsdon, ‘Book Review: Achieving space security’ (2008) 24(40) *Issues in Science and Technology* http://issues.org/24-4/br_logsdon/; Office of the President of the United States, ‘Unclassified – US National Space Policy’ on Federation of American Scientists (31 August 2006) <https://fas.org/irp/offdocs/nspd/space.html>.

88 United Nations, ‘Treaty on the Prevention of the Placement of Weapons in Outer Space, The Threat or Use of Force Against Outer Space Objects’ on Reaching Critical Will (10 June 2014) [reachingcriticalwill.org/images/documents/Disarmament-fora/cd/2014/documents/PPWT2014.pdf](http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/cd/2014/documents/PPWT2014.pdf)

89 Cassandra Steer, ‘Global Commons, Cosmic Commons: Implications of Military and Security Uses of Outer Space’ (2017) 18(1) *Georgetown Journal of International Affairs* 14; Michael Listner and Rajeswari Pillai Rajagopalan, ‘The 2014 PPWT: a new draft but with the same and different problems’ on *The Space Review* (11 August 2014) <http://www.thespacereview.com/article/2575/1>.

governing military affairs by academic institutions has been in progress since May 2016. The creation of the Manual of International Law Applicable to Military Uses of Outer Space (MILAMOS) is being overseen by academics and seeks to clarify the limitations which international law places on the threat or use of force in outer space, and the rules of engagement for hostilities in outer space.⁹⁰

International operational law manuals have had a tangible effect upon the development of *opinion juris*. Illustrated by the *San Remo Manual* to the UK's Manual of the Law of Armed Conflict,⁹¹ international manuals are becoming increasingly prevalent in courts, tribunals and other administrative bodies as references to assist within deliberative and advocacy projects. This is explained by the fact that international manuals are concise and accessible, they capture more nuanced government positions on legal issues, and present an impartial position from which various jurisdictions can seek to establish norms around.⁹²

State Sovereignty

While OST Articles clarify that space and celestial bodies cannot be claimed by nations, it remains uncertain how this applies to private corporations. This unknown has emboldened technologically and economically developed States to undertake unilateral action and endanger the existing multilateral TCBM framework. The passage of unilateral initiatives by governments within the US and Luxembourg have drawn concerns over the conflict between national laws and OST provisions.

The US 2015 Space Act,⁹³ was a legislative instrument adopted by the US government, outlining that any asteroid resources obtained in Outer Space were recognized by the government as the property of the entity that obtained them; provided that the entity is considered a “citizen of the United States.”⁹⁴ This was accompanied by the misnomer that “the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body.”⁹⁵ The US government became one of the first states to recognize the rights of its citizens to the extraction, possession and sale of natural resources from celestial bodies.

In July 2017, Luxembourg's legislative assembly also independently adopted space resource laws which provide national frameworks to recognize the rights of independent

90 McGill University, ‘manual on International Law Applicable to Military uses of Outer Space’ on McGill University (29 May 2016) <https://www.mcgill.ca/milamos/>; Dale Stephens and Melissa De Zwart, ‘*The Manual of International Law Applicable to Military Uses of Outer Space (MILAMOS)*’ (RUMLAE Research Paper No. 17-12, 2017) 1.

91 Ministry of Defence, JSP 383 – The Joint Service Manual of the Law of Armed Conflict (Ministry of Defence, 2004) vii.

92 Dale Stephens and Melissa de Zwart, *The Manual of International Law Applicable to Military Uses of Outer Space (MILAMOS)* (University of Adelaide RUMLAE Research Paper No. 17-12, 2017) 3-4.

93 *US Commercial Space Launch Competitiveness Act*, above n52.

94 R. Venkata Rao and V. Goplakrishnan, Kumar Abhijeet, *Recent Developments in Space Law: Opportunities & Challenges* (Springer, 2017) 33.

95 *US Commercial Space Launch Competitiveness Act*, above n52, §403.

non-governmental entities to extract resources from asteroids or other celestial bodies. Its articles recognize that the resources of outer space are susceptible to appropriation, which is subject to the written assignment of the government.⁹⁶ This serves to make Luxembourg an attractive place for space mining companies to settle and distribute acquired space resources.⁹⁷ The legislation also created a governing body called the Space Resources Initiative to supervise the harvesting of these asteroids, and to serve as a critical component of Luxembourg's space mining ambitions. The body has signed a MOU with the China National Space Administration, and seeks to provide a bilateral framework for economic, technical and political cooperation with China.⁹⁸

As an increasing number of states resort to unilateral legislative acts to capitalize on the growing space industry, the international order becomes increasingly anarchic as the authority of the UN and the international rule of law diminishes. In 2013 the UN General Assembly adopted a resolution⁹⁹ outlining how national legislation may reconcile with international law. The resolution contains a set of recommendations on national legislation relevant to the peaceful exploration and use of outer space, emphasizing 'sustainable use' of outer space resources, and reminding States of their responsibility for supervising space activity originating from their territories.¹⁰⁰ Incorporating these recommendations into the OST would reinforce their authority among member States, while encouraging the supervision and regulation of private space activities in compliance with international agreements.

Pertaining to issues of national sovereignty, there exists the option of redefining the international customary agreement on the 100-kilometer Karman line as the boundary for outer space and codifying the territorial limits of a state with respect to outer space.¹⁰¹ As the OST did not contemplate the delimitation of outer space, an amendment may reconsider the utility of the 1976 Bogota Declaration.¹⁰² The declaration characterized the geostationary orbit (GEO) as a natural resource, not a region of space given that the unique properties of GEO are created by earth itself. States aimed to draw upon *jus*

96 Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace, above n53, Art 1, Art 2.
97 Grand Duchy of Luxembourg, 'A Legal Framework for Space Exploration' on Grand Duchy of Luxembourg (13 July 2017) <http://www.luxembourg.public.lu/en/actualites/2017/07/21-spaceresources/index.html>.

98 Grand Duchy of Luxembourg, 'Luxembourg to open a Research laboratory' on Grand Duchy of Luxembourg (17 January 2018) <http://www.luxembourg.public.lu/en/actualites/2018/01/17-centre-spatial/index.html>; Grand Duchy of Luxembourg, 'SpaceResources.lu: First-time FNR investment in space exploration projects' on Grand Duchy of Luxembourg (27 November 2017) <http://www.luxembourg.public.lu/en/actualites/2017/11/23-space/index.html>.

99 *Recommendations on national legislation relevant to the peaceful exploration and use of outer space*, adopted 11 December 2013, A/RES/68/74 (Adopted without vote 11 December 2013).

100 Simonetta Di Pippo, 'The peaceful use of space' (2014) 1(1) *Room – The Space Journal*.

101 Olavo De Oliveira Bittencourt Neto, *Defining the Limits of Outer Space for Regulatory Purposes* (Springer, 2015) 69.

102 *The Bogotá Declaration*, signed 3 December 1976 (Adopted 3 December 1976) http://www.jaxa.jp/library/space_law/chapter_2/2-2-1-2_e.html.

cogens principle that States have absolute control over their natural resources.¹⁰³

However, the Declaration is precluded by public international law. As Article II of the OST has passed into customary international law, adopting the Declaration's view on GEO runs contrary to well established limits in international customary law on State sovereignty.¹⁰⁴ This was compounded by the fact that only eight States contributed to the declaration, and further multilateral debate and consultation with OST member states is required before its provisions are to be seriously considered.

Inevitable Militarization

While the term "peaceful" makes multiple appearances throughout the OST, its interpretation under international legal customs and principles has been understood to mean "nonaggressive, but military-friendly".¹⁰⁵ Accordingly, the growing perception of space as the new warfighting domain further erodes this definition of "peaceful," with intensifying geopolitical competition causing numerous states to establish dedicated space-focused military branches and organizations. This was illustrated by China in 2015 through the People's Liberation Army Strategic Support Force,¹⁰⁶ and by the US in 2018 through Space Policy Directive-3 and the establishment of a Space Force as a branch of the military.¹⁰⁷

The benefits of military space-based infrastructure are well documented and have provided developed nations with significant increases in the accuracy, agility, range, and effectiveness of their military forces. Space infrastructure has become a significant tool for information dominance and therefore deterrence.¹⁰⁸ Paradoxically, the notion of space deterrence has only contributed to the cascading militarization of outer space, as States continuously seek to dissuade the use of counter-space capabilities by adversaries.¹⁰⁹

Given increasing military dependency on space-based assets, there has arisen the development of a cascading array of specialized weapon systems that can target space-based assets, including kinetic anti-satellite missiles (ASATs), co-orbital ASATs, directed

103 Hamilton, above n12, 396.

104 Dan St. John, 'The Bogotá Declaration and the Curious Case of Geostationary Orbit' on Denver Journal of International Law and Policy (31 January 2013) <http://djilp.org/3494/the-bogota-declaration-and-the-curious-case-of-geostationary-orbit/>.

105 Ann Deslandes, 'The Bold Future of the Outer Space Treaty' on JSTOR Daily (1 August 2018) <https://daily.jstor.org/the-bold-future-of-the-outer-space-treaty/>.

106 Rachel Burton, 'The People's Liberation Army Strategic Support Force: Leadership and Structure' on Project 2049 Institute (25 September 2018) <https://project2049.net/2018/09/25/the-peoples-liberation-army-strategic-support-force-leadership-and-structure/>.

107 The White House, 'Remarks by President Trump at a Meeting with the National Space Council and Signing of Space Policy Directive-3' on The White House (18 June 2018) <https://www.whitehouse.gov/briefings-statements/remarks-president-trump-meeting-national-space-council-signing-space-policy-directive-3/>.

108 Michael L. Howard, 'Rendezvous in Space – Looking in on military space power' (2010) Summer Edition *Army Space Journal* 23.

109 Malcolm Davis, 'Avoiding a free-for-all: the Outer Space Treaty revisited' on ASPI (16 July 2018) <https://www.aspistrategist.org.au/avoiding-a-free-for-all-the-outer-space-treaty-revisited/>.

energy weapons, cyber weapons and electromagnetic pulse weapons.

Assuming armed conflict involving space-based assets, the central principles of distinction, proportionality and precaution that underpin International Humanitarian Law (IHL) naturally applies to regulate armed conflict in space. These principles ostensibly provide for protection of civilians and civilian uses of space-based assets on the limits of their application.¹¹⁰

However, outer space warfare raises specific challenges for the interpretation of IHL, revolving around the notions of “attack” and the implications for dual-use characteristics of satellites, and the consequences of orbital debris. While parties to a conflict have a general duty to take constant care with respect to civilians, most of the specific obligations concerning the conduct of hostilities apply to attacks rather than defensive actions. More so, as many satellites are dual-use, the impact of attacks on multi-national satellites could be devastating to the industrial control systems of more than just the target nation. Finally, the impact of space debris from civilian activities or kinetic attacks poses a long-term risk to freedom of navigation and access to space.¹¹¹

Concerns persist over Article IV's definition of WMDs. The language of the OST does not prohibit the actual use of nuclear weapons terrestrially, only their permanent placement or installation in outer space or on another celestial body.¹¹² Greater utility exists in modifying the OST to align with international norms and subordinate international instruments pertaining to the definition over what constitutes a WMD, in accord with the customary IHL principle of avoiding indiscriminate damage.¹¹³

This would account for destructive kinetic weaponry (i.e. ASAT missiles) of which the resulting debris from an attack can pose an indiscriminate risk to personnel and property in earth orbit and beyond. This was demonstrated by China's ASAT missile destruction of a redundant weather satellite in January 2007, creating in-excess of 3,000 pieces of orbital debris which have since then posed a threat to access space.¹¹⁴ OST amendments may further recognize and prohibit the use of debris and non-explosive projectiles as WMDs. Indeed, the prospect of orbital weaponry (i.e. kinetic bombardment) has the potential to

110 Dale Stephens, 'Why Outer Space Matters: Dr Dale Stephens Gives a Brief Introduction to International Humanitarian Law' on International Committee of the Red Cross – Intercross Blog (7 November 2016) <http://intercrossblog.icrc.org/blog/twmzia1cp84kv2c29bi4iz6q4u03in>.

111 Richard Desgagne, 'International Humanitarian Law in Outer Space' on United Nations Institute for Disarmament Research (2 December 2015) <http://www.unidir.ch/files/conferences/pdfs/international-humanitarian-law-in-outer-space-en-1-1099.pdf>.

112 Thomas J. Herron, 'Deep Space Thinking: What Elon Musk's Idea to Nuke Mars Teaches us about Regulating the Visionaries and Daredevils of Outer Space' (2016) 41(3) *Columbia Journal of Environmental Law* 563.

113 Mihai-Cladiu Dragomirescu, 'Legal means of preventing war in the Outer Space' on Space Law Resource (27 November 2016) <https://www.spacelawresource.com/single-post/2016/11/30/Legal-means-of-preventing-war-in-the-Outer-Space>.

114 Jaganath Sankaran, 'Limits of the Chinese Antisatellite Threat to the United States' (2014) 8(4) *Strategic Studies Quarterly* 25.

effect destruction comparable to nuclear weapons.¹¹⁵

Additionally, the OST may consider the industrial application of nuclear material and weaponry in space technologies/applications. This is illustrated through its use in nuclear propulsion, within planetary defense for near-earth object collisional mitigation, and with regard to resource mining activities.¹¹⁶

Regardless, proposed amendments to the OST relating to military activities must be predicated upon the existing prohibitions on weaponry outlined under IHL. This is necessary in considering prohibitions on the use of force, and destructive conventional and unconventional weaponry in outer space, while recognizing the outdated prohibition on the use of nuclear material.

Analysis

The UN must maintain the momentum of its achievements - within the 2010 creation of a Group of Governmental Experts on TCBMs,¹¹⁷ and the 2014 PAROS NFP Resolution 69/32 – in promoting the consolidation of these multilateral agreements and their principles under amendments to the OST.

Resolution 69/32 represented a renewed international initiative to limit the weaponization of outer space and hints at the possibility for similar achievements to be made in restricting military actions and weapons in outer space.¹¹⁸ Since the 1980s, the adoption by the UN General Assembly of PAROS and TCBM resolutions have taken place without constructive debate among delegations, which lacked the open exchange of opinions and views which form the basis of TCBMs.¹¹⁹ Resolution 69/32 introduced a step-by-step approach to PAROS which may enable future initiatives, involving clarifying its relationship with the Draft PPWT, inclusion of a definition of “space weapons” into future PAROS agreements, and the suggestion that States make additional pledge of “no first attack” in space.

Secondly, the international legal framework underlying PAROS would benefit from the accountability and responsibility resulting from the inclusion of enforcement mechanisms. The possibility of a binding mechanism to ban weapons in outer space has been raised by nascent space countries including Yemen, Kazakhstan, and Indonesia.¹²⁰

While enforcement within international law is a tedious affair, multiple international

115 M.N. Sirohi, *Military Space Force and Modern Defence* (Vij Books India, 2016) 25; Alex B. Englehart, ‘Common Ground in the Sky: Extending the 1967 Outer Space Treaty to Reconcile US and Chinese Security Interests’ (2008) 17(1) *Pacific Rim Law & Policy Journal* 136.

116 G.R Schmidt., ‘Nuclear Pulse Propulsion – Orion and Beyond’ on Stanford University (19 July 2000) <http://large.stanford.edu/courses/2013/ph241/micks1/docs/aiaa-2000-3856.pdf>.

117 *Resolution Adopted by the General Assembly on 8 December 2010*, adopted 8 December 2010, A/RES/65/68.

118 Liu and Tronchetti, above n93, 67.

119 United Nations Office for Disarmament Affairs, ‘Outer Space’ on United Nations (2018) <https://www.un.org/disarmament/topics/outerspace/>.

120 United Nations, above n10.

regulatory regimes (i.e. the Convention on Cluster Munitions) and organizations (i.e. the Organization for the Prohibition of Chemical Weapons) demonstrate the capacity of the international community to recognize and respond to weapons which present a clear and present danger to international peace and security. TCBMs in space security constitutes a first step in the progressive development of international space law towards this conclusion by reducing mishaps, misinterpretations and miscalculations, while creating greater predictability and consensus on critical matters.¹²¹

Finally, the two key areas within which the UN should seek to direct its subsequent efforts to involve the improvement in inspection and mechanisms and broadening the category of weapons which fall under its purview.

A precedent has been established in international customary law since the Cold War by the US that the placement of ground-based systems that temporarily place prohibited weapons into orbit would not be considered a violation of the OST, while space-based nuclear weapons would be considered a violation.¹²² Accordingly, inclusion of an explicit positive clause allowing for the inspection of spacecraft to ensure compliance with PAROS agreements should be considered in furthering TCBMs between UN member states and safeguarding the rule of law in outer space.

Furthermore, Article IV should be amended in a targeted manner to address kinetic kill vehicles, lasers and ASATs weaponry alone. This would be sufficient to have a comparable effect on peace and security in outer space and carries the highest probability of being accepted by China and the US, by providing sufficient certainty for areas in which the US can pursue its military and strategic interests in outer space.¹²³

Environment

Articles to Consider

Article VII – “Each State Party to the Treaty that launches or procures the launching of an object into outer space...is internationally liable for damage to another State Party to the Treaty”.

The article places an overly-onerous burden on governments to be responsible in perpetuity for all actions conducted in space; with no explicitly specified statute of limitations, nor limits on causation. This implies that the “State-of-launch” bears unlimited legal responsibility for damage caused to others, which has resulted in many governments passing down the costs of risks to businesses.¹²⁴

121 United Nations, ‘Amid Commemoration of Landmark Treaty’s Fiftieth Anniversary, Joint Meeting of First, Fourth Committees Discusses Keeping Weapons Away from Outer Space’ on United Nations Press (12 October 2017) <https://www.un.org/press/en/2017/gaspd640.doc.htm>.

122 Paine, above n5.

123 B. Englehart, above n129, 151.

124 *Space Activities Act 1998* (Cth), s.48.

Article V – “States Parties to the Treaty shall immediately inform the other State Parties...of any phenomena they discover in outer space...which could constitute a danger to the life or health of astronauts.”

The OST outlines a foundational framework for the reporting of dangers posed by space debris, one further refined by the 2010 UN Space Debris Mitigation Guidelines.¹²⁵ However, beyond Article VII holding states responsible for any potential damages caused by debris generated by their entities, the OST is notably absent of any preceding duty or obligation for responsible entities to adopt immediate or prolonged measures to remove or mitigate debris related to their activities. Further, in practice the duty to report “immediately” is often ignored by state parties.¹²⁶

Article IX – “States Parties to the Treaty shall pursue studies of outer space... so as to avoid their harmful contamination and also adverse changes...”

This article addresses the environmental considerations of outer space activities and seeks to protect outer space and other celestial bodies from contamination and environmental damage. This requires State parties to consider the adverse effects of their activities upon other states and requires them to seek consultation prior to assuming a course of action. However, international customary law has established that the consultation requirement is not interpreted in a standardized manner, nor possesses a strong enforcement infrastructure; meaning that while a State is required to request an opinion or examination of a specific problem little else is required beyond that.¹²⁷

Space Debris Remediation

The OST must be amended to promote sustainable mining practices in outer space, and the responsible use of technologies in outer space. The allure of asteroid mining has raised concerns that mining minerals could damage the environment around earth. This is alluded to by the existing extensive list of environmental considerations involved with mining on earth, and the added dangers of space debris and hazardous materials when mining in space.¹²⁸

Consequently, the threats posed by accidents caused by falling space craft upon the terrestrial environment is a cause for great concern, one whose framework may serve

¹²⁵ Peter Stubbe, *State Accountability for Space Debris: A Legal Study of Responsibility for Polluting the Space Environment and Liability for Damage Caused by Space Debris* (Brill, 2017) 232.

¹²⁶ Jonathan Lim, ‘Written in the Stars: China’s Space Ambitions’ on Young Australians in International Affairs (16 April 2018) <https://www.youngausint.org.au/single-post/2018/04/16/Written-in-the-Stars-Chinas-Space-Ambitions>.

¹²⁷ D. Doshi, above n51, 204.

¹²⁸ Tony Milligan, ‘Asteroid Mining, Integrity and Containment’ on Jai Galliot, *Commercial Space Exploration: Ethics, Policy and Governance* (Routledge, 2016) 124.

as an example for environmental regulations in outer space. This was illustrated by the Cosmos 954 satellite on 24th January 1978, whose crash spread radioactive materials over 124,000 km² of Canada.¹²⁹ A similar incident also occurred on 11th July 1979 when the US space station Skylab landed within a populated area in Western Australia upon re-entry; resulting in the first instance of the *Liability Convention* being activated.

The OST lacks any binding international agreement which specifies meaningful environmental protection in outer space and space debris control mechanisms. While difficult to compel actors to cease pollutive activities, the devastating prospect of a Kessler syndrome limiting access to space for generations must be addressed through a binding agreement. This will take steps towards defining what constitutes “space” and “space debris,” provide economic means for member States to remove space debris, and establish data-sharing responsibilities necessary to effectively monitor and mitigate the threat of space debris throughout the international community.¹³⁰

However, any mandatory measures to mitigate space debris must avoid unjustly disadvantaging developing states, as it is likely to lead to an increase in the cost of space activities and access. Rationally, a multilateral solution to space debris can only be implemented after appropriate national and regional regulations are developed and harmonized internationally. A level playing field is key to an effective regulatory system.¹³¹

Consequently, progress has been made in creating a separate instrument which addresses sustainability in outer space. As aforementioned, the February 2018 meeting of LSOSAWG under COPUOS facilitated the creation of nine guidelines for sustainable development by reducing the risks of collisions and other harmful activities.

Focus must henceforth be directed upon the early agreement on the next set of proposed guidelines and facilitating the broader participation of leading space powers (i.e. US, Russia, China)¹³² which will generate positive momentum during a period of heightened tensions for terrestrial geopolitics and outer space diplomacy.¹³³

Analysis

To facilitate the long-term sustainability of outer space activities, the term “outer void space” may be introduced within the OST. The inclusion of this phrase is precipitated by shifting interpretations regarding the UNs use of the term “outer space”. Where the substance of the OST speaks consistently of “outer space, including the moon and celestial

129 Francis Lyall and Paul B. Larsen, *Space Law – A Treatise* (Routledge, 2016) Ch 4.

130 Joseph S. Imburgia, ‘Space Debris and Its Threat to National Security: A Proposal for a Binding International Agreement to Clean Up the Junk’ (2011) 44 *Vanderbilt Journal of Transnational Law* 634.

131 Joanne Wheeler, ‘Managing Space - International Space Law and Prospective Reforms’ on Harvard International Review (30 March 2012) <http://hir.harvard.edu/article/?a=2929>.

132 United Nations, ‘Do Not Let Political Differences Distract You, General Assembly President Urges Member States, as Fourth Committee Continues Outer Space Debate’ on United Nations Press (13 October 2017) <https://www.un.org/press/en/2017/gaspd641.doc.htm>.

133 Paul Meyer, ‘The Outer Space Treaty at 50: An enduring basis for cooperative security’ on The Space Review (25 September 2017) <http://www.thespacereview.com/article/3335/1>.

bodies,” an obtuse interpretation permits that “outer space” does not designate the space in-between celestial bodies. The definition of the terminology surrounding this manner of physically discrete phenomena retains an ostensible relevance, despite the functional focus of international space law.¹³⁴

The introduction of this phrase will firstly fill a terminological gap in space law, and should not be construed as an attempt to change the long-established meaning of outer space established in space law jurisprudence. Furthermore, the term is specifically meant for use in legal discussions meant for outer space, and will provide greater clarity, purpose, and scope within space law.¹³⁵

Secondly, a broadly worded provision within the OST, mandating the obligation to facilitate debris removal, would represent a tangible step towards an established legal framework and mechanism. The existing treaties do not mention the term ‘space debris’ anywhere, and their use of the term ‘space object’ does not provide sufficient definition which would enable the application of legal consequences to it.¹³⁶

In addressing this issue, inspiration may be drawn from the scope of Maritime Tradition and its provisions for sailors. This would ideally encourage States to cooperate with each other, and with private Active Debris Removal entities, to remove space debris under a rewards system; while establishing a customary practice which can later be codified under an international agreement. In considering the legality of ownership over the multitude of space debris objects and Article VI OST, this process may be envisaged under a framework similar to the International Space Station Intergovernmental Agreement, which stands as a working example of States changing the nature of their liability to one another under specified circumstances.¹³⁷

Another suggestion involves inclusion of a requirement for States to restrict the orbital lifetimes of spacecraft through the inclusion of built-in de-orbiting measures within space vehicles as an international norm.¹³⁸

Finally, the notion of *res communis* hinders responsible commercial mining by promoting the tragedy of the commons.¹³⁹ Attention should be turned to Article 11 – Moon

134 Philip De Man, *Exclusive Use in an Inclusive Environment: The Meaning of the Non-Appropriation Principle for Space Resource Exploitation* (Springer, 2016) 104.

135 Bin Cheng, “Outer Void Space – The Reason for this Neologism in Space Law” (1999) *Australian Journal of International Law* 1.

136 Ward Munters, ‘Space debris conundrum for international law makers’ (2016) 1(7) *Room – The Space Journal* 60-64.

137 Al Anzaldua and Michelle Hanlon, ‘Maritime tradition can inform policy and law for commercial active debris removal’ on *The Space Review* (19 February 2018) <http://www.thespacereview.com/article/3434/1>.

138 Joshua Hampson, ‘Space to Breathe: The Argument for a New Outer Space Treaty’ on *The Potomac Institute for Policy Studies* (15 October 2015) <http://www.potomacinstitute.org/steps/views-in-brief/46-space-to-breathe-the-argument-for-a-new-outer-space-treaty>.

139 Christy Collins, ‘Res Communis?: A Critical Legal Geography of Outer Space, Antarctica, and the Deep Seabed’ on James S. Ormrod and Peter Dickens, *The Palgrave Handbook of Society, Culture and Outer Space* (Springer, 2017) Part 2 – Chapter 9.

Treaty, wherein no natural resources ‘in place’ shall become property of any entity. To clarify the OST’s effect on property rights within extracted resources, States could build upon the substance of the Moon treaty to provide that natural resources which are not ‘in place’ may become property of any entity.¹⁴⁰ This would codify existing customary law as it applies to the collection of scientific samples observed within the Apollo Program and Hayabusa mission.¹⁴¹

Concluding Remarks

Summary

Where common concerns pertaining to business and the economic issues, national security, and the environment have resulted in a multiplicity of proposed OST amendments, the successful maintenance of peace and security for future generations mandates the broad acceptance and adoption of specific amendments which provide for property and ownership, regulate space-based weaponry, and safeguard the environment in outer space.

The achievement of broad acceptance to these amendments requires the promotion of TCBMs, which calls upon UN member States to rectify the growing inequality and balance between technologically advanced and developing States. This should be addressed through the proliferation of joint-space initiatives akin to the International Space Station, the removal of political barriers, and increased technology and research sharing.

Promoting economic prosperity while simultaneously harmonizing multilateral cooperation is also manageable through increased operational coordination, and the codification of existing international customary norms and principles into separate instruments.

Operational coordination should be sought to avoid a tragedy of the commons. The diminishing amount of space in low earth orbit, and growing volume of orbital debris, will increasingly threaten the military, economic and scientific use of space for all nations. The UN must coordinate a framework for public-private sector utilization of space and create comprehensible measures of liability for incidents in space. One solution exists for UN member states to address sustainability issues by either adopting the ICOC or forging a new space code of conduct.

The codification of existing soft-law instruments also provides an alternative means of facilitating mutual trust amongst the international community. The establishment of unmistakable boundaries illustrating when a clear breach of international law has occurred, and uniform application of sanctions and enforcement procedures following a breach, reinforce the rule of law and enable the establishment of a viable trust-based

140 Nicole Ng, ‘Fences in Outer Space: Recognizing Property Rights in Celestial Bodies and Natural Resources’ (2016) 7 *The West Australian Jurist* 168.

141 NASA, ‘Hayabusa Asteroid Itokawa Samples’ on NASA (1 September 2016) <https://curator.jsc.nasa.gov/hayabusa/>.

framework.¹⁴²

Codifying an international response to violations of the OST reinforces international norms and encourages multilateral cooperation and unity. The achievements of the 2014 NFP resolution and the 2012 Space Assets Protocol has demonstrated that tangible progress can be made in codifying developing norms within international space law. It is anticipated that the progress of TCBMs between UN member States will pave the way to effective enforcement measures being instituted into the OST. Indeed, the OST is in desperate need of traditional sanctions, the payment of restitution, and restrictions on an offending State's access to space - in response to the sabotage of another country's space assets.

A multilateral response reinforces the rule of law, promotes inclusivity, precludes the notion of "might makes right", and prevents the emergence of an anarchic international order. Should the damaging of space assets result in coordinated punishment, the international community may also confidently rely upon its authority and the notion of deterrence as a means of enforcement.

Limitations

Considerations that arise when overcoming institutional inertia opposing the regulation of outer space activities under an amended OST encompass; the differing political objectives and perceptions of national security and interests, the diversion of attention from what actors regard as their remits, incremental approaches versus comprehensive approaches, the institution for the negotiations on these issues, and questions of timing and sense of urgency.¹⁴³

There also exists the issue of balancing equitability and fairness (Article I – OST) against the notions of effectiveness and efficiency mentioned by developed states advocating regulatory liberalism and the merits of private enterprise and free market capitalism. The successful implementation of benefit sharing would reduce inequality and promote the notion of common but differentiated responsibilities among OST member States.¹⁴⁴

Furthermore, several of the suggestions explored in advocating a return to form within the OST – by considering space as a global commons - appear impractical in the current geopolitical climate and presence of mounting commercial activities in outer space. Indeed, it appears highly improbable that both the notion of common property or common heritage of mankind would be adopted without significant concessions offered

142 Timothy Meyer, 'How Different are Treaties and Modern Customary International Law? A Response to Verdier and Voeten' on American Society of International Law (5 April 2015) <https://www.asil.org/blogs/how-different-are-treaties-and-modern-customary-international-law-response-verdier-and-voeten>.

143 United Nations Institute for Disarmament Research, *Celebrating the Space Age: 50 Years of Space Technology, 40 Years of the Outer Space Treaty - Conference Report, 2-3 April 2007* (United Nations Publications, 2007) 33.

144 Elisa Morgera, 'The Need for an International Legal Concept of Fair and Equitable Benefit Sharing' (2016) 27(2) *European Journal of International Law* 355.

to the leading space powers of US, Russia and China.

Areas for Further Study

First, OST Articles enable different space-faring countries to interpret the terms with great fluidity. One area of concern is where the Article IV explicitly forbids WMDs in space, but falls silent on the use of conventional weaponry. The opportunity exists for the international community to revise the scope of WMDs to encompass kinetic ASAT weaponry and kinetic bombardment.

Second, the rule of law may be reinforced through the removal of the treaty denunciation article of OST under Article XVI, to prevent states from withdrawing from the OST. The Vienna Convention on the Law of Treaties¹⁴⁵ outlines that a treaty that contains no provisions for denunciation is not subject to denunciation, unless the parties intended to admit the possibility of denunciation, or a right of denunciation was implied by its nature.

Third, promotion of space debris remediation practices may be advanced through proposed amendments to Article IX of the OST, changing the phrase “adopt appropriate measures” to “adopt proactive measures.”¹⁴⁶ This clause would compel States to explore space debris remediation options the moment it becomes aware of issues with its object, to actively track the location of its objects, and advocate for the compulsory inclusion of de-orbiting technology within satellites - among other proactive measures.

Fourth, the explicit limitation of national appropriation and exploitation of resources in outer space to specific celestial objects (i.e. asteroids) alone bears consideration. This would limit the scope for environmental damage in the immediate term, while regulating economic development and preventing adverse market conditions caused by the oversupply of resources.

Conclusion

Despite increasing militarization and competition in outer space, the possibility of amendments to the OST being adopted by the international community remains uncertain. Accordingly, cooperation within international diplomacy requires on patience and communication as adversaries seek to build mutual trust through common ground. The successful implementation amendments to the OST must be interpreted as an iterative process, contingent upon common interests in maintaining the rule of law by strengthening the existing international rules-based order, incentivizing state and private actors to use outer space responsibly, and the flexibility to adapt to the dynamic climate of terrestrial geopolitics.¹⁴⁷

145 Vienna Convention on the Law of Treaties, opened for signature 23 May 1969, 1155 UNTS 331 (entered into force 27 January 1980) Article 65.

146 Ram S Jakhu and Md Tanveer Ahmad, ‘The Outer Space Treaty and states’ obligation to remove space debris: a US perspective’ on *The Space Review* (13 November 2017) <http://www.thespacereview.com/article/3370/1>.

147 G. Quinn, above n44, 497-502.

Where it appears that any proposed changes to the OST must be minor and incremental to account for inequalities and obtain wide acceptance, the use of soft law and TCBMs remains the most viable and effective immediate option. The politicization of any guiding principles should also be avoided by releasing draft materials to the public only when all parties agree, and by working through sub-committees operating from a technical perspective.¹⁴⁸ This would recognize the growing needs of nations and businesses in outer space and contribute most to international peace and stability. Incremental change is better than ambitious failure, for success feeds on itself.

¹⁴⁸ Johnson-Freese, above n8, 184.

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