GOOD FENCES MAKE GOOD (SPACE) NEIGHBOURS

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Humanity has reached a critical point in its history. Technological advancements herald a great renaissance for humanity's reach to the stars. States and private companies plan commercial and other activities in space and upon celestial bodies, demonstrating that humankind can become an inter-planetary species. Such planning occurs in accordance with the prevailing space law regime and, notwithstanding the undeniable ambition of the planners, it is evident this space law regime does have gaps and ambiguities that must be addressed before these endeavours can be meaningfully fulfilled. This article examines the legal regime encapsulated by the 1967 Outer Space Treaty ('OST') (ratified by all major space-faring nations) and explores ways in which specific OST provisions can give rise to temporary proprietary and jurisdictional rights, which can be used to avoid future conflict in space. The authors contend that these provisions provide rights of control to States so as to manage 'facilities', to exercise jurisdiction and to observe rights of 'due regard' that in turn establish basic legal boundaries. Such boundaries, it is argued, permit confidence and certainty in the conduct of commercial and other activities upon celestial bodies, enabling competing States and companies to delimit areas in which they conduct their operations. Additionally, the article examines the capacity of military forces to operate on these celestial bodies so as to undertake a peacekeeping type role consistently with the provisions of the OST. Such a function is argued to be necessary, given the unique attribution mechanism of the OST that can give public legal significance to the acts of private companies. It is an underlying theme of this article that respecting legal boundaries on the Moon and other celestial bodies while engaging in commercial activity can create good neighbours which in turn can underpin a peaceful, stable and cooperative space environment.

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I INTRODUCTION

The 1960s saw intense competition between the two major space powers, namely the United States ('US') and the former Soviet Union ('USSR.'), in their struggle to be triumphant in the space race. Despite the strong rivalry, both the US and USSR. were able to negotiate a key multilateral treaty that sets out the fundamental legal principles that would guide humanity's reach for the stars. The resulting effort, the 1967 *Outer Space Treaty* ('OST'),[1] establishes the basic framework for the conduct of all space activity and enjoys a high number of subsequent State party ratifications, including all of the major space powers today.[2] The OST provides, inter alia, that there shall be no national appropriation of space or any celestial body.[3] It also proscribes the establishment of military bases, and other particular military activities, on the Moon and other celestial bodies.[4] Such a framework is commendable in seeking to avoid the egregious mistakes that came from the colonialisation projects of European powers in former centuries, and is specifically committed to the goal of ensuring the cooperative and peaceful exploration and use of outer space.[5]

While setting out the fundamental principles for guiding space activities, the OST was very much a product of its time. Drafted when only a limited number of States had the

[1] *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, opened for signature 27 January 1967, 610 UNTS 205 (entered into force 10 October 1967) ('OST').
[2] In particular, ratifications made by the US (10 October 1967), the Union of Soviet Socialist Republics (10 October 1967), China (12 January 1984) (by accession) and India (18 January 1982).
[3] OST (n 1) art II.
[4] Ibid art IV.
[5] Ibid Preamble, art I.

economic, technological and industrial capacity to voyage into space and the goals for human habitation of celestial bodies were very uncertain, the basic framework adequately reflected the realities of 1967. However, in the current century, it is self-evident that many more States, as well as private companies, now have the same capacities to explore and use space. Moreover, it is also becoming very clear that human settlement and exploitation of resources within space are on the cusp of being fully realised. Such exploitation of space resources is envisioned to allow humanity to travel further into the solar system and become an interplanetary species.[6] Given these imminent developments, it may be fairly asked whether the OST is optimally suited to meet the emerging challenges that have already manifested as States and private entities start and increase their activities in space. A case is made in this article that the OST framework is not ideally suited to meet current, and inevitably increasing, pressures in this area. However, it will be argued that the OST does contain provisions that provide a reasonable starting point. While it is laudable that States cannot claim space and celestial bodies as national territory, the absence of any kind of proprietary entitlement to undertake activities on the Moon or other celestial bodies, however temporary, sows the seeds for uncertainty and potential conflict. Similarly, it is desirable that the blanket prohibition on military bases and other stated military activities on the Moon and other celestial bodies serves the goal of lessening military competition and conflict. However, security concerns remain, especially under the unique attribution framework established by the OST. Article VI of that treaty links the actions of private actors in space much more directly with the State than what general international law rules otherwise provide for attribution. Such direct attribution for private actors in space thus allows for the possibility of unwitting violation of international law in circumstances where States would not otherwise be implicated. Such violation has the real chance of heightening

[6] Dylan Love, 'The Next Frontier: Space Miners are the Universe's Future Tycoons', *CNBC* (Web Page, 26 December 2016) <https://www.cnbc.com/2016/12/26/the-next-frontier-space-miners-are-the-universes-future-tycoons.html>; Adrian Turner, 'Mars and Our Path to Being an Interplanetary Species', *Financial Review* (Web Page, 18 July 2019) <https://www.afr.com/work-and-careers/leaders/mars-and-our-path-to-being-an-interplanetary-species-20190718-p528ky>; Rob Liddell, 'Could We Become an Interplanetary Species? What's Next for Space Travel', *BBC Two Stargazing* (Web Page, 2019) <https://www.bbc.co.uk/programmes/articles/27jMG32HjQmf0JGDxCNy6Nj/could-we-become-an-interplanetary-species-what-s-next-for-space-travel>.

tensions and risking conflict. Accordingly, security mechanisms that maintain control over such private actors and otherwise 'keep the peace' are necessary.

Given that humanity is about to enter a new era of space use, and the likelihood of any major new multilateral treaty is unlikely, this article will examine how the existing provisions of the OST may be interpreted and applied to achieve humanity's current goals while minimising the risk of potential conflict. A case will be made that there is some capacity to use pre-existing, though as yet untested, provisions of the OST. It will be argued that these may provide for both a sense of relative confidence in undertaking commercial activities in space as well as allowing for a sense of security and ensuring de-escalation of conflict in undertaking those very same activities. The article will comprise three parts: first, a brief survey of currently planned activities in space will be undertaken to provide context; then, an analysis of Articles VIII and XII of the OST will be undertaken to assess whether they can provide a basis for ensuring confidence in undertaking planned activity; finally, an assessment of Article IV and the prohibition on a number of military activities will be undertaken. Paradoxically, a case will be made that the restrictions outlined in Article IV need to be read narrowly in order to ensure that military forces can be deployed on 'peacekeeping' type missions to exercise control over private actors and broker disagreements in a manner that reduces the risk of escalating tension and potential conflict.

II CONTEXT OF CURRENT AND NEAR FUTURE SPACE ACTIVITIES

The new space race for the 21st century has already begun. Unlike its 1960s counterpart, the field today is comprised of numerous States, as well as many capable private actors. New technology has quite literally propelled the world into an era in which commercial uses of space are driving an economic paradigm shift. Mining on celestial bodies is an inevitability and traditional ways of thinking about international space law must shift accordingly. In April 2020, the Trump administration signed an executive order encouraging an American return to the Moon,[7] led by the US' commercial companies and precipitating an exponential increase in exploration and exploitation of mineral and

[7] United States Government Executive Order No 13914, 'Encouraging International Support for the Recovery and Use of Space Resources', Federal Register, vol 85, no 70 <https://www.govinfo.gov/content/pkg/FR-2020-04-10/pdf/2020-07800.pdf>.

chemical resources from the Moon, Mars, and other celestial bodies. The order complements the Obama administration's US *Commercial Space Launch Competitiveness Act 2015* ('*Commercial Space Act*')[8] through which the U.S. Government provided its citizens the right to claim commercial ownership of celestial resources and established the theme of a commercially led race to claim space resources. US Government officials have sought interest from China and other space faring States to engage in cooperative commercial operations in space.[9] The significance of these declarations in light of the value and the scale of commercial space industry will be demonstrated further in this paper. Other States are also planning their own commercial space initiatives: China has already announced its own long-term plans for the extraction of space resources, with the current chief scientist of the Chinese Lunar Exploration Program remarking on the feasibility of removing large quantities of Helium-3 from the Moon as long ago as 2006;[10] Russia and Europe are collaboratively assessing resource deposits on the Moon through the aptly named Prospect project.[11]

Private actors are equally important drivers of this paradigm shift. The so-called 'billionaire space race'[12] lists Jeff Bezos' Blue Origin, Elon Musk's SpaceX and Richard Branson's Virgin Galactic as its main competitors. These companies are some of the most well-known of thousands of companies interested in the commercial exploitation of space. These private actors are engaged for good reason. Predictions of the potential profits of space mining ventures are, in a word, astronomical. Goldman Sachs' conservative estimate of the value of minerals extracted from a single small asteroid at between US $25-50 billion is indeed difficult for a more terrestrially minded audience

[8] US Commercial Space Launch Competitiveness Act, HR Res 2262, 114th Congress (2015). See Executive Order No. 13914 (n 8) for an explicit reference to the *U.S Commercial Space Launch Competitiveness Act*.
[9] Theresa Hitchens, 'WH Woos Potential Allies, Including China for Space Mining', *Breaking Defense* (Web Page, 6 April 2020) <https://breakingdefense.com/2020/04/wh-woos-potential-allies-including-china-for-space-mining/>.
[10] Jia Hepeng, 'He Asked for The Moon and He Got It', *China Daily* (Web Page, 26 July 2006) <http://www.chinadaily.com.cn/cndy/2006-07/26/content_649325.htm>; Jack H Burke, 'China's New Wealth-Creation Scheme: Mining the Moon', *National Review* (Web Page, 13 June 2019) <https://www.nationalreview.com/2019/06/china-moon-mining-ambitious-space-plans/>.
[11] European Space Agency, 'One Step Closer to Prospecting the Moon', *Science & Exploration* (Web Page, 30 January 2020) <https://www.esa.int/Science_Exploration/Human_and_Robotic_Exploration/Exploration/One_step_closer_to_prospecting_the_Moon>.
[12] David Dawkins, 'Billionaire Space Race: Elon Musk Shows Sympathy as Branson's Virgin Orbit Fails to Lift Off', *Forbes* (Web Page, 26 May 2020).

to comprehend.[13] Companies like Deep Space Industries and Planetary Resources have already aimed to extract celestial resources, and their goals contributed to the creation of the US *Commercial Space Act* mentioned above.[14] The failure of these two companies in 2018 shows that the industry is volatile.[15] As will be demonstrated in this article, the law surrounding such operations poses a number of challenges for commercial operations which must be addressed. Nonetheless, the creativity of these commercial actors is boundless, and they are accomplishing significant technological feats. Blue Origin recently revealed its lunar lander and announced its plan to harvest water resources from the Moon to convert into hydrogen-based fuel.[16] Blue Origin, Dynetics and SpaceX have realised significant advancements in lunar landing technology and each received major contracts from NASA to help land humans on the Moon as early as 2024.[17] SpaceX and NASA also recently collaborated in a historic launch of a crewed mission to the International Space Station (ISS) this year, the first such mission from American soil in nearly a decade.[18] Outside the US, nearly 150 Chinese companies have entered the commercial space arena. One of these companies, Origin Space, has developed a method of telescopic prospecting, allowing China to map celestial resources through a satellite in Low Earth Orbit.[19] Interestingly, one of the billionaire participants in the new space race, Elon Musk, explicitly espouses an intention to apply this technology to the eventual human settlement of Mars, musing on the possibility of humankind becoming an interplanetary species by 2050.[20]

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[13] Jack Heise, 'Space, the Final Frontier of Enterprise: Incentivizing Asteroid Mining Under a Revised International Framework' (2018) 40(1) *Michigan Journal of International Law* 191.
[14] Jeff Foust, 'Lunar Exploration Providing New Impetus for Space Resources Legal Debate', *SpaceNews* (Web Page, 7 September 2019) <https://spacenews.com/lunar-exploration-providing-new-impetus-for-space-resources-legal-debate/>.
[15] See Atossa Araxia Abrahamian, 'How the Asteroid-Mining Bubble Burst', *MIT Technology Review* (Web Page, 26 June 2019) <https://www.technologyreview.com/2019/06/26/134510/asteroid-mining-bubble-burst-history/>.
[16] Jeff Foust, 'Blue Origin Unveils Lunar Lander', *SpaceNews* (Web Page, 9 May 2019) <https://spacenews.com/blue-origin-unveils-lunar-lander/>.
[17] Michael Sheetz, 'NASA Awards Contracts to Jeff Bezos and Elon Musk to Land Astronauts on the Moon', *CNBC* (Web Page, 30 April 2020) <https://www.cnbc.com/2020/04/30/nasa-selects-hls-lunar-lander-teams-blue-origin-spacex-dynetics.html>.
[18] Jeff Foust, 'Crew Dragon in Orbit after Historic Launch', *SpaceNews* (Web Page, 30 May 2020) <https://spacenews.com/crew-dragon-in-orbit-after-historic-launch/>.
[19] Andrew Jones, 'Chinese Space Resource Utilization Firm Origin Space Signs Deal for Space Telescope', *SpaceNews* (Web Page, 23 April 2020) <https://spacenews.com/chinese-space-resource-utilization-firm-origin-space-signs-deal-for-space-telescope/>.
[20] Mike Wall, 'Elon Musk Is Still Thinking Big with SpaceX's Starship Mars-Colonizing Rocket. Really Big', *Space.com* (Web Page, 18 January 2020) <https://www.space.com/elon-musk-starship-spacex-flights-mars-colony.html>.

Regarding the lawfulness of the mining and use of space resources, the International Institute of Space Law (IISL) has concluded that the extraction of such material from celestial bodies (for non-State parties to the Moon Agreement) is not expressly prohibited under current international space law.[21] In its 2015 position paper, the IISL notes the express prohibition on national appropriation in the OST, but acknowledges that the US legislation does not assert this and the US view of their legal rights regarding use of resources may be shared by other States.[22] Indeed, this US legislation, alongside that of the United Arab Emirates ('UAE')[23] and Luxembourg,[24] is shaping our understanding of the legality of mining operations, with each of the three countries taking collaborative steps to assert the legality of, and become global leaders in, space resource extraction.[25] This municipal legislation can be taken as state practice and *opinio juris,* and will usefully inform the interpretation of customary international law in this area.[26] Moreover, it has the capacity to inform the meaning of treaty terms in accordance with Article 31(3)(b) of the *Vienna Convention on the Law of Treaties*.[27] As such, while such activities remain potentially legally ambiguous at present, there is an ongoing push towards their classification as lawful activity.[28]

As more State and corporate interests explicitly announce their intentions and prepare to commence space operations, debates over the manner in which space resources will be exploited become crucial to resolve before the rapidly approaching rush for resources. New issues surrounding the prospecting of resources; the building of infrastructure on

[21] International Institute of Space Law, 'Position Paper on Space Resource Mining' (adopted 20 December 2015) <http://iislwebo.wwwnlss1.a2hosted.com/wp-content/uploads/2015/12/SpaceResourceMining.pdf> (para 2: 'Therefore, in view of the absence of a clear prohibition of the taking of resources in the Outer Space Treaty one can conclude that the use of space resources is permitted').
[22] Ibid [2], [3].
[23] See Government of the United Arab Emirates, 'The UAE Space Law', Space Science and Technology (Web Page, 20 July 2020) <https://u.ae/en/about-the-uae/science-and-technology/key-sectors-in-science-and-technology/space-science-and-technology> ('*UAE Space Law*'); Federal Law No 12 of 2019 On the Regulation of the Space Sector (UAE) (2019).
[24] See Le Gouvernement Du Grand-Duché de Luxembourg, *Luxembourg Space Agency,* 'Law of July 20th 2017 on the Exploration and Use of Space Resources' (Web Page, 18 November 2018) <https://space-agency.public.lu/en/agency/legal-framework/law_space_resources_english_translation.html> ('*Law of July 20th*').
[25] See generally Scot W Anderson, Korey Christensen and Julia LaManna, 'The Development of Natural Resources in Outer Space' (2018) 37(2) *Journal of Energy & Natural Resources Law* 227.
[26] See *Statute of the International Court of Justice* art 38(1)(c).
[27] *Vienna Convention on the Law of Treaties,* opened for signature 23 May 1969, 1155 UNTS 331 (entered into force 27 January 1980) ('*VCLT*').
[28] See John G Wrench, 'Non-Appropriation, No Problem: The Outer Space Treaty is Ready for Asteroid Mining' (2019) 51(1) *Case Western Reserve Journal of International Law* 437.

celestial bodies; conflicts over resources; State jurisdiction and control over claimed resources, and resource extracting operations; and many, so far unimaginable scenarios will manifest in challenging and fascinating ways.

III THE OUTER SPACE TREATY

The range, scope and pace of thinking, investment and capability in this burgeoning field of space activity is impressive. However, the capacity of the OST to address these developments is less certain. The OST's ban on national appropriation ensures that no State can outright claim national territory in space; however, it does not set up any accompanying regime to govern temporary rights as to the use of space or celestial bodies. For example, it is easy to anticipate a potential conflict where the mining company of one country finds resources in a particular location on an asteroid or the Moon, and another company from another country moves into this very same area to extract the same resources, possibly right on top of the original area claimed by the first company. At present, the absence of any proprietary right that can be asserted by either company does not prevent such an outcome. Inevitably, such an action will lead to a dispute that may escalate into actual conflict. On earth, a State's national territory, airspace and territorial seas, have particular legal status and national military forces monitor and provide continuing security over such areas. Moreover, the rights and obligations of States and private parties are well understood, and foreign companies and other entities are provided with permission (or not) to undertake commercial activities within such areas.

The OST provides only two Articles that deal to a greater or lesser extent with proprietary rights. These are Articles VIII and XII. It will be these two Articles that will, initially at least, likely provide the foundation for seeking to set jurisdictional and legal boundaries and hence certainty for planned activities. Even so, their ambit and scope are unlikely to fully provide what is necessary. The following section will address the content and potential application of Articles VIII and XII of the OST. It will then assess the nature of the military prohibitions contained within Article IV and identify where the implied permissions in this Article may, in fact, enhance a sense of security for future planned activities.

A *Article VIII*

Article VIII of the OST provides:

> [a] State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body.

Registration is normally undertaken pursuant to the terms of the 1975 *Registration Convention*.[29] Von der Dunk notes that Article VIII provides jurisdiction 'on a quasi-territorial basis' and ought to be construed as providing States 'maximum leeway' as regards jurisdiction.[30] Accordingly, a State which is the State of registry of a space object has exclusive enforcement (the right to investigate, arrest, prosecute or otherwise enforce laws), and comprehensive prescriptive (the right to make laws that can apply to nationals) and adjudicative (the right to exercise judicial control over the resolution of a dispute) jurisdiction with respect to that space object. There can only be one State of registry and thus if there are multiple States involved in the one space object, then an agreement will be necessary to nominate which State shall be the relevant State of registry.

Importantly, Article VIII does not prohibit other States from seeking to exercise prescriptive or adjudicative jurisdiction. It does mean, however, that a State that is not the State of registry cannot exercise enforcement jurisdiction within the physical area of a space object. While several States may have concurrent prescriptive and adjudicative jurisdiction, only the State of registry has the primary right of enforcement jurisdiction based upon its exclusive enforcement powers over a space object. This can be assessed with reference to state practice under the *International Space Station Agreement* ('ISS Agreement').[31] The ISS Agreement invokes Article VIII of the OST in setting out principles of jurisdiction and ownership, and illustrates how States interpret the limits of

[29] *Convention on Registration of Objects Launched into Outer Space*, opened for signature 6 June 1975, 1023 UNTS 15 (entered into force 15 September 1976) ('the Registration Convention').
[30] Frans G Von Der Dunk, 'Effective Exercise of "In Space Jurisdiction": The US Approach and the Problems It Is Facing' (2015) 40(1) *Journal of Space Law* 147, 157.
[31] *Agreement Among the Government of Canada, Governments of Members States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station*, opened for signature 29 January 1998 (entered into force 27 March 2001) TIAS No 12927 art 5 ('ISS Agreement').

jurisdiction provided by Article VIII.[32] The ISS Agreement states that 'each Partner shall retain jurisdiction and control over the elements it registers… and over personnel in or on the Space Station who are its nationals'.[33] Accordingly, jurisdiction applies both 'in' and 'on' the component parts of the space object, thus granting the State of registration wide jurisdiction over the entire physical area of the object, including its outside surfaces and the areas within it. Each State retains jurisdiction only over those areas and is thus unable to exert enforcement jurisdiction in or on an 'element' that another State has registered.[34] This acknowledged limitation on jurisdiction supports the contention of this article as regards the boundaries of jurisdiction over space objects more generally.

This differentiation of jurisdiction between prescriptive, adjudicative and enforcement can only partially address the issue of control and certainty over commercial activity on a celestial body. It represents a very indirect mechanism for actually governing activity though the mechanism of applicable laws, and an actual capacity to enforce such laws to space objects themselves. More importantly however, it does not apply to the actual ground activity that may be occurring outside that space object. Hence, it does not stop a State asserting enforcement jurisdiction if a relevant national should leave a space object that another State has registered. Moreover, it can only apply to a space object that has a temporary presence on the celestial body. Hence, space objects such as lunar landers or spacecraft that are intended to depart from the celestial body, would be subject to Article VIII but they would not be subject to the more comprehensive rights that Article XII of the OST provides. This distinction between objects temporarily on the surface of celestial bodies and facilities that are established on the same surface is demonstrated by the negotiating history of Article XII, which evinces an intent that visitation provisions will apply only to facilities permanently stationed on a celestial body. This is clear in the treaty's listing of stations constructed and operating permanently on celestial bodies, as against the rejection of the insertion of 'platforms' in orbit into the list of visitable items

[32] Zhao Yun, 'Revisiting the 1975 Registration Convention: Time for Revision?' (2004) 11(1) *Australian Journal of International Law* 106, 117.
[33] ISS Agreement (n 32) art 5.
[34] See discussion of these principles under a previous ISS Agreement in Stacy J Ratner, 'Establishing the Extraterrestrial: Criminal Jurisdiction and the International Space Station' (1999) 22(2) *Boston College International and Comparative Law Review* 330-332.

including 'stations, installations, equipment and space vehicles'.[35] Thus, if a space object is intended to operate permanently on the surface of a celestial body, then it will be a 'facility' subject to Article XII rights and obligations. There is yet to be any definitive agreement or judicial assessment for when a 'space object' (Article VIII) can become a 'facility' (Article XII), although indicia regarding the permanence of placement such as being fixed in location, would likely be relevant to any such conclusion.

While Article VIII does provide for the exercise of primary enforcement jurisdiction over a space object, albeit even one that is temporarily located on a celestial body, it is unlikely to provide for the required level of operational and legal certainty for the ambitious commercial off world activities that are currently planned.

B *Article XII*

Article XII of the OST relevantly provides:

> All stations, installations, equipment and space vehicles on the Moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity. Such representatives shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may be taken to assure safety and to avoid interference with normal operations in the facility to be visited.[36]

The term 'facility' used in the last sentence of this Article at least applies to all 'stations, installations, equipment and space vehicles' on the Moon and other celestial bodies. This Article only applies to facilities on the Moon and other celestial bodies — it does not apply to facilities in outer space itself.

The negotiating history of this Article reveals that an attempt was made by the US to replicate a similar provision contained within the Antarctic Treaty.[37] Such a provision gives liberal rights of 'visit' and 'inspection' to all State parties to that treaty, to facilities

[35] Summary Record of the 64th Meeting, UN GAOR, 4th Comm, 5th sess, 64th mtg UN Doc A/AC.105/C.2/SR.64 (24 October 1966) 7 ('UN COPUOS 64th Meeting'). See, also, UN COPUOS 64th Meeting 5, 8, 9.
[36] OST (n 1) art VII.
[37] *The Antarctic Treaty*, opened for signature 1 December 1959, 402 UNTS 71 (entered into force June 23 1962); *Summary Record of the 63rd Meeting*, UN GAOR, 4th Comm, 5th sess, 63rd mtg UN Doc A/AC.105/c.2/SR/63 (20 October 1966) ('UNCOPUOS 63rd Meeting') at 6.

established in Antarctica. This very liberal access proposal was rejected, in particular by the USSR, during the OST negotiations. This rejection was manifested in the concept of reciprocity that was discussed at relative length during the negotiation of Article XII. Proposals were discussed regarding the need to have actual facilities on the Moon or a celestial body before this right could be exercised.[38] Similarly, the issue of whether there needed to be parity in the number of facilities, as to whether the right could be exercised, was also raised.[39] Both of these issues were resolved in favour of expanding the capacity to visit other facilities.

The issue of reciprocity, however, ignited considerable debate during the negotiating process as to the exercise of the substantive right in the first place. Not without a level of ambiguity, a general consensus emerged that dealt with the question of reciprocity in terms of acknowledging an indirect veto States had in restricting access to their facilities. Hence it was acknowledged that 'any State which was affected by the refusal of another State to grant access could, on the basis of the principle of reciprocity, suspend its obligations to allow access'.[40] Critically, the Soviet amendment that introduced the concept of reciprocity to Article XII 'suggested to several delegations that if a particular nation, which controls a station on a celestial body, has no desire to inspect the stations … of other nations, it is under no obligation to permit visitors from other stations to enter its own stations'.[41] Such an agreed result means that a refusal to allow a visit would be lawful and the consequence of that action would be the lawful denial of a corresponding right to visit the facilities of the requesting State party.[42] This is not a result of the operation of international law and remedies against unlawful conduct,[43] but rather an exercise of lawful discretion under the wording and meaning of Article XII.

Where a State party was willing to agree to a visit, then it needed to receive 'reasonable advance notice' of a projected visit to then undertake 'appropriate consultations'. Such consultations are predicated upon the need to ensure 'that maximum precautions may be taken to assure safety and to avoid interference with normal operations in the facility to

[38] UN COPUOS 64th Meeting, (n 35) 5.
[39] Ibid 5.
[40] Ibid 6.
[41] Paul Dembling and Daniel Arons, 'The Evolution of the Outer Space Treaty' (1967) 33 *Journal of Air Law and Commerce* 419, 448.
[42] UN COPUOS 64th Meeting (n 35) 6-7 (Canada), 8-9.
[43] Ibid (Italy) 8.

be visited'. This directly reflects the treaty negotiation consensus that access is not absolute and that the right of visit is subject to serious considerations of safety and non-interference with normal operations.[44] This would allow for restricted access and controlled conduct within specified areas in a facility to ensure that safety concerns and avoidance of interference with normal operations could continue.

The term 'visit' as used in Article XII is not defined in the OST. It is nonetheless notable that the term used in the Antarctic Treaty, which was initially in contemplation during the negotiations of Article XII,[45] allows for an unlimited right of open access to all 'stations, installations and equipment' anywhere within Antarctica and a corresponding right of 'inspection' of those same facilities at 'all times'. Similar absolute access rights as proposed by the US during the OST negotiations were not accepted. More particularly, rights of 'inspection' as opposed to reciprocal 'visit' are not included within the wording of Article XII as a result of the Soviet resistance to the verbatim inclusion of terms as found in the Antarctic Treaty. In fact, the Soviet delegate rejected that such an automatic comparison could be made between the legal and physical similarities of Antarctica and outer space.[46]

Article XII represents the only provision in the OST that gives (indirectly) a right of control over access to a facility. It does not actually define what a 'station' or 'installation' is, but presumably there is scope to cover the physical limits of such a facility including its ground area. The power to deny entry, with the necessary consequence that such reciprocal rights are also denied, would give a State (and a company of that State) a right to control access to a physical area where such a facility was located. In addition, as discussed below, there is a suggestion with the so called 'Artemis Accords' that an associated safety zone around a facility could also expand beyond the physical limits of the facility itself, thus providing a broader range of control.

The US 'Artemis Accords' are a consensus-seeking attempt to develop this concept of safety zone and bring it into the accepted canon of lawful activities on celestial bodies under international space law. These Accords, presently not fully announced, will attempt to gather a number of countries and private actors in a shared recognition of, among other

[44] Ibid 8-10 where comments from Soviet, Japanese and Italian delegates reinforced this point.
[45] UNCOPUOS 63rd Meeting (n 37) 6.
[46] Ibid 10.

things, the lawfulness of safety zones surrounding celestial installations. NASA cites principles found under Article IX of the OST, that States should have 'due regard' to the interests of other space-faring States, and that they should avoid 'harmful interference' with the activities of other States, as a legal basis for the establishment of these zones.[47] State practice in adopting the Accords and implementing such zones will help to inform the standard and scope of the requirement to show 'due regard' under Article IX, as well as the threshold for triggering this responsibility. The Accords also seem to invoke principles under Article XI of the OST as regards safety zones, suggesting that public information about the 'location and general nature of operations' will affect their establishment and scope.[48] Further, they aim to achieve international consensus on the extraction of space resources, with NASA citing Articles II, VI and XI of the OST as supporting the lawfulness of such activities.[49] It is clear that this signals a more *laissez faire* interpretation of the OST's prohibition on national appropriation, reflecting the positions already taken by the US, UAE and Luxembourg.[50] However, NASA also suggests the Accords will facilitate 'exploration, science and commercial activities for all of humanity to enjoy', seemingly echoing the sentiments of Article I of the OST.[51] Overall, the Accords are an encouraging step toward the establishment of accepted, practical measures to implement obligations and rights under Article XII of the OST.

It ought to be noted that the Accords explicitly repudiate principles of the *Moon Agreement,* which will pose challenges for those few States that have ratified that treaty (such as Australia). The Accords most notably clash with the *Moon Agreement*'s proscriptions on unilateral extraction and ownership of space resources.[52] This is in line with the aforementioned US declarations that the *Moon Agreement* does not reflect customary international law.[53] Thus, States that accept principles of the Accords would

[47] NASA, 'Principles for a Safe, Peaceful and Prosperous Future', *The Artemis Accords* (Web Page, May 2020) <https://www.nasa.gov/specials/artemis-accords/index.html>.
[48] Ibid. See also OST (n 1) art XI.
[49] NASA (n 47) 6.
[50] See *U.S. Commercial Space Launch Competitiveness Act* (n 8); *The UAE Space Law* (n 23); *Law of July 20th* (n 24).
[51] NASA (n 47) 6; OST (n 1) art I.
[52] Ibid. See also *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, opened for signature 18 December 1979, 1363 UNTS 3 (entered into force 11 July 1984) art 11 ('Moon Agreement'). See also commentary by Dennis O'Brien, 'The Artemis Accords: Repeating the Mistakes of the Age of Exploration', *The Space Review* (Web Page, 29 June 2020) <https://www.thespacereview.com/article/3975/1>.
[53] See Executive Order No 13914 (n 8).

seemingly signal a rejection of the framework underpinning the *Moon Agreement.* Accordingly, the relatively few parties to the *Moon Agreement* have a separate regime to navigate in adopting the Accords.

At present, there are no facilities on the Moon or any other celestial body and hence no exercise of Article XII rights and obligations. It is likely, however, that when commercial activities are commenced on such bodies, that Article XII will quickly acquire great significance. It remains the only provision in the OST that recognises a sense of physical legal boundaries on a celestial body. As such, the actions of States and private companies when invoking the terms of this Article will establish relevant 'subsequent State practice'[54] for the purposes of informing meaning of Article XII that will thus provide a critical foundation for understanding in decades to come.

IV MILITARY ACTIVITIES AND THE PROVISION OF SECURITY IN SPACE

Article IV of the OST provides that 'The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes' and proceeds to identify three specific military prohibitions on the Moon and other celestial bodies: namely, (1) the establishment of military bases, installations and fortifications, (2) the testing of any type of weapons, and (3) the conduct of military manoeuvres. In addition, Article IV also specifically prohibits the installation of weapons of mass destruction on the Moon or other celestial bodies. Article IV then provides that military personnel undertaking scientific research or 'for any other peaceful purpose shall not be prohibited'. Similarly, Article IV makes clear that the use of 'any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited'.

The term 'peaceful purposes' has been accepted to broadly mean 'non-aggressive' purposes as read consistently with the United Nations (UN) Charter.[55] In respect of this view, a Canadian Government working paper presented at the Conference on Disarmament in 1986, specifically examined this issue of 'peaceful purposes'.[56] The

[54] *VCLT* (n 28) art 31(3)(c).
[55] See, eg, US Department of Defense, *Law of War Manual* 2015 (General Counsel of the Department of Defense, December 2016) 944, n 168.
[56] Working paper submitted by the Canada Delegation to the Conference on Disarmament, 'Terminology Relevant to Arms Control and Outer Space', CD/716, CD/OS/WP.15, 16 July 1986 ('Canadian Working Paper').

Canadian Government evaluated the views of States on this term, paid regard to the negotiating history and subsequent State practice, and looked at analogous treaties. It concluded that this term 'peaceful purposes' was to be read narrowly and that military restrictions needed to be expressly stated in a treaty such as the OST.[57] Such a view is also reflected by academic commentary. Hobe, for example, notes that:

> The text of the Outer Space Treaty hence remains silent on the precise meaning of the notion "peaceful purposes". At the very least, the travaux of the Outer Space Treaty do not support a reading that would interpret "peaceful uses" as outlawing all military uses of outer space. Though the United States had urgently favoured this approach at the beginning of the space era, it soon turned to the non-aggressive doctrine. Likewise, the USSR, while publicly supporting the "non-military view", used satellites to carry out military activities in the guise of scientific research during the Outer Space Treaty negotiations.[58]

Hobe goes on to observe that '[t]he practice of the US and Russia may lead one to conclude that the two original space powers do not favour an interpretation of peaceful as "non-military"'.[59]

The wording of the OST is unlike similar terminology used in the 1959 Antarctic Treaty that prohibits all military activity in that region, including 'any measures of a military nature'.[60] While the wording is subtly different, the significance is considerable. Article IV of the OST does not use that same unqualified language as the Antarctic Treaty in its prohibition of military activity. As the Canadian working paper on this issue concluded, the correct Treaty analogy would be Article 88 of the Law of the Sea Convention, which similarly 'reserves' the high seas for 'peaceful purposes' but outside of restricting acts of aggression imposes no further limitation on military activity.[61] Hence, it is open to conclude that outside of the specific prohibitions enumerated in Article IV (which unlike

[57] Ibid 15.
[58] Stephan Hobe, 'The Meaning of Peaceful Purposes in Article IV of the Outer Space Treaty' (2015) 40 *Annals Air and Space Law* 9, 14.
[59] Ibid 16.
[60] Article I of the Antarctic Treaty (n 37) provides: 'Antarctica shall be used for peaceful purposes only. There shall be prohibited, inter alia, any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military maneuvers, as well as the testing of any type of weapons.'
[61] Canadian Working Paper (n 56) 15.

the *Antarctic Treaty* are not given as illustrative examples of what is prohibited, but rather is an exhaustive list), these provisions do permit the conduct of some military activity on the Moon and other celestial bodies. Hence, there is no explicit prohibition of military personnel occupying facilities, provided that such facilities are not established as a military base, installation and/or fortification. Similarly, while conventional weapon testing upon the Moon or other celestial bodies is prohibited, as is the installation of weapons of mass destruction, the general presence and carriage of personal weapons is not expressly prohibited. Finally, military activities that do not constitute 'manoeuvres' are not prohibited. This term contemplates the mass movement of troops in formation, not the presence of a small security force. However, military activities outside of the specific prohibitions contained in Article IV are still subject to the 'peaceful purposes' obligation and must therefore be consistent with the UN Charter which is directly applied to outer space by virtue of Article III of the OST. While efforts to minimise the overt militarisation of the Moon and other celestial bodies with the listing of specific prohibitions is a desirable goal, it should also not be forgotten that military forces can also act to enhance stability and security. This is especially the case with respect to controlling private actors engaging in activities in space. The OST creates a unique status of private actors in space that implicates deeper issues of international law, in particular the regime of State responsibility. Hence, Article VI of the OST provides as follows:

> States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. 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. When activities are carried on in outer space, including the Moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.[62]

[62] OST (n 1) art VI.

The wording of Article VI resolved an early potential conflict between the USSR and the US. Originally, the view taken by the USSR. was that only States could undertake space activities, whereas the US took the view that private companies, as non-governmental entities, should also be able to undertake space activities. Article VI represents a compromise where private companies are permitted to undertake space activity, however, 'the State concerned' with a non-governmental entity is to bear international responsibility for the activities of that non-governmental entity. As Von Der Dunk notes, this means there would be 'private activity but public responsibility'.[63] There has not been any great elaboration of what the term 'national activities' means within international legal discourse.[64] Academic commentary (coupled with perspectives reflected in national legislation) has largely resulted in a consensus view that 'jurisdiction' over a nation or company satisfies this requirement.[65] What is striking about Article VI is its very unique application of attribution for the actions of private companies in undertaking activities in outer space. Extending way beyond what the normal rules of State responsibility require for attribution,[66] Article VI imposes a strict requirement of attribution upon States. Accordingly, should a private company undertake malevolent or unlawful behaviour in space, the relevant State concerned would bear international responsibility for that activity. As Von der Dunk poignantly notes, 'Contrary to the version of the concept applicable under general international law … Article VI [makes] no difference as to whether the activities at issue were the State's own … or those of private actors'.[67] This consequence has very significant implications with respect to unpredictable and impulsive actions undertaken by a private company that constitute a use of force contrary to Article 2(4) of the UN Charter or even an 'armed attack', thus allowing a targeted State to respond in self-defence under Article 51 of the UN Charter.[68] Accordingly, this unique attribution regime requires that effective security control be exercised over the activities of such a company, especially where there is competition and uncertainty as to proprietary rights concerning extraction activity on a celestial body.

[63] Frans Von Der Dunk, 'The Origins of Authorisation: Article VI of the Outer Space Treaty and International Space Law' in Frans Von Der Dunk (ed), *Studies in Space Law* (Martinus Nijhoff, vol 6, 2011) 1, 3.
[64] Ibid 4.
[65] Ibid 4-7.
[66] Ibid 4.
[67] See ibid.
[68] *Charter of the United Nations.*

Paradoxically, therefore, ensuring military security and oversight of a State's private entities on a celestial body enhances the necessary control to avoid escalation and potential conflict. This type of military deployment is well accepted in military doctrine and also well practiced in the context of international peacekeeping, which has been successfully undertaken over the past 70 years within the terrestrial environment,[69] and can have obvious application in outer space.

In addition to the issue of attribution and ensuring control, there is ample evidence of military to military connections within the terrestrial environment encouraging stability and understanding. Military diplomacy itself has an enviable record of averting conflict and preserving equilibrium in otherwise tense contexts.[70] The OST does permit military members to operate on the Moon and other celestial bodies, subject to specifically stated prohibitions. Hence, any effort to further 'read down' the permissions contained within the OST for military forces to provide security, may deliver unanticipated consequences, regarding escalatory conduct by private entities and potential conflict.

V CONCLUSION

Humanity is at a key moment in its ambitions for space use and settlement. We are poised to undertake a truly momentous leap in our history by exploring, using and settling in space. We are about to become an inter-planetary species. The capacity for human ingenuity has allowed private industry in conjunction with State support to realistically plan on the manner in which this can be undertaken. The existing central treaty for space — the OST — that was negotiated over 50 years ago, does provide a basic framework of principles that will guide this endeavour. However, that treaty was negotiated before humanity had even walked on the Moon, and while some of its provisions can be made to work, it is not optimal. While it is timely to consider negotiating a new space treaty that deals with emerging issues in a comprehensive fashion, the chances of this occurring are not good. The last major Space Treaty negotiated was in 1979 with the Moon Agreement and to date has a mere 18 ratifications (with no major space faring nations as party). Given this record, there seems little likelihood that a new treaty will provide necessary

[69] United Nations, 'What Peacekeeping Does', *United Nations Peacekeeping* (Web Page) <https://peacekeeping.un.org/en>.
[70] See Amy Ebitz, *The Use of Military Diplomacy in Great Power Competition* (Brookings, 2019).

solutions. However, as argued in this article, there are provisions in the existing OST that do provide a level of legal foundation for developing a framework that can underpin future planned human activity in space.

Indeed, future space use and human settlement on celestial bodies must be undertaken with a sense of confidence in the legal rights and obligations that will accompany planned activity. Outer space cannot become a 'wild west' free for all, where the strongest prevail and armed conflict becomes an optional means for success. The current OST regime, even with its current limitations, must be applied creatively to ensure that the interests of all are protected and that States remain responsible and accountable for their actions. In this context, the proverb that 'good fences make good neighbours' rings true. Humanity's development of resources on celestial bodies to expand our ambitions in space needs to be undertaken in a context of certainty. One where security is maintained by those who are directly responsible under international law to their State and have the capacity to control otherwise wayward behaviour. We need to be realistic in ensuring the tendencies of human nature which can bring out our worst are properly contained, so as to allow the best of humanity to flourish as we enter this new golden era of space exploration and use.

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