

# THE NEXT ARMS RACE AND THE UNKNOWN FRONTIER OF OUTER SPACE: THE CONCEPTUAL CHALLENGES FOR INTERNATIONAL LAW AND SPACE WEAPONIZATION

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## ABSTRACT

Space activity is growing at an exponential rate, with world powers heightening their military capabilities and non-State actors using military-able space technology. The rapid development in space military technology has created the real possibility that the next arms race will occur in outer space. Further, the war in Ukraine has showcased the impacts of unilateral military acts of aggression, emphasising the urgent need to address the global issue of space weaponization. This article will consider the gaps in the current international space law agreements relating to space weaponization. Then, the article will explore the conceptual challenges for bridging these normative gaps, with the potential for a soft law approach as a way forward. This article places a spotlight on the urgency for the international community to negotiate and develop appropriate regulations for space weaponization before outer space becomes a warfighting domain.

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## I. INTRODUCTION

As we venture into the 2020s, space activity will continue to grow at an exponential rate. The precariousness of international stability, the capacity and willingness of world powers to exercise their military capabilities in space, and the prominence of non-State actors utilizing military-able space technology, create an explosive mix potentially laying the foundation for an arms race in space. The rapid advancements in space technology, coupled with new commercial and State actors, raises concerns that space law has not developed at the same pace, leaving potential gaps in the international regulatory framework. This article will consider the pressing question of whether current international space law is effective in addressing the emerging issues involving the weaponization of space.

Part II of this article will consider the current global situation with a specific focus on space weaponization and why this is a pressing international political and legal issue. Part III will briefly cover the existing international legal framework for international space activities as it relates to weaponization. Part IV then analyzes the conceptual challenges that exist under international law concerning space weaponization. Finally, Part V will consider the potential for a soft law approach as a way forward to bridge the normative gaps in the existing international law relating to the weaponization of space.

## II. AN OUTER SPACE ARMS RACE—ON THE EDGE OF A PRECIPICE?

The reality of States developing and exercising their military capabilities has repercussions for the balance of power, diplomatic processes, national economies, and global inequality.<sup>1</sup> It is predicted that this will be amplified with the additional domain of space, particularly for States without spacefaring capabilities.<sup>2</sup> With the unfolding war in Ukraine and Russia's unilateral exercise of military aggression, the weaponization of outer space has

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<sup>1</sup> Kathryn Robinson Hasani, *The Next Frontier of The Global Commons, in* COMMERCIAL AND MILITARY USES OF OUTER SPACE 25, 25 (Melissa de Zwart & Stacey Henderson eds., 2021).

<sup>2</sup> *Id.*

emerged as a pressing global issue. The security assurances made in the Budapest Memorandum by Russia (along with the United Kingdom and the United States (US)) to “respect the independence and sovereignty and the existing borders of Ukraine” and to “refrain from the threat or use of military force,” have been completely disregarded.<sup>3</sup> One cannot help but feel that the world order is at a tipping point. Space technology, specifically satellite technology, has played a role in the war in Ukraine.<sup>4</sup> Examples include the small gesture of the US providing Ukrainian President Volodymyr Zelensky with a satellite phone for communication,<sup>5</sup> to Google turning off real-time traffic updates for the geographical area of Ukraine<sup>6</sup>—presumably in an attempt to avoid the misuse of this data by Russia to formulate military strategic targets based on troop movements. There have been reports of Western high-quality, real-time satellite imagery of Russian troop movements being made available to both the Ukraine military and to Ukraine private companies (non-State actors).<sup>7</sup> Notably, SpaceX owner Elon Musk turned on the Starlink satellite services over Ukraine at the request of the Ukrainian Minister of Digital Transformation.<sup>8</sup> Starlink has provided the Ukraine military (and civilians) with unparalleled continuous communications and internet coverage (due to the placement of the Starlink satellites in the Low Earth Orbit). While this is not the first time

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<sup>3</sup> Memorandum on Security Assurances in Connection with Ukraine’s Accession to the Treaty on the Non-Proliferation of Nuclear Weapons, § 1, Dec. 5, 1994, 3007 U.N.T.S. 52241.

<sup>4</sup> Morgan Meaker, *High Above Ukraine, Satellites Get Embroiled in the War*, WIRED (Mar. 4, 2022), <https://www.wired.com/story/ukraine-russia-satellites/>.

<sup>5</sup> Kylie Atwood & Zachary Cohen, *US in contact with Zelensky through secure satellite phone given to him by the US*, CNN 9 (Mar. 1, 2022), [https://edition.cnn.com/europe/live-news/ukraine-russia-putin-news-03-01-22/h\\_5a65303ee7ffa3cb8765d5aafd8c2202](https://edition.cnn.com/europe/live-news/ukraine-russia-putin-news-03-01-22/h_5a65303ee7ffa3cb8765d5aafd8c2202).

<sup>6</sup> Gavin Butler, *Google Turns off Maps Features in Ukraine that Inadvertently Showed Russian’s Invasion*, VICE NEWS (Feb. 27, 2022), <https://www.vice.com/en/article/5dgjka/google-maps-ukraine-live-traffic-russia-invasion>.

<sup>7</sup> Mark Krutov & Sergei Dobrynin, *In Russia’s War On Ukraine, Effective Satellites Are Few And Far Between*, RADIO FREE EUROPE RADIO LIBERTY (Apr. 11, 2022), <https://www.rferl.org/a/ukrain-satellites-ukraine-war-gps/31797618.html>; Mark Hilborne, *Ukraine war: how it could play out in space – with potentially dangerous consequences*, THE CONVERSATION (Mar. 10, 2022), <https://theconversation.com/296kraine-war-how-it-could-play-out-in-space-with-potentially-dangerous-consequences-178557>.

<sup>8</sup> *How Elon Musk’s satellites have saved Ukraine and changed warfare*, THE ECONOMIST (Jan. 5, 2023), <https://www.economist.com/briefing/2023/01/05/how-elon-musks-satellites-have-saved-ukraine-and-changed-warfare>.

that satellite technology has played a role in an international conflict, it demonstrates the real-time need for international law to keep pace in this area as both State and non-State actors have readily engaged with space technology to achieve military objectives.

There have also been several successful attempts to destroy satellites in space. In January 2007, China fired a missile to shoot down an old satellite. This action was condemned by many States including the US, particularly because the destruction created significant space debris.<sup>9</sup> Interestingly, despite condemning China's action, the US continued to pursue several space and missile defense projects, and a year later shot down a failed spy satellite.<sup>10</sup> It is noted that it was announced by US Vice President Kamala Harris, in April 2022, that the US was committed to refraining from conducting destructive, direct-ascent anti-satellite (DA-ASAT) missile testing.<sup>11</sup> The US is the first State to adopt a voluntary moratorium on destructive testing of DA-ASAT missile systems.<sup>12</sup> In the announcement, other nations were also called upon to make similar commitments, in the hope of establishing it as a "new international norm for responsible behavior in space."<sup>13</sup> The UN General Assembly approved a resolution in December 2022 encouraging countries to refrain from conducting DA-ASAT tests. A total of 155 nations voted in favor of the non-binding resolution. So far, 13 States have made the commitment to not conduct DA-ASAT tests. Panda and Silverstein remain doubtful on whether this push by the US for a moratorium on DA-ASAT tests will slow space militarization overall – but nevertheless acknowledge that it has ignited the development of norms for space sustainability.<sup>14</sup>

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<sup>9</sup> PAROS Treaty, THE NUCLEAR THREAT INITIATIVE <https://www.nti.org/education-center/treaties-and-regimes/proposed-prevention-arms-race-space-paros-treaty/> (last visited Aug. 27, 2022) [hereinafter PAROS Treaty].

<sup>10</sup> *Id.*

<sup>11</sup> THE WHITE HOUSE, Fact Sheet: Vice President Harris Advances National Security Norms in Space (April 18, 2022), <https://www.whitehouse.gov/briefing-room/statements-releases/2022/04/18/fact-sheet-vice-president-harris-advances-national-security-norms-in-space/> [hereinafter White House Fact Sheet].

<sup>12</sup> Ankit Panda & Benjamin Silverstein, *The U.S. Moratorium on Anti-Satellite Missile Tests Is a Welcome Shift in Space Policy* ¶ 1 (Apr. 20, 2022) <https://carnegieendowment.org/2022/04/20/u.s.-moratorium-on-anti-satellite-missile-tests-is-welcome-shift-in-space-policy-pub-86943>.

<sup>13</sup> White Hour Fact Sheet, *supra* note 11, ¶ 1.

<sup>14</sup> Panda & Silverstein, *supra* note 12, ¶ 5.

In February 2023, the international media reported four unidentified flying objects shot down by the US over South Carolina, Alaska, the Yukon Territory (in Canadian airspace with the authorization of the Canadian Government), and Michigan.<sup>15</sup> The first object, a Chinese “spy” balloon, was tracked by the US over a number of days and flew at an altitude of approximately 20 kilometers (km) (which is above the flight path of commercial and military aircraft).<sup>16</sup> The Chinese have maintained that the balloon was a civilian device for meteorological purposes, despite its size and intelligence-gathering capabilities (parts of its antennae, sensors, and electronics were recovered by the US).<sup>17</sup> As demonstrated by the Chinese spy balloon, it is now possible for military technology (such as balloons and drones) to operate in the zone that sits above the altitude flown by aircraft but below the orbit of satellites—a grey area for international law. These incidents have launched discussions on the potential for this “Near Space Zone” as a “new front for militarization.”<sup>18</sup> As will be discussed later in this paper, the extension of sovereignty beyond air space (namely, the demarcation of the boundary with outer space) has emerged as a pressing international legal issue, particularly in relation to weaponization, surveillance and national security.

Scholars have raised several concerns about the inadequacy of current space law to manage the weaponization of space.<sup>19</sup> Tronchetti surmised that space law is not a “comprehensive and

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<sup>15</sup> Julian E. Barnes, Adam Goldman & Chris Cameron, *What Were Those Flying Objects? Not Aliens, the White House Says*, N.Y. TIMES (Feb. 14, 2023), <https://www.nytimes.com/article/ufo-spy-balloons-china.html>; *4 Flying Objects Have Been Shot Down Over North America: Timeline of Key Moments*, ABC7 NEWS, (Feb.14, 2003), <https://abc7news.com/chinese-spy-balloon-flying-object-shot-down-over-lake-huron-undiscovered-objects/12809246/>

<sup>16</sup> Paul Stephen Dempsey & Maria Manoli, *Suborbital Flights and the Delimitation of Airspace Vis-à-Vis Outer Space: Functionalism, Spatialism and State Sovereignty*, 42 ANN AIR SPACE L. 209, 248 (2017).

<sup>17</sup> Max Matza, *Chinese Balloon Sensors Recovered from Ocean, Says US*, BBC NEWS (Feb. 15, 2023), <https://www.bbc.com/news/world-us-canada-64633705>.

<sup>18</sup> Simone McCarthy, Nectar Gan & Wayne Chang, *China's Balloons Are Part of a Strategy to Beat the US on a New Battlefield: 'Near Space'*, N.Y. TIMES (Feb. 10, 2023), <https://edition.cnn.com/2023/02/09/china/china-balloon-near-space-development-intl-hnk/index.html>.

<sup>19</sup> Yan Ling, *Prevention of Outer Space Weaponization under International Law: A Chinese Lawyer's Perspective*, 4(2) J. EAST ASIA INT. LAW 271, 272 (Autumn 2011) (discussing international legal community concerns).

integral legal system” despite having “a vast number of applicable rules,” it is limited in that it does not address all the issues needed for “completeness.”<sup>20</sup> Moreover, with the increasing number of States developing the capability to access space, the challenge of forming effective law is exacerbating.<sup>21</sup> According to Hoffstadt, space law is “one of the most unstable areas of international law” due to its ambiguous phrasing, and this has only been intensified exacerbated by changes in technology.<sup>22</sup> As will be discussed in the next part of this paper, the current space agreements embrace underlying principles of maintaining international peace and security and promoting international cooperation for the benefit of all. These principles potentially clash with the rising commercialization of space activities, the potential fiscal benefits from the appropriation of space natural resources and driving national security objectives. On this basis, some scholars have predicted that the current international space agreements will eventually be rejected.<sup>23</sup> Maogoto and Freeman further this reasoning, indicating that the current international space laws leave room for uncertainty and exploitation for military and strategic purposes.<sup>24</sup> In the absence of clear provisions in the space agreements relating to weaponization, the “vacant” international regulatory hole will, at best, be filled by other existing international law (such as international humanitarian law),<sup>25</sup> or at worst, go completely unregulated with States independently following their own laws that suit their military and national security objectives.<sup>26</sup> This article will now turn its

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<sup>20</sup> FABIO TRONCHETTI, *FUNDAMENTALS OF SPACE LAW AND POLICY* 3 (2013).

<sup>21</sup> *Id.* at 4.

<sup>22</sup> Brian M. Hoffstadt, *Moving the Heavens: Lunar Mining and the Common Heritage of Mankind in the Moon Treaty*, 42, *UCLA L. REV.* 575, 581 (1994).

<sup>23</sup> Adam G. Quinn, *The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space*, 17, *MINN. J. INT'L L.* 475, 489 (2008); Ivan Vlastic, *Space Law and the Military Applications of Space Technology*, in *PERSPECTIVES ON INTERNATIONAL LAW* 385, 406 (Manfred Lachs & Nandasiri Jasentuliyana eds., 1995).

<sup>24</sup> Jackson Nyamuya Maogoto & Steven Freeland, *Space Weaponization and the United Nations Charter Regime on Force: A Thick Legal Fog or a Receding Mist?* 41 *INT'L LAW* 1091, 1118 (2007).

<sup>25</sup> Michel Bourbonnière & Ricky J. Lee, *Legality of the Deployment of Conventional Weapons in Earth Orbit: Balancing Space Law and the Law of Armed Conflict*, 18 *EUR. J. INT'L L.* 873, 901 (2007).

<sup>26</sup> Note—this article will not specifically consider the application (and suitability) of international humanitarian law to the weaponization of space, as this analysis merits a separate scholarly paper in its own right.

consideration to the existing space agreements and then the conceptual challenges for normative reform.

### III. OVERVIEW OF CURRENT INTERNATIONAL SPACE LAW

There are five key international agreements that form the regulatory framework governing outer space—they are known colloquially as the Outer Space Treaty<sup>27</sup> (OST), the Rescue Agreement,<sup>28</sup> the Liability Convention,<sup>29</sup> the Registration Convention,<sup>30</sup> and the Moon Agreement<sup>31</sup> (MA). These agreements were negotiated within the framework of the United Nations (UN), under the umbrella of the UN Committee on the Peaceful Uses of Outer Space (COPUOS).<sup>32</sup> Customary international law and international law principles, such as the UN Charter, also apply to space law.<sup>33</sup> It is also important to note the influence domestic law and national agendas have on international law.<sup>34</sup> For the purpose of this article, only the space law agreements relevant to weaponization will be discussed.

#### A. *The Space Agreements*

##### 1. The Outer Space Treaty

Sometimes referred to as the Magna Carta of space, the OST established a guiding framework to regulate States' activities in space.<sup>35</sup> Presently, the OST has been ratified by 112 States, with

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<sup>27</sup> Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and other Celestial Bodies, art. II, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

<sup>28</sup> Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue Agreement].

<sup>29</sup> Convention on the International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

<sup>30</sup> Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

<sup>31</sup> Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1362 U.N.T.S. 3 [hereinafter Moon Agreement].

<sup>32</sup> TRONCHETTI, *supra* note 20, at 3.

<sup>33</sup> Brian Wessel, *The Rule of Law in Outer Space: The Effects of Treaties and Non-binding Agreements on International Space Law*, 35 HASTINGS INT'L & COMP. L. REV. 289, 298 (2012).

<sup>34</sup> *Id.* at 308.

<sup>35</sup> TRONCHETTI, *supra* note 20, at 8.

signatures by a further 23 States.<sup>36</sup> Article I of the OST establishes that the “exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries ... and shall be the province of all [hu]mankind.”<sup>37</sup> Further, Article II of the OST provides that outer space “is not subject to national appropriation by claim of sovereignty, by means of use or occupation or by any other means.”<sup>38</sup> Of particular relevance, in Article III of the OST, States are obliged to carry out activities in space “in the interest of maintaining international peace and security and promoting international co-operation and understanding.”<sup>39</sup> However, it is unclear what is encapsulated in the term “peace” and whether weaponization and militarization (terms that will be distinguished further on in this article) are incompatible with maintaining peace and security. The OST touches on weapons in Article IV, stating that States undertake “not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.”<sup>40</sup> Establishing “military bases, installations, and fortifications” is specifically “forbidden” under the OST, as is “the testing of any type of weapons and the conduct of military maneuvers on celestial bodies.”<sup>41</sup> However, the OST allows the use of equipment or facilities that are necessary, even the use of military personnel, if it is for scientific or peaceful exploration.<sup>42</sup> The OST places responsibility on States to ensure all activities are conducted in accordance with the OST, even those carried out by non-governmental agencies.<sup>43</sup>

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<sup>36</sup> Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcommittee on its Sixty-Second Session, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2023*, U.N. Doc. A/AC.105/C.2/2023/CRP.3 (2023) [hereinafter *Status of International Space Agreements*].

<sup>37</sup> Outer Space Treaty, *supra* note 27, art. I.

<sup>38</sup> *Id.* at art. II.

<sup>39</sup> *Id.* at art. III.

<sup>40</sup> *Id.* at art. IV.

<sup>41</sup> *Id.*

<sup>42</sup> *Id.*

<sup>43</sup> *Id.* at art. VI.

## 2. The Liability Convention

The Liability Convention establishes State responsibility for compensation in the event their space object causes damage to the surface of the earth or an aircraft in flight.<sup>44</sup> In this Convention, accountability is placed not only on the State who launched or procured the space object, but also on the State whose territory or facility the space object was launched from.<sup>45</sup> If these are two different States, then they will have joint liability.<sup>46</sup> Article XXII specifies that the reference to States throughout the Convention, encompasses intergovernmental organizations, with the exception of Articles XXIV and XXVII which details State ratification and review.<sup>47</sup> Although this treaty was drawn up to provide further clarification on the international responsibility for space activities, it is emblematic of its time in that it is State-centric and does not necessarily contemplate (nor account for) the rise of non-State actors, commercialization and the changing face of the current space industry.<sup>48</sup>

## 3. The Moon Agreement

The Moon Agreement (MA) applies to the Moon and other celestial bodies in the solar system (except for Earth).<sup>49</sup> Drawing similarities with the OST, Article III of the MA states that the Moon shall strictly be used for peaceful purposes, prohibiting the threat of and use of force, as well as any hostile acts.<sup>50</sup> It also prohibits the placing of nuclear weapons or other weapons of mass destruction in or on the Moon and its orbit.<sup>51</sup> Moreover, testing any type of weapon and establishing military bases or conducting military maneuvers on the Moon are forbidden.<sup>52</sup> The MA specifies that “the moon and all its resources are the *common heritage of [hu]mankind*”<sup>53</sup>—a

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<sup>44</sup> Liability Convention, *supra* note 29, art I.

<sup>45</sup> *Id.* at arts. I & II.

<sup>46</sup> *Id.* at art. IV.

<sup>47</sup> *Id.* at arts. XXII, XXIV & XXVII.

<sup>48</sup> Petr Boháček, *Peaceful Use of Lasers in Space? Potential, Risks, and Norms for Using Lasers in Space*, 61 SPACE POL'Y 1, 6 (2022).

<sup>49</sup> Moon Agreement, *supra* note 31, art. 1.

<sup>50</sup> *Id.* at art. III.

<sup>51</sup> *Id.*

<sup>52</sup> *Id.*

<sup>53</sup> *Id.* at art. 11(1) (emphasis added).

phrase that invokes slightly different connotations in international law compared to the characterization of the exploration and use of space as the “province of all [hu]mankind” as indicated in the OST.<sup>54</sup> The MA elaborates that “neither the surface nor subsurface of the moon, nor any part thereof or natural resources in place, shall become the property of any State, international intergovernmental organization or non-governmental organization, national organization, non-governmental entity or of any natural person.”<sup>55</sup> Article 11(6) of the MA also requires States to inform the UN Secretary General, the international scientific community and the public of any natural resources they find on the Moon, to the “greatest extent feasible and practical.”<sup>56</sup> Article 11(7)(d) of the MA advocates for an international regime to be established to ensure that the Moon’s resources are shared equitably, taking into consideration the needs of developing States and States who have contributed, both directly and indirectly, to the exploration of the Moon.<sup>57</sup> The specificity (and potentially restrictive nature) of these provisions on natural resources led to the MA receiving only 18 ratifications (with four additional signatories)<sup>58</sup> and is considered by some to be a “failed” international law.<sup>59</sup>

### *B. United Nations Resolutions and Legal Instruments*

On October 17, 1963, the UN General Assembly adopted UN Resolution 1884 with the stated purpose of preventing the “spread of the arms race to outer space.”<sup>60</sup> Specifically, UN Resolution 1884 called on States to “refrain from placing in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, installing such weapons on celestial bodies, or stationing such weapons in outer space in any other manner.”<sup>61</sup>

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<sup>54</sup> Outer Space Treaty, *supra* note 27, art. I.

<sup>55</sup> Moon Agreement, *supra* note 31, at art. 11(3).

<sup>56</sup> *Id.* at art. 11(6).

<sup>57</sup> *Id.* at art. 11(7).

<sup>58</sup> Status of the International Space Agreements, *supra* note 36. In January 2023, Saudi Arabia announced its intention to withdraw from the Moon Agreement with effect from January 5, 2024.

<sup>59</sup> See Michael Listner, *The Moon Treaty: failed international law or waiting in the shadows?*, THE SPACE REV. (Oct. 24, 2011), <https://www.thespacereview.com/article/1954/1>.

<sup>60</sup> G.A. Res. 1884 (XVIII), ¶ 2 (Oct. 17, 1963).

<sup>61</sup> *Id.* at ¶ 2(a).

Later that year, on December 13, 1963, the General Assembly passed UN Resolution 1962, which set out broad principles for space activities, including that such activities should be carried out in the “interest of maintaining international peace and security and promoting international cooperation and understanding.”<sup>62</sup> Both of these UN Resolutions formed the basis for the negotiations of the text for the OST.

Following the formulation of the five UN treaties on outer space, the UN General Assembly (GA) adopted a number of additional resolutions relating to outer space activities including the Principles Relevant to the Use Nuclear Power Sources in Space<sup>63</sup> and the Space Benefits Declaration.<sup>64</sup> However, the international community has been unable to finalize further binding international agreements since the five treaties were established.<sup>65</sup>

Manuals are another legal instrument used to interpret and elucidate international agreements.<sup>66</sup> Recently, two manuals have been launched to elucidate the applicable international law to military operations in space. The Woomera Manual on the International Law of Military Space Activities and Operations (Woomera Manual) aims to articulate and clarify “existing international law applicable to military space operations.”<sup>67</sup> The McGill Manual on International Law Applicable to Military Uses of Outer Space (MILAMOS) seeks to clarify “the fundamental rules applicable to the military use of outer space in time of peace, including challenges to peace.”<sup>68</sup> They aspire to follow in the footsteps of other successful manuals, such as the San Remo Manual on International Law Applicable to Armed Conflict at Sea<sup>69</sup> and the Tallin Manual on

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<sup>62</sup> G.A. Res. 1962 (XVII), at 4 (Dec. 13, 1963).

<sup>63</sup> G.A. Res. 47/68 (Feb. 23, 1993).

<sup>64</sup> G.A. Res. 51/122 (Feb. 4, 1997).

<sup>65</sup> Yun Zhao, *Space Commercialization and the Development of Space Law*, OXFORD RSCH. ENCYC. OF PLANETARY SCI. 1, 3 (2018).

<sup>66</sup> WILLIAM H. BOOTHBY, CONFLICT LAW 65, 66 (2014).

<sup>67</sup> *The Woomera Manual on the International Law of Military Space Activities and Operations*, THE UNIVERSITY OF ADELAIDE, § Mission, <https://law.adelaide.edu.au/woomera/> (last visited March 2023).

<sup>68</sup> *Manual on International Law Applicable to Military Uses of Outer Space*, MCGILL UNIVERSITY, § What is the MILAMOS Project?, <https://www.mcgill.ca/milamos/>, (last visited March 2023).

<sup>69</sup> SAN REMO MANUAL ON INTERNATIONAL LAW APPLICABLE TO ARMED CONFLICTS AT SEA (Louise Doswald-Becks, ed. 1995).

International Law Applicable to Cyber Warfare.<sup>70</sup> The adoption of this “soft law” approach to the regulation of outer space activities will be discussed in more detail later in this article.

#### IV. CONCEPTIONAL CHALLENGES UNDER EXISTING LAW

This article turns now to the consideration of some of the conceptual challenges for bridging the normative gaps in the international legal framework for the regulation of space weaponization. The interception of politics, commercialization, military power and technological development has led to a discourse on many of these existing and emerging issues.

##### A. *What Is Outer Space?*

In analyzing the international law that applies to the weaponization of outer space, one must first consider the definitional terms of what legally constitutes “outer space.” In particular, whether there is a legal (if not physical) boundary between where the air space of Earth ends and outer space begins.<sup>71</sup> The importance of this “boundary” is relevant in the context of conflicting provisions between the two legal frameworks governing air space and outer space activities. Article 1 of the Chicago Convention recognizes that each State has “complete and exclusive sovereignty over the air space above its territory.”<sup>72</sup> This contrasts with the OST, which affirms that space is “not subject to national appropriation by claim of sovereignty.”<sup>73</sup> A further potential conflict between the two regimes relates to liability.<sup>74</sup> The Montreal Convention places liability on the air carrier,<sup>75</sup> whereas the Liability Convention attributes liability for space activities to the launching State.<sup>76</sup> Any debate over the need to address conflicts between the two regimes of air

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<sup>70</sup> TALLINN MANUAL 2.0 ON THE INTERNATIONAL LAW APPLICABLE TO CYBER OPERATIONS (Michael N. Schmitt & Liis Vihul, eds., 2017).

<sup>71</sup> Alexandra Harris & Ray Harris, *The Need for Air Space and Outer Space Demarcation*, 22 SPACE POLY 3, 4 (2006).

<sup>72</sup> Convention on International Civil Aviation, Dec. 7, 1944, T.I.A.S. 13-613.1, 15 U.N.T.S. 295, art. 1.

<sup>73</sup> Outer Space Treaty, *supra* note 27, art II.

<sup>74</sup> Dempsey & Manoli, *supra*, note 16, at 217.

<sup>75</sup> Convention for the Unification of Certain Rules for International Carriage by Air, art. 17, 51 Stat. 233, 2242 U.N.T.S. 309.

<sup>76</sup> Liability Convention, *supra* note 29, art. 2.

law and space law is somewhat moot in the absence of a consensus for delimitating a boundary between air space and outer space.<sup>77</sup> Defining “outer space” is crucial to the issue of space weaponization—the demarcation line affects which legal regime applies (air law or space law) and has huge ramifications for national sovereignty claims and the legitimacy of military activities.<sup>78</sup> Harris and Harris suggest that the lack of a space boundary is rooted in political objectives, with a blurry definition of a boundary being advantageous to States with interests in space exploration and mining.<sup>79</sup> However, there have been numerous proposed boundary demarcation methods, which will now be discussed.

### 1. The Kármán Line

The Kármán line is 100 km above mean sea level, based on Theodore von Kármán’s discovery of the certain altitude where the atmosphere becomes thin and requires the object traveling through it to be at a certain speed (faster or close to the orbital speed) in order to move forward, or in other words to be able to commence aeronautical flight.<sup>80</sup> Although the change in atmosphere was found to be at 83.8 km, von Kármán and the World Sport Federation adapted this to 100 km for ease of use and remembrance.<sup>81</sup> However, this method has been criticized for neglecting scientific evidence that demonstrates this altitude is much lower.<sup>82</sup> As McDowell points out, lower values around 30 to 35km have been proposed as space, or near space, such as by Alan Stern, a prominent astrophysicist currently involved in a near-space tourism venture.<sup>83</sup>

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<sup>77</sup> Dempsey & Manoli, *supra* note 16, at 218.

<sup>78</sup> *Id.* at 98.

<sup>79</sup> Harris & Harris, *supra* note 71, at 5.

<sup>80</sup> Alex S. Li, *Ruling Outer Space: Defining the Boundary and Determining Jurisdictional Authority*, 73 OKLA. L. REV. 711, 725 (2021); O. DE OLIVEIRA BITTENCOURT NETO, *DEFINING THE LIMITS OF OUTER SPACE FOR REGULATORY PURPOSES* 46 (2015).

<sup>81</sup> Li, *supra* note 80, at 725.

<sup>82</sup> *Id.* at 725-726.

<sup>83</sup> Jonathan C. McDowell, *The Edge of Space: Revisiting the Karman Line*, 151 ACTA ASTRONAUTICA 668, 669 (2018).

## 2. The Astronaut Badge Line

The Astronaut Badge line advocates for an 80 km altitude boundary (which would equate to 50km above mean sea level).<sup>84</sup> It comes from the award given to US military personnel to those flying at least 80 km above the Earth.<sup>85</sup> Although this method has not been officially endorsed by the US, their criteria for the award suggests an indirect acceptance, as the US has made it clear that they do not support the demarcation of space.<sup>86</sup> It is interesting that this criteria for an accolade has gained traction as a potential method for demarcation, rather than being based on scientific evidence. This award, referred to as the Wing program, ended in 2021 with the impending commencement of space tourism. However, the US Federal Aviation Industry continues to recognize those who have flown this distance on their website.<sup>87</sup>

## 3. The Mission Intent Line

The Mission Intent Line aligns with the functionalist group of thought, proposing that the destination of an airborne object should determine whether it is classified as a spacecraft or aircraft.<sup>88</sup> From this perspective, objects and activities are based on intention rather than geographical boundaries.<sup>89</sup> Critics see this approach as too subjective, warning that people will abuse the system by choosing a legal system that would be more favorable.<sup>90</sup> For example, stating the intent of the object was to reach space even though it was never planned to, in order to have the less restrictive law applied.<sup>91</sup> This would become even more complicated when considering dual-use technologies.<sup>92</sup>

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<sup>84</sup> Li, *supra* note 80, at 726.

<sup>85</sup> *Id.*; Chelsea Gohd, *New FAA Rules Change Who Qualifies for Commercial Astronaut Wings*, SPACE.COM, ¶ 1, (Jul. 27, 2021), <https://www.space.com/faa-commercial-astronaut-wings-rule-change>.

<sup>86</sup> Li, *supra* note 80, at 726-727.

<sup>87</sup> FEDERAL AVIATION ADMINISTRATION, *FAA Ends Commercial Space Astronaut Wings Program, Will Recognize Individuals Reaching Space on Website*, (Dec. 10, 2021), <https://www.faa.gov/newsroom/faa-ends-commercial-space-astronaut-wings-program-will-recognize-individuals-reaching>.

<sup>88</sup> Li, *supra* note 80, at 728.

<sup>89</sup> *Id.*

<sup>90</sup> *Id.*

<sup>91</sup> *Id.*

<sup>92</sup> *Id.*

#### 4. Near-Space or Transitional Outer Space Zone

A more recent demarcation approach is the creation of a transitional zone, most popularly called the Near Space Zone. Dempsey and Manoli posit that the emergence of New Space activities occurring at altitudes between 20 km to 160 km has given rise to the need for the establishment of a Near Space Zone.<sup>93</sup> This zone sits above the flightpaths of most commercial and military jets but falls below the orbit for satellites—making it a unique space for low-cost spaceflight and also weaponization.<sup>94</sup> As previously mentioned in this article, both the US and China have focused on developing military space capabilities in the Near Space Zone. Li advocates that the zone between 80 and 100 km should become a Transitional Outer Space Zone (TOS Zone).<sup>95</sup> The TOS Zone would be modeled on the Exclusive Economic Zone stipulated in the Law of Sea Convention,<sup>96</sup> where all States can operate in the area provided that their activities do not impede on national security.<sup>97</sup> Li reasons this as an amalgamation of the three predominant approaches to boundary demarcation; the Kármán line, the Astronaut Badge Line, and the Mission Intent Line. Creating a “transitional” Near Space Zone would permit the regulation of activities that occur within the zone limits, without States sacrificing the freedoms resulting from a strict boundary delimitation between national air space and outer space.<sup>98</sup>

#### 5. Functionalist versus Spatialist

There are currently two broad schools of thought regarding how space should be demarcated.<sup>99</sup> The spatialist approach advocates for a fixed demarcation line to be based on scientific or technological criteria, which include some of the aforementioned methods. In contrast, the functional approach considers the ‘function’—being the objective and purpose—of the space activities as the

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<sup>93</sup> Dempsey & Manoli, *supra* note 16, at 248.

<sup>94</sup> McCarthy, Gan & Chang, *supra* note 18.

<sup>95</sup> Li, *supra* note 80, at 728.

<sup>96</sup> U.N. Convention on the Law of the Sea, arts. 55-56, Dec. 10 1982, 1833 U.N.T.S. 397.

<sup>97</sup> Li, *supra* note 80, at 728.

<sup>98</sup> *Id.* at 730.

<sup>99</sup> BITTENCOURT NETO, *supra* note 80, at 3.

trigger for regulation under international space law.<sup>100</sup> In the context of space weaponization, a functionalist approach would turn on whether the “activity” (weapons) in question is designed and intended (their *function*) to operate in outer space. While superficially straightforward, we are left with the task of considering the definitional parameters of the “functional” criteria that would trigger the normative provisions.<sup>101</sup> This turns on the subjective assessment of the “objective” and “purpose” of the space activity. As will be discussed below, the distinction between a weapon that is intended to be a “space” weapon and a “conventional” weapon is blurry. It is also unclear whether the triggering space “activity” is the launching of the space weapons, the weapons themselves, or both?

It could be said that the existing legal regime for outer space already takes a somewhat functionalist approach, as it focuses primarily (in terms of liability, responsibility, and access) on the objects (and act of) entering space rather than the activities conducted once in outer space.<sup>102</sup> The latter activities are referred to in broad brush terms with objectives of “peace,” “cooperation,” and “sharing.” Although Harris and Harris advise that a border needs to be decided on before it becomes a “major source of friction on the international stage;” this has arguably already occurred through practice.<sup>103</sup> Notwithstanding such practice, formality and certainty on the definition of “outer space” is desirable—specifically, the inclusion of a definition of “outer space” vis-à-vis “air space” in an international agreement. Alternatively, the creation of a Near-Space Zone that permits regulation of space activities in that zone. However, in the absence of such agreement (and given the obstacles in realistically achieving a consensus amongst States), it is the authors’ opinion that the functional approach, however flawed, is currently the best suited approach for the definition and demarcation of outer space from national air space law. With world powers maintaining their opposition to boundary delimitation and the international legal community emphasizing its necessity to minimize the risk of space weaponization, we are faced with the challenge of

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<sup>100</sup> *Id.*

<sup>101</sup> *Id.* at 40.

<sup>102</sup> See Harris & Harris, *supra* note 71.

<sup>103</sup> *Id.* at 6.

paving a way forward. This is particularly the case given the potential for weapons-building capabilities in the Near Space Zone.

### B. Defining “Weaponization”

The definition of what constitutes a space “weapon” is a significant challenge for achieving any sort of international consensus for the development of normative provisions on this issue. This article will consider— (1) the distinction between weaponization and militarization and (2) the definitional distinction of a space weapon compared to conventional weapons and the challenges posed by dual-use space technology on definitional parameters of the term.

#### 1. “Weaponization” as distinct from “Militarization”

It is important to note the difference between weaponization and militarization. Vlastic defines militarization as the “use of outer space by a significant number of military spacecraft.”<sup>104</sup> Whereas weaponization refers to “placing in outer space for any length of time any device designed to attack [hu]man-made targets in outer space and/or in the terrestrial environment.”<sup>105</sup> Mosteshar further clarifies, “space weaponization is always a form of militarization, but space militarization . . . does not necessarily involve space weaponization.”<sup>106</sup> Weaponization is a significant issue for space law, and increasingly so, with the use and value of space growing rapidly.<sup>107</sup> Weaponization also entails extensive risk. It risks further global insecurity as it has the potential to destabilize current international and State relations.<sup>108</sup> This would jeopardize not only national security but also human security.<sup>109</sup> This article is limiting its consideration to the “weaponization” and not the broader concept of militarization of space.

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<sup>104</sup> Vlastic, *supra* note 23, at 386.

<sup>105</sup> *Id.*

<sup>106</sup> Sa’id Mosteshar, *Space Law and Weapons in Space*, OXFORD RSCH. ENCYC. OF PLANETARY SCI. 1, 10 (2019).

<sup>107</sup> *Id.* at 16.

<sup>108</sup> Blair Stephenson Kuplic, *The Weaponization of Outer Space: Preventing an Extraterrestrial Arms Race* 39 N.C. J. INT’L L. & COM. REG. 1123, 1142 (2014).

<sup>109</sup> *Id.* at 1142.

## 2. Space “Weapons”–Categorization of “Lawful”

In the context of the somewhat terrifying possibility of warfare in outer space, it is necessary to consider whether international law provides adequate guidance on the parameters of the definition between “lawful” or “unlawful” space weapons.

The only specific reference in the OST relating to the “unlawful” use of weapons in outer space is found in the prohibition in Article IV of the OST on space objects that carry “nuclear weapons or any other weapons of mass destruction.”<sup>110</sup> Alongside treaties between States, customary international law is also a recognized source of international law.<sup>111</sup> Further, Article III of the OST provides that States shall carry on activities in the exploration and use of outer space “in accordance with international law, including the Charter of the United Nations.”<sup>112</sup> Accordingly, the customary law principles relating to “lawful” conventional weapons (now also reflected in the UN Convention on Certain Conventional Weapons<sup>113</sup>) may also apply to outer space weapons. These principles provide that for a weapon to be considered “lawful” it must not cause superfluous injury/unnecessary suffering and must not be indiscriminate in nature.<sup>114</sup> This provides a starting point for developing normative provisions.

We then turn to what types, or categories of “lawful” space weapons should be regulated at the international level? There are three types of space weapons, according to Lyall and Larson:

- (1) weapons in orbit which may be used to strike the surface of the Earth or targets in air-space,

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<sup>110</sup> Outer Space Treaty, *supra* note 27, art. IV.

<sup>111</sup> Statute of the International Court of Justice, Art. 38, June 26 1945, 6 L.N.T.S. 391-413.

<sup>112</sup> Outer Space Treaty, *supra* note 27, art. III.

<sup>113</sup> Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to have Indiscriminate Effects, Oct. 10, 1980, U.N.T.S. 137 (registered ex officio Dec. 2, 1983; Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, as amended on 21 December 2001, <https://geneva-s3.unoda.org/static-unoda-site/pages/templates/the-convention-on-certain-conventional-weapons/CCW%2Btext.pdf> [hereinafter Convention on Conventional Weapons]).

<sup>114</sup> Bill Boothby, *Space Weapons and the Law*, 93 INT’L L. STUD. 180, 185 (2017).

(2) weapons in orbit that may be used to strike other space objects and,

(3) weapons located in outer space used to target ballistic missiles being boosted from the surface of the Earth (ASATs).<sup>115</sup>

These weapons may have the capability to paralyze radio frequencies and energy sources, or they may be in the form of kinetic energy used to strike targets.<sup>116</sup> Anti-satellite technology (ASAT) is a technological weapon used in space that has been tested successfully to destroy satellites.<sup>117</sup>

Kuplic breaks up space “weapons” further into the following five different categories based on the weapon type and functionality:<sup>118</sup> (1) kinetic energy weapons which are designed to destroy hostile satellites by utilizing high speed and kinetic energy on impact, and are the most common type of weapon in space;<sup>119</sup> (2) co-orbital ASATs which utilize a missile armed with explosives to detonate when the target is in close proximity;<sup>120</sup> (3) directed energy technologies which destroy targets by “shooting” energy at, or almost at, the speed of light, such as a laser or high-powered radio frequency;<sup>121</sup> (4) soft kill weapons that aim to disable rather than destroy their target, such as disrupting power supply or nudging a satellite out of orbit (these are considered a covert method of attack because they can easily be perceived as a routine failure);<sup>122</sup> and (5) electromagnetic and radiation weapons which create an electromagnetic pulse that can disable electronics within a 700 mile radius and have the potential to cause blackouts on Earth.<sup>123</sup>

Also impeding the consensus on a neat definition of a space weapon is the reality that space technology is often dual-use in nature.<sup>124</sup> An example of this technology is lasers, which can be used

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<sup>115</sup> FRANCIS LYALL & PAUL B. LARSEN, *SPACE LAW: A TREATISE* 448 (2nd ed. 2018).

<sup>116</sup> *Id.*

<sup>117</sup> Kuplic, *supra* note 108, at 1138.

<sup>118</sup> *Id.*

<sup>119</sup> *Id.*

<sup>120</sup> *Id.*

<sup>121</sup> *Id.* at 1139.

<sup>122</sup> *Id.*

<sup>123</sup> Kuplic, *supra* note 108, at 1140.

<sup>124</sup> Joan Johnson-Freese & David Burbach, *The Outer Space Treaty and the Weaponization of Space*, 74(4) BULL. ATOMIC SCIENTISTS 137, 137 (2019).

to track satellites and temporarily or permanently blind them.<sup>125</sup> The use of technology for both civil and military purposes renders it potentially difficult to identify the true purpose of the use of technology and thereby poses a challenge for regulation.<sup>126</sup> Mosteshar stresses that this paradigm is complicated even further when the technology is used by multiple States.<sup>127</sup> What happens when a technology is used as a weapon by one State? Should this lead to the entire technology or system being classified as a weapon (despite also having non-military uses)?<sup>128</sup>

The dual-use nature of space technology presents issues not only for identifying space weapons but also for the enforcement of international laws. It is difficult to hypothesize how soft-kill weapons can be regulated from a practical perspective. For example, what happens when a State destroys its own satellite in order to generate space debris to damage or destroy another State's space object indirectly? How will it be determined whether such damage was an unintentional consequence of an innocent (legitimate) space activity or a military attack? How will the humanitarian laws of "aggression" apply to international space activities? Clearly, this is a conceptual challenge for international law that is crucial to maintaining peace and security.

It is evident that there are varying interpretations of what constitutes a space weapon and how they are categorized. Further clarification and consensus about space weapons could enable us to ascertain and monitor the number of weapons in space.<sup>129</sup> This, in turn, could facilitate the development of legal regimes in addressing space weaponization as there would be a better understanding of what the space weapon landscape looks like, and the risks and threats that need to be addressed. In the absence of a clear definition, there is scope for debate and ambiguity over which (if any) law applies to the situation. For example, the Convention on Certain Conventional Weapons may apply depending on the specific location of the weapon and one's application of the demarcation between air space and outer spaces.<sup>130</sup> Further, will space "weapons"

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<sup>125</sup> *Id.* at 138.

<sup>126</sup> *Id.* at 137.

<sup>127</sup> Mosteshar, *supra* note 106, at 11.

<sup>128</sup> *Id.*

<sup>129</sup> LYALL & LARSEN, *supra* note 115, at 467.

<sup>130</sup> Convention on Conventional Weapons, *supra* note 113.

be regulated on the potential use or “actual” use, and what level of destruction (or protentional destruction) will act as a trigger to invoke the normative laws? In this regard, Boothby raises the pertinent question of whether the amount of *damage* the space weapon technology inflicts upon another mechanism or system in space will distinguish the action as a “weapon” or a “method of warfare”—the latter being defined as when the action does not damage or injure but merely “adversely affects enemy military operations or capacity.”<sup>131</sup> If the “use” of a space weapon is deemed a “method of warfare,” then International Humanitarian Law may be applied.<sup>132</sup> As the questions surrounding the definitional parameters of the phrase “space weapon” pile up, it is clear that there is a pressing need for clarity going forward.

### C. “Peaceful Use” of Outer Space

A contributing factor impacting the effectiveness of the regulation of space weaponization is the growing concern over the absence of a clear definition of “peaceful purpose” in Article IV of the OST. Article IV relevantly provides:

.... The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies shall be forbidden.  
....<sup>133</sup>

In fact, the “peaceful” use of outer space is a cornerstone element of the OST—appearing eight times throughout the preamble and the Articles of the agreement. Post World War II, the phrase “peaceful use” in the context of outer space activities was generally agreed (if only tacitly) to mean “non-military” activities.<sup>134</sup> The launch of Sputnik in 1957 was a catalyst for debate over the

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<sup>131</sup> Boothby, *supra* note 114, at 183.

<sup>132</sup> Roxanne Pope, *Space Weapons and the Increasing Militarisation of Outer Space: Whether the Legal Framework Is Fit-for-Purpose*, 27 AUCKLAND U. L. REV. 263, 267-278 (2021).

<sup>133</sup> Outer Space Treaty, *supra* note 27, art. IV.

<sup>134</sup> KIRAN KRISHNAN Nair, SMALL SATELLITES AND SUSTAINABLE DEVELOPMENT - SOLUTIONS IN INTERNATIONAL SPACE LAW 11 (2019).

interpretation of the term “peaceful use,” sparking concern over the demonstration of Soviet military space technology and capabilities. In the same year, the four western powers of the US, France, the United Kingdom, and Canada requested an inspection system to ensure that space objects were used only for peaceful and scientific purposes from the UN Disarmament Commission.<sup>135</sup> As famously retorted by John F. Kennedy in 1960, “if the Soviets control space they can control the earth, as in past centuries the nation that controlled the seas dominated the continents.”<sup>136</sup> The launch of Sputnik was followed by an escalation of military activity in space, with the launching of numerous military satellites and nuclear tests conducted by both the US and the Soviet Union.<sup>137</sup>

Given the ambiguity of the scope of the phrase “exclusively for peaceful purposes” in the OST, assistance may be garnered from looking at the broader context and any subsequent relevant normative principles.<sup>138</sup> In 1959, the UN established COPUOS as a permanent body in recognition of “the common interest of [hu]mankind as a whole in furthering the peaceful use of outer space.”<sup>139</sup> Relevantly, it was recognized by the General Assembly at the time that there was a desire “to avoid the extension of present national rivalries into this new field [of space]” and “the great importance of international co-operation in the exploration of and exploitation of outer space for peaceful purposes.”<sup>140</sup> It is noted, with some irony, that COPUOS was not specifically tasked with defining the meaning of “peaceful use” of outer space, but rather was mandated to (a) “review, as appropriate, the area of international co-operation and to study practical and feasible means for giving effect to programmes in the peaceful uses of outer space, and (b) to study the nature of legal problems which may arise from the exploration of outer space.”<sup>141</sup> Perhaps, in the context of the Cold War tensions of

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<sup>135</sup> U.N. DCOR, 153rd mtg., at 18, U.N. Doc. DC/SC.1/PV.153 (Aug. 29, 1957).

<sup>136</sup> Edward Clinton Ezell & Linda Neuman Ezell, *Competition Versus Cooperation: 1959-1962*, NASA HISTORY, <https://history.nasa.gov/SP-4225/documentation/competition/competition.htm>, (Last Visited Aug. 27, 2022).

<sup>137</sup> NAIR, *supra* note 134, at 12-15.

<sup>138</sup> Vienna Convention on the Law of Treaties, art. 31, May 23, 1969, 1155 U.N.T.S. 331.

<sup>139</sup> G.A. Res. 1472 (XIV) (Dec. 12, 1959).

<sup>140</sup> *Id.*

<sup>141</sup> *Id.* at ¶ A1.

the time, the meaning of “peaceful use” activities was less contentious?

Guidance might also be taken from Article 2 of the UN Charter, which provides that “all Members shall settle their international disputes by *peaceful means* in such a manner that international peace and security, and justice, are not endangered.”<sup>142</sup> The UN Security Council also has the power to determine “any threat to the peace, breach of the peace, or act of aggression.”<sup>143</sup> This provides the Security Council with the power to determine and potentially define, what is peace, or at least what is not peaceful. Consequently, in the context of contemplations of the Security Council, the determination of what is, or what is not, “peaceful” activity is not clarified until the situation has already eventuated and is on a case-by-case basis. This provides little assistance in determining categories of peaceful (or specifically *non-peaceful*) space activities before the fact.

More recently, a dichotomy of thinking has materialized on the interpretation of space activities for “peaceful purposes” in the context of Article IV of the OST. Kuplic suggests a narrower view that the phrase in Article IV only prohibits “aggressive” actions.<sup>144</sup> The definition of “aggression” according to the UN is “the use of armed force by a State against the sovereignty, territorial integrity or political independence of another State.”<sup>145</sup> In this sense, if space law only prohibited *aggressive* acts, then non-aggressive military activities would be permitted within the scope of Article IV.<sup>146</sup> However, this appears to be in direct contrast to the expressed terms in Article IV that prohibits the establishment of military bases, weapons testing, and military maneuvers on celestial bodies.

Nevertheless, the absence of a precise definition of “peaceful” has left Article IV open to subjective interpretation permitting States and international organizations to pursue their own interests whilst maintaining that such activities are aligned with “peaceful” purposes. The US Department of Defense, along with leading US military strategists, now consider space to be a

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<sup>142</sup> U.N. Charter art. 2 (emphasis added).

<sup>143</sup> *Id.* at art. 39.

<sup>144</sup> Kuplic, *supra* note 108, at 1146.

<sup>145</sup> G.A. Res. 3314 (XXIX), art. 1 (Dec. 14, 1974).

<sup>146</sup> Kuplic, *supra* note 108, at 1146.

warfighting domain.<sup>147</sup> In its 2021 *US Space Priorities Framework*, the US states that it “will defend its national security interests from the growing scope and scale of space and counterspace threats.”<sup>148</sup> Further, “the United States also will take steps to protect its military forces from space-enabled threats.”<sup>149</sup> In 2019, NATO declared space as an operational domain, integrating space into their defense and deterrence approach.<sup>150</sup> They are also establishing dedicated divisions, including a Space Centre in Germany and a Space Centre of Excellence in France.<sup>151</sup> In NATO’s overarching space policy, they declare that they have a reliance on space for their activities and specify that they utilize their space capabilities in order to meet their political and military objectives.<sup>152</sup> NATO has also affirmed their position on space exploration, stating “the free access, exploration, and use of outer space for peaceful purposes is in the common interest of all nations.”<sup>153</sup> Although NATO does not clarify what they mean when they refer to “peaceful purposes”, by their reference to military objectives/activities, it would be inferred that they view it from the same lens as the US, as perhaps meaning “non-aggressive.” Thus, we have started to see a potential carve out of Article IV for military activities where the objective may be considered passive (or defensive) versus aggressive.

As Nair notes, there are instances where military activities could be considered “peaceful” (e.g., UN military peacekeeping and humanitarian efforts).<sup>154</sup> Conversely, some non-military activities may be considered non-peaceful.<sup>155</sup> Would military payloads on commercial space flights be considered a peaceful use of outer

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<sup>147</sup> Stephen M. McCall, CONG. RSCH. SERV., *Space As A Warfighting Domain: Issues For Congress* (2021). <https://crsreports.congress.gov/product/pdf/IF/IF11895>

<sup>148</sup> *United States Space Priorities Framework*, December 2021. [https://www.whitehouse.gov/wp-content/uploads/2021/12/united-states-space-priorities-framework\\_-december-1-2021.pdf](https://www.whitehouse.gov/wp-content/uploads/2021/12/united-states-space-priorities-framework_-december-1-2021.pdf)

<sup>149</sup> *Id.*

<sup>150</sup> *NATO’s overarching Space Policy*, NORTH ATLANTIC TREATY ORGANISATION, §9 (Jan. 17, 2017), [https://www.nato.int/cps/en/natohq/official\\_texts\\_190862.htm?utm\\_source=linkedin&utm\\_medium=nato&utm\\_campaign=20220117\\_space#:~:text=In%20November%202019%2C%20NATO%20declared,Air%20Command%20in%20Ramstein%2C%20Germany.](https://www.nato.int/cps/en/natohq/official_texts_190862.htm?utm_source=linkedin&utm_medium=nato&utm_campaign=20220117_space#:~:text=In%20November%202019%2C%20NATO%20declared,Air%20Command%20in%20Ramstein%2C%20Germany.)

<sup>151</sup> *Id.*

<sup>152</sup> *Id.* § 10 & 16.

<sup>153</sup> *Id.* § 5.

<sup>154</sup> See NAIR, *supra* note 134, at 20.

<sup>155</sup> *Id.*

space? Commercial agreements with military forces involving space are already a reality—for example, on September 21, 2011, the launch by Science Applications International Corporation included a US Air Force Commercially Hosted Infrared Payload (CHIRP)—the CHIRP had been integrated onto a commercial telecommunications satellite.<sup>156</sup> With the increase in commercial activities in space, and the potential for growth in military-commercial partnerships, these joint space missions challenge the black-and-white interpretation of “non-peaceful” activities. This leads us to the question of the true purpose behind the phrase “peaceful purposes” in Article IV of the OST. Specifically, whether the narrow characterization of it being analogous with military activities still holds accurate? Which leads to the following question—how do we re-draft (or at least clarify) Article IV in order to give meaningful effect to the phrase “peaceful” so as to maintain global security and avoid space warfare?

*D. Space in the 2020s and Beyond—Is it a Global Commons?*

An issue currently being raised in the international legal (and diplomatic) community is whether outer space, like the high seas, is truly a shared global resource.<sup>157</sup> Article I of the OST provides that space exploration shall be carried out for the “benefit and in the interests of all countries” and shall be the “province of all [hu]mankind.”<sup>158</sup> To further support this overarching principle of “sharing,” Article II of the OST provides that space, including the Moon and other celestial bodies are “not subject to national appropriation by claim of sovereignty.”<sup>159</sup> Interestingly, according to Cheng, in 1958 the US National Aeronautics and Space Act included a declaration by Congress affirming that the US’s policy and

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<sup>156</sup> Major Peter A. Cunningham, *Military Payloads Hosted on Commercial Satellites: How Can the Space and Missile Systems Center Increase the Number of Commercially Hosted Military Payload Contract Awards?*, 53 WRIGHT FLYER PAPER 1 (2015). See also, *SAIC Helps Launch Commercially-Hosted Infrared Payload Sensor for U.S. Air Force Space and Missile Systems Center*, LEIDOS (Sep. 23, 2011), <https://investors.leidos.com/news-and-events/news-releases/press-release-details/2011/SAIC-Helps-Launch-Commercially-Hosted-Infrared-Payload-Sensor-for-US-Air-Force-Space-and-Missile-Systems-Center/default.aspx>.

<sup>157</sup> U.N. Convention on the Law of the Sea, *supra* note 96, art. 136. (The high seas “and its resources are the common heritage of [hu]mankind.”)

<sup>158</sup> Outer Space Treaty, *supra* note 27, art. 1.

<sup>159</sup> *Id.* at art. II.

“activities in space should be devoted to peaceful purposes for the benefit of [hu]mankind.”<sup>160</sup> Cheng notes that the Soviet Union made similar assertions.<sup>161</sup>

While there may be general agreement between States that celestial bodies should not be subject to claims of territorial “sovereignty,” other proprietary claims and rights over space minerals and resources remain more contentious.<sup>162</sup> As is well known, the inclusion of limitations on the exploitation of space resources and references to space as a “common heritage of [hu]mankind” (a phrase that has particular connotations from the international Law of Sea legal regime) was a contributing reason for the lack of support afforded to the Moon Agreement.<sup>163</sup> From this starting point in the 1950s, we have seen a policy shift by some States toward the rejection of space as a shared global resource.

In 2015, President Obama signed the Commercial Space Launch Competitiveness Act affording US citizens engaged in the commercial recovery of an asteroid resource or a space resource the right to possess, own, transport, use, and sell that same asteroid or space resource.<sup>164</sup> Then, in 2020, President Trump issued an Executive Order declaring that the US did not view space as a global common.<sup>165</sup> It is noted that this is a movement away from the position taken by the US in its 2010 National Security Strategy in which “safeguarding the global commons. . . to optimize the use of shared sea, air and space domains” was a key policy strategy.<sup>166</sup> The Biden Administration is yet to confirm their position but did affirm their commitment to a “rules-based international order for space” in their recent statement about DA-ASAT testing.<sup>167</sup>

Commercial interests and the promise of an abundance of resources in space is a likely driving factor in the policy shift away from recognizing outer space as a “common heritage.” It is predicted

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<sup>160</sup> BIN CHENG, *STUDIES IN INTERNATIONAL SPACE LAW* 514 (1997).

<sup>161</sup> *Id.*

<sup>162</sup> *See Zhao, supra* note 65.

<sup>163</sup> *Id.*

<sup>164</sup> U.S. Commercial Space Launch Competitiveness Act, Pub L No 114–190, 129 Stat 704 § 51303.

<sup>165</sup> Exec. Order No. 13914, 85 Fed. Reg. 70, § 1 (Apr. 6, 2020). This Executive Order reiterated the Congressional act in 2018; H.R. 2809 115th Cong. § 80308 (2018).

<sup>166</sup> National Security Strategy, 47, (2010), [https://obamawhitehouse.archives.gov/sites/default/files/rss\\_viewer/national\\_security\\_strategy.pdf](https://obamawhitehouse.archives.gov/sites/default/files/rss_viewer/national_security_strategy.pdf).

<sup>167</sup> White House Fact Sheet, *supra* note 11, ¶ 6.

that there will be a new phase of globalization, which Fox calls “asterization,” where globalization expands beyond Earth’s orbit, such that the “sky is no longer the limit” for commercialization and profit.<sup>168</sup> The resources in space can be used to manufacture everyday products such as televisions and cars but can also be used for weapons, making them “faster, stronger, lighter and more efficient.”<sup>169</sup> The potential for rapid growth in research, development and manufacture of space weapons, suggests we could see the creation of a new “industry” which would be intrinsically linked to commercialization, profit, and power. The movement away from recognizing space as a global commons may make it just that little bit harder to regulate space weapons.

#### V. A SOFT LAW APPROACH—A WAY FORWARD?

The effectiveness of international law is contingent upon State support, ratification, and compliance.<sup>170</sup> This is a key challenge to the efficacy and development of space law. In recent years, both Russia and China have pushed for new regulations for space activities. In 2008, these two States jointly proposed two treaties relating to space weapons, the Prevention of an Arms Race in Space (PAROS) and the Prevention of the Placement of Weapons in Outer Space Treaty (PPWT).<sup>171</sup> The central obligation of the PPWT is set out in Article II of the draft treaty as follows:

The States Parties undertake not to place in orbit around the Earth any objects carrying any kinds of weapons, not to install

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<sup>168</sup> Sarah Jane Fox, *Space: The Race for Mineral Rights ‘The Sky is No Longer the Limit’ Lessons from Earth!*, 49 RESOURCES POL’Y 165, 166-175 (2016).

<sup>169</sup> Julie Butters, *Elements of Conflict*, THE BRINK - BOSTON UNIVERSITY ¶ 1 (2016) <https://www.bu.edu/articles/2016/rare-earths/>.

<sup>170</sup> Anthea Roberts & Sandesh Sivakumarani, *The Theory and Reality of the Sources of International Law*, in INTERNATIONAL LAW 89, 107-108. (Malcom D. Evans ed., 5th ed. 2018).

<sup>171</sup> PAROS Treaty, *supra* note 9; Draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects, in letter dated Feb. 12, 2008 from the Permanent Representative of the Russian Federation and the Permanent Representative of China to the Conference on Disarmament addressed to the Secretary-General of the Conference transmitting the Russian and Chinese texts of the 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)” introduced by the Russian Federation and China, U.N. Doc. CD/1839 (Feb. 29, 2008) [hereinafter Prevention of the Placement of Weapons].

such weapons on celestial bodies and not to place such weapons in outer space in any other manner; not to resort to the threat or use of force against outer space objects; and not to assist or induce other States, groups of States or international organizations to participate in activities prohibited by this Treaty.<sup>172</sup>

Not surprisingly, these two draft treaties of China and Russia were met with suspicion from the US, with the latter suggesting it was “a diplomatic ploy by the two nations to gain a military advantage.”<sup>173</sup> In considering the draft treaty provisions proposed by the PPWT, the US took particular issue with the inclusion of the phrase “threat of force.”<sup>174</sup> Highlighting that the text of the draft treaty leaves the definition only loosely defined within the context of “use of force” being “any hostile actions against outer space objects . . . .”<sup>175</sup> The US then raised the question of whether activities—such as developing an ASAT capability, destroying one’s own satellite, or a close fly-by of either one’s own, or another State’s, satellite—would be considered a “threat” of force within the meaning of the PPWT.<sup>176</sup> In addition, the US raised concerns over the ambiguities on how a new self-defense exception (contained in Article V of the PPWT) would operate in relation to the obligations in Article II.<sup>177</sup>

The US reaffirmed its policy position (which it declared it had held for three decades) that it would:

oppose arms control concepts, proposals, and legal regimes that  
(i) seek prohibitions on military or intelligence uses of space; or  
(ii) fail to preserve the rights of the United States to conduct

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<sup>172</sup> Prevention of the Placement of Weapons, *supra* note 171, at art II.

<sup>173</sup> PAROS Treaty, *supra* note 9, at § 2008-2007.

<sup>174</sup> Analysis of a Draft “Treaty on Prevention of the Placement of Weapons in Outer Space, or the Treaty or Use of Force against Outer Space Objects”, Letter dated 19 August 2008 from the Permanent Representative of the United States of America addressed to the Secretary-General of the Conference Transmitting Comments on the 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)” as Contained in Document CD/1839 of 29 February 2008, U.N. Doc. CD/1847, (Aug. 26, 2008).

<sup>175</sup> *Id.* ¶ 6.

<sup>176</sup> *Id.*

<sup>177</sup> *Id.*

research, development, testing, and operations in space for military, intelligence, civil, or commercial purposes.<sup>178</sup>

Potentially even more concerning was the declaration by the US that it had “consistently posited that it is not possible to develop an effectively verifiable agreement for the banning of either space-based weapons or terrestrial-based anti-satellite systems.”<sup>179</sup>

Given the difficulties in negotiating a formal international agreement for space weaponization, a “soft law” approach may be the way forward to address immediate concerns. “Soft law” agreements are non-binding instruments that have been particularly important in the space law area, considering the international community has failed to adopt any binding documents following the Moon Agreement.<sup>180</sup> Initially, UN General Assembly Resolutions were adopted to cover gaps in the space agreements—such as the 1963 Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space.<sup>181</sup> More recently, the international community has developed guidelines through COPUOS to address emerging issues—such as the Space Debris Mitigation Guidelines<sup>182</sup> and the Guidelines for the Long-term Sustainability of Outer Space Activities.<sup>183</sup>

As noted by Freeman and Zhao, some scholars take issue with the term “soft law,” given these non-binding instruments do not enjoy the status of being “law” at all.<sup>184</sup> While accepting that this point may warrant deeper consideration, it is outside the scope of this article to delve down this philosophical tunnel. It is sufficient to say that the non-binding nature of soft law agreements is often the sole reason *why* States “agree” to abide by the legal instrument. Further, it is noted that some States perceive a status difference

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<sup>178</sup> *Id.* ¶ 21.

<sup>179</sup> *Id.* ¶ 24.

<sup>180</sup> See Zhao, *supra* note 65.

<sup>181</sup> G.A. Res. 1962 (XVIII), (Dec. 13, 1963).

<sup>182</sup> U.N. Office for Outer Space Affairs, Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space, U.N. Sales No. E.99.I.17 (2010), available at [http://www.unoosa.org/pdf/publications/st\\_space\\_49E.pdf](http://www.unoosa.org/pdf/publications/st_space_49E.pdf).

<sup>183</sup> Comm. on the Peaceful Uses of Outer Space, Rep. of the Comm. on Its Sixty-Second Session, Annex II, U.N. Doc A/74/20 (2019) [hereinafter LTS Guidelines].

<sup>184</sup> Steven Freeland & Yun Zhao, *Rules of the “Space Road:” How Soft Law Principles Interact with Customary International Law for the Regulation of Space Activities*, 44 J. SPACE L. 405, 414 (2020).

between soft law resolutions adopted by a unanimous vote and those simply adopted by a majority.<sup>185</sup> For instance, the United Kingdom indicated that they view unanimous resolutions as more authoritative.<sup>186</sup> However, the eminent late Professor Cheng points out that “legally and constitutionally, no special virtue attaches to a unanimous vote, even though it may be of political significance.”<sup>187</sup> Irrespective of the legal status as “formal” law, such soft law instruments provide an avenue to achieve some consensus and consistency on principles, actions, and responsibilities. Further, following Cheng’s theory of the role of customary international law as an integral part of space law—these “soft law” instruments, over time, may become customary international law, if universally accepted and implemented.<sup>188</sup>

Turning specifically to soft law instruments and space weapons, in December 2020, the General Assembly adopted the resolution on Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviours.<sup>189</sup> Specifically, the Resolution calls upon Member States to:

... reach a common understanding of how best to act to *reduce threats* to space systems in order to maintain outer space as a peaceful, safe, stable and sustainable environment, *free from an arms race and conflict*, for the benefit of all, and consider establishing channels of direct communication for the management of perceptions of threat.<sup>190</sup>

In their response to the Resolution, the US declared that, in line with their National Space Policy, they would:

lead the enhancement of safety, stability, security, and long-term sustainability in space by promoting a framework for responsible behavior in outer space, including the pursuit and

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<sup>185</sup> *Id.* at 133-134.

<sup>186</sup> *Id.*

<sup>187</sup> CHENG, *supra* note 160, at 135-136.

<sup>188</sup> See Bin Cheng, *United Nations Resolutions on Outer Space: ‘Instant’ International Customary Law?*, 5 INDIAN J. INT. L. 23 (1965), *reprinted in* BIN CHENG, *STUDIES IN INTERNATIONAL SPACE LAW* (1997). *See also* Freeland & Zhao, *supra* note 184.

<sup>189</sup> G.A. Res. 75/36, (Dec. 7, 2020).

<sup>190</sup> *Id.* § 3 (emphasis added).

effective implementation of best practices, standards, and norms of behavior.<sup>191</sup>

It was determined, by the Resolution adopted by the UN General Assembly on December 24, 2021, to create an open-ended working group on Reducing Space Threats.<sup>192</sup> The Open-Ended Working Group is tasked with (a) taking stock of the existing international legal and other normative frameworks concerning space threats; (b) considering current and future threats by States to space systems, and actions, activities, and omissions that could be considered irresponsible; (c) making recommendations on possible norms, rules, and principles of responsible behaviors relating to threats by States to space systems, including, as appropriate, how they would contribute to the negotiation of legally binding instruments, including on the prevention of an arms race in outer space; and (d) the submission of a report to the General Assembly at its seventy-eighth session in September 2023.<sup>193</sup> The Working Group on Space Threats, which met twice in 2022 and twice 2023, has opened a new pathway for the creation of space law principles to address space threats. However, it is noted that due to a lack of consensus (notably the objection by Russia), no formal report could be submitted to the UN General Assembly following the latest meeting of the working group in August 2023.

In March 2021, President Biden released the Interim National Security Strategic Guidance, which affirmed the US will take a leading role in “promoting shared norms and forging new agreements on outer space.”<sup>194</sup> Most recently, the US has spearheaded a new direction in space law through the creation of the Artemis Accords (as part of its NASA Artemis Program). The Artemis Accords is an agreement to “establish a common vision via a practical set of principles, guidelines, and best practices to enhance the governance of the civil exploration and use of outer space.”<sup>195</sup> The Accords

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<sup>191</sup> U.N. Secretary-General, Reducing Space Threats Through Norms, Rules and Principles of Responsible Behaviours, at 95, U.N. Doc. A/76/77 (Jul. 13, 2021).

<sup>192</sup> G.A. Res. 76/231 (Dec. 24, 2021).

<sup>193</sup> *Id.* ¶ 5.

<sup>194</sup> Interim National Security Strategic Guidance (Mar. 2021), <https://www.whitehouse.gov/wp-content/uploads/2021/03/NSC-1v2..pdf>

<sup>195</sup> The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids, NASA, <https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf> [hereinafter Artemis Accords].

contain 13 principles governing the human exploration of the Moon and the other celestial bodies and the exploitation of their natural resources. As of this writing, the Artemis Accords have 21 signatories, including Australia, Canada, Italy, Japan, Luxembourg, United Arab Emirates, United Kingdom, and the United States of America.<sup>196</sup> From a legal standpoint, the Artemis Accords are non-binding and sit more in the category of “guidelines.” However, the reality is that in order to engage in partnerships with the US, accession to the Artemis Accords is being proffered as a pre-requisite.<sup>197</sup> While the Accords do not deal directly with space weapons, it is important to highlight the concern over the direction taken by the US to create a framework for regulating space activities that have been negotiated outside of the UN and operate outside of the formal international space agreements. While the Artemis Accords shows a willingness of States to address emerging issues in space law, there is concern that this might signal an end to the negotiations of multilateral law (or even soft law) within the framework of the UN for outer space.<sup>198</sup>

## VI. CONCLUSION

Unilateral acts of aggression, competing interests over resources and territory, and militarization are well-known risks that have the potential to disrupt international stability. The unilateral use of military aggression in the Ukraine War and the downing of four flying objects have put a spotlight on the urgency to address the gaps in international law arising from the threat of the weaponization of space.

It is evident that the landscape of space activities and exploration has changed since the formation of the five original space treaties. Rapid technological development has been the catalyst for space weaponization becoming a reality in such a short amount of

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<sup>196</sup> NASA, *The Artemis Accords*, <https://www.nasa.gov/specials/artemis-accords/index.html> (Last Visited Aug. 15 2022); Press Release, NASA, International Partners Advance Cooperation with First Signings of Artemis Accords (Oct. 14, 2020), <https://www.nasa.gov/press-release/nasa-international-partners-advance-cooperation-with-first-signings-of-artemis-accords>.

<sup>197</sup> Rossana Deplano, *The Artemis Accords: Evolution or Revolution In International Space Law?*, 70(3) INT'L & COMP. L.Q. 799, 799 (2021).

<sup>198</sup> Jack Wright Nelson, *The Artemis Accords and the Future of International Space Law*, 24(31) AM. SOC'Y OF INT. L. 1, 4 (2020).

time. There are several components of space law that need to be clarified to regulate space weaponization effectively. This paper has sought to identify and discuss a number of these conceptual challenges. However, as alluded to, determining the ‘gaps’ in the law is one thing; achieving consensus for new international normative provisions is quite another. In the absence of any successful negotiations on formal space agreements since the Moon Agreement, it is suggested that a soft law approach might be the best and only way forward at this point in time. The recommendations by the UN *Working Group on Space Threats* in its upcoming report to the General Assembly (due at the end of 2023) will hopefully provide some guidance on the way forward to address the gaps in the international normative framework concerning threats from State behavior in outer space. With world military powers already present in space, and grave concerns about the global ramifications of space warfare, it is imperative that action is taken now to develop a framework for regulating space weaponization before it is too late.