

## The Laws of Space Warfare: A Tale of Non-Binding International Agreements

Eytan Tepper

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## THE LAWS OF SPACE WARFARE: A TALE OF NON-BINDING INTERNATIONAL AGREEMENTS

EYTAN TEPPER\*

*This Article presents the in-progress development of the laws of space warfare as a case of non-binding international lawmaking and connects it to recent scholarship on non-binding international agreements and to Elinor Ostrom's Nobel Prize winning theory of polycentric governance. A rapid escalatory cycle—from NATO's December 2019 declaration of space as a warfighting domain and the subsequent establishment of the U.S. Space Force to Russia's successful test of a killer satellite capable of destroying spacecrafts, culminating in the first space-cyber war in Ukraine—turned a domain once reserved for peaceful purposes to a war zone. Yet, these laws of war are the least developed compared to the other war domains (land, sea, and air). The under-supply of rules meets a multilateral system almost incapable of adopting new legally binding instruments. Is space on its way to becoming a lawless war arena? This Article suggests otherwise. With no new treaty expected in the foreseeable future, the laws of space warfare are incrementally developed by multiple off-UN forums that introduce non-binding instruments and agreements. While the lack of a comprehensive approach and legally binding status may cause concern, this Article suggests that this is the best course of action to develop the corpus juris of space warfare under the conditions of modern global affairs, based on empirically backed principles of polycentric governance. In terms of policy recommendations, this Article suggests policymakers embrace a polycentric approach and divert governance-building efforts to support initiatives to introduce non-binding rules and agreements. These may complement binding law and create, in the aggregate, a more comprehensive array of rules for space warfare. The Article further suggests membership and compliance as more suitable tests for international agreements than bindingness and proposes that, because non-binding international agreements complement legally binding treaties, they are within the compound of international law.*

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INTRODUCTION.....	460
I. THE SOFTENING OF INTERNATIONAL LAW AND POLYCENTRIC GOVERNANCE.....	465
A. The Softening of International Law .....	465
B. The Invisible Hand of Polycentric Governance.....	468
C. The Analytical Advantages of Using the Polycentric Governance Concept.....	471
II. THE DEVELOPING LAWS OF SPACE WARFARE .....	473
A. Governance of Conflicts in Traditional Theaters: Land, Sea, and Air .....	473
B. Governance of Conflicts in Theater of Outer Space.....	475
1. Applicability of International Law to Outer Space .....	476
2. The Outer Space Treaty .....	480
3. Prevention of an Arms Race in Outer Space.....	482
4. Anti-Satellite Weapons Test Ban.....	486
5. European Union Initiatives .....	489
6. Research Initiatives on the Laws of Space Warfare.....	491
7. Conclusions on the Status of the Various Initiatives .....	493
C. Governance of Conflicts in Theater of Cyberspace.....	493
1. Defining Cyber Conflicts .....	494
2. UN Efforts on Cyber Conflict.....	495
3. The Tallinn Manual.....	499
D. The Regime Complex of Space Warfare.....	500
III. STRUCTURAL NON-BINDINGNESS.....	501
A. Chronicle of Polycentric Governance Foretold.....	501
B. Polycentric Governance Theory: From Local Commons to Global Commons and Global Affairs .....	503
C. The Rise of Regime Complexes .....	505
D. The Advantages of Non-Binding International Agreements: Cross-Disciplinary Convergence of Theories and Insights.....	508
IV. NON-BINDING AGREEMENTS AS PART OF INTERNATIONAL LAW .....	509
A. Bindingness vs. Membership .....	510
B. Bindingness vs. Compliance .....	512
C. The Big Tent of International Law .....	513
V. THE WAY FORWARD: THE PROGRESSIVE DEVELOPMENT OF SPACE LAW IN THE TWENTY-FIRST CENTURY .....	514
CONCLUSION .....	516

## INTRODUCTION

This Article presents the current regulation of space warfare and its gradual development as a case of non-binding international lawmaking and connects it to recent scholarship on non-binding international agreements.<sup>1</sup>

In my past inquiry on the structure and future of space governance, I concluded that it is on track to become polycentric.<sup>2</sup> This Article examines and elaborates on one specific sub-issue within space governance—namely the regulation of space warfare—and connects the polycentric governance framework to the literature on non-binding international agreements.<sup>3</sup> Scholarship on non-binding agreements is sparse, and the topic requires more attention, in particular regarding whether there are contexts or subject areas that are more or less amenable to non-binding agreements.<sup>4</sup> As this Article demonstrates, even the laws of war are amenable to non-binding international agreements. This Article thus contributes to the effort to study these agreements and their implications on international law by shedding light on how the laws of space warfare are developed in ways that are distinctly not legally binding. Indeed, a focus on binding international treaties and agreements misses many of the rules that currently govern space warfare, as scholars and even States see them. Moreover, the efforts and processes in place to further develop the rules of space warfare are almost exclusively designed to introduce non-binding instruments and agreements. Significantly, these efforts are not made by a single authorized monocentric forum, but rather by multiple alternative forums with a very limited mandate, or even a self-proclaimed mandate like the research entities developing manuals on the laws of space warfare.<sup>5</sup>

This reality of international lawmaking on space warfare supports the observations of Koh, Bradley, and other scholars that international lawmaking is broadly tilting toward non-binding agreements.<sup>6</sup> As this Article explains, the literature on polycentric governance provides a structural explanation for the changing nature of international law, as well as justification for the emerging practice due to the empirical merits of

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1. In particular, this Article draws on the recent work of Bradley, Goldsmith, and Hathaway on the growing centrality of nonbinding agreements to international law. See Curtis A. Bradley, Jack Goldsmith & Oona A. Hathaway, *The Rise of Nonbinding International Agreements: An Empirical, Comparative, and Normative Analysis*, 90 U. CHI. L. REV. 1281 (2023).

2. Eytan Tepper, *The Big Bang of Space Governance: Towards Polycentric Governance of Space Activities*, 54 N.Y.U. J. INT'L. L. & POL. 485, 555 (2022).

3. See generally Bradley et al., *supra* note 1.

4. *Id.* at 1363–64.

5. See *infra* Section II.B.

6. See, e.g., Harold Hongju Koh, *Remarks: Twenty-First-Century International Lawmaking*, 101 GEO. L.J. 725 (2013); Bradley et al., *supra* note 1.

polycentrism.<sup>7</sup> For example, Elinor Ostrom—the first woman to be awarded the Nobel Prize in Economic Sciences in 2009—distilled eight design principles correlated with robust governance systems, which can and should be used by policymakers when establishing new forums and agreements related to space warfare.<sup>8</sup>

Space warfare has made a comeback in terms of attention and discourse. A review of the literature reveals a series of writings on the issue during the 1980s,<sup>9</sup> probably inspired by the Regan Administration's Strategic Defense Initiative, colloquially known as the Star Wars program.<sup>10</sup> There was a sharp decline in writings on the issue in later years but a resurgence of writings since the turn of the twenty-first century.<sup>11</sup> On the geopolitical front, a slow build-up of capabilities and strategic attention erupted at the outset of the third decade of the twenty-first century.<sup>12</sup>

7. See *infra* Part III.

8. Elinor Ostrom, *Beyond Markets and States: Polycentric Governance of Complex Economic Systems*, 100 AM. ECON. REV. 641, 652–63 (2010).

9. See, e.g., JOHN W. MACVEY, SPACE WEAPONS, SPACE WAR (1985); Daniel Deudney, *Review: The Literature of Star Wars*, 39 J. INT'L AFFS. 199 (1985); Scott F. March, *An Interdisciplinary Approach to the Strategic Defense Initiative Debate*, 19 AKRON L. REV. 351 (1986); CHRISTOPHER LEE, WAR IN SPACE (1986); DAVID PAHL, SPACE WARFARE AND STRATEGIC DEFENSE (1987); Alfred R. Garcia, Jr., A Strategy for Space Warfare (Mar. 1987) (Research Report, Air War College), <https://apps.dtic.mil/sti/tr/pdf/ADA186658.pdf>; DAVID HOBBS, AN ILLUSTRATED GUIDE TO SPACE WARFARE (1986); Simon P. Worden & Bruce P. Jackson, *Space, Power, and Strategy*, 13 NAT'L INT. 43 (1988); COL. ELVY PETTIT, JR., WHAT TO DO ABOUT ASAT (1988).

10. See Deudney, *supra* note 9, at 199.

11. See, e.g., DAVID E. LUPTON, ON SPACE WARFARE: A SPACE POWER DOCTRINE (1998); JIM OBERG, SPACE POWER THEORY (1999); MICHAEL E. O'HANLON, NEITHER STAR WARS NOR SANCTUARY: CONSTRAINING THE MILITARY USES OF SPACE (2004); JOHN J. KLEIN, SPACE WARFARE: STRATEGY, PRINCIPLES AND POLICY (2006); HELEN CALDICOTT & CRAIG EISENDRATH, WAR IN HEAVEN: THE ARMS RACE IN OUTER SPACE (2007); BERT CHAPMAN, SPACE WARFARE AND DEFENSE: A HISTORICAL ENCYCLOPEDIA AND RESEARCH GUIDE (2008); JAMES CLAY MOLTZ, THE POLITICS OF SPACE SECURITY: STRATEGIC RESTRAINT AND THE PURSUIT OF NATIONAL INTERESTS (2008); SPACE AND DEFENSE POLICY (Damon Coletta & Frances T. Pilch eds., 2009); TOWARD A THEORY OF SPACEPOWER: SELECTED ESSAYS (Charles D. Lutes et al. eds., 2011); SPACE STRATEGY IN THE 21ST CENTURY: THEORY AND POLICY (Eligar Sadeh ed., 2012); NAYEF R.F. AL-RODHAN, META-GEOPOLITICS OF OUTER SPACE: AN ANALYSIS OF SPACE POWER, SECURITY AND GOVERNANCE (2012); MAX M. MUTSCHLER, ARMS CONTROL IN SPACE: EXPLORING CONDITIONS FOR PREVENTIVE ARMS CONTROL (2013); JAMES CLAY MOLTZ, CROWDED ORBITS: CONFLICT AND COOPERATION IN SPACE (2014); BRENT ZIARNICK, DEVELOPING NATIONAL POWER IN SPACE: A THEORETICAL MODEL (2015); David Jordan, *Air and Space Warfare*, in UNDERSTANDING MODERN WARFARE (2d ed. 2016); JOAN JOHNSON-FREESE, SPACE WARFARE IN THE 21ST CENTURY: ARMING THE HEAVENS (2017); LINDA DAWSON, WAR IN SPACE: THE SCIENCE AND TECHNOLOGY BEHIND OUR NEXT THEATER OF CONFLICT (2018).

12. See, e.g., BLEDDYN E. BOWEN, WAR IN SPACE: STRATEGY, SPACEPOWER, GEOPOLITICS (2020); U.S. SPACE FORCE, SPACEPOWER: DOCTRINE FOR SPACE FORCES (2020); U.S. DEP'T OF DEF., DEFENSE SPACE STRATEGY SUMMARY (2020) [hereinafter DEFENSE SPACE STRATEGY SUMMARY]; U.S. DEP'T OF DEF., DIRECTIVE 3100.10: SPACE POLICY (2022), <https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/310010p.PDF>.

In December 2019, NATO declared space as a new operational domain.<sup>13</sup> Global escalation quickly ensued: States started establishing independent space forces or transforming their air force to an aerospace force, notably the United States, Russia, France, Australia, and Israel. The new U.S. Space Force, established in 2020, is the first new service branch introduced to the U.S. Military since the Air Force in 1947, and the second new branch to be introduced since the Coast Guard in 1790. Some experts view it as a vital, massive shift for the U.S. Military.<sup>14</sup> Also in 2020, the United States issued a Defense Space Strategy<sup>15</sup> and declared its “space fence” operational,<sup>16</sup> and Russia successfully tested a killer satellite, Kosmos 2543, capable of destroying spacecrafts.<sup>17</sup> In 2021, NATO took a step further and declared that its mutual defense clause requires a collective response to attacks in space,<sup>18</sup> Russia successfully tested an anti-satellite missile,<sup>19</sup> and China might have tested its own killer satellite.<sup>20</sup> India has also demonstrated capabilities to destroy satellites in orbit by a missile launched from Earth. Defense institutions around the world have already developed, or are developing, strategies and tactics for warfare in the theater of space. The Russo-Ukrainian War is the first military campaign to see attacks on space-based services, particularly cyberattacks, and has already been dubbed “the first space-cyber war.”<sup>21</sup> In 2022, Chinese military strategists suggested that

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13. NATO's Approach to Space, N. ATL. TREATY ORG., [https://www.nato.int/cps/en/natohq/topics\\_175419.htm](https://www.nato.int/cps/en/natohq/topics_175419.htm) (last updated May 23, 2023); see Ali Stickings, *Space as an Operational Domain: What Next for NATO?*, RUSI NEWSBRIEF (Oct. 15, 2020), <https://rusi.org/explore-our-research/publications/rusi-newsbrief/space-operational-domain-what-next-nato>.

14. Jonathan Shieber, *Experts Say Space Force Is a Vital, Massive Shift for US Military*, TECHCRUNCH (Mar. 11, 2020, 2:12 PM), <https://techcrunch.com/2020/03/11/experts-say-space-force-is-a-vital-massive-shift-for-us-military/>.

15. DEFENSE SPACE STRATEGY SUMMARY, *supra* note 12.

16. Sandra Erwin, *Space Fence Surveillance Radar Site Declared Operational*, SPACENEWS (Mar. 28, 2020), <https://spacenews.com/space-fence-surveillance-radar-site-declared-operational/>.

17. Joseph Trevithick, *Space Force Boss Says One of Russia's Killer Satellites Fired A Projectile In Orbit*, DRIVE (July 23, 2020), <https://www.thedrive.com/the-war-zone/35057/space-force-boss-says-russia-has-been-testing-its-killer-satellites-in-orbit>.

18. Lorne Cook, Associated Press, *NATO Says Attack in Space Could Trigger Mutual Defense Clause*, DEF. NEWS (June 14, 2021), <https://www.defensenews.com/smr/nato-priorities/2021/06/14/nato-says-attack-in-space-could-trigger-mutual-defense-clause/>.

19. Chelsea Gohd, *Russian Anti-Satellite Missile Test Was the First of Its Kind*, SPACE.COM (Aug. 10, 2022), <https://www.space.com/russia-anti-satellite-missile-test-first-of-its-kind>.

20. Ashish Dangwal, *Satellite Killer? US Raises Alarm Over Mysterious Object Orbiting Near China's New Shijian-21 Spacecraft*, EURASIAN TIMES (Nov. 11, 2021), <https://eurasianimes.com/satellite-killer-us-raises-alarm-over-mysterious-object-orbiting-near-chinas-new-shijian-21-spacecraft/>.

21. EYTAN TEPPER, CTR. FOR INT'L GOVERNANCE INNOVATION, THE FIRST SPACE-CYBER WAR AND THE NEED FOR NEW REGIMES AND POLICIES 1 (2022), <https://www.cigionline.org/publications/the-first-space-cyber-war-and-the-need-for-new-regimes-and-policies/>.

the People's Liberation Army "must be able to destroy Elon Musk's Starlink satellites if they threaten national security."<sup>22</sup> Indeed, the outpour of funds to develop space weapons meets "increasingly bellicose rhetoric emanat[ing] from military and civilian authorities."<sup>23</sup>

The potential for war in outer space has all of the attributes of a classic security dilemma. Some analysts using game-theoretic models conclude that war in space is inevitable, while others conclude that a deterrence regime is feasible.<sup>24</sup> Strategic theorist Dolman suggests that "[t]he coming war with China will be fought for control of outer space."<sup>25</sup> In a span of a little more than two years, from NATO's December 2019 announcement to the war in Ukraine, space—once signaled by the first United Nations ("UN") resolution on space to "be used for peaceful purposes *only*,"<sup>26</sup>—has been re-imagined as a war zone. These changes necessitate a new account of the legal regime for space warfare that can draw the future trajectory of this military domain.

While the rules applicable to warfare in the traditional theaters are well established and known,<sup>27</sup> those applicable to space warfare are inchoate with relatively very little authoritative writings. Wars fought in more regulated arenas—land, sea, and air—have seen violations of the binding laws of war. Yet, most of the parties involved acknowledged the rules and purported to follow them most of the time. What will a lawless war look like in the twenty-first century? Indeed, "the world's traditional mechanisms for responding to emergent security threats have failed . . . and no fresh concepts have emerged that command the international consensus among spacefaring states to avoid or mitigate the new dangers."<sup>28</sup>

Space warfare can be divided into three types, resulting in five possible theaters for space war. The three types of space warfare are (1) space-to-space attack, taking place solely in space, in which space-based installations or weapons attack other space-based installations; (2) space-to-earth attack, initiated from space to earth or vice versa and crossing the air space on the way; and (3) a cyber-attack targeting space assets, which may start in the

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22. Stephen Chen, *China Military Must Be Able to Destroy Elon Musk's Starlink Satellites If They Threaten National Security: Scientists*, S. CHINA MORNING POST (May 25, 2022, 12:00 PM), <https://www.scmp.com/news/china/science/article/3178939/china-military-needs-defence-against-potential-starlink-threat>.

23. David A. Koplow, *The Fault Is Not in Our Stars: Avoiding an Arms Race in Outer Space*, 59 HARV. INT'L. L. J. 331, 332 (2018).

24. Bonnie L. Triezenberg, *Deterring Space War: An Exploratory Analysis Incorporating Prospect Theory into a Game Theoretic Model of Space Warfare* (2017) (Ph.D. dissertation, Pardee RAND Graduate School) (on file with RAND Corporation), [https://www.rand.org/pubs/rgs\\_dissertations/RGSD400.html](https://www.rand.org/pubs/rgs_dissertations/RGSD400.html).

25. Everett Carl Dolman, *New Frontiers, Old Realities*, 6 STRATEGIC STUD. Q. 78, 78 (2012).

26. G.A. Res. 1348 (XIII), at 5 (Dec. 13, 1958) (emphasis added).

27. For example, the laws of naval warfare have had four centuries of evolution.

28. Koplow, *supra* note 23, at 332.

virtual domain but have effects in the real world.<sup>29</sup> Space warfare therefore may take place in five different theaters or domains: outer space, air space, open seas, territorial land, and cyberspace. Each theater has different sets of rules of international law—for example, regarding sovereignty and warfare—and the application of public international law to the new theaters of outer space and cyberspace is not self-evident.<sup>30</sup> At the same time, special regimes for space warfare have been established with partial yet progressive success, leading to multiple international forums with fragmented mandates over space warfare issues. Space warfare, in its various theaters, thus faces a potential dual problem: (i) lack of appropriate legal rules or forums; or (ii) overlapping and possibly conflicting legal rules and forums.

The governance of space warfare is a complex aggregate of all these instruments and forums, and the literature on polycentric governance provides the analytic tools for understanding and constructing the governance of space warfare. Part I discusses the concept of polycentric governance, which occurs when there are multiple independent but partly overlapping centers of collective decision-making.<sup>31</sup> Part II traces the development of the governance of various theaters of war, focusing especially on outer space and cyber space, and demonstrates that the governance of space warfare is on track to become polycentric.<sup>32</sup> It first provides a brief overview of the governance of traditional theaters of war, such as the United Nations Charter, the International Criminal Court, and other established structures of public international law.<sup>33</sup> It then describes major efforts to govern the theater of outer space, including treaties restricting the placement and use of weapons in outer space, recent self-mandated initiatives to limit the testing of anti-satellite missiles, and work by research entities to clarify the laws of space warfare.<sup>34</sup> Finally, it describes the emerging governance of conflicts in cyberspace.<sup>35</sup> Part III discusses non-bindingness in the form of polycentric

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29. For example, the Stuxnet virus caused physical damage to the centrifuges in a nuclear plant in Iran back in 2009–10. For more on the Stuxnet's role in the emergence of cyber warfare, see, for example, Jon R. Lindsay, *Stuxnet and the Limits of Cyber Warfare*, 22 SEC. STUD. 365 (2013); Thomas M. Chen, *Editor's Note: Stuxnet, the Real Start of Cyber Warfare?*, IEEE NETWORK, Nov./Dec. 2020, at 2, <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=5634434>; John Richardson, *Stuxnet as Cyberwarfare: Applying the Law of War to the Virtual Battlefield*, 29 J. MARSHALL J. COMPUTER & INFO. L. 1 (2011); Sean Collins & Stephen McCombie, *Stuxnet: The Emergence of a New Cyber Weapon and Its Implications*, 7 J. POLICING, INTEL. & COUNTER TERRORISM 80 (2012).

30. See *infra* Section II.B.

31. See *infra* Part I.

32. See *infra* Part II.

33. See *infra* Section II.A.

34. See *infra* Section II.B.

35. See *infra* Section II.C.



governance and non-binding international agreements.<sup>36</sup> Part IV analyzes non-binding agreements as part of international law by focusing on membership and compliance.<sup>37</sup> Last, Part V draws on the work of Elinor Ostrom to propose that the way forward is to embrace polycentricity and non-binding agreements as the best strategy for further developing the international law of space warfare.<sup>38</sup>

#### I. THE SOFTENING OF INTERNATIONAL LAW AND POLYCENTRIC GOVERNANCE

This Article sheds a light on how the laws of space warfare are developed through distinctly non-binding legal mechanisms, and it thereby contributes to the broader study of nonbinding international agreements. This Part presents, on the one hand, the increasing trend toward non-binding international agreements and commitments, which deviates from the classic legally binding model of international law. On the other hand, this Part describes the concept of polycentric governance and the merits of this approach. The Article will later connect the dots in portraying non-binding instruments as parts of a polycentric system.

##### *A. The Softening of International Law*

In a groundbreaking recent study of international law, Bradley, Goldsmith, and Hathaway point to the growing use of nonbinding international agreements as an essential aspect of modern international law.<sup>39</sup> Other scholarship has described a similar phenomenon in terms of “soft law” or “informal law”<sup>40</sup>—though Bradley, Goldsmith, and Hathaway distinguish

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36. See *infra* Part III.

37. See *infra* Part IV.

38. See *infra* Part V.

39. Bradley et al., *supra* note 1, at 1283.

40. See, e.g., CHARLES B. ROGER, *THE ORIGINS OF INFORMALITY: WHY THE LEGAL FOUNDATIONS OF GLOBAL GOVERNANCE ARE SHIFTING, AND WHY IT MATTERS* (2020); Fionnuala Ní Aoláin, ‘Soft Law’, *Informal Lawmaking and ‘New Institutions’ in the Global Counter-Terrorism Architecture*, 32 EUR. J. INT’L L. 919, 920 (2021); INFORMAL INTERNATIONAL LAWMAKING (Joost Pauwelyn, Ramses A. Wessel & Jan Wouters eds., 2012); Kenneth W. Abbott & Duncan Snidal, *Hard and Soft Law in International Governance*, 54 INT’L ORG. 421 (2000); Jean Galbraith & David Zaring, *Soft Law as Foreign Relations Law*, 99 CORNELL L. REV. 735, 739–40 (2014). A related literature explores the reasons why nations might choose nonbinding agreements rather than binding ones. See, e.g., Anthony Aust, *The Theory and Practice of Informal International Instruments*, 35 INT’L & COMPAR. L.Q. 787, 788–96 (1986); Charles Lipson, *Why Are Some International Agreements Informal?*, 45 INT’L ORG. 495, 514–27 (1991); Gregory Shaffer & Mark A. Pollack, *Hard and Soft Law: What Have We Learned?*, in *INTERNATIONAL LAW AND INTERNATIONAL RELATIONS: INSIGHTS FROM INTERDISCIPLINARY SCHOLARSHIP* 197 (Jeffrey L. Dunoff & Mark A. Pollack eds., 2012).

these terms.<sup>41</sup> Using empirical methodologies from the social sciences,<sup>42</sup> they demonstrate that nonbinding international agreements are an increasingly dominant practice in the United States and around the world. So much so that:

It is . . . time to reorient the field of international law to take account of the rise of nonbinding agreements. The growing use of these agreements has potentially profound implications for the future of the international legal system. . . . [C]ore assumptions underlying the field—including most fundamentally the assumption that international agreements are operating *as law* in constraining the behavior of nations—need to be revisited . . . .<sup>43</sup>

However, they further note that scholarship on this issue is sparse, with little written on the subject in recent years, and these agreements require significantly more scholarly attention. One of the questions they suggest for further study is whether there are contexts or subject areas that are more (or less) amenable to nonbinding agreements.<sup>44</sup>

The laws of space warfare are one such subject area amenable to non-binding agreement. Indeed, legally binding international treaties and agreements do not come close capturing the entirety of rules that currently govern space warfare, as scholars and even States see them.<sup>45</sup> Moreover, the efforts and processes in place to further develop the rules of space warfare are exclusively designed to introduce nonbinding instruments. Non-bindingness is the new primary form of international lawmaking, at least when it comes to space warfare—as this Article later demonstrates—and to other issue-areas in space governance.<sup>46</sup> Koh similarly observes:

The exploration and use of outer space is conducted pursuant to important multilateral treaties as old as space exploration itself. But

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41. They explain:

[F]or our purposes, the fact that an agreement is nonbinding does not necessarily mean that it is “soft law.” The two concepts are sometimes used interchangeably, especially in scholarly discussions. But soft law is often used as a broader term to capture agreements and international policies that impose weak or uncertain obligations through some combination of nonbindingness, vague or hortatory terms, shallow obligations, and a lack of enforcement mechanisms.

Bradley et al., *supra* note 1, at 1292 (footnote omitted).

42. These methodologies include compiling and analyzing a dataset of nonbinding international agreements and conducting interviews with major stakeholders. *Id.* at 1287.

43. *Id.* at 1363 (emphasis added).

44. *Id.* at 1363–64.

45. Space warfare is not the only aspect of the laws of war that has become the subject of nonbinding international agreements. Aoláin notes the increasingly important and diverse role of a broad range “soft-law” instruments in the war against terror since September 2001, as well as a range of new institutions and entities producing norms. Aoláin, *supra* note 40, at 941.

46. On the rise of alternative international lawmaking in the context of space in general, see Tepper, *supra* note 2.

to address contemporary problems presented by new capabilities and new actors, instead of new international agreements, space-faring states have favored legally nonbinding principles and technical guidelines that are layered on top of those preexisting treaties.<sup>47</sup>

If international law scholarship wants to capture the entirety of the laws of space warfare, it needs to reconcile and incorporate the effects of non-binding instruments and agreements. Berman suggests that we need to enlarge our conception of what counts as law, thereby recognizing many non-governmental forums where legal norms are articulated and disseminated, in order to capture the multiple and multifaceted ways in which rules are created, disseminated, received, resisted, and internalized. Indeed, the scholarship of legal pluralism has taught us to look beyond formal rules to the effects of norm-generating communities, even when rules produced by such communities are overlapping and possibly conflicting.<sup>48</sup> While “this is not your grandfather’s international law,”<sup>49</sup> it is the reality of international law in the twenty-first century. The theory and scope of international law must account for this transformed legal landscape.

The International Law Commission has acknowledged the need to consider the place of non-binding agreements within international law. In 2022 it decided to include the topic “[n]on-legally binding international agreements” in its programme of work, and in 2023, it appointed Mathias Forteau as Special Rapporteur for the topic.<sup>50</sup> In referring to potential legal effects of non-legally binding agreements, the Commission noted that “[i]nternational law cannot be reduced today to binding obligations alone” and, citing Oppenheim, “[t]hat an instrument does not constitute a treaty does not mean that it does not have legal effect.”<sup>51</sup> Indeed, while non-binding international agreement are defined as agreements not governed by international law,<sup>52</sup> they still fall under its scope and may even have legal consequences.

While the Commission focuses specifically on agreements,<sup>53</sup> this Article includes in its discussion other non-binding instruments such as guidelines

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47. Koh, *supra* note 6, at 741.

48. Paul Schiff Berman, *From International Law to Law and Globalization*, 43 COLUM. J. TRANSNAT’L L. 485, 507–08, 538–39 (2005).

49. Koh, *supra* note 6, at 746.

50. *Summaries of the Work of the International Law Commission*, INT’L L. COMM’N, [https://legal.un.org/ilc/summaries/1\\_17.shtml](https://legal.un.org/ilc/summaries/1_17.shtml) (last updated Aug. 9, 2023).

51. Int’l Law Comm’n, Rep. on the Work of Its Seventy-Third Session, U.N. Doc. A/77/10, at 356 (Aug. 12, 2022) [hereinafter ILC Report on Seventy-Third Session] (second alteration in original) (quoting 1 OPPENHEIM’S INTERNATIONAL LAW 1209–10 (Robert Jennings & Arthur Watts eds., 9th ed. 2008)).

52. Bradley et. al., *supra* note 1, at 1289.

53. ILC Report on Seventy-Third Session, *supra* note 51, at 360.

and standards, whether they were introduced or adopted by states or by other forums. International law today cannot be reduced to binding instruments, nor, on the same token, to the long-standing multilateral forums and processes that produce binding instruments. The transition from a fairly monocentric system to a polycentric one is intertwined with the rise of non-binding instruments.

*B. The Invisible Hand of Polycentric Governance*

As this Article demonstrates, polycentric governance in global affairs goes hand in hand with non-binding agreements, as many of the relevant governance centers are not authorized to produce legally binding rules. Moreover, in many cases this lack of authority is a key reason to refer issues to such forums—or for such forums to be established in the first place. At the heart of the study of polycentric governance is the age-old “collective action problem,” which is exemplified by the challenge of achieving and sustaining international cooperation.<sup>54</sup>

The problem of collective action is probably as old as human grouping to societies, and the literature on collective action also has a long history.<sup>55</sup> A key focus is the problem of proper exploitation of common pool resources, which has occupied the attention of philosophers and politicians for at least two millennia, from Aristotle onwards.<sup>56</sup> Hardin’s famous concept of the “tragedy of the commons” helped launch the modern discussion with its pessimistic conclusion on the feasibility of collective action.<sup>57</sup> More recently, however, Elinor Ostrom refuted Hardin’s “tragedy” and proved the feasibility of collective action by way of polycentric governance.<sup>58</sup> Indeed, the Nobel

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54. “The problem of collective action is ubiquitous: it is in many ways the central problem of social life.” FREDERICK W. MAYER, *NARRATIVE POLITICS: STORIES AND COLLECTIVE ACTION* 13 (2014).

55. See, e.g., MANCUR OLSON, JR., *THE LOGIC OF COLLECTIVE ACTION* (1965).

56. Aristotle phrased the problem as follows: “For that which is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, hardly at all of the common interest; and only when he is himself concerned as an individual.” ARISTOTLE, *POLITICS* 1261b 35 (H. Rackham trans., 1944). For another classic contribution to the collective action problem, see DAVID HUME, *A TREATISE OF HUMAN NATURE* 534–39 (L. A. Selby-Bigge ed., Clarendon Press 1896) (1740) (“Two neighbours may agree to drain a meadow, which they possess in common; because ‘tis easy for them to know each others mind . . . . But ‘tis very difficult, and indeed impossible, that a thousand persons shou’d agree in any such action . . .”).

57. Garrett Hardin, *The Tragedy of the Commons*, 162 *SCIENCE* 1243, 1243–48 (1968). Hardin argued that “[r]uin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.” *Id.* at 1244; see also OLSON, *supra* note 55 (offering a similarly pessimistic account of collective action).

58. ELINOR OSTROM, *GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION* (1990); Elinor Ostrom, *Beyond Markets and States: Polycentric Governance of Complex Economic Systems*, 100 *AM. ECON. REV.* 1 (2010).

Committee, in its decision to award Elinor Ostrom with the 2009 Nobel Prize in Economic Sciences, noted, “[Ostrom’s] observations are important not only to the study of natural resource management, but also to the study of human cooperation more generally.”<sup>59</sup>

The pioneering work of Elinor and Vincent Ostrom and other scholars affiliated with the Ostrom Workshop in Political Theory and Policy Analysis<sup>60</sup> demonstrated the viability and efficiency of polycentric governance, contrary to previous thought.<sup>61</sup> Vincent Ostrom, Tiebout, and Warren first introduced the concept of “polycentric governance” to refer to the independent but semi-cooperative decision-making centers in metropolitan areas,<sup>62</sup> and Elinor Ostrom provided empirical support for the theory. She studied diverse institutional agreements for governing local commons and found strong empirical proof in controlled experiments and field experiments, across countries and sectors, that polycentric institutions perform better than centralized governance.<sup>63</sup>

A monocentric system is a hierarchical system with a single decision-making center that enjoys a monopoly on power. Polycentric governance is a case of decentralized governance in which there are multiple independent centers or forums of collective decision-making with at least partial overlap in jurisdictions.<sup>64</sup> The governance centers interact and collaborate to a certain

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59. ECON. SCIS. PRIZE COMM. OF THE ROYAL SWEDISH ACAD. OF SCIS., SCIENTIFIC BACKGROUND ON THE SVERIGES RIKSBANK PRIZE IN ECONOMIC SCIENCES IN MEMORY OF ALFRED NOBEL 2009: ECONOMIC GOVERNANCE 2 (2009), <https://www.nobelprize.org/uploads/2018/06/advanced-economicsciences2009.pdf> [hereinafter SCIENTIFIC BACKGROUND ON THE NOBEL 2009].

60. Ostrom Workshop, IND. U., <https://ostromworkshop.indiana.edu/index.html> (last visited Jan. 4, 2024). The Ostrom Workshop is also known as the Bloomington School.

61. Filippo Sabetti, *Constitutional Artisanry and Institutional Diversity: Elinor Ostrom, Vincent Ostrom, and the Workshop*, 20 GOOD SOC’Y 73, 78 (2011); see also Ostrom, *supra* note 8, at 641. The study of polycentric governance falls under the broad field of political economy and under the more specific fields and labels of institutional analysis and New Institutional Economics. See generally CLAUDE MÉNARD & MARY M. SHIRLEY, HANDBOOK OF NEW INSTITUTIONAL ECONOMICS (2005); SCIENTIFIC BACKGROUND ON THE NOBEL 2009, *supra* note 59. The theory of polycentric governance is “the Bloomington school’s most distinctive and innovative extension of the political economy and public choice perspective in the domain of governance studies.” Filippo Sabetti & Paul Dragos Aligica, *Introduction: The Ostroms’ Research Program for the Study of Institutions and Governance: Theoretical and Epistemic Foundations*, in CHOICE, RULES AND COLLECTIVE ACTION 1, 9 (Filippo Sabetti & Paul Dragos Aligica eds., 2014).

62. Vincent Ostrom, Charles M. Tiebout & Robert Warren, *The Organization of Government in Metropolitan Areas: A Theoretical Inquiry*, 55 AM. POL. SCI. REV. 831, 831 (1961).

63. See ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990); Elinor Ostrom, *A Polycentric Approach for Coping with Climate Change* (World Bank, Pol’y Rsch. Working Paper No. 5095, 2009), <http://documents1.worldbank.org/curated/en/480171468315567893/pdf/WPS5095.pdf>. Ostrom’s work, including her “design principles” for sustainable governance systems, are discussed further *infra* Sections I.C, III.B.

64. Ostrom et al., *supra* note 62, at 831.

extent, taking each other into account in complex and ever-changing ways.<sup>65</sup> Out of these seemingly uncoordinated processes of mutual adjustment emerges the repertoire of norms and rules that guide the behavior of actors within the entire realm.<sup>66</sup>

The conventional wisdom was that multiplicity of political units makes governance “a pathological phenomenon” and leads to “too many governments and not enough government.”<sup>67</sup> However, as the literature emerging from the Ostrom Workshop demonstrated, the merits of polycentric governance outweigh the shortcomings. The study of the problem of metropolitan government demonstrated that “the existence of multiple agencies interacting and overlapping, far from being a pathological situation, ‘may be in fact a natural and healthy one.’”<sup>68</sup> This overlapping and duplication is the result of the fact that different services require a different scale for efficient provision and that principles of division of labor, cooperation, and exchange function in the public sector, too.<sup>69</sup> As Vincent and Elinor Ostrom noted, duplication of functions is assumed to be wasteful and inefficient, yet market economy is efficient precisely because of the existence of multiple suppliers of a single product or service—i.e., competition. Similar forces operate in a public economy, and the duplication is efficient also in public governance.<sup>70</sup> Furthermore, polycentric systems have a built-in mechanism of self-correction, as they provide more opportunity for actors to intervene and correct, which contributes to the success of such systems.<sup>71</sup> Writing on polycentric governance in climate

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65. *Id.*

66. Ostrom, Tiebout and Warren explain:

“Polycentric” connotes many centers of decision-making which are formally independent of each other. Whether they actually function independently, or instead constitute an interdependent system of relations, is an empirical question in particular cases. To the extent that they take each other into account in competitive relationships, enter into various contractual and cooperative undertakings or have recourse to central mechanisms to resolve conflicts, the various political jurisdictions in a metropolitan area may function in a coherent manner with consistent and predictable patterns of interacting behavior. To the extent that this is so, they may be said to function as a “system.”

*Id.*; see also Michael D. McGinnis, *An Introduction to IAD and the Language of the Ostrom Workshop: A Simple Guide to a Complex Framework*, 39 POL’Y STUD. J. 169, 169 (2011), Michael D. McGinnis, *Polycentric Governance in Theory and Practice: Dimensions of Aspiration and Practical Limitations* (Feb. 19, 2016) (unpublished manuscript), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3812455](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3812455).

67. Paul D. Aligica & Vlad Tarko, *Polycentricity: From Polanyi to Ostrom, and Beyond*, 25 GOVERNANCE 237, 241 (2012).

68. *Id.*

69. *Id.*

70. Vincent Ostrom & Elinor Ostrom, *A Behavioral Approach to the Study of Intergovernmental Relations*, 359 ANNALS AM. ACAD. POL. & SOC. SCI. 137, 138 (1965).

71. Elinor Ostrom, *The Comparative Study of Public Economies*, 42 AM. ECONOMIST 3 (1998); see also Aligica & Tarko, *supra* note 67.

change Elinor Ostrom asserted that polycentrism is a long-term reality but also an effective way of addressing problems that would otherwise encounter gridlock.<sup>72</sup> Polycentric governance may intuitively seem messy, but out of the multiple governance centers and instruments, better governance emerges in what may be seen as another type of “invisible hand.”<sup>73</sup>

Polycentric governance is a kind of “spontaneous order,” the literature on which is mainly within economics—though, as this Article points out, its implications extend to other disciplines. In general, “spontaneous order” refers to the emergence of order as a result of the voluntary activities of individual actors with no single guiding hand. Adam Smith’s concept of the “invisible hand”<sup>74</sup> is an example of this, and Nobel Laureate Friedrich Hayek (economic sciences, 1974) asserted that market economies are a spontaneous order that is more efficient than any central design can achieve.<sup>75</sup> Polanyi, the first to introduce the concept of polycentricism, used the concept of “spontaneous order” in the context of polycentricism,<sup>76</sup> but Vincent Ostrom was reluctant to do so. Though acknowledging the merit in Hayek and Polanyi’s use of the concept of spontaneity in this context, he argued that “polycentric systems of order depend upon a good deal of deliberateness in their creation, operation, and maintenance over time.”<sup>77</sup> Yet, even a free market is not lawless. On the contrary, it needs rules in order to function properly. Likewise, a polycentric system is not without rules. In both cases, the rules are predominately rules of the game, in contrast to substantive rules. Spontaneous or not, polycentric governance has the capacity to provide better results, despite—or because of—the fact that there is no single guiding hand.

### *C. The Analytical Advantages of Using the Polycentric Governance Concept*

The polycentric governance literature provides a structural perspective on the phenomenon of non-binding agreements in international law. While the literature on non-binding international law reviewed above focuses on the agreements themselves—the result—polycentric governance focuses on the forums that introduce them.<sup>78</sup> This institutional emphasis provides a structural explanation for the rise of non-binding agreements and a rich

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72. Elinor Ostrom, *A Polycentric Approach for Coping with Climate Change* (World Bank Pol’y Rsch. Working Paper No. 5095, 2009).

73. See Aligica & Tarko, *supra* note 69, at 244.

74. ADAM SMITH, *AN INQUIRY INTO THE NATURE AND CAUSES OF THE WEALTH OF NATIONS* 36 (Edwin Cannan ed., 1904) (1776).

75. F.A. Hayek, *The Use of Knowledge in Society*, 35 AM. ECON. REV. 519, 528 (1945).

76. MICHAEL POLANYI, *THE LOGIC OF LIBERTY* 157–59 (1951).

77. VINCENT OSTROM, *THE MEANING OF AMERICAN FEDERALISM: CONSTITUTING A SELF-GOVERNING SOCIETY* 226 (1991).

78. See *supra* Section I.A.

empirical grounding that demonstrates the advantages of polycentric governance, especially for addressing complex problems or in complex circumstances.<sup>79</sup> Developing space law in a divided world, and for a field characterized by fast technological developments, exemplifies this complexity. Moreover, Elinor Ostrom has distilled from a massive database a set of “design principles” for robust governance systems.<sup>80</sup> These may guide the further progressive development of international law in a decentralized and complex international system, with non-binding agreements as a feature rather than a bug. Employing the concept of polycentric governance thus has several functions.

“Polycentricity is a complex multifaceted concept, and it is yet to be fully and systematically elaborated as an analytical instrument” Sabetti and Aligica observe.<sup>81</sup> Nonetheless, they note several key functions of the concept that help to identify order in a seemingly chaotic reality, and thus to properly understand that reality and prescribe policy recommendations. The first function is heuristic, as the concept helps us locate patterns of order in what otherwise may look as anarchic or chaotic social systems.<sup>82</sup> It thus helps us make sense of a seemingly disorganized reality that we might have otherwise dismissed as unstructured and ineffective. Another function is descriptive, as the concept assists us in describing the complex social reality of multiple decision centers and overlapping, multi-layered jurisdictions.<sup>83</sup> The third function is explanatory, as it helps “identify social mechanisms and causal processes in the complex concatenation of causes and effects of complex systems.”<sup>84</sup> Finally, there is a normative function. Building on both its vast empirical grounding and theoretical concepts, polycentrism provides an “original approach to the problem of optimal political structures, and the issue of determining what are the main features of a functional, desirable political structure.”<sup>85</sup>

The heuristic, descriptive, and explanatory functions of this concept are used herein to analyze, describe, and explain the emerging laws of space warfare as a case of polycentric governance producing mainly non-binding instruments and agreements. Further, the normative function of polycentric governance can act as a tool for the institutional design of space governance and the much-needed progressive development of the international laws of space warfare. The literature on polycentric governance thus provides

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79. See *supra* Section I.B.

80. Ostrom, *supra* note 8, at 653.

81. Sabetti & Aligica, *supra* note 61, at 9.

82. *Id.*

83. *Id.*

84. *Id.* at 10.

85. *Id.*



analytical tools for understanding and constructing, to the that extent planning is feasible, the governance of global affairs, including space warfare. It is therefore important to think about the development of the laws of space warfare as taking place within a decentralized international system and consider the advantages of a polycentric approach.<sup>86</sup>

## II. THE DEVELOPING LAWS OF SPACE WARFARE

This Part maps the existing and emerging international regimes applicable to space warfare, where “regime” is defined as a set of implicit or explicit principles, norms, rules, and decision-making procedures around which actor expectations converge. It does so by presenting (i) select legal or quasi-legal instruments such as treaties, non-binding agreements, and normative guidelines; and (ii) multilateral forums with appropriate mandate, which constitute the operative mechanisms. The regimes applicable to traditional conflicts on land, sea and air are only briefly reviewed, as they are well established and known; the newer regimes applicable to outer space and cyberspace receive more attention. The main aim here is not a thorough description of each regime but rather a taxonomy that portrays the meta-structure of space warfare which is—as suggested herein—a regime complex, defined as multiple and partly overlapping regimes for a single issue.<sup>87</sup>

### A. Governance of Conflicts in Traditional Theaters: Land, Sea, and Air

The regimes relevant to the traditional theaters of land, sea, and air are well established. The laws of war are the segment of public international law governing all aspects of international armed conflicts, with two sub categories: (i) *jus ad bellum*, the rules providing when it is lawful for a State to *open* war or to resort to the use of armed force in general, as an exception to the general prohibition against the use of force;<sup>88</sup> and (ii) *jus in bello*, the

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86. See SCOTT J. SHACKELFORD, GOVERNING NEW FRONTIERS IN THE INFORMATION AGE: TOWARD CYBER PEACE 298 (2020) (presenting a polycentric approach for the management of space militarization and space debris).

87. The review of the applicable regimes may be divided into two modes: (i) according to the theater, where a separate account is given to regimes applicable to the different domains of land, sea, air, outer space and cyberspace; and (ii) according to the level of the regime, from the multilateral, to the regional, national, and non-State levels. This Article reviews only multilateral regimes and will therefore follow the first mode of division. Section III.C further elaborates on the concepts of regimes and regime complexes.

88. The prohibition is stipulated in Article 2(4) of the UN Charter which reads: “All members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the purposes of the United Nations.” U.N. Charter art. 2(4).

laws of armed conflict, also known as international humanitarian law,<sup>89</sup> comprising the rules regulating behavior *during* an armed conflict.<sup>90</sup>

The laws of war include basic norms and specific rules, which are set out in binding instruments such as the UN Charter of 1945,<sup>91</sup> the Geneva Conventions of 1949 and their additional protocols,<sup>92</sup> and the Hague Conventions of 1899 and 1907.<sup>93</sup> Numerous institutions have a mandate on issues of warfare in the traditional theaters of land, sea, and air, most notably the UN and its General Assembly and Security Council, the International Court of Justice (“ICJ”),<sup>94</sup> the International Criminal Court (“ICC”),<sup>95</sup> and the International Tribunal for the Law of the Sea.<sup>96</sup> In addition to these rules and forums on the launch and conduct of warfare, there are regimes that address the use and possession of specific types of weapons, such as the Chemical Weapons Convention.<sup>97</sup> There are also informal multilateral regimes that include both an instrument and a forum to limit proliferation of

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89. On the various titles used for the laws of war, see GARY D. SOLIS, *THE LAW OF ARMED CONFLICT: INTERNATIONAL HUMANITARIAN LAW IN WAR* 20 (2nd ed. 2016).

90. On war and international law, see generally *THE OXFORD HANDBOOK OF INTERNATIONAL LAW IN ARMED CONFLICT* (Andrew Clapham et al. eds., 2014); STEPHEN C. NEFF, *WAR AND THE LAW OF NATIONS: A GENERAL HISTORY* (2005); SOLIS, *supra* note 89.

91. U.N. Charter.

92. For details about the Geneva Conventions, including the text of each treaty and the additional protocols, see *The Geneva Conventions and Their Commentaries*, INT’L COMM. OF THE RED CROSS, <https://www.icrc.org/en/war-and-law/treaties-customary-law/geneva-conventions> (last visited Dec. 8, 2023).

93. *THE PROCEEDINGS OF THE HAGUE PEACE CONFERENCES* (James Brown Scott, Carnegie Endowment Int’l Peace ed., 1920). There are also numerous other treaties, case law, and customs of international law, including instruments addressing certain types of warfare or weapons. See *supra* note 209.

94. See INT’L CT. OF JUST., <https://www.icj-cij.org/en> (last visited Dec. 8, 2023). For more background on the ICJ, see ROBERT KOLB & ALAN PERRY, *THE INTERNATIONAL COURT OF JUSTICE* (2013).

95. See INT’L CRIM. CT., <https://www.icc-cpi.int/> (last visited Dec. 8, 2023). For a detailed discussion of the ICC, see OLYMPIA BEKOU & ROBERT CRYER, *THE INTERNATIONAL CRIMINAL COURT* (2004); CENAP ÇAKMAK, *A BRIEF HISTORY OF INTERNATIONAL CRIMINAL LAW AND INTERNATIONAL CRIMINAL COURT* (2017).

96. See INT’L TRIBUNAL FOR THE L. OF THE SEA, <https://www.itlos.org> (last visited Dec. 8, 2023). On the Tribunal, see generally P. CHANDRASEKHARA RAO & PH. GAUTIER, *THE RULES OF THE INTERNATIONAL TRIBUNAL FOR THE LAW OF THE SEA: A COMMENTARY* (2006).

97. Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction, Jan. 13, 1993, 80 Stat. 271, 1974 U.N.T.S. 45; see also, e.g., Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Apr. 10, 1972, 26 U.S.T. 583, 1015 U.N.T.S. 163; Treaty on the Non-Proliferation of Nuclear Weapons, July 1, 1968, 21 U.S.T. 483, 729 U.N.T.S. 161; Treaty on the Limitation of Anti-Ballistic Missile Systems, U.S.-U.S.S.R., May 26, 1972, 23 U.S.T. 3435, 944 U.N.T.S. 13.

certain kinds of weapons, such as the Missile Technology Control Regime (“MTCR”).<sup>98</sup>

If space warfare will occur, at least in part, in a traditional theater, all the above regimes will apply, and more. Anti-satellite weapons (“ASAT”) are a prime example of these connections between domains. The MTCR, which regulates the distribution of missiles and missile technology, also applies to rocket launchers used to launch satellites and place them in orbit, as they are essentially missiles.<sup>99</sup> While this regime was established to address the proliferation of missiles, it therefore extends to space warfare.<sup>100</sup> Moreover, most current kinetic anti-satellite weapons are essentially missiles, and therefore are covered. However, the MTCR does not apply to ASAT missiles launched from aircrafts and does not ban altogether the development and holding of missiles including ASATs. A future use of ASAT missiles could mean that an attack is launched from land or sea, crosses the airspace, and matures in outer space, thus already involving several theaters and multiple applicable regimes.<sup>101</sup>

### *B. Governance of Conflicts in Theater of Outer Space*

The laws governing warfare in the traditional theaters developed gradually over centuries, with several windows of opportunity—mostly pursuant to major wars—that resulted in waves of regulation.<sup>102</sup> In contrast, space warfare is still in its earliest stages, and so is its regulation. There was a brief window of opportunity in the 1960s and early 1970s that resulted in the introduction of several treaties and basic norms on space exploration, but only one provision directly regulates space warfare.<sup>103</sup> Moreover, with the increasing power diffusion in global politics and difficulties in the adoption of legally binding instruments, the introduction of a comprehensive and binding instrument governing space warfare may take decades, if not longer. Instead, numerous more modest initiatives have emerged. These provide

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98. See MISSILE TECH. CONTROL REGIME, <https://mtcr.info/> (last visited Dec. 8, 2023). Other informal regimes include the Wassenaar Arrangement, the Nuclear Suppliers Group, the Zangger Committee on nuclear proliferation, and the Australia Group on chemical weapons and biological weapons.

99. See Bureau of Int’l Security & Nonproliferation, *Missile Technology Control Regime (MTCR) Frequently Asked Questions*, U.S. DEP’T OF STATE (last visited Dec. 25, 2023), <https://www.state.gov/remarks-and-releases-bureau-of-international-security-and-nonproliferation/missile-technology-control-regime-mtcr-frequently-asked-questions/>.

100. See *id.* See generally MISSILE TECH. CONTROL REGIME, EQUIPMENT, SOFTWARE, AND TECHNOLOGY ANNEX (2023).

101. See *infra* Section II.B.4.

102. Examples include the 1648 Peace of Westphalia treaties after the Thirty Years’ War, and the UN Charter with its prohibition on the threat and use of force after World War II.

103. See *infra* Section II.B.2.

pockets of regulation which, in the aggregate, incrementally introduce the mosaic that is the governance of conflicts in the theater of outer space.

As the law slowly develops, space is quickly emerging as a theater of its own. Several States have already established, or are on track to establish, an independent space force or space command as part of their armed forces—notably the United States,<sup>104</sup> France,<sup>105</sup> Japan,<sup>106</sup> and Australia.<sup>107</sup> Others have transformed their air force to an air force and space command or aerospace force, notably Russia<sup>108</sup> and Israel.<sup>109</sup> Defense institutions around the world, mainly those of the big powers, are developing strategies and tactics for warfare in the theater of space, making the question of governing these conflicts increasingly vital. This Section provides an overview of major attempts to regulate warfare in the theater of space—the main pieces of the mosaic of space governance. The Section begins with early efforts to apply international law to outer space and the primary forums relevant to space warfare. It next describes key instruments and agreements, such as Outer Space Treaty, the proposed Prevention of the Placement of Weapons in Outer Space Treaty, the ASAT test ban, and several other efforts by international institutions, States, and non-state actors.

### *1. Applicability of International Law to Outer Space*

The application of international law to outer space was not self-evident. Indeed, one of the first things that outer space law set out to do was to declare or establish such an application. This began in the 1960s with non-binding

104. The Trump administration decided to create an independent Space Force, which was established by the National Defense Authorization Act for Fiscal Year 2020 and transformed the Air Force Space Command into the Space Force. H.R. 2500, 116th Cong. § 952 (2019). The President signed the Act on December 20, 2019. Section 952 of the Act, titled “The Space Force”, provides that “[t]he Air Force Space Command is hereby redesignated as the United States Space Force (USSF).” *Id.* § 952(a). The Space Force is the United States’s sixth military service branch and the first branch to be established since the U.S. Air Force in 1947. The budget of the new Space Force is expected to be sixty percent of the budget of NASA, or \$15.4 billion for the fiscal year 2021. Mike Wall, *Space Force Gets \$15.4 Billion in 2021 Budget Request*, SPACE (Feb. 10, 2020), <https://www.space.com/space-force-2021-budget-request.html>.

105. Joshua Posaner, *Macron to Create French Military Space Force*, POLITICO (July 14, 2019, 10:27 AM), <https://www.politico.eu/article/macron-to-create-french-military-space-force/>.

106. *Japan’s New Space Squadron Takes a Giant Leap Forward*, JAPAN TIMES (June 2, 2020), <https://www.japantimes.co.jp/news/2020/06/02/reference/japan-space-force-self-defense-forces/>.

107. Ruth Harrison, *ADF Establishes New Defence Space Command Branch*, SPACEAUSTRALIA (Mar. 29, 2022), <https://spaceaustralia.com/index.php/news/adf-establishes-new-defence-space-command-branch>.

108. *Aerospace Defense Forces*, MINISTRY OF DEF. OF THE RUSSIAN FED’N, <https://eng.mil.ru/en/structure/forces/cosmic.htm> (last visited Nov. 12, 2023); see Vladimir Motorin, *Star War: How Space Is Becoming a New Arena for Confrontation Between Russia and the United States*, FORBES (July 24, 2020), <https://www.forbes.ru/obshchestvo/405681-zvezdnaya-voyna-kak-kosmos-stanovitsya-novoy-arenoy-dlya-protivostoyaniya-rossii>.

109. The force is called *צְהָלָה הַחֹלִים*, meaning the Air and Space Arm in Hebrew.

actions by the UN General Assembly.<sup>110</sup> A resolution from 1961 provides that “[i]nternational law, including the Charter of the United Nations, applies to outer space and celestial bodies.”<sup>111</sup> Next came the 1963 Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, which prescribes in Article 4 that all space activities “shall be carried on in accordance with international law.”<sup>112</sup>

The widely endorsed 1967 Outer Space Treaty, which will be discussed further in Section II.B.3, gave legal force to this claim. Article I provides: “Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States . . . in accordance with international law.”<sup>113</sup> Article III provides: “States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations.”<sup>114</sup> However, it is noteworthy that, while the General Assembly of 1961 had set to apply international law to outer space *per se*, the 1967 Outer Space Treaty, like the 1963 Declaration, simply provides that States should comply with international law when conducting activities in outer space. That is, the Outer Space Treaty applies international law not to the domain of space itself, but rather to States insofar as they conduct activities in outer space.

The principle that international law applies to outer space extends beyond the signatories of the Outer Space Treaty. Jakhu and Freeland note that some of the provisions of the Treaty have already become part of customary international law, and this includes the provisions on the applicability of international law to outer space.<sup>115</sup> Furthermore, international law also applies to non-State human activities in outer space because Article VI of the Outer Space Treaty mandates States to ensure compliance of non-state actors under their jurisdiction.<sup>116</sup> Thus, whereas in general international

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110. On the non-binding nature of General Assembly resolutions, see generally, Stephen M. Schwab, *The Effect of Resolutions of the U.N. General Assembly on Customary International Law*, 73 PROC. ANN. MEETING AM. SOC’Y INT’L L. 301, 301 (1979).

111. G.A. Res. 1721 (XVI), at 6 (Dec. 20, 1961).

112. G.A. Res. 1962 (XVIII), at 15 (Dec. 13, 1963).

113. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. I, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

114. *Id.* art. III. Similar provisions have been included in succeeding UN treaties, General Assembly resolutions, and annual reports of the UN Committee on the Peaceful Uses of Outer Space.

115. Ram S. Jakhu & Steven Freeland, *The Relationship between the Outer Space Treaty and Customary International Law* 9 (59th IISL Colloquium on the Law of Outer Space, Paper No. 32294, 2016), <https://ssrn.com/abstract=3397145>.

116. The Treaty declares:

law, non-State activities need to be imputable to a State to trigger state responsibility,<sup>117</sup> the Outer Space Treaty provides as well for state responsibility for non-State activities in space, and thus removes all doubts concerning imputability.<sup>118</sup> International law—including the laws of war discussed in the previous Section—therefore applies to all human space activities carried on by State and non-State actors, including space warfare.<sup>119</sup> Indeed, “[a]s soon as activities of States entered outer space, the overarching regime of international law which governs the rights and responsibilities of States became automatically applicable there.”<sup>120</sup>

As a result of the application of a substantial body of law to conflicts in the theater of space, the mandates of existing international institutions—particularly the UN, but also the ICJ and ICC—have broadened to include conflicts in outer space.<sup>121</sup> The forums relevant to space warfare are mostly affiliated with the UN, primarily the Security Council and General Assembly, but also include NGOs and research centers. Within the UN, the Committee on the Peaceful Uses of Outer Space (“UN-COPUOS”) is the main multilateral forum on space issues, assisted by the Office for Outer Space Affairs, but numerous other bodies are involved in questions of space warfare.<sup>122</sup> Beyond international institutions, important NGOs in the field

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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.

Outer Space Treaty, *supra* note 113, art. VI.

117. On state responsibility, see generally IAN BROWNLIE, SYSTEM OF THE LAW OF NATIONS: STATE RESPONSIBILITY: PART 1 (1983); IAN BROWNLIE, PRINCIPLES OF PUBLIC INTERNATIONAL LAW 435–36 (5th ed. 1998); *The Factory at Chorzów (Ger. v. Pol.)*, Claim for Indemnity, 1927 P.C.I.J. (Ser. A) No. 8, at 21 (July 26).

118. MANFRED LACHS, THE LAW OF OUTER SPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING 122 (1972).

119. Notably, in the Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons, the ICJ declared that the law of armed conflict “applies to all forms of warfare and to all kinds of weapons, those of the past, those of the present and those of the future.” 1996 I.C.J. 226, 259 (July 8). The law of armed conflict therefore applies to both weapons used in space warfare and generally in the theater of space. See Ram S. Jakhu, Cassandra Steer & Chen Kuan-Wei, *Conflicts in Space and the Rule of Law*, 66 GERMAN J. AIR & SPACE L. 657, 663 (2017) [hereinafter Jakhu et al., *Conflicts in Space*].

120. Jakhu et al., *Conflicts in Space*, *supra* note 119, at 663.

121. In addition to the laws of war, international telecommunications law, which regulates the use of radio frequencies and the placement of satellites in orbit, is also applicable, considering that warfare in space involves the use—and disruption—of radio frequencies and satellites.

122. For example, the UN’s First Committee (Disarmament and International Security) and the Conference on Disarmament, the designated UN organ for negotiating disarmament agreements, are particularly relevant and active. The two are assisted by the UN Institute for Disarmament

include the Simons Foundation<sup>123</sup> and the Secure World Foundation.<sup>124</sup> Research centers like the Space Security Research Group at King's College London,<sup>125</sup> the Aerospace Security Project of the Center for Strategic and International Studies,<sup>126</sup> and the McGill Institute of Air and Space Law<sup>127</sup> also contribute to the development of the law of space warfare and help form a broader epistemic community.

While UN-affiliated organs carry a political backing that can give force to agreements, disagreement among States and blocs of States makes progress slow<sup>128</sup>—though the UN remains the primary track to produce multilateral, legally binding agreements in the long run. In contrast, NGOs and research centers do not produce legally binding agreements, but they effectively promote knowledge on the issue and move ideas and initiatives forward.<sup>129</sup> The bottom line is that progress in the governance of space warfare need not—and cannot—come from a single forum or instrument.

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Research (“UNIDIR”), which holds an annual Space Security Conference, and by the UN Office for Disarmament Affairs. The International Telecommunication Union is another important multilateral organization with a mandate on issues pertaining to outer space activities, as it allocates slots in the geostationary orbit and radio frequencies that are used, *inter alia*, by satellites. François Rancy, *Welcome to ITU-R*, INT’L TELECOMM’NS UNION, RADIOCOMM’N SECTOR (ITU-R), <http://www.itu.int/net/ITU-R/index.asp?category=information&mlink=itur-welcome&lang=en> (last visited Dec. 8, 2023). The periodical Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE) also discusses issues of space security and space warfare—with conferences held in 1968, 1982, 1999, and 2018—but it is less important than other forums. *UNISPACE Conferences*, U.N. OFF. FOR OUTER SPACE AFFS., <http://www.unoosa.org/oosa/en/aboutus/history/unispace.html> (last visited Dec. 8, 2023).

123. SIMONS FOUND. CAN., [www.thesimonsfoundation.ca](http://www.thesimonsfoundation.ca) (last visited Dec. 8, 2023). The Simons Foundation was a co-founder of UNIDIR’s annual Space Security Conference.

124. SECURE WORLD FOUND., <https://swfound.org> (last visited Dec. 8, 2023).

125. *Space Security Research Group*, KING’S COLL. LONDON, <https://www.kcl.ac.uk/research/space-security-research-group> (last visited Dec. 8, 2023).

126. *Aerospace Security Project*, CTR. FOR STRATEGIC & INT’L STUD., <https://www.csis.org/programs/international-security-program/aerospace-security-project> (last visited Dec. 8, 2023).

127. *Institute of Air & Space Law*, MCGILL UNIV., <https://www.mcgill.ca/iasl/> (last visited Dec. 8, 2023).

128. Both UN-COPUOS and the Conference on Disarmament work by consensus, which is obviously very difficult to achieve on most questions. The International Telecommunications Union has been more successful, producing comprehensive, elaborated, and legally binding instruments that regulate the issues under its jurisdiction. See *Constitution and Convention Collection*, INT’L TELECOMM’NS UNION, <https://www.itu.int/en/history/Pages/ConstitutionAndConvention.aspx> (last visited Dec. 9, 2023) (collecting constitutions and conventions from 1865 to 2022). The secret to its success is that it engages mainly with technical issues, on which agreement is more easily reached because the laws of physics mandate rules and their adherence.

129. For a discussion of several important research center initiatives, see *infra* Section II.B.6.

## 2. *The Outer Space Treaty*

As far as binding instruments, the Outer Space Treaty of 1967, mentioned above, imposed the first restrictions on the military uses of outer space. However, the UN began initiating efforts to maintain outer space for peaceful purposes as early as 1957—the same year in which Russia launched the first artificial earth satellite, Sputnik 1—when the General Assembly passed a resolution urging that “the sending of objects through outer space shall be exclusively for peaceful and scientific purposes.”<sup>130</sup> In a resolution a year later, the General Assembly expressed the hope and goal that humanity would “avoid the extension of present national rivalries into this new field.”<sup>131</sup> Over the next several years, the UN considered proposals for prohibiting the use of space for military purposes and the placement of weapons of mass destruction in space, which resulted in several limited but binding agreements, most prominently the Outer Space Treaty.<sup>132</sup>

Article IV of the Treaty prohibits the placement anywhere in space of weapons of mass destruction, prescribes that celestial bodies—but not earth orbit or void space—shall be used exclusively for “peaceful purposes,” and bars the establishment of military bases on celestial bodies.<sup>133</sup> The Treaty was negotiated and agreed upon between the United States and the Soviet Union at the height of the Cold War and served partly as an arms control instrument, in addition to securing free access to space and celestial bodies.<sup>134</sup> President Johnson even described it as “the most important arms control development since the limited test ban treaty of 1963.”<sup>135</sup>

Some contended that Article IV prohibits military uses of outer space altogether. However, it is important to note that the Outer Space Treaty does not prohibit the placement of weapons other than weapons of mass

130. G.A. Res. 1148 (XII), at 4 (Nov. 14, 1957).

131. G.A. Res. 1348 (XIII), at 5 (Dec. 13, 1958).

132. *Outer Space*, UN OFF. FOR DISARMAMENT AFFS., <https://www.un.org/disarmament/topics/outerspace/> (last visited Dec. 8, 2023).

133. Specifically, the Treaty provides that Parties “undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, instal [sic] such weapons on celestial bodies, or station such weapons in outer space in any other manner.” Regarding military use of the moon, the Treaty prohibits “[t]he establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies.” However, it permits “use of military personnel for scientific research or for any other peaceful purposes,” as well as “any equipment or facility necessary for peaceful exploration.” *Outer Space Treaty*, *supra* note 113, art. IV.

134. Peter Martinez, *Challenges for Ensuring the Security, Safety and Sustainability of Outer Space Activities*, 6 J. SPACE SAFETY ENG’G 65 (2019).

135. The statement was released on December 8, 1966, pursuant to the agreement between the major space powers on the text. Bin Cheng, *Properly Speaking, Only Celestial Bodies Have Been Reserved for Use Exclusively for Peaceful (Non-Military) Purposes, But Not Outer Void Space*, 75 INT’L L. STUD. 81, 106 & n.77 (2000) (quoting 55 DEP’T OF STATE BULL. 952 (1966)).



destruction in space. While at the time the United States and the Soviet Union negotiated the Treaty there was a popular demand to exclude altogether military uses of outer space, the two superpowers chose to leave the door open for some military uses, while prohibiting others.<sup>136</sup> The United States is persistent in its stance that “peaceful purposes” merely means “non-aggressive,” but not “non-military.”<sup>137</sup> Indeed, by now many accept the U.S. position and suggest that only *aggressive* activities are prohibited, while *non-aggressive* military uses of outer space are lawful.<sup>138</sup> However, Bin Cheng dismisses this notion and suggests that there is no ground for such an interpretation and that no State practice, or “no protest,” could be so far demonstrated.<sup>139</sup>

Even assuming that “peaceful” means non-military, and not just non-aggressive, the Outer Space Treaty did not de-militarize outer space as a whole. It did de-militarize celestial bodies which are to be used *exclusively* for “peaceful purposes,” which seems to prohibit even non-aggressive military activities.<sup>140</sup> However, with regards to void space the only limitation is the placing of weapons of mass destruction—but not other types of weapons—and States may use void space for military purposes. Bin Cheng summarized the issue of demilitarization of space by noting that nothing in the Outer Space Treaty:

affect[s] the contracting States’ freedom to use outer space for military purposes, though they all intend to promote its peaceful use. . . . [T]here is no provision, contrary to a very prevalent misconception, anywhere in the entire Treaty which reserves the whole of outer space exclusively for peaceful use or exploration. Only the moon and the other celestial bodies have been so reserved in Article IV (2), which does not apply to the void in between.<sup>141</sup>

The Outer Space Treaty, therefore, does not prevent a space arms race, and the quest to prevent such an arms race continues to date.

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136. *Id.* at 96.

137. *Id.* at 109–10.

138. See Jakhu et al., *Conflicts in Space*, *supra* note 119, at 663; Carl Q. Christol, *The Common Interest in the Exploration, Use and Exploitation of Outer Space for Peaceful Purposes: The Soviet-American Dilemma*, 18 AKRON L. REV. 193 (1984). Jakhu and Kuan-Wei elaborate on the meaning of “aggressive purposes.” See Ram S. Jakhu, Kuan-Wei Chen & Bayar Goswami, *Threats to Peaceful Purposes of Outer Space: Politics and Law* 18 ASTROPOLITICS 22 (2020) [hereinafter Jakhu et al., *Peaceful Uses*].

139. Cheng, *supra* note 135, at 98.

140. On the meaning of “peaceful purposes” and whether space activities should be exclusively for peaceful purposes, see *id.*

141. *Id.* at 107.

### 3. *Prevention of an Arms Race in Outer Space*

Many other instruments and agreements governing space warfare emerge from disarmament efforts.<sup>142</sup> The 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water,<sup>143</sup> known as the Partial Test Ban Treaty, was the first treaty to explicitly refer to outer space in general, and to military uses of outer space in particular. It prohibits the conduct of nuclear weapons tests or any other nuclear explosion in the atmosphere, including outer space, or under water. The treaty gained widespread acceptance, with 125 State parties, although nuclear powers China and France did not ratify it, and no nuclear test has been conducted in the atmosphere and in outer space since its adoption.<sup>144</sup>

After the Outer Space Treaty and the Partial Test Ban Treaty, which covered only select issues, efforts to expand multilateral regulation of military activities in space continued under the umbrella of the UN. The General Assembly held three Special Sessions devoted to disarmament—in 1978, 1982, and 1988—but only the first succeeded in producing a final document.<sup>145</sup> That document provided that “[i]n order to prevent an arms race in outer space, further measures should be taken and appropriate international negotiations held in accordance with the spirit of the [Outer Space Treaty],”<sup>146</sup> and the Conference on Disarmament was mandated with holding these negotiations.

In 1985 the Conference established an ad hoc committee on the Prevention of an Arms Race in Outer Space (“PAROS”), which convened

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142. In addition to the Partial Test Ban Treaty, another relevant treaty is the Environmental Modification Convention, which prohibits the hostile use of environmental modification techniques with widespread, long-lasting, or severe effects, and which expressly refers to outer space. *See* Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, May 18, 1977, 31 U.S.T. 333, 1108 U.N.T.S. 152. A non-binding but relevant instrument is the 2002 Hague Code of Conduct Against Ballistic Missile Proliferation, which attempts to limit the proliferation of ballistic missiles and applies to rocket-launchers. UN-COPUOS also adopted guidelines in 2019 for the long-term sustainability of outer space activities, which encourage use of space for exclusively peaceful use but recognize legitimate national security interests in outer space. However, because the guidelines are non-binding, and the principles are already broadly recognized, their expected effect on the prevention of space warfare is limited. *See* Press Release, U.N. Off. for Outer Space Affs., Guidelines for the Long-Term Sustainability of Outer Space Activities, UNIS/OS/518 (June 22, 2019), <https://www.unoosa.org/oosa/en/informationfor/media/2019-unis-os-518.html>.

143. Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, Aug. 5, 1963, 14 U.S.T. 1313, 480 U.N.T.S. 43 [hereinafter Partial Test Ban Treaty].

144. Jakhu et al., *Peaceful Uses*, *supra* note 138, at 28–29.

145. *Special Sessions of the General Assembly Devoted to Disarmament*, U.N. OFF. FOR DISARMAMENT AFFS., <https://www.un.org/disarmament/topics/ssod/> (last visited Dec. 8, 2023).

146. G.A. Res. S-10/2, ¶ 80 (June 30, 1978).

annually for almost a decade.<sup>147</sup> The committee ceased meeting in 1994, but the Conference's PAROS work remains in progress. The General Assembly's First Committee most recently issued a PAROS resolution in late 2023, which reaffirmed the importance of preventing an arms race, emphasizing the insufficiency of the current legal regime for that goal and the need for further legally binding measures.<sup>148</sup> The Committee invited the Conference, "as the sole multilateral disarmament negotiating forum," to establish a working group for this end.<sup>149</sup> The Committee also recommended the establishment of a separate open-ended working group on "[f]urther practical measures for the prevention of an arms race in outer space" following a draft put forward by Russia.<sup>150</sup> The proposed creation of two different working groups—criticized by some participants as inefficient and polarizing—exemplifies the multiplicity of laws and forums regarding space warfare.<sup>151</sup>

Current UN efforts on transparency and confidence-building measures ("TCBMs") in outer space also emerged from PAROS. TCBMs aim to discourage an arms race in space by promoting openness and trust between nations regarding space activities.<sup>152</sup> The General Assembly's PAROS resolution of 1990 recognized "the relevance of considering measures on confidence-building and greater transparency and openness in space,"<sup>153</sup> and the General Assembly has had TCBMs as an agenda item almost annually since then 1990.<sup>154</sup> Most recently, in 2023, the First Committee again

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147. *PAROS Treaty*, NTI, <https://www.nti.org/education-center/treaties-and-regimes/proposed-prevention-arms-race-space-paros-treaty/> (last visited Dec. 8, 2023). PAROS work began in 1981, when the General Assembly adopted a resolution titled "Prevention of an Arms Race in Outer Space," which noted that further effective measures to prevent an arms race in outer space should be adopted by the international community. The resolution urged all States, in particular those with major space capabilities, to actively contribute to this goal, and requested the Conference on Disarmament to consider negotiating agreements for this effect. G.A. Res. 36/97 (C), at 71 (Dec. 9, 1981). The General Assembly has had PAROS as an agenda item almost annually since 1981, producing resolutions of a similar nature.

148. Rep. of the First Comm., Prevention of an Arms Race in Outer Space, U.N. Doc. A/78/407, at 1, 18–20 (2023).

149. *Id.* at 20.

150. Consensus Scuttled in First Committee over Two Competing Draft Resolutions on Space Security, Creating Parallel Processes, Polarization, Say Speakers, U.N. Meeting Coverage GA/DIS/3730 (Oct. 31, 2023), <https://press.un.org/en/2023/gadis3730.doc.htm> [hereinafter Consensus Scuttled in First Committee]; see U.N. First Comm., Further Practical Measures for the Prevention of an Arms Race in Space, U.N. Doc. A/C.1/78/L.55 (Oct. 12, 2023).

151. See Consensus Scuttled in First Committee, *supra* note 150.

152. See *Outer Space*, *supra* note 132.

153. G.A. Res. 45/55 (Dec. 14, 1990).

154. See, e.g., G.A. Res. 63/68 (Dec. 2, 2008); G.A. Res. 64/49 (Dec. 2, 2009); G.A. Res. 65/68 (Dec. 8, 2010); G.A. Res. 68/50 (Dec. 5, 2013); G.A. Res. 69/38 (Dec. 2, 2014); G.A. Res. 70/53 (Dec. 7, 2015); G.A. Res. 71/42 (Dec. 5, 2016); G.A. Res. 72/56 (Dec. 4, 2017); G.A. Res. 73/72 (Dec. 5, 2018).

recommended proposed TCBMs to the General Assembly and asked it to encourage review and implementation by Member States.<sup>155</sup>

The most ambitious PAROS attempt is the proposed Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects, known as the Prevention of Placement of Weapons Treaty. This traces back to a 1981 General Assembly resolution calling for the conclusion of a treaty on the prohibition of the stationing of weapons *of any kind* in outer space.<sup>156</sup> Russia and China initially submitted the proposed treaty in 2008, but after heavy criticism, they revised the draft and resubmitted in 2014.<sup>157</sup> The proposed treaty would prohibit its signatories from placing any weapons into orbit, installing weapons on celestial bodies, and using force against objects in outer space.<sup>158</sup> It would not, however, affect States' right to self-defense under Article 51 of the UN Charter.<sup>159</sup> Both drafts were rejected by the United States, and no legally binding instrument has been adopted.<sup>160</sup>

The biggest obstacle to the treaty is the strong objection by the United States, which perceives it as prohibiting space weapons that the United States might hold or develop but allowing the type of ground-based space weapons that Russia and China already possess, namely ASAT systems.<sup>161</sup> Even if it were implemented, Listner and Rajagopalan note that major protective gaps would remain in the proposed treaty's failure to address ASATs and the space debris they can create.<sup>162</sup> Further, the current draft focuses on the placement of weapons in outer space and overlooks ground-based weapons that may target space assets. Tronchetti and Hao note that while the 2014 draft was

155. Consensus Scuttled in First Committee, *supra* note 150.

156. G.A. Res. 36/99 (Dec. 9, 1981).

157. *Draft Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects*, MINISTRY OF FOREIGN AFFS. OF THE PEOPLE'S REP. OF CHINA, (June 16, 2014), [https://www.fmprc.gov.cn/mfa\\_eng/wjb\\_663304/zzjg\\_663340/jks\\_665232/kjfywj\\_665252/201406/t20140616\\_599726.html](https://www.fmprc.gov.cn/mfa_eng/wjb_663304/zzjg_663340/jks_665232/kjfywj_665252/201406/t20140616_599726.html) [hereinafter *Draft PPWT*]; see Jinyuan Su, *The "Peaceful Purposes" Principle in Outer Space and the Russia-China PPWT Proposal*, 26 SPACE POL'Y 81 (2010).

158. *Draft PPWT*, *supra* note 157.

159. Su, *supra* note 157, at 87–88.

160. The United States is consistently against any PAROS treaty, and Israel consistently abstains. In 2017 the Conference on Disarmament approved—by majority—four draft resolutions concerning on the prevention of an arms race in outer space, but with objection from the United States and Israel to all of them, and the objection of France, the United Kingdom, Ukraine, and Georgia to some of them. See First Committee Submits Six Drafts to General Assembly, One Calling for Immediate Start of Negotiations on Treaty Preventing Outer Space Arms Race, U.N. Meeting Coverage GA/DIS/3591 (Oct. 30, 2017) <https://www.un.org/press/en/2017/gadis3591.doc.htm>.

161. Jeff Foust, *U.S. Dismisses Space Weapons Treaty Proposal as "Fundamentally Flawed"*, SPACENEWS.COM (Sept. 11, 2014), <https://spacenews.com/41842us-dismisses-space-weapons-treaty-proposal-as-fundamentally-flawed/>.

162. See *infra* Section II.B.4.

supposed to answer the criticism of the first draft, it mainly represents rewording and re-organization, while maintaining the most controversial aspects of the 2008 version. In a joint statement on February 4, 2022, Russian President Vladimir Putin and Chinese President Xi Jinping expressed their continued support for the proposed treaty.<sup>163</sup>

Despite the failure so far of the Prevention of Placement of Weapons Treaty, since 2014 several States have introduced a policy of not being the first to place weapons in outer space.<sup>164</sup> This policy is pursuant to the General Assembly resolution adopted that year, which encouraged “all States, especially space-faring nations, to consider the possibility of upholding as appropriate a political commitment not to be the first to place weapons in outer space.”<sup>165</sup> It was Russia that promoted the no first placement resolutions, with the United States as the major opponent.<sup>166</sup> The European Union (“EU”) expressed reservation in a formal statement articulating concern that the initiative “does not adequately respond to the objective of strengthening trust and confidence between States . . . and may entice States to prepare to be second or third.”<sup>167</sup> Nevertheless, the General Assembly adopted the no first placement resolution by majority vote and has reiterated the principles in subsequent resolutions.

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163. They explained:

Russia and China will continue to increase cooperation on such matters of mutual interest as the long-term sustainability of space activities and the development and use of space resources. The sides oppose attempts by some States to turn outer space into an arena of armed confrontation and reiterate their intention to make all necessary efforts to prevent the weaponization of space and an arms race in outer space. They will counteract activities aimed at achieving military superiority in space and using it for combat operations. The sides affirm the need for the early launch of negotiations to conclude a legally binding multilateral instrument based on the Russian-Chinese draft treaty on the prevention of placement of weapons in outer space and the use or threat of force against space objects that would provide fundamental and reliable guarantees against an arms race and the weaponization of outer space.

*Russia-China Joint Statement on International Relations*, USC US-CHINA INST. (Feb. 4, 2022), <https://china.usc.edu/russia-china-joint-statement-international-relations-february-4-2022>.

Nevertheless, Russian and China also participate in processes geared at introducing a non-legally binding agreement.

164. These States are Armenia, Belarus, Brazil, Cuba, Argentina, Indonesia, Kazakhstan, Kyrgyzstan, the Russian Federation, Sri Lanka and Tajikistan.

165. G.A. Res. 69/32 (Dec. 2, 2014). The General Assembly adopted similar resolutions annually in subsequent years. *See, e.g.*, G.A. Res. 70/27 (Dec. 7, 2015); G.A. Res. 71/32 (Dec. 5, 2016); G.A. Res. 72/27 (Dec. 4, 2017); G.A. Res. 73/31 (Dec. 5, 2018).

166. Jakhu et al., *Conflicts in Space*, *supra* note 119, at 677.

167. The EU also noted that “this initiative does not address the difficult issue of defining what a weapon in outer space is.” *Conference on Disarmament - Working Group on the “Way Ahead” - EU Statement on the Prevention of an Arms Race in Outer Space*, EU EXTERNAL ACTION SERV. (Jun. 16, 2017), [https://eeas.europa.eu/headquarters/headquarters-homepage/28329/conference-disarmament-working-group-way-ahead-eu-statement-prevention-arms-race-outer-space\\_en](https://eeas.europa.eu/headquarters/headquarters-homepage/28329/conference-disarmament-working-group-way-ahead-eu-statement-prevention-arms-race-outer-space_en) [hereinafter *EU Statement on PAROS*].

Though General Assembly resolutions are non-binding, these “no first placement” policies still have a potentially forceful effect since the ICJ recognizes that States’ unilateral statements are binding if issued with that intention.<sup>168</sup> Hao and Tronchetti suggest that, despite the limited attention the resolution received in academic circles, its adoption represents an important development in the area of space security—though at the same time States’ hesitation demonstrates that a universal solution to the issue of space security still lies far ahead.<sup>169</sup> As with regard to the Prevention of Placements of Weapons Treaty, this initiative would need to be adopted by all major spacefaring nations in order to have a decisive effect.

#### 4. *Anti-Satellite Weapons Test Ban*

Some of the most recent and important developments in the laws of space warfare concern anti-satellite weapons. ASATs are a conventional way to destroy satellites in orbit and so far have been successfully tested by Russia, the United States, China, and India.<sup>170</sup> These tests have provoked significant controversy, partly because they greatly increase space debris—already a major problem that damages satellites in orbit and forces the International Space Station to occasionally maneuver to avoid collisions.<sup>171</sup> Other countries’ development of ASATs, particularly China’s test in 2007, was a “pivot point” in U.S. space operations, leading eventually to the creation of the U.S. Space Force.<sup>172</sup>

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168. See *infra* notes 183–184 and accompanying text.

169. Hao Liu & Fabio Tronchetti, *United Nations Resolution 69/32 on the “No First Placement of Weapons in Space”: A Step Forward in the Prevention of an Arms Race in Outer Space?*, 38 SPACE POL’Y 64 (2016).

170. China was not the first to successfully test ASAT missiles, but its 2007 test invoked fierce rebuke by many nations, mainly citing the sharp increase in space debris that followed, which scientists estimate was the most significant debris generating event in history. India conducted a successful ASAT test in 2019 and declared that it was executed in such an orbit as to not cause space debris, but later findings demonstrated that this claim was false. See SECURE WORLD FOUND., GLOBAL COUNTERSPACE CAPABILITIES: AN OPEN SOURCE ASSESSMENT 1-9, 6-2 to 6-3 (Brian Weeden & Victorina Samson eds., 2019). The most recent ASAT test was in November 2021, when Russia destroyed its Cosmos 1408 satellite. U.S. Space Command Pub. Affs. Off., *Russian Direct-Ascent Anti-Satellite Missile Test Creates Significant, Long-Lasting Space Debris*, U.S. SPACE COMMAND (Nov. 15, 2021), <https://www.spacecom.mil/Newsroom/News/Article-Display/Article/2842957/russian-direct-ascent-anti-satellite-missile-test-creates-significant-long-last/>.

171. We may even reach a point in which space debris blocks our way to space. We are at risk of the “Kessler Syndrome” of collisional cascading, where the density of debris particles is such that collision between them will continually increase the amount of debris. See Donald J. Kessler & Burton G. Cour-Palais, *Collision Frequency of Artificial Satellites: The Creation of a Debris Belt*, 83 J. GEOPHYSICAL RSCH. 2637 (1978).

172. Greg Hadley, *Saltzman: China’s ASAT Test Was ‘Pivot Point’ in Space Operations*, AIR & SPACE FORCES MAG. (Jan. 13, 2023), <https://www.airandspaceforces.com/saltzman-chinas-asat-test-was-pivot-point-in-space-operations/>.

The calls to ban ASAT tests have grown over the years. Kopolev suggested that in the absence of a new outer space disarmament treaty, we could turn to customary international law to impede the development and use of ASAT weapons.<sup>173</sup> In contrast, Li Juqian suggests that ASAT tests are legal, legitimate, and not extraordinary under the Outer Space Treaty, which provides that launching States “retain jurisdiction and control” over their satellites and does not prohibit the testing of conventional weapons in orbit.<sup>174</sup>

Ultimately, the solution might come from a series of unilateral undertakings initiated by the United States. In April 2022, Vice President Kamala Harris announced that the United States will not conduct ASAT tests, and she called on other nations to make similar commitments and help establish this as a norm of responsible behavior in space.<sup>175</sup> Nine allied countries made similar declarations,<sup>176</sup> and the United States submitted a draft resolution against ASAT testing to the UN First Committee. This resolution was approved in November 2022 by a record vote of 154 in favor, with only eight votes against and ten abstentions<sup>177</sup>—though none of the other countries to conduct ASAT tests supported the resolution.<sup>178</sup> In December 2022, the General Assembly approved a nearly identical resolution, with the supporting vote of 155 countries, nine voting against and nine abstaining.<sup>179</sup> Again, Russia and China voted against, and India abstained.<sup>180</sup>

The unilateral U.S. pledge and its subsequent efforts may be an attempt to create a new customary international law rule. Customary international law

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173. David A. Koplow, *ASAT-ification: Customary International Law and the Regulation of Anti-Satellite Weapons*, 30 MICH. J. INT'L L. 1187, 1189 (2009).

174. Li Juqian, *Legality and Legitimacy: China's ASAT Test*, 5 CHINA SEC. 43 (2009). Specifically, Juqian argues that, because a State retains ownership over its satellites under Article VIII of the Outer Space Treaty, it has the full rights to dispose of satellites. Second, Article IV includes a ban on the testing of weapons on celestial bodies and a ban on placement of weapons of mass destruction in orbit around earth, but it says nothing about the testing of conventional weapons in orbit and therefore does not apply to ASATs. He also invokes Article I, which provides that space is free for exploration and use by all countries, including various tests. *Id.*

175. *FACT SHEET: Vice President Harris Advances National Security Norms in Space*, WHITE HOUSE (Apr. 18, 2022), <https://www.whitehouse.gov/briefing-room/statements-releases/2022/04/18/fact-sheet-vice-president-harris-advances-national-security-norms-in-space/>.

176. These States were Australia, Canada, New Zealand, Japan, Germany, Switzerland, the United Kingdom, South Korea, and France. Jeff Foust, *France Joins ASAT Testing Moratorium*, SPACENEWS (Nov. 30, 2022), <https://spacenews.com/france-joins-asat-testing-moratorium/>.

177. Approving 21 Drafts, First Committee Asks General Assembly to Halt Destructive Direct-Ascent Anti-Satellite Missile Tests in Outer Space, U.N. Meeting Coverage GA/DIS/3703 (Nov. 1, 2022), <https://press.un.org/en/2022/gadis3703.doc.htm>.

178. China and Russia voted against, and India abstained. *Id.*

179. G.A. Res. 77/41 (Dec. 7, 2022).

180. U.N. GAOR, 77th Session, 46th plen. mtg. at 9, U.N. Doc A/77/PV.46 (Dec. 7, 2022); see Jeff Foust, *United Nations General Assembly Approves ASAT Test Ban Resolution*, SPACENEWS (Dec. 13, 2022), <https://spacenews.com/united-nations-general-assembly-approves-asat-test-ban-resolution/>.

results when States engage in a general and consistent practice out of a sense of legal obligation.<sup>181</sup> Koh, calling on his experience as Legal Adviser to the U.S. State Department, explains that the Executive Branch can engage in international lawmaking, even without binding agreements, by helping rules develop into custom.<sup>182</sup> The Biden Administration specifically stated that it sought to establish the ban on ASAT testing as a new norm, and adoption by 155 States might seem to achieve this. As noted above, The ICJ recognized that such unilateral statements are binding if they are issued with the intention of being binding,<sup>183</sup> and the International Law Commission has issued guiding principles on such unilateral statements.<sup>184</sup> Moreover, one might claim that the resolution created “instant international customary law,” which can arise even without practice, particularly in rapidly changing fields like space law.<sup>185</sup>

However, the rejection of the ASAT testing ban rule by three out of the four most relevant states—those who can actually conduct such tests, two of which are permanent members of the UN Security Council—precludes the principle from being instant international customary law and casts doubt on even its status as a new international norm. Both Russia and China expressed hostility soon after the initial US pledge.<sup>186</sup> China stated the hope that the United States would remain committed to its promises regarding military actions in outer space but called the U.S. hypocritical.<sup>187</sup> Russia similarly noted that it considered the United States decision a move in the right

181. See generally Jordan J. Paust, *Customary International Law: Its Nature, Sources and Status as Law of the United States*, 12 MICH. J. INT'L L. 59 (1990).

182. Koh, *supra* note 6, at 738–39. For example, the Obama administration declared that the U.S. government would, out of legal obligation, regard humane treatment principles of Article 75 of the First Additional Protocol to the Geneva Conventions as applicable to any individual detained in an international armed conflict, and it stated that it expected other nations to also abide by those principles. *Id.*

183. Nuclear Tests Case (Austl. v. Fr.), Judgment, 1974 I.C.J. 253, 267, ¶ 43 (Dec. 20).

184. Int'l Law Comm'n, Rep. on the Work of Its Fifty-Eighth Session, U.N. Doc. A/61/10, at 366–81 (2006).

185. See Bin Cheng, *United Nations Resolutions on Outer Space: “Instant” International Customary Law?*, 5 INDIAN J. INT'L LAW 35 (1965); MICHAEL P. SCHARF, CUSTOMARY INTERNATIONAL LAW IN TIMES OF FUNDAMENTAL CHANGE: RECOGNIZING GROTIAN MOMENTS 123–39 (2013).

186. EurAsian Times Desk, “Stop The Hypocritical Practice” – Russia, China Respond to US Pledge to Ban “Destructive” Anti-Satellite Weapon Tests, EURASIAN TIMES (Apr. 19, 2022), <https://eurasianimes.com/srussia-china-respond-to-us-pledge-to-ban-anti-satellite-tests/>.

187. In the words of a Chinese Foreign Ministry spokesman:

We hope that the American side will truly assume the obligations of a major power, revise a number of its own negative actions in outer space, stop the hypocritical practice of expanding its military superiority under the pretext of arms control, and stop blocking the process of coordinating legal documents on arms control in space.

*Id.* The spokesman further observed that the United States was the first country in the world to test ASATs. *Id.*



direction but did not regard it as a good faith initiative, especially given U.S. efforts to block the Russo-Chinese draft Prevention of Placement of Weapons Treaty.<sup>188</sup> In contrast, India merely abstained, which might be explained by its stage of ASAT development. As the last of the four countries to conduct an ASAT test, it requires more time to command the technology, but appears willing to leave the door open for a future such pledge.<sup>189</sup>

While a vast majority of UN members supported the ban, it thus remains a failure because the most important countries did not join the U.S. initiative. What the ASAT test ban attempt teaches us about non-binding international agreements is that their membership rather than their non-bindingness is the main cause for concern. In this sense, a non-binding agreement supported by all relevant States is better than a legally binding treaty whose membership does not include the most important actor. Indeed, even if the ASAT test ban would have been made as a legally binding treaty ratified by the same 155 States who voted for the General Assembly resolution, its effect would have been minor if Russia, China, and India were not parties to it. Further, constructing an agreement as non-binding typically increases the chances of wider acceptance, and therefore its overall effect. In this sense, the ASAT test ban is an exception, which may be explained by the fact that it was not put forward as a joint effort by the four ASAT-capable countries—an important lesson in non-binding governance.<sup>190</sup>

### 5. *European Union Initiatives*

Many key agreements and debates in the governance of space war have occurred multilaterally in the forums of the UN, but the EU has also sought to enhance space security, though with limited success. In 2008—the same year in which Russia and China proposed the Prevention of Placement of

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188. In the words of the Russian Deputy Foreign Minister: “[W]hat about our well-known proposal for a moratorium on the deployment of medium-range missile systems, is the United States ready to return to its consideration in a positive way, and is it ready to commit itself not to deploy such systems anywhere in response to our moratorium?” *Id.* It is also worth noting that while the ASAT tests discussed herein refer to terrestrial based systems, where a missile is launched from Earth and targets a satellite in orbit, Russia may have space-based ASAT weapons. See Jaganath Sankaran, *Russia’s Anti-Satellite Weapons: An Asymmetric Response to U.S. Aerospace Superiority*, ARMS CONTROL ASS’N (Mar. 2022), <https://www.armscontrol.org/act/2022-03/features/russias-anti-satellite-weapons-asymmetric-response-us-aerospace-superiority>.

189. Kartik Bommakanti, *An A-SAT Test Ban Can Wait: India Needs to Widen Kinetic A-SAT Capabilities*, OBSERVER RSCH. FOUND. (Jan. 25, 2023), <https://www.orfonline.org/expert-speak/an-a-sat-test-ban-can-wait/>.

190. An opposite example is the Space Debris Mitigation Guidelines prepared by the Inter-Agency Space Debris Coordination Committee, which includes all major spacefaring nations. These guidelines were also later adopted by the General Assembly, but, more importantly, they represent a political undertaking by all major spacefaring nations. U.N. OFF. FOR OUTER SPACE AFFS., SPACE DEBRIS MITIGATION GUIDELINES OF THE COMMITTEE ON THE PEACEFUL USES OF OUTER SPACE (2010), [https://www.unoosa.org/pdf/publications/st\\_space\\_49E.pdf](https://www.unoosa.org/pdf/publications/st_space_49E.pdf).

Weapons Treaty—the EU put forward a proposal for a nonbinding instrument: the Code of Conduct for Outer Space Activities.<sup>191</sup> The Council of the EU adopted the draft Code of Conduct later that year, and the EU subsequently initiated negotiations with other countries with the goal of creating a broader international agreement.<sup>192</sup> The Code of Conduct addressed space security issues and mentioned military activities and the “peaceful purposes” principles, but it did not discuss arms control.<sup>193</sup> The multilateral negotiations that the EU convened in 2015 demonstrated divergence of opinions and approach, mainly between Western nations and Japan, on the one hand, and the rest of the world, led by the BRICS nations, on the other.<sup>194</sup> Ultimately the initiative failed to gather enough support and was shelved after almost a decade of futile discussions.<sup>195</sup>

Nevertheless, the EU has not abandoned efforts to promote multilateral agreements on space security, and it has had success encouraging the elaboration of principles of responsible behavior. In an official statement at the Conference on Disarmament in 2017, the EU expressed reservations for the no first placement resolutions and instead urged a focus on the norms of responsible behavior regarding military activities in space.<sup>196</sup> The United Kingdom then took the lead on these efforts and in 2020, with backing from the United States, successfully introduced a proposal in the General Assembly on “[r]educing space threats through norms, rules and principles of responsible behaviours.”<sup>197</sup> The resolution—which marked a small victory in an arena otherwise more favorable to initiatives led by Russia and China—called on States to develop and implement norms, rules and principles of responsible behavior in space and asked the Secretary-General to compile a report based on States’ submissions.<sup>198</sup> The Secretary-General submitted its report to the General Assembly in July 2021,<sup>199</sup> and in December of that year, the General Assembly established an open-ended working group tasked with

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191. General Secretariat, *Council Conclusions and Draft Code of Conduct for Outer Space Activities*, SEC (2008) 17175/08.

192. CHRIS JOHNSON, SECURE WORLD FOUND., DRAFT INTERNATIONAL CODE OF CONDUCT FOR OUTER SPACE ACTIVITIES FACT SHEET (2014), [https://swfound.org/media/166384/swf\\_draft\\_international\\_code\\_of\\_conduct\\_for\\_outer\\_space\\_activities\\_fact\\_sheet\\_february\\_2014.pdf](https://swfound.org/media/166384/swf_draft_international_code_of_conduct_for_outer_space_activities_fact_sheet_february_2014.pdf).

193. *Council Conclusions and Draft Code of Conduct for Outer Space Activities*, *supra* note 191, at 3.

194. Jakhu et al., *Conflicts in Space*, *supra* note 119, at 678–79.

195. *Id.*

196. *EU Statement on PAROS*, *supra* note 167.

197. G.A. Res. 75/36, at 1 (Dec. 7, 2020).

198. *Id.*

199. This report included all State submissions, as well as submissions from NGOs. See U.N. Secretary-General, *Reducing Space Threats Through Norms, Rules and Principles of Responsible Behavior*, U.N. Doc. A/76/77 (July 13, 2021).

recommending “possible norms, rules and principles of responsible behaviours relating to threats by States to space systems.”<sup>200</sup>

The success of launching and continuing this process marks an achievement for Western countries, which prefer soft law, over the Sino-Russian approach that favors hard law agreements like the proposed Prevention of the Placement of Weapons Treaty.<sup>201</sup> However, Russia and China remained contrarian in the working group, which ended recently without any agreement on any principle or norms.<sup>202</sup> Still, the discussions were important in putting forward all the issues at stake, and the UN First Committee has already adopted a United Kingdom proposal to convene a succeeding open-ended working group under the same title to continue these efforts.<sup>203</sup>

### 6. Research Initiatives on the Laws of Space Warfare

In response to decades of deadlock within the Conference on Disarmament and UN-COPUOUS, private actors such as research centers and think tanks have been working to clarify the international law governing space warfare.<sup>204</sup> With the chances for a new multilateral regime low and States quickly building military capacity in space,<sup>205</sup> researchers like Jakhu have expressed “a dire need to clarify the rules of international law applicable to military space activities during peacetime, as well as those governing the prohibition on the use of force and international humanitarian law.”<sup>206</sup> Projects like the *McGill Manual* and *Woomera Manual* aim to do exactly that.

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200. G.A. Res. 76/231, at 3 (Dec. 24, 2021). The working group was also asked to include “as appropriate, how [these norms, rules, and principles] would contribute to the negotiation of legally binding instruments, including on the prevention of an arms race in outer space.” *Id.*

201. See *supra* Section II.B.3.

202. Open-Ended Working Group on Reducing Space Threats Through Norms, Rules and Principles of Responsible Behaviours, Chairperson’s Summary, U.N. Doc. A/AC.294/2023/WP.22 (Sept. 1, 2023); see JESSICA WEST, PROJECT PLOUGHSHARES, THE OPEN-ENDED WORKING GROUP ON REDUCING SPACE THREATS: RECAP OF THE THIRD SESSION 9–10 (2023), [https://assets-global.website-files.com/63e066081ef50cb16a3f4157/6478f13f4ffb075b3b23fd40\\_OEWGThirdSessionJune2023.pdf](https://assets-global.website-files.com/63e066081ef50cb16a3f4157/6478f13f4ffb075b3b23fd40_OEWGThirdSessionJune2023.pdf) (discussing Russia and China’s opposition to the goal of “norms” instead of binding rules).

203. See Consensus Scuttled in First Committee, *supra* note 150.

204. See Martinez, *supra* note 134, at 66 (discussing the importance of harnessing the private sector for space security); Tepper, *supra* note 2, at 543–45 (noting the role of NGOs and academic experts in space governance).

205. Back in 1999, Bell argued that “[i]t is inevitable that mankind will weaponize space . . . . The United States is in the early stages of a transition from using space assets to support combat operations on the surface of the earth, to using space assets to conduct combat operations in space, from space, and through space.” Thomas D. Bell, *Weaponization of Space: Understanding Strategic and Technological Inevitabilities*, at iv (Air War Coll., Occasional Paper No. 6, 1999), <https://apps.dtic.mil/dtic/tr/fulltext/u2/a425531.pdf>.

206. Jakhu, *Conflicts in Space*, *supra* note 119, at 659.

In 2016, the McGill Centre for Research in Air and Space Law launched an international project for drafting the *McGill Manual on International Law Applicable to Military Uses of Outer Space*—known as the *McGill Manual*—and the first volume was published in 2022.<sup>207</sup> The *McGill Manual* will clarify the fundamental rules of international law applicable to military uses of outer space by states and non-state actors during both peacetime and periods of armed conflict.<sup>208</sup> The project follows the footsteps of similar efforts to articulate the law of armed conflict at sea, in air, and in cyberspace,<sup>209</sup> but is intended for use by a wider spectrum of space operators, stakeholders, experts, and interest groups. The project is based on the belief that an objective clarification of existing international law applicable to military uses of outer space carried out by an independent international group of experts might dissuade the actual use of force and avoid future conflicts in outer space.<sup>210</sup> As primarily a restatement of the existing law, the *McGill Manual* does not have legal effect in itself, but it is expected to serve as a valuable reference on binding law for military personnel, defense officials, and policymakers.<sup>211</sup>

Other similar research initiatives are also underway. A spin-off of the *McGill Manual* project is the competing *Woomera Manual on the International Law of Military Space Operations*.<sup>212</sup> The team from Adelaide University, which was part of the original McGill group, broke away and established their own competing project, teaming with several other universities.<sup>213</sup> Like the *McGill Manual*, the *Woomera Manual* aims to

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207. MCGILL UNIV. INST. OF AIR & SPACE L., MANUAL ON INTERNATIONAL LAW APPLICABLE TO MILITARY USES OF OUTER SPACE (2022), [https://www.mcgill.ca/iasl/files/iasl/mcgill\\_manual\\_volume\\_i\\_-\\_rules.pdf](https://www.mcgill.ca/iasl/files/iasl/mcgill_manual_volume_i_-_rules.pdf) [hereinafter MCGILL MANUAL]. Participants in the project include scholars and experts from around the world—from spacefaring nations and non-spacefaring nations—working in their individual capacity, as well as representatives of the International Committee of the Red Cross and the Union of Concerned Scientists. Representatives of several States also often participate as observers in the drafting meetings.

208. The issues to be addressed by the *McGill Manual* include responsibility for national space activities, treatment of astronauts, military bases and installations, space debris, cooperation and mutual assistance, recovery and return of space objects, jamming of satellite communications, orbital rights, and protection of the natural environment, among many others.

209. These projects include the *San Remo Manual on International Law Applicable to Armed Conflict at Sea*, the *Manual on International Law Applicable to Air and Missile Warfare* from Harvard University, and the *Tallinn Manual on International Law Applicable to Cyber Warfare*.

210. MCGILL MANUAL, *supra* note 207, at 2.

211. *Id.* at 2–3. This is in contrast to the *Tallinn Manual*, which attempted to set out new rules of cyber warfare, not just to compile existing law. *See infra* Section II.C. As a result, the *McGill Manual* is expected to have a greater impact on States' behavior than *Tallinn Manual*.

212. *The Woomera Manual*, UNIV. OF ADELAIDE, <https://law.adelaide.edu.au/woomera/> (last visited Dec. 9, 2023).

213. The other participating universities are the University of Exeter, the University of Nebraska and the University of New South Wales – Canberra. *Id.*

objectively articulate and clarify existing international law applicable to military space operations.<sup>214</sup> It is yet to be seen how the competition between these two manuals will influence their adoption or rejection and their capacity to influence actors' behavior.

### *7. Conclusions on the Status of the Various Initiatives*

The various initiatives reviewed above to restrict space warfare need further work—and, more importantly, political will and agreement among the leading actors—in order to bring significant results. One reason for the insufficient political will is that, while some sees space as a “sanctuary” to be exempt from wars and national rivalries, many see space as an “ultimate high ground” to control.<sup>215</sup> Moreover, actors are splintered on the best way to approach questions of regime and governance. Russia, China, and most other non-Western countries support legally binding multilateral agreements, whereas the United States and EU oppose such agreements and instead support soft law like transparency and confidence building measures.<sup>216</sup> China and Russia promote one initiative, while the EU promotes another, and the Conference on Disarmament remains deadlocked.<sup>217</sup> The fault lines of the ongoing controversies frequently align by West-East and North-South, though even Western nations have disagreements among themselves. The result is multiple initiatives and faltering progress.

### *C. Governance of Conflicts in Theater of Cyberspace*

Cyber warfare will likely be the main method of space warfare in the foreseeable future due to the cost of space to space or space to Earth attacks, so it is worth briefly describing the instruments and agreements relevant to cyberspace. Cyber-attacks have a low barrier to entry, and offense is cheaper than defense, which makes them available to states that are not top space powers and even non-state actors like criminal organizations and terrorist groups.<sup>218</sup> For this reason, one commentator suggests that a combined space-

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214. *Id.*

215. Jakhu et al., *Conflicts in Space*, *supra* note 119, at 662; see Bruce M. DeBlois, *Space Sanctuary: A Viable National Strategy*, 12 AIRPOWER J. 41 (Winter 1998) (presenting strategic arguments for not weaponizing space).

216. See *supra* Sections II.B.3–5.

217. Jakhu et al., *Conflicts in Space*, *supra* note 119, at 672.

218. For example, Turla, a Russian criminal gang, allegedly hijacked satellite IP addresses, later used to steal data, and Hamas hacked an Israeli TV satellite and took over its broadcast for a few minutes. Kim Zetter, *Russian Spy Gang Hijacks Satellite Links to Steal Data*, WIRED (Sept. 9, 2015, 8:30 AM), <https://www.wired.com/2015/09/turla-russian-espionage-gang-hijacks-satellite-connections-to-steal-data/>; Graham Cluley, *Israeli TV Hijacked by Hamas Hackers*, BITDEFENDER (July 2014), <https://www.bitdefender.com/blog/hotforsecurity/israeli-tv-hijacked-by-hamas-hackers/>.

cyber warfare theatre is emerging, which might even become the primary battlefield for global powers in the twenty-first century.<sup>219</sup> For instance, in 2020, the U.S. Chairman of the Joint Chiefs of Staff predicted that “the first shots of a future war between great powers is likely to be in space and cyber.”<sup>220</sup> The war in Ukraine saw, for the first time, space-based services targeted as part of a military campaign when, on the eve of the invasion, Russia disrupted the satellite service of the Ukrainian army, making Ukraine perhaps the first space-cyber war.<sup>221</sup>

### 1. Defining Cyber Conflicts

Despite the prominence of cyber-warfare, how to define a cyber-attack remains an unresolved question. On one hand, for example, the disruption of satellite signals may, in some cases, not be considered an attack at all.<sup>222</sup> Projects like the *Tallinn Manual*, discussed below, seek to provide guidelines for this assessment.<sup>223</sup> On the other hand, a cyber-attack may be answered by an old-fashioned “real-world” response, as the United States has said:

[T]he United States will respond to hostile acts in cyberspace as we would to any other threat to our country. We reserve the right to use all necessary means— diplomatic, informational, military, and economic—as appropriate and consistent with applicable international law, in order to defend our Nation, our allies, our partners, and our interests.<sup>224</sup>

The head of the Russian space agency declared, amidst the war with Ukraine and potential disruption of Russian space services, that Russia will treat any hacking of its satellites as a *casus belli*.<sup>225</sup> Israel was the first to respond to cyber-attacks by means of conventional warfare, when it attacked

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219. Marc Boucher, *The Emerging Space Cyberwarfare Theatre*, SPACEREF (Mar. 18, 2013), <https://spaceref.com/newspace-and-tech/the-emerging-space-cyberwarfare-theatre/>.

220. Katrina Manson & Christian Shepherd, *US Military Officials Eye New Generation of Space Weapons*, FIN. TIMES (Sept. 2, 2020), <https://www.ft.com/content/d44aa332-f564-4b4a-89b7-1685e4579e72>.

221. TEPPER, *supra* note 21, at 2–3.

222. See Jakhu et al., *Conflicts in Space*, *supra* note 119, at 666. Disruption can include jamming, blinding, spoofing, dazzling, and other forms of interference.

223. See *infra* Section II.C.3.

224. THE WHITE HOUSE, INTERNATIONAL STRATEGY FOR CYBERSPACE: PROSPERITY, SECURITY, AND OPENNESS IN A NETWORKED WORLD 14 (2011), [https://obamawhitehouse.archives.gov/sites/default/files/rss\\_viewer/international\\_strategy\\_for\\_cyberspace.pdf](https://obamawhitehouse.archives.gov/sites/default/files/rss_viewer/international_strategy_for_cyberspace.pdf).

225. *Russia Space Agency Head Says Satellite Hacking Would Justify War*, REUTERS (Mar. 2, 2022), <https://www.reuters.com/world/russia-space-agency-head-says-satellite-hacking-would-justify-war-report-2022-03-02/>.

a building in Gaza from which Hamas hackers allegedly launched or tried to launch cyber-attacks against Israeli targets.<sup>226</sup>

Koh explains “that a cyber attack can, under certain circumstances, constitute an illegal use of force; that under certain conditions, such an attack can give rise to a right of self-defense.”<sup>227</sup> Indeed, we might be witnessing the emergence of a new customary international law by which certain cyberattacks on space assets are *casus belli*,<sup>228</sup> permitting individual and collective self-defense through the invocation of Article 51 of the UN Charter.<sup>229</sup> The identities of the countries that have stated this or acted accordingly—two leading superpowers and a cyber power—suggest that the principle is not a marginal point of view.<sup>230</sup> Further, now that NATO declared space to be an operational domain, such an attack on space assets of a NATO member might even trigger Article 5 of the North Atlantic Treaty, calling other members to join the war.<sup>231</sup>

## 2. UN Efforts on Cyber Conflict

The UN’s work to regulate cyberwar has primarily resulted in reports by groups of government experts and the creation of an open-ended working group. Cybersecurity first became an agenda item for the General Assembly in 1998, pursuant to Russia’s initiative to place it on the agenda of the UN’s First Committee.<sup>232</sup> A 1999 resolution entitled “Developments in the field of information and telecommunications in the context of international security” recognized the benefits of information and communication technologies

226. In a Tweet on May 5, 2019, the Israel Defense Forces announced: “We thwarted an attempted Hamas cyber offensive against Israeli targets. Following our successful cyber defensive operation, we targeted a building where the Hamas cyber operatives work.” Israel Defense Forces (@IDF), TWITTER (May 5, 2019, 11:55 AM), <https://twitter.com/IDF/status/1125066395010699264>.

227. Koh, *supra* note 6, at 742.

228. See Deborah Housen-Couriel, *Disruption of Satellite Transmissions ad Bellum and in Bello: Launching a New Paradigm of Convergence*, 45 ISR. L. REV. 431, 438–39 (2012).

229. On the right of self-defense and what constitutes an “armed attack” under Article 51, see *Military and Paramilitary Activities in and Against Nicaragua (Nicar. v. U.S.)*, Judgement, 1984 I.C.J. 392 ¶ 92 (Nov. 26).

230. See *supra* notes 224–226.

231. *NATO’s Approach to Space*, *supra* note 13.

232. *Developments in the Field of Information and Telecommunications in the Context of International Security*, U.N. OFF. FOR DISARMAMENT AFFS., <https://www.un.org/disarmament/ict-security/> (last visited Dec. 9, 2023). While the First Committee covers cyber-security, the issues of internet governance and freedom of expression on the internet are covered by the Second Committee (Economic and Financial Committee) and Third Committee (Social, Humanitarian and Cultural Committee). *United Nations: Recent Developments in the Field of Information and Telecommunications in the Context of International Security*, CCDCOE, [https://ccdcoe.org/incyder-articles/united-nations-recent-developments-in-the-field-of-information-and-telecommunications-in-the-context-of-international-security/#footnote\\_0\\_2548](https://ccdcoe.org/incyder-articles/united-nations-recent-developments-in-the-field-of-information-and-telecommunications-in-the-context-of-international-security/#footnote_0_2548) (last visited Dec. 9, 2023).

(“ICTs”), but also cautioned of threats to cyber-security.<sup>233</sup> In 2003, again pursuant to a Russian proposal, the UN Secretary-General established the UN Group of Governmental Experts (“GGE”) on Developments in the Field of Information and Telecommunications in the Context of International Security.<sup>234</sup> Five more such Groups were later established over the next fifteen years.<sup>235</sup>

The GGEs, which fell under the UN’s First Committee with the UN Office for Disarmament Affairs as Secretariat, were tasked with creating reports on the security implications of ICTs.<sup>236</sup> The first Group did not reach consensus and was unable to agree on a report.<sup>237</sup> The second Group had more success and submitted its report in 2010, which acknowledged the need for international cooperation—covering States, the private sector, and civil society—and provided several recommendations on measures like risk-reduction, exchange of information, and capacity building.<sup>238</sup> The third Group, which comprised representatives from fifteen States, including all the cyber-powers, made a breakthrough in 2013 and created the normative framework for international cyber-security. It did this first and foremost by suggesting the application of international law to activities in cyberspace.<sup>239</sup>

As with outer space, the application of international law to cyberspace was not self-evident.<sup>240</sup> The third Group’s report stated that “the application of norms derived from existing international law relevant to the use of ICTs by States is essential to reduce risks to international peace, security and

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233. G.A. Res. 53/70 (Dec. 4, 1998).

234. G.A. Res. 58/32 (Dec. 8, 2003).

235. Group 1 worked from 2004–05. G.A. Res. 58/32 (Dec. 8, 2003). Group 2 worked from 2009–10. G.A. Res. 60/45 (Dec. 8, 2005). Group 3 worked from 2012–13. G.A. Res. 66/24 (Dec. 2, 2011). Group 4 worked from 2014–15. G.A. Res. 68/243 (Dec. 27, 2013). Group 5 worked from 2016–17. G.A. Res. 70/237 (Dec. 23, 2015). Group 6 worked from 2019–21. G.A. Res. 73/266 (Dec. 22, 2018).

236. Placing the Groups in the context of the UN’s First Committee was meaningful, since it meant that issues not under the purview of the First Committee—such as espionage, Internet governance, development and digital privacy—are not the focus of the Group’s work. The Groups further decided that terrorism and crime, though relevant to cyber-security, are best discussed in other UN bodies. UNIDIR & CTR. FOR STRATEGIC & INT’L STUD., REPORT OF THE INTERNATIONAL SECURITY CYBER ISSUES WORKSHOP SERIES 5 (2016).

237. U.N. Secretary-General, *Group of Governmental Experts on Developments in the Field of Information and Telecommunications in the Context of International Security*, U.N. Doc. A/60/202 (Aug. 5, 2005).

238. U.N. Secretary-General, *Group of Governmental Experts on Developments in the Field of Information and Telecommunications in the Context of International Security*, U.N. Doc. A/65/201 (July 30, 2010).

239. U.N. Secretary-General, *Group of Governmental Experts on Developments in the Field of Information and Telecommunications in the Context of International Security*, U.N. Doc. A/68/98 (June 24, 2013) [hereinafter *GGE 3 ICT Security Report*]; see also G.A. Res. 68/243 (Jan. 9, 2014) (taking note of the report and requesting the Secretary-General to establish a new Group).

240. See *supra* Section II.B.1.



stability.”<sup>241</sup> The report also called for extending principles of State sovereignty to cyber-activities and jurisdiction over information technology infrastructure within their territory, and for States to respect human rights when acting on cybersecurity.<sup>242</sup> In a subsequent joint report on the Group’s work, UNIDIR and the Center for Strategic & International Studies observed:

The 2013 report reshaped the political context for discussing cyberspace by upending the widely held but mistaken view that the Internet was “global commons[.]” The idea of a borderless cyberspace that grew out of millennial thinking on the future of international relations was an impediment to negotiations and agreement and it introduced confusion over the role of States and their responsibilities. It is now widely accepted that the Internet has borders and depends on a physical infrastructure that is subject to sovereign control. The recognition of sovereignty usefully embeds international discussion of cybersecurity in the existing framework for obligations, State practice, and understandings among States.<sup>243</sup>

The fourth Group, which submitted its report in 2015, built on the 2013 report and “examined *how* international law applies to the use of ICTs by States.”<sup>244</sup> The 2015 report also “emphasized the importance of international law, the Charter of the United Nations and the principle of sovereignty” as the foundation for improved security in the use of cyber technology.<sup>245</sup> The General Assembly endorsed the report and called upon Member States to follow its recommendations. The fifth Group did not reach consensus on a final report due to disagreements on countermeasures, self-defense, and international humanitarian law.<sup>246</sup> The sixth and last Group adopted a report by consensus in 2021, which further developed the normative framework for

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241. *GGE 3 ICT Security Report*, *supra* note 239, at 2.

242. *Id.* at 8. In addition, the report recommended the application of the rules of international law regarding international wrongful acts and encouraged the introduction of confidence-building measures like voluntary information exchange about strategies, policies, best practices, and mechanisms for cooperation in law enforcement. *Id.* at 9–10.

243. UNIDIR & CTR. FOR STRATEGIC & INT’L STUD., *supra* note 236, at 6.

244. U.N. Secretary-General, *Group of Governmental Experts on Developments in the Field of Information and Telecommunications in the Context of International Security*, U.N. Doc A/70/174, at 3 (July 22, 2015) [hereinafter *GGE 4 ICT Security Report*] (emphasis added); *see also* G.A. Res. 70/237 (Dec. 23, 2015) (welcoming the report and requesting the Secretary-General to establish another Group of Government Experts).

245. *GGE 4 ICT Security Report*, *supra* note 244, at 3.

246. Ann Väljataga, *Back to Square One? The Fifth UN GGE Fails to Submit a Conclusive Report at the UN General Assembly*, CCDCOE, <https://ccdcOE.org/incyde/articles/back-to-square-one-the-fifth-un-gge-fails-to-submit-a-conclusive-report-at-the-un-general-assembly/> (last visited Dec. 9, 2023).

responsible behavior of States in cyberspace in the context of international security.<sup>247</sup>

In addition to the GGEs, the General Assembly launched an open-ended working group in 2018, which worked in parallel to the GGEs and included all interested States.<sup>248</sup> In 2021, the Group adopted by consensus a report that stressed the importance of non-binding principles and agreements.<sup>249</sup> The report concluded that “[v]oluntary, non-binding norms of responsible State behaviour can reduce risks to international peace, security and stability,” as such norms reflect the expectations and standards of the international community.<sup>250</sup> In other words, though these norms do not replace or alter States’ binding obligations and rights, they provide additional specific guidance on what constitutes responsible behavior in the use of ICTs.<sup>251</sup> In terms of substance, the report’s recommendations focused primarily on the need for States to refrain from conducting or supporting ICT activities that damage critical infrastructure.<sup>252</sup> Since 2020, the General assembly has tasked a new open-ended working group, with a five-year term, with further developing these principles and expectations around security and ICTs.<sup>253</sup>

In short, despite some recent faltering, there is now general acceptance of the applicability of international law to cyber operations.<sup>254</sup> As with the theater of outer space, international law has been applied to the *activities* of States in this theater.<sup>255</sup> However, unlike with outer space, the application of international law to activities in cyberspace was not made by a legally binding instrument such as a treaty, but rather by reports of the third and fourth GGEs.<sup>256</sup> Though the reports are not legally binding, they articulate

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247. U.N. Secretary-General, *Group of Government Experts on Advancing Responsible State Behaviour in Cyberspace in the Context of International Security*, U.N. Doc. A/76/135 (July 14, 2021).

248. G.A. Res. 73/27, at 5 (Dec. 5, 2018).

249. Open-Ended Working Group on Developments in the Field of Information and Telecommunications in the Context of International Security, Final Substantive Report, U.N. Doc. A/AC.290/2021/CRP.2 (Mar. 10, 2021).

250. *Id.* at 4.

251. *Id.* at 4–5.

252. *Id.* at 5.

253. G.A. Res. 75/240 (Dec. 31, 2020).

254. François Delerue, *The Codification of the International Law Applicable to Cyber Operations: A Matter for the ILC?*, 7 EUR. SOC’Y INT’L L. REFLECTIONS, July 3, 2008, at 1.

255. See *supra* Section II.B.1.

256. The 2013 report noted that “[g]iven the unique attributes of ICTs . . . additional norms could be developed over time.” *GGE 3 ICT Security Report*, *supra* note 239, at 2. Indeed, the Group that produced the 2015 report saw it as one of its tasks to “identify where additional norms that take into account the complexity and unique attributes of ICTs may need to be developed.” *GGE 4 ICT Security Report*, *supra* note 244, at 7. Specific rules urged by the report include state jurisdiction over ICT infrastructure within their territory, a prohibition on ICT activity that intentionally

understandings and consensus reached by all the cyber powers, and they represent the only widely accepted multilateral guidance to responsible State behavior in cyberspace.<sup>257</sup> In providing this framework, they can be considered a regime, though a weak one. This will not likely mean full adherence, but overall States are expected to follow its principles.<sup>258</sup> This would be more than enough, since even binding international law is not always followed; rather, as Henkin famously noted, “almost all nations observe almost all principles of international law and almost all of their obligations almost all of the time.”<sup>259</sup>

### 3. *The Tallinn Manual*

Similar to the realm of outer space, efforts to advance the law of cyber warfare are also coming from academia. The *Tallinn Manual on the International Law Applicable to Cyber Warfare* (“*Tallinn Manual*”) is a NATO-initiated and supported academic study on the rules of international law applicable to cyber conflicts and cyber warfare published in 2013.<sup>260</sup> The *Tallinn Manual 2.0*, released in 2017, expands the scope of the first edition to cyber operations during peacetime.<sup>261</sup> The *Tallinn Manual* is obviously not legally binding, but it does promote the understanding of the legal rules applicable to cyber warfare.<sup>262</sup> In particular, the manual discusses the applicability of general international law—like sovereignty, due diligence, jurisdiction, and international responsibility—to the realm of cyberspace.<sup>263</sup> It also discusses cyber operations not *per se* regulated by international law, and the relevance of specialized regimes like international human rights law,

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damages critical infrastructure, and a requirement that States should seek to prevent the proliferation of malicious ICT. *Id.* at 8, 12.

257. William H. Boothby, *Cyber Capabilities*, in *NEW TECHNOLOGIES AND THE LAW IN WAR AND PEACE* 85 (William H. Boothby ed., 2018).

258. The many States, including all the cyber powers, that have entrusted the issue to UN and the GGEs are not likely to easily retract this mandate. Moreover, the States that sent representatives to the GGEs or endorsed the reports will not easily denounce the basic principles stipulated therein.

259. LOUIS HENKIN, *HOW NATIONS BEHAVE* 47 (2d ed. 1979); *see also* Jianming Shen, *The Basis of International Law: Why Nations Observe*, 17 *DICKINSON J. INT’L L.* 287 (1999).

260. NATO COOP. CYBER DEF. CTR. OF EXCELLENCE, *TALLINN MANUAL ON THE INTERNATIONAL LAW APPLICABLE TO CYBER WARFARE* (Michael N. Schmitt ed., 2013).

261. NATO COOP. CYBER DEF. CTR. OF EXCELLENCE, *TALLINN MANUAL 2.0 ON THE INTERNATIONAL LAW APPLICABLE TO CYBER OPERATIONS* (Michael N. Schmitt ed., 2d ed. 2017) [hereinafter *TALLINN MANUAL 2.0*].

262. *See* SCOTT J. SHACKELFORD, *MANAGING CYBER ATTACKS IN INTERNATIONAL LAW, BUSINESS, AND RELATIONS: IN SEARCH OF CYBER PEACE* (2014); *see also* Michael Gervais, *Cyber Attacks and the Laws of War*, 30 *BERKELEY J. INT’L L.* 525 (2012); Oona A. Hathaway et al., *The Law of Cyber-Attack*, 100 *CALIF. L. REV.* 817 (2012); Pauline C. Reich et al., *Cyber Warfare: A Review of Theories, Law, Policies, Actual Incidents - and the Dilemma of Anonymity*, 1 *EUR. J. L. & TECH.* 1 (2010).

263. *TALLINN MANUAL 2.0*, *supra* note 261, at 11–167.

diplomatic and consular law, the law of the sea, air and space law, and international telecommunication law.<sup>264</sup>

The *Tallinn Manual 2.0* is the most comprehensive work written so far describing how international law regulates cyber activities that take place below the use-of-force threshold.<sup>265</sup> Jensen, an expert involved in the creation of the *Tallinn Manual*, notes that while there are still many areas of disagreement and lack of clarity, it will serve as the starting point for moving forward with the law on cyber operations.<sup>266</sup> Unlike the Group of Government Expert reports, which sought to broaden the scope of norms, principles and rules that apply to activities in cyberspace, the *Tallinn Manual* initially set out to identify existing applicable rules of law and comment on how they apply to activities in cyberspace.<sup>267</sup> Though not binding, the manuals still help to create, reflect, and affect actors' expectations. In this they, like the GGE reports, may be considered a weak regime, at least for States that openly supported the project.<sup>268</sup> In view of these multiple frameworks and forums, even if we examine only the theater of cyberspace, there is, as Nye observed, a regime complex.<sup>269</sup>

#### *D. The Regime Complex of Space Warfare*

As the above review demonstrates, space warfare is governed neither by an institution with a comprehensive mandate imposing regulations through a hierarchical governance structure, nor a single set of applicable norms, rules and procedures. To the contrary, there are numerous sources of norms, regulations and procedures, and numerous forums with partly overlapping mandates. Nevertheless, the law of space warfare is not a fragmented stockpile of unrelated arrangements with no identifiable core or linkages. There are important joint sources of both hard and soft law such as the foundational Outer Space Treaty.<sup>270</sup> There are also important common forums, notably the General Assembly and its First Committee, the

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264. *Id.* at 168–300.

265. Robert E. Barnsby & Shane R. Reeves, *Give Them an Inch, They'll Take a Terabyte: How States May Interpret Tallinn Manual 2.0's International Human Rights Law Chapter*, 95 TEX. L. REV. 1515, 1515 (2017).

266. Eric Talbot Jensen, *The Tallinn Manual 2.0: Highlights and Insights*, 48 GEO. J. INT'L L. 735, 778 (2017).

267. Boothby, *supra* note 257, at 87. It did, however, eventually expand and introduce new norms.

268. *See supra* Section II.C.2.

269. 1 JOSEPH S. NYE, JR., GLOBAL COMM'N ON INTERNET GOVERNANCE, THE REGIME COMPLEX FOR MANAGING GLOBAL CYBER ACTIVITIES 7 (2014), [https://www.cigionline.org/sites/default/files/gcig\\_paper\\_no1.pdf](https://www.cigionline.org/sites/default/files/gcig_paper_no1.pdf).

270. *See supra* Section II.B.2.

Conference on Disarmament, and UN-COPUOS.<sup>271</sup> Work is ongoing in some forums, and more issue-specific forums may be established going forward. The laws of space warfare thus evolve incrementally and progressively, with the various agreements loosely coupled. The laws of space warfare may be described, borrowing from Koh, as “an innovative array of binding and nonbinding arrangements, layered cooperation, normative dialogues, and hybrid public-private partnerships.”<sup>272</sup> As the remainder of this Article will explain, this reality can be described and analyzed as a case of polycentric governance or a regime complex.<sup>273</sup>

### III. STRUCTURAL NON-BINDINGNESS

This Part demonstrates that the rise of non-binding rules and agreements was inevitable—a consequence of the anarchic<sup>274</sup> structure of the international system, the significant increase in the number of state actors, the increasing diffusion of power globally, and the evolution of domestic processes, all of which hinder the achievement of hard rules and commitments. Moreover, this Part explains that the rise of non-bindingness is actually advantageous because it facilitates governance in a troubled international system. To this end, this Part uses the lenses of political theory and international relations theory, bringing to convergence their insights to analyze the phenomenon of non-binding international law.

#### A. *Chronicle of Polycentric Governance Foretold*<sup>275</sup>

Polycentric governance is a mode of decentralized governance. Global affairs are characterized by what international relations scholars call “anarchy”—the absence of a global central political authority. Absent a global legislator, international lawmaking is in the hands of States, which choose the treaties and international organizations to join. International lawmaking is thus, by nature, decentralized. Similarly, the application of international law is in the hand of States and other actors in global affairs; hence, it too is decentralized.

Legally binding international lawmaking is an ever-harder task. The basic nature of global affairs—the lack of a global political authority—is joined by growing power diffusion. There are more State actors—the number

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271. See *supra* note 122 and accompanying text.

272. Koh, *supra* note 6, at 746.

273. See *infra* Part III; see also NYE, *supra* note 269, at 7.

274. Anarchic in the sense of the absence of a global sovereign or supreme authority.

275. This title is inspired by GABRIEL GARCÍA MÁRQUEZ, *CHRONICLE OF A DEATH FORETOLD* (Gregory Rabassa trans., Vintage Books 1982) (1981).

of UN Member States grew from 51 in 1945 to the current 193 in 2023<sup>276</sup>—and they are joined by non-State actors, particularly in space, where commercial companies are almost taking the lead from national space agencies. Power is increasingly diffused globally, notably with the rise of China and the other BRICS countries, which leads States to strategically refrain from binding multilateral regimes in order to maintain discretion, especially in view of the increasing number and influence of developing countries in multilateral forums.<sup>277</sup> Add to that the barriers to cooperation in general—the age-old problem of achieving and maintaining collective action<sup>278</sup>—and the result is gridlock in long-standing multilateral institutions.

The same applies in the space context, where UN-COPUOS, entrusted with the progressive development of space law, grew from twenty-four members in its outset in 1959 to 102 in 2023.<sup>279</sup> Now one of the biggest UN committees, it has become much harder to adopt decisions by consensus.<sup>280</sup> The undersupply of rules led to de facto outsourcing of international lawmaking regarding space warfare to various forums that introduce non-binding instruments. This is, by definition, polycentric governance. The work of the alternative forums complements, rather than replaces, the work of the traditional multilateral forums and binding international treaties. Indeed, in some cases, the General Assembly and UN-COPUOS refer an issue to another forum<sup>281</sup> or adopt an instrument prepared by another forum. For example, UN-COPUOS adopted the Space Debris Mitigation Guidelines prepared by the Inter-Agency Space Debris Coordination Committee, and the General Assembly subsequently adopted the same guidelines in a resolution.<sup>282</sup> In a decentralized global system, polycentric governance is both inevitable and effective.

In a similar way, the U.S. domestic process of adopting legally binding international agreements, like Article II treaties and executive agreements, is ever more complicated bureaucratically and politically and is an increasingly

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276. *Growth in United Nations Membership*, UNITED NATIONS, <https://www.un.org/en/about-us/growth-in-un-membership> (last visited Dec. 10, 2023).

277. Eyal Benvenisti & George W. Downs, *The Empire's New Clothes: Political Economy and the Fragmentation of International Law*, 60 STAN. L. REV. 595, 617 (2007).

278. See *supra* Section I.B.

279. *Members of the Committee on the Peaceful Uses of Outer Space*, U.N. OFF. FOR OUTER SPACE AFFS., <https://www.unoosa.org/oosa/en/members/index.html> (last visited Dec. 28, 2023).

280. See Tare Brisibe, *Parliamentary Diplomacy in the United Nations and Progressive Development of Space Law*, 18 EUR. J. L. REFORM 6 (2016); Kai-Uwe Schroggl, *The New Debate on the Working Methods of the UNCOPUOS Legal Subcommittee*, 105 ACTA ASTRONAUTICA 101 (2014).

281. This includes the establishment of a group of government experts or open-ended working group. See *supra* Sections II.B3, II.C.2.

282. See *supra* note 190.

inadequate solution for the U.S. needs for global engagement.<sup>283</sup> As a result, U.S. agreements with other countries are increasingly made by various departments and agencies entering into non-binding agreements.<sup>284</sup> This complements, rather than replaces, the process and products of Article II treaties and executive agreements.

The diffusion of the making of international agreements to multiple forums internationally, and multiple departments and agencies domestically in the United States, is a transition to polycentric governance, which correlates with the use of non-binding agreements. Many decision-making centers lack the capacity to introduce legally binding international agreements—and often the task is delegated to them precisely for this reason, stemming either from a preference for non-binding instruments or because they are more feasible to introduce.<sup>285</sup> Either way, polycentric governance and non-binding agreements are the response to the increasing difficulty, and diminished desirability, of introducing legally binding international treaties and agreements. Indeed, space governance as a whole is already on track to become polycentric.<sup>286</sup>

*B. Polycentric Governance Theory: From Local Commons to Global Commons and Global Affairs*

The concept of polycentric governance has been studied mainly at the national level, where it emanates both from the sub-national decentralization in metropolitan areas and the realities and needs of the management of local commons. It is in this context that Elinor Ostrom distilled eight design principles for robust governance systems, including user boundaries, collective-choice arrangements, monitoring mechanisms, and nested enterprises.<sup>287</sup> Ostrom herself, together with Dietz and Stern, suggested that many of the general principles for robust governance systems for local resources “also appear to be applicable to regional and global resources, although they are less well tested at those scales.”<sup>288</sup> Later work applied the polycentric governance literature to large scale commons and global commons.<sup>289</sup>

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283. See Bradley et al., *supra* note 1, at 1283–85.

284. *Id.* at 1333–35; Koh, *supra* note 6, at 740–43.

285. For example, see the discussions of the UN’s non-binding PAROS efforts and recent work on cyber conflicts, *supra* Sections II.B.3, II.C.2.

286. Tepper, *supra* note 2, at 538–40.

287. See Ostrom, *supra* note 8, at 653.

288. Thomas Dietz, Elinor Ostrom & Paul C. Stern, *The Struggle to Govern the Commons*, 302 SCIENCE 1907, 1910 (2003) (citation omitted).

289. See Special Issue, *Introducing SESMAD: The Social-Ecological Systems Meta-Analysis Database*, 8 INT’L J. COMMONS 265 (2014); ERIK NORDMAN, *THE UNCOMMON KNOWLEDGE OF ELINOR OSTROM: ESSENTIAL LESSONS FOR COLLECTIVE ACTION* 105–92 (2021).

The insights on polycentric governance apply also beyond the commons to global affairs more generally. McGinnis and Elinor Ostrom argue that research on polycentrism in local settings applies to studies of international cooperation for three essential reasons:

First, the substantive nature of many local and global problems is similar. Second, despite vast differences in the scale involved in local and global commons, the underlying logical configuration . . . is fundamentally similar . . . . Third, any global regime that undermines the requisites for successful cooperation at the local level is unlikely to be sustainable in the long run.<sup>290</sup>

Drawing on the study of common-pool resources (“CPRs”), Elinor Ostrom and Keohane further suggest a convergence between the literature on local commons and on international regimes, which both demonstrate the feasibility of collective action without hierarchical authority. Keohane, a leading international relations scholar, first identified the potential to apply Ostrom’s theory to the study of international regimes.<sup>291</sup> Working together, Keohane and Ostrom later observed that “many of the ‘design principles’ underlying successful self-organized solutions to CPR problems appear relevant to the design of institutions to resolve problems of international cooperation.”<sup>292</sup> Ostrom and Cole further developed this model, each applying the knowledge on polycentric governance to climate change, which is more of an issue in global affairs than governance of a commons.<sup>293</sup> And, as Keohane observes, there remain numerous potential research avenues for

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290. Michael McGinnis & Elinor Ostrom, *Design Principles for Local and Global Commons* 2 (Harv. Ctr. Int’l Affs., Working Paper No. D92-6, 1992), <https://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/5460/design%20principles%20for%20local%20and%20global%20commons.pdf>.

291. See Robert O. Keohane, *The Demand for International Regimes*, 36 INT’L ORG. 325, 325–55 (1982). Of Keohane’s contributions, one commentator explains, “Robert Keohane, who has shaped the study of international regimes probably more than any other scholar, has distinguished regimes from international agreements. Regimes are often created when there are potential gains from agreements but when agreements are costly or difficult to reach.” Anu Bradford, *Regime Theory*, in MAX PLANCK ENCYCLOPEDIAS OF INTERNATIONAL LAW § A(5) (2007), <https://opil.ouplaw.com/display/10.1093/law:epil/9780199231690/law-9780199231690-e1462>.

292. Robert O. Keohane & Elinor Ostrom, *Introduction*, in LOCAL COMMONS AND GLOBAL INTERDEPENDENCE: HETEROGENEITY AND COOPERATION IN TWO DOMAINS 1, 2 (Robert O. Keohane & Elinor Ostrom eds., 1995) [hereinafter LOCAL COMMONS AND GLOBAL INTERDEPENDENCE].

293. Elinor Ostrom, *A Polycentric Approach for Coping with Climate Change* (World Bank, Working Paper No. 5095, 2009), <https://documents1.worldbank.org/curated/en/480171468315567893/pdf/WPS5095.pdf>; Daniel H. Cole, *Advantages of a Polycentric Approach to Climate Change Policy*, 5 NATURE CLIMATE CHANGE 114 (2015).



applying Ostrom's theory to global affairs—"unexploited opportunities" for future investigators.<sup>294</sup>

### *C. The Rise of Regime Complexes*

Polycentric governance is thus a necessary evolution of global affairs—and it is also a positive one, as this Section elaborates. One of the core investigations of international relations literature is international cooperation, with a particular research focus on regimes. A regime, according to Krasner's classic definition, is a "set[] of implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations."<sup>295</sup> This definition encompasses what we refer to herein as non-binding international agreements, and, as this Section explains, the concept of "regime complexes" effectively describes polycentric governance.

Regime theory, a field that emerged in the 1970s and evolved into the study of global governance,<sup>296</sup> investigates the emergence of cooperation from the self-interested interaction of multiple actors in the absence of a central political authority, and it emphasizes the importance of institutions in facilitating cooperation.<sup>297</sup> In the absence of a world government, the subjects of the international system participate in their own governance. This is the reality of global governance and this amounts to "governance without government."<sup>298</sup> This decentralized structure projects onto specific issue-areas in global affairs where, instead of a unified coherent regime, there is a collection of regimes that vary in scope and norms.

294. Robert O. Keohane, *Beyond the Tragedy of the Commons: A Discussion of Governing the Commons: The Evolution of Institutions for Collective Action*, 8 PERSP. ON POL. 577, 579 (2010). Indeed, an ongoing research project at the Ostrom Workshop focuses on applying Ostrom's theory, including on polycentric governance, to global affairs.

295. Stephen D. Krasner, *Structural Causes and Regime Consequences: Regimes as Intervening Variables*, 36 INT'L ORG. 185, 186 (1982).

296. For literature on regime theory, see, for example, ROBERT O. KEOHANE & JOSEPH S. NYE, *POWER AND INTERDEPENDENCE: WORLD POLITICS IN TRANSITION* (1977); Keohane, *supra* note 291; Krasner, *supra* note 295; Oran R. Young, *Regime Dynamics: The Rise and Fall of International Regimes*, 36 INT'L ORG. 277 (1982); ROBERT O. KEOHANE, *AFTER HEGEMONY: COOPERATION AND DISCORD IN THE WORLD POLITICAL ECONOMY* (1984); Robert Axelrod & Robert O. Keohane, *Achieving Cooperation Under Anarchy: Strategies and Institutions*, 38 WORLD POL. 226 (1985); *REGIME THEORY AND INTERNATIONAL RELATIONS* (Volker Rittberger & Peter Mayer eds., 1993). For a recent account on the development of regime theory, see Oran R. Young, *Regime Theory Thirty Years On: Taking Stock, Moving Forward*, E-INT'L RELS. (Sept. 18, 2012), <http://www.e-ir.info/2012/09/18/regime-theory-thirty-years-on-taking-stock-moving-forward>. On global governance, see generally *GOVERNANCE WITHOUT GOVERNMENT: ORDER AND CHANGE IN WORLD POLITICS* (James N. Rosenau & Ernst-Otto Czempiel eds., 1992) [hereinafter *GOVERNANCE WITHOUT GOVERNMENT*].

297. For a thorough review of interest-based cooperation in the international level, see *LOCAL COMMONS AND GLOBAL INTERDEPENDENCE*, *supra* note 292.

298. See generally *GOVERNANCE WITHOUT GOVERNMENT*, *supra* note 296.

Raustiala and Victor, using the case study of plant genetic resources, developed the concept of “regime complexes” by analyzing the implications of the proliferation of international treaties and organizations.<sup>299</sup> In the place of a single comprehensive regime, they found that relevant rules occur in several different “elemental regimes,” which are created and maintained in distinct forums with the participation of different sets of actors but overlap in scope, subject, and time.<sup>300</sup> The collective of these elements is a *regime complex*: an array of partially overlapping and nonhierarchical regimes, possibly interconnected and often with conflicting rules. Since its introduction in 2004, the concept of regime complex has become widespread in global affairs, used to analyze issue-areas including trade policy,<sup>301</sup> international regulation of intellectual property,<sup>302</sup> international security,<sup>303</sup> global refugee policy,<sup>304</sup> climate change,<sup>305</sup> the Arctic,<sup>306</sup> maritime piracy,<sup>307</sup> genetic resources,<sup>308</sup> and global cyber activities.<sup>309</sup> The concept of regime complexes can also be used to analyze the governance space warfare.

Regime complexes are a result of the reality of global affairs, characterized by multiple actors with different and conflicting agendas and interests, which leads to an array of narrowly focused but sometimes

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299. Kal Raustiala & David Victor, *The Regime Complex for Plant Genetic Resources*, 58 INT’L ORG. 277, 279 (2004).

300. *Id.*

301. Christina L. Davis, *Overlapping Institutions in Trade Policy*, 7 PERSPS. ON POL. 25 (2009); Jean Frédéric Morin et al., *The Trade Regime as a Complex Adaptive System: Exploration and Exploitation of Environmental Norms in Trade Agreements*, 20 J. INT’L ECON. L. 365 (2017).

302. Laurence R. Helfer, *Regime Shifting in the International Intellectual Property System*, 7 PERSP. ON POL. 39 (2009); Jonathan Kuyper, *Deliberative Capacity in the Intellectual Property Rights Regime Complex*, 9 CRITICAL POL’Y STUD. 317 (2015).

303. Stephanie C. Hofmann, *Overlapping Institutions in the Realm of International Security: The Case of NATO and ESDP*, 7 PERSP. ON POL. 45 (2009); Grégoire Mallard, *Crafting the Nuclear Regime Complex (1950–1975): Dynamics of Harmonization of Opaque Treaty Rules*, 25 EUR. J. INT’L L. 445 (2014).

304. Alexander Betts, *Institutional Proliferation and the Global Refugee Regime*, 7 PERSPS. ON POL. 53 (2009).

305. Robert O. Keohane & David G. Victor, *The Regime Complex for Climate Change*, 9 PERSPS. ON POL. 7 (2011); MANAGING INSTITUTIONAL COMPLEXITY: REGIME INTERPLAY AND GLOBAL ENVIRONMENTAL CHANGE (Sebastian Oberthür & Olav Schram Stokke eds., 2011); Kenneth W. Abbott, *The Transnational Regime Complex for Climate Change*, 30 ENV’T & PLAN. C: GOV’T & POL’Y 571 (2012); Myanna Dellinger, *Narrowed Constellations in a Supranational Climate Change Regime Complex: The “Magic Number” Is Three*, 37 FORDHAM INT’L L.J. 373 (2014).

306. Oran R. Young, *Building an International Regime Complex for the Arctic: Current Status and Next Steps*, 2 POLAR J. 391 (2012).

307. Michael J. Struett et al., *Navigating the Maritime Piracy Regime Complex*, 19 GLOB. GOVERNANCE 93 (2013).

308. Jean Frédéric Morin & Amandine Orsini, *Policy Coherency and Regime Complexes: The Case of Genetic Resources*, 40 REV. INT’L STUD. 303 (2014).

309. See NYE, *supra* note 269, at 7.

overlapping regimes. Across the various issue-areas of global governance, centralization is unattainable, and the reality is one of fragmentation and regime complexes.<sup>310</sup> The narrowly focused regimes in any single issue-area tend to be linked to various degrees, and they can be mutually reinforcing but can also at times be in conflict. However, this does not necessarily imply that there is no core regime. In the context of space governance, for example, the 1967 Outer Space Treaty is a core regime: It provides the basic principles and norms of space law and is widely accepted, having been ratified by 112 States, including all spacefaring nations.<sup>311</sup> In short, a regime complex functions as a middle ground between a comprehensive legal instrument and complete fragmentation.<sup>312</sup>

Similar to polycentric governance, one may initially suspect that regime complexes are a problem and inherently inferior to a comprehensive regime. Yet, regime complexes offer both practical and substantive advantages. For example, Keohane and Victor assert that efforts to build an effective, legitimate, and adaptable comprehensive regime on matters climate change are unlikely to succeed, so a regime complex is virtually inevitable.<sup>313</sup> Moreover, they argue that a climate change regime complex, if it meets specified criteria, actually has advantages over any politically feasible comprehensive regime, particularly with respect to adaptability and flexibility.<sup>314</sup> These characteristics are particularly important in environments of high uncertainty and disagreement, where governance requires flexibility in substantive content and scope.<sup>315</sup> As Nye puts it:

What regime complexes lack in coherence, they make up in flexibility and adaptability. Particularly in a domain with extremely volatile technological change, these characteristics help both states and non-state actors to adjust to uncertainty. Moreover, they permit the formation of clubs or smaller groupings of like-minded states than can pioneer the development of norms that may be extended to larger groups at a later time.<sup>316</sup>

In other words, the loose coupling among issues that characterizes regime complexes permits cooperation among actors in some areas while they disagree in others, facilitating gradual and segmented progress.<sup>317</sup> The

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310. See John Gerard Ruggie, *Global Governance and "New Governance Theory": Lessons from Business and Human Rights*, 20 GLOB. GOVERNANCE. 5, 12–13 (2014).

311. See *supra* Section II.B.2.

312. NYE, *supra* note 269, at 7.

313. Keohane & Victor, *supra* note 305, at 12–14.

314. *Id.* at 15–17 (offering criteria—such as accountability, sustainability, and fairness—for assessing whether decentralized regime complexes are superior to integrated institutions).

315. *Id.* at 8–9.

316. NYE, *supra* note 269, at 9.

317. *Id.*

variance in regimes allows for local-scale experimentation that may promote the pursuit of feasible, effective, and sustainable regimes.<sup>318</sup> Incremental regimes may allow potential new members to gradually and partially join the regime, thus lowering the bar for a broad membership. Further, where a linkage is made between regimes, it allows bargains across topics and increase what is at stake to the sum of the linked issues.<sup>319</sup> In short, in a decentralized international system, regime complexes are both as inevitable and advantageous as they are effective in providing governance.

*D. The Advantages of Non-Binding International Agreements: Cross-Disciplinary Convergence of Theories and Insights*

The concepts of polycentric governance and regime complexes provide political economy and international relations perspectives, respectively, on the international law phenomenon of non-binding international agreements. Moreover, they help to explain the emergence of non-binding international agreements and, significantly, their merits.

While the concepts of polycentric governance and regime complexes evolved within two different disciplines, there are similarities between their underlying causes, characteristics, and insights. International regimes are established in a system where power is dispersed among various actors. These actors cooperate to establish and maintain rules and manage global affairs in a decentralized, bottom-up manner, as the basic state of international relations and international law is the absence of a global government or supreme authority. Similarly, a polycentric system is characterized by multiple governance centers—in other words, dispersed power and bottom-up governance. For this reason, the literatures on regime complexes and polycentric governance converge in explaining how effective rules can be established and enforced through the cooperation of stakeholders

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318. See Keohane & Victor, *supra* note 305, at 19–20 (describing potential experimentation with emissions reduction strategies within a regime complex for climate change).

319. Indeed, actors often intentionally make connections between issues, a phenomenon considered by Keohane an integral part of international regimes. See generally KEOHANE, *supra* note 296. For additional work on issue linkage, see, for example, KEOHANE & NYE, *supra* note 296; Robert O. Keohane & Joseph S. Nye, Jr., *Power and Interdependence Revisited*, 41 INT'L ORG. 725 (1987) (revisiting the theories of their earlier book); Robert D. Tollison & Thomas D. Willett, *An Economic Theory of Mutually Advantageous Issue Linkages in International Negotiations*, 33 INT'L ORG. 425 (1979); Ernst B. Haas, *Why Collaborate?: Issue-Linkage and International Regimes*, 32 WORLD POL. 357 (1980); Arthur A. Stein, *The Politics of Linkage*, 33 WORLD POL. 62 (1980); James K. Sebenius, *Negotiation Arithmetic: Adding and Subtracting Issues and Parties*, 37 INT'L ORG. 281 (1983); Michael D. McGinnis, *Issue Linkage and the Evolution of International Cooperation*, 30 J. CONFLICT RESOL. 141 (1986); Christina L. Davis, *International Institutions and Issue Linkage: Building Support for Agricultural Trade Liberalization*, 98 AM. POL. SCI. REV. 153 (2004); Paul Poast, *Does Issue Linkage Work? Evidence from European Alliance Negotiations, 1860 to 1945*, 66 INT'L ORG. 277 (2012); HEATHER ELKO MCKIBBEN, *STATE STRATEGIES IN INTERNATIONAL BARGAINING: PLAY BY THE RULES OR CHANGE THEM?* (2015).

rather than hierarchically from above.<sup>320</sup> However, the two concepts are mostly studied separately, and Elinor Ostrom's work on polycentric governance is methodologically, theoretically, and empirically more rigorous than the international relations literature on regime complexes.<sup>321</sup>

In this sense, space warfare can be analyzed as a case of a regime complex with further substantiation from the theory of polycentric governance. The prism of "regimes" captures more than a classic international law framework, even factoring in the flexible concepts of "soft law" and non-binding law.<sup>322</sup> Regimes encompass non-binding agreements and unenforceable norms, but they also add a focus on forums of lawmaking—an element that is at the heart of polycentric governance. In this, polycentric governance and regime complexes both point to the merits of a messy array of forums and instruments—with partial overlap and even contradiction—as advantageous in comparison to an idealized (and often infeasible) comprehensive regime or monocentric governance. A key advantage is the feasibility of achieving governance under anarchic conditions, and the study of regime complexes thus demonstrates the merits of polycentric governance for the progressive development of the laws of warfare. However, the prism of polycentric governance further contributes design principles that elucidate how to construct robust governance systems in the absence of centralized authority.<sup>323</sup> As the remainder of this Article will further explore, this approach to a regime complex of space warfare has the potential to achieve more than a comprehensive and binding regime by embracing States' divergent interests and providing the flexibility to adjust to the fast-changing technological environment of space conflict.

#### IV. NON-BINDING AGREEMENTS AS PART OF INTERNATIONAL LAW

As demonstrated above, non-binding international agreements play a key role in the progressive regulation of space warfare. But, in the absence legally binding status, are these agreements truly part of international law? This Part asserts that the answer is yes, and it argues that other characteristics, like membership and compliance, determine the actual effect of an instrument and have the capacity to render a non-binding instrument part of international law. The goal of any international regulation is to be adopted and followed by as many states as possible, and if a non-binding instrument achieves this goal, it has earned its place within international law.

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320. See *supra* Sections III.B–C.

321. Keohane, *supra* note 294, at 577–79.

322. See generally COMMITMENT AND COMPLIANCE: THE ROLE OF NON-BINDING NORMS IN THE INTERNATIONAL LEGAL SYSTEM (Dinah Shelton ed., 2000) [hereinafter COMMITMENT AND COMPLIANCE]. On the difference between soft law and non-binding agreements, see *supra* note 41.

323. See Ostrom, *supra* note 8, at 653.

*A. Bindingness vs. Membership*

The Moon Agreement, which sets out terms for the peaceful and shared use of the moon and other celestial bodies and their resources,<sup>324</sup> is legally binding—but on fewer than twenty states and none of the major spacefaring nations.<sup>325</sup> In contrast, the non-binding Space Debris Mitigation Guidelines were adopted by all major spacefaring nations.<sup>326</sup> Which instrument is more impactful?

The literature on non-binding international agreements naturally highlights their non-bindingness. Indeed, the bindingness of an instrument is important; it is supposed to result in higher rates of compliance and raises the possibility of accountability for breach. At the same time, however, there is often a *disincentive* for States to join a legally binding arrangement.<sup>327</sup> For this reason, the membership of an arrangement is at least as important as its bindingness—indeed, if there is a reverse-causal link between bindingness and membership, membership in many cases should be preferred. To specify, it is not necessarily the number of members that matters most—though this is also important, since a larger membership means that a rule is more recognized and that its breach may result in reputational damage and perhaps other costs. However, the identity of the members is equally crucial to the success of non-binding arrangements. While some agreements require wide endorsement to succeed, many others require only a small number of essential States.

Take, for example, the ASAT test ban pledge reviewed above.<sup>328</sup> It may be legally binding—the ICJ recognized that such unilateral statements are binding if they are issued with the intention of being binding.<sup>329</sup> But the ban has a critical flaw in terms of membership: While a seemingly impressive number of States supported the resolution in the General Assembly, all relevant countries except the United States rejected it.<sup>330</sup> Only the United States, China, Russia, and India have the capacity to conduct ASAT tests, and if three of the four did not join the pledge, its impact is critically limited.<sup>331</sup> On the other hand, the transparency and confidence-building

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324. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, December 18, 1979, 1363 U.N.T.S. 21.

325. 2. *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, U.N. TREATY COLLECTION, [https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg\\_no=XXIV-2&chapter=24&clang=\\_en](https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXIV-2&chapter=24&clang=_en) (last updated Oct. 12, 2023).

326. See U.N. OFF. FOR OUTER SPACE AFFS., *supra* note 190.

327. See *supra* Section III.A.

328. See *supra* Section II.B.4.

329. Nuclear Tests Case (Austl. v. Fr.), Judgment, 1974 I.C.J. 253, ¶ 43 (Dec. 20).

330. See *supra* notes 175–180 and accompanying text.

331. See *supra* note 170 and accompanying text.

measures may not be legally binding, but were supported by all major spacefaring nations.<sup>332</sup>

An example from a different context is also telling: the United States and China are together responsible for nearly forty-three percent of the world's carbon footprint.<sup>333</sup> A significant footprint reduction by these two countries is thus more important than a reduction by the vast majority of other countries. Similarly, in the context of arms control, the Strategic Arms Limitation Talks were held between only two countries—the United States and the Soviet Union—and they finally led to the Strategic Arms Reduction Treaties, the first of which resulted the dismantling of eighty percent of all the world's strategic nuclear weapons and is considered one of the most successful arms control agreements.<sup>334</sup> In contrast, when it comes to radio frequencies, used by all countries, a successful arrangement requires every nation in the world. Indeed, nearly all countries—191—are members of the International Telecommunication Union and joined its Constitution and Convention.<sup>335</sup>

Within the context of space warfare, there are three or four key countries whose participation in an arrangement is critical to its success: the United States, China, Russia, and, to a lesser extent, India. Direct talks between these key countries may therefore be more important than any multilateral process. Indeed, Trump Administration called for bilateral talks with both Russia and China; Russia agreed, but China did not respond.<sup>336</sup> The Administration was also interested in a trilateral dialogue.<sup>337</sup> It is unclear whether any such bilateral or trilateral dialogues are taking place, but a direct dialogue between rival superpowers may be more effective than multilateral discussions. These discussions would provide a small forum with potential participants that are all heavily engaged in space militarization, with a lot to gain or lose. Any agreement that includes these three States would be important, whether

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332. See *supra* notes 152–155 and accompanying text.

333. *Climate Change*, GLOB. FOOTPRINT NETWORK, <https://www.footprintnetwork.org/our-work/climate-change/> (last visited Dec. 10, 2023).

334. See *Strategic Arms Reduction Treaty (START I)*, CTR. FOR ARMS CONTROL & NON-PROLIFERATION (Nov. 16, 2022), <https://armscontrolcenter.org/strategic-arms-reduction-treaty-start-i/>; *U.S.-Russia Nuclear Arms Control*, COUNCIL ON FOREIGN RELS., <https://www.cfr.org/timeline/us-russia-nuclear-arms-control> (last visited Sept. 20, 2023).

335. *List of Countries for an Agreement*, INT'L TELECOMM'NS UNION, <https://www.itu.int/online/mm/scripts/gensel25?agrmtd=0000925204> (last updated Nov. 12, 2023).

336. See *U.S., Russia to Hold First Space Security Talks Since 2013*, REUTERS (July 25, 2020, 12:11 AM), <https://www.reuters.com/article/us-usa-russia-space/u-s-russia-to-hold-first-space-security-talks-since-2013-idUSKCN24P2GC/>; Ctr. for Strategic & Int'l Stud., *Threats, Challenges, and Opportunities in Space*, YOUTUBE (Apr. 8, 2020), <https://www.youtube.com/watch?v=xeADKsw2ELQ>.

337. Ctr. for Strategic & Int'l Stud., *supra* note 336.

binding or not, and any agreement that does not include all three will lack meaningful effect even if it is binding.

*B. Bindingness vs. Compliance*

The purpose of legally binding instruments—and of law in general—is to introduce rules that will be followed. Legally binding status is, in most cases, the best means to secure adherence to rules. Yet, there are other factors influencing whether actors will follow the rules. Even legally binding rules might effectuate weak conformity if the enforcement mechanism (police, prosecution, or the court system) is weak or otherwise ineffective. In the context of international law, of course, enforcement mechanisms are extremely weak.

If the goal is to introduce rules that will be followed, the test for success should focus less on bindingness and more on compliance. Regardless of formal obligations and consequences, are rules in fact being followed to a sufficient degree? If compliance is the test, then non-binding agreements have the capacity to introduce legitimate and effective rules, depending on the issue and how the agreement is constructed. States that join an international non-binding agreement will typically comply with it, for the same reason they chose to join the agreement—an interest in the regime introduced by the agreement.<sup>338</sup> Even legally binding international treaties largely depend on the goodwill and interest of the member States to abide by them. Indeed, the long debate on whether international law is “law,” in the absence of a strong enforcement mechanism is summed up by Henkin’s practical conclusion that “almost all nations observe almost all principles of international law and almost all of their obligations almost all of the time.”<sup>339</sup> Moreover, even when States seemingly do not, they typically refrain from explicitly rejecting the rule or their need to abide by it, but rather excuse their behavior as conforming with the rule. Therefore, in a discussion on whether or not non-binding international agreements are part of international law, compliance is a better standard than bindingness.

While bindingness is a legal question about the status of an instrument, compliance presents an empirical question combined with a normative evaluation: To what extent did parties to an international agreement comply with it? And what degree of compliance is satisfactory? To further

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338. For this reason, Hathaway suggests that “commitment and compliance are reciprocal influences on each other.” Oona A. Hathaway, *Between Power and Principle: An Integrated Theory of International Law*, 72 U. CHI. L. REV. 469, 469 (2005). Additionally, states face reputational damage from failing to comply even with non-binding agreements. See generally KEOHANE, *supra* note 296.

339. HENKIN, *supra* note 259, at 47; see also Harold Hongju Koh, *Why Do Nations Obey International Law?*, 106 YALE L.J. 2599 (1997).



complicate the picture some scholars argue that the level of compliance with international agreements in general is inherently unverifiable by empirical procedures.<sup>340</sup> Chayes & Chayes suggest that in assessing compliance, our standard should not be strict compliance but rather a level of overall compliance that is “acceptable” in light of the interests and concerns at stake.<sup>341</sup> Ultimately, determining the acceptable degree of compliance is a normative question, and a host of factors beyond binding status affect states’ compliance with international obligations.<sup>342</sup>

### *C. The Big Tent of International Law*

Non-binding international agreements serve both to replace and complement binding agreements. The non-binding international agreements on space warfare, reviewed above, replace the proposed binding Prevention of the Placement of Weapons Treaty, but they complement the 1967 Outer Space Treaty, as well as the UN Charter and general treaties on the laws of war.<sup>343</sup> In this sense, the non-binding international agreements on space warfare are part of the compound of international law.

Contemporary international law is thus a big tent, under which legally binding treaties reside alongside international soft law, informal law, and non-binding international agreements, making the field both more versatile and complex. The non-binding agreements surveyed by Bradley et al. are an inherent part of the United States’ international obligations with which it fully intends to comply.<sup>344</sup> As Koh attests, based on his experience as the U.S. State Department’s Legal Adviser, entering into a non-binding agreement is not motivated by the option not to comply with their substantive provisions, but rather mainly by obstacles to binding arrangements.<sup>345</sup> In this sense, non-binding agreements are used to extend international agreements and obligations, not to narrow them.

Elinor Ostrom suggests that “complexity is not the same as chaos,”<sup>346</sup> but repeatedly cautions against trying to find simple solutions to complex

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340. Abram Chayes & Antonia Handler Chayes, *On Compliance*, 47 INT’L ORG. 175, 176 (1993).

341. *Id.* See generally ABRAM CHAYES & ANTONIA HANDLER CHAYES, *THE NEW SOVEREIGNTY: COMPLIANCE WITH INTERNATIONAL REGULATORY AGREEMENTS* (2009); Koh, *supra* note 339.

342. See Dinah Shelton, *Introduction*, in COMMITMENT AND COMPLIANCE, *supra* note 322, at 1.

343. See *supra* Section II.B.

344. See Bradley et al, *supra* note 1.

345. See Koh, *supra* note 6, at 8–11.

346. Ostrom, *supra* note 8, at 644.

problems.<sup>347</sup> International lawmaking in the twenty-first century is a complex problem, and we need complex solutions to address it. These include non-binding international agreements.

#### V. THE WAY FORWARD: THE PROGRESSIVE DEVELOPMENT OF SPACE LAW IN THE TWENTY-FIRST CENTURY

The above discussion provides valuable insights for navigating the laws of space warfare, and for the future development and study of international law more generally. Decentralized governance in global affairs is inherent and inevitable, and it also has advantages, notably in the continuous evolution of governance under anarchic conditions. This Part suggests that, for the laws of space warfare to continue to evolve productively, governance-building efforts should focus more on expanding the existing elemental regimes and introducing new elemental regimes, and less on futile attempts at introducing a comprehensive multilateral regime or treaty.

The reasons for the transition of global governance to polycentrism, the emergence of regime complexes, and the softening of international law are here to stay. This path, which compliments binding law, is dictated by the reality of global politics and represents the most effective course of action. Centralization is an efficient way to establish a new regime but not to expand and update it, and the rigidity of a centralized regime often leads to an impasse when the law requires further development. Polycentric governance, or the embrace of a regime complex, provides a bypass to this deadlock.

Indeed, costs and deficiencies tend to drive even initially centralized and coherent regimes into the multifaceted arrangements of a regime complex. This is the case with space governance, which started with a central institution, UN-COPUOS, that introduced multilateral treaties—notably the 1967 Outer Space Treaty and its article on military uses of space.<sup>348</sup> While UN organs like UN-COPUOS and the Conference on Disarmament are still the most important international forums on space governance, and the Outer Space Treaty is the most important legal instrument, further evolution of the laws of space warfare often happens away from the UN.<sup>349</sup> The work of these off-UN forums is critical—they provide the bulk of new instruments—but they still depend on UN organs to serve as a “clearing house” for the instruments.

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347. See Arturo Lara, *Rationality and Complexity in the Work of Elinor Ostrom*, 9 INT’L J. COMMONS 573, 573 (2015).

348. See *supra* Section II.B.2.

349. The various UN organs working to regulate space warfare are deadlocked and have been so far unable to produce binding instruments that have the force of law beyond the treaties adopted in the 1960s. Jakhu et al, *Conflicts in Space*, *supra* note 119, at 684; see *supra* Section II.B.

A single overarching regime for space warfare is therefore unlikely, and instead we will see an evolution of the current regime complex.<sup>350</sup> As Shackelford explains, governance is moving away from a multilateral system centered on the United States, and polycentric regimes can “complement the top-down governance model favored throughout much of the history of space governance.”<sup>351</sup> The flexibility of a regime complex is particularly important in the context of space warfare, since strategies, technologies, and weapons are new and rapidly developing. Therefore, it is difficult to prescribe the rules at this stage, except, perhaps, bans of space warfare or weapons. Moreover, developing binding rules at this stage may lead to inadequate and rigid rules that are hard to amend, which can work in the context of weapons or warfare bans but are inadequate in other contexts. The flexibility of a regime complex is key, and the establishment and development of the various regimes should therefore be gradual and progressive, with an emphasis on non-binding agreements that can expand the reach of the laws of space warfare while adapting to the varied and changing needs of nations.

Considering the advantages of polycentric governance and regime complexes, and the superiority of membership to bindingness as a measure of success, the progressive development of the laws of space warfare can and should take place via multiple forums, each with differing membership, topics, and instruments produced.<sup>352</sup> Emphasis should be on having the three or four key space powers participate in all forums and agreements. In terms of scope, it will likely be more effective if each forum is devoted to a relatively narrow sub-issue—like an ASAT test ban or cyberattacks on space assets—to facilitate a successful agreement. When issues are not linked, this allows for the development of the laws of space warfare in increments, permitting agreement on one sub-issue while discussion continues on another. Incremental agreements may also allow potential new members to gradually or partially join an agreement, thus encouraging a broad membership. Alternatively, when issues are linked, this allows bargains across sub-issues and increase what is at stake for all actors. And even outside of international institutions, work by NGOs and university research centers, such as the *McGill Manual* and the Space Governance Lab provide an important addition to traditional international governance.<sup>353</sup>

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350. Cf. NYE, *supra* note 269 (making a similar argument about regime complexes and cyberspace); Young, *supra* note 306 (making a similar argument about the Arctic).

351. SHACKELFORD, *supra* note 86, at 303.

352. The use of multiple forums does raise concerns about participation and representation, but these may be addressed by the application of global administrative law. See Tepper, *supra* note 2, at 554; Benedict Kingsbury, *The Administrative Law Frontier in Global Governance*, 99 PROC. ANN. MEET. AM. SOC. INT’L L. 143, 143 (2005).

353. See *supra* Section II.B.6; *A Groundbreaking Partnership on Space Governance*, IND. UNIV.: OSTROM WORKSHOP, <https://ostromworkshop.indiana.edu/research/space->

While the rules of sea warfare have had more than 400 years to evolve, those of space warfare have had barely several decades. They are sparse and scarce and in early stages of development. The age of space warfare has arrived, announced by the war in Ukraine. However, in a struggling and contested multilateral system, the adoption of rules via the established international institutions faces growing challenges. The best path forward is to embrace polycentricism and the regime complex of the laws of space warfare. This will allow the development of the laws of space warfare in a manner that is more robust, flexible, secure, and efficient than an attempt at a monocentric, legally binding comprehensive regime.

#### CONCLUSION

In a span of little more than two years, from NATO declaring space as an operational domain to the first space-cyber war in Ukraine, space has been solidified and reimagined as a warfighting arena. Significantly, civilian infrastructure is also a target. The risks are high. Space-based infrastructure, critical to most aspects of modern lives, might be the first to get hit by counter-space weapons. But while the space arms race accelerates, the laws of space warfare lag behind. The under-supply of rules meets a multilateral system almost incapable of adopting new legally binding agreements. Moreover, multilateralism in general is increasingly contested and even existing arms control regimes are collapsing.

The complexity of space conflicts adds to the difficulty in isolating a legal regime. Space warfare encompasses any attack conducted by or targeting space assets. It can be divided into three types: space-to-space attacks, space-to/from-earth attacks, and cyber-attacks targeting space assets. Space warfare can thus take place in five theaters: outer space, airspace, land, sea, and cyberspace. As a result, in addition to the space-specific forums and rules, those applicable to warfare in the other theaters are also relevant, with the governance of space warfare a complex aggregate of the regimes that apply to each theater. This Article has presented the major forums and sets of rules applicable to space, including those still in the making with no guaranteed success. Even if one examines only the instruments and forums applicable to warfare in the theater of outer space, it is clear that no comprehensive regime exists, nor is one likely to emerge.

Instead, various forums introduce various sets of rules, with varying degrees of success. The growing diffusion of power and polarity in global politics exacerbates this decentralization and renders a comprehensive regime for space warfare impossible to achieve. Taking a polycentric

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[governance/index.html](#) (last visited Dec. 10, 2023). As a point of disclosure, the author leads the Space Governance Project.

approach is a feasible way to incrementally develop the governance of space warfare in light of this diffusion of power and the need to yield flexible rules that can adapt to the emerging strategies and technologies of space warfare. The political economy literature on polycentric governance, which includes vast empirical studies, supports these conclusions.

In term of policy recommendations this Article calls to focus and direct governance-building efforts on various issue-specific forums that produce non-binding agreements. The focus should be on membership and compliance. For an agreement to be successful in the context of space warfare, its membership likely needs to include the United States, Russia, China, and potentially India. Compliance may be hard to evaluate, but it is a more suitable criteria than bindingness for assessing the success of agreements in international law. This polycentric approach is both effective and feasible, and it will enable the governance of space warfare to rise to modern challenges and extend to new grounds.