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## Customary International Law as a Vessel for Global Accord: The Case of Customary Rules-of- the-Road for Governing the Orbital Highways of Earth

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**CUSTOMARY INTERNATIONAL LAW AS A VESSEL FOR  
GLOBAL ACCORD: THE CASE OF CUSTOMARY RULES  
OF THE ROAD FOR GOVERNING THE ORBITAL  
HIGHWAYS OF EARTH**

HJALTE OSBORN FRANDBSEN\*

ABSTRACT

In a time where the international community seems unable or unwilling to commit to binding instruments to solve global-governance issues, ranging from climate to cybercrime, increased reliance on customary norms presents a path forward. Using the case of space traffic, this author investigates if and how customary international law can emerge to govern complex transnational issues. The traditional approach to international custom is augmented with perspectives from the broader field of social science to accord for the influence of private actors and technological development on the formation of customary law.

Commercialization of the space sector has unleashed a tremendous proliferation of satellites in the orbits of Earth. Without globally aligned “rules of the road” for the orbital highways, the collective human space activities are on an unsustainable path towards congestion, competition, and rapidly increasing collision risk. In lieu of an elusive treaty solution, binding rules of the road for space may emerge through customary international law.

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## I. INTRODUCTION

**R**ULE OF THE ROAD has been defined as “a customary practice (such as driving always on a particular side of the road or yielding the right of way) developed in the interest of safety and often subsequently reinforced by law. [*E*] *especially*: any of the rules making up a code governing ships in matters relating to mutual safety.”<sup>1</sup>

Humankind, as a spacefaring civilization, urgently needs to figure out how to coordinate and govern traffic in the orbits around our home planet. Drastic reductions in launch cost,<sup>2</sup> miniaturization of satellites,<sup>3</sup> and commercialization of the space industry<sup>4</sup> are lowering the barriers to spacefaring. As a result, the quantity and diversity of human space activities are rising at an unprecedented pace.<sup>5</sup> The orbital domain is about to become much more crowded with mega-constellations of

<sup>1</sup> *Rule of the Road*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/rule%20of%20the%20road> [<https://perma.cc/RM63-GL4C>].

<sup>2</sup> See Harry W. Jones, *The Recent Large Reduction in Space Launch Cost*, at 1–7, 48th Int’l Conf. on Env’t Sys., Doc. ICES-2018-81 (July 8, 2018), [https://ttu-ir.tdl.org/bitstream/handle/2346/74082/ICES\\_2018\\_81.pdf](https://ttu-ir.tdl.org/bitstream/handle/2346/74082/ICES_2018_81.pdf) [<https://perma.cc/FV5N-7YV2>].

<sup>3</sup> See Martin N. Sweeting, *Modern Small Satellites—Changing the Economics of Space*, 106 *PROC. IEEE* 343, 347–53 (2018).

<sup>4</sup> See Matt Weinzierl & Mehak Sarang, *The Commercial Space Age Is Here*, *HARV. BUS. REV.* (Feb. 12, 2021), <https://hbr.org/2021/02/the-commercial-space-age-is-here> [<https://perma.cc/G2M7-9HEQ>].

<sup>5</sup> See *id.*

thousands of satellites,<sup>6</sup> space tourism,<sup>7</sup> and private space stations<sup>8</sup> adding to the already-increasing activities of nation-states. Due to the rapid expansion of space activity in Low Earth Orbit (LEO),<sup>9</sup> there is a need for common rules of the road to avoid congestion and collisions. The growing urgency of instituting better governance of space traffic is widely recognized by nations,<sup>10</sup> industry,<sup>11</sup> and academia.<sup>12</sup>

The governance of traffic in space is generally discussed under the term “space traffic management,” which refers to both regulatory and technical tools aimed at ensuring the sustainability and safety of current and future space traffic.<sup>13</sup> Developments in both technical capabilities and regulation are needed for a functional, holistic space traffic management sys-

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<sup>6</sup> See Theodore J. Muelhaupt, Marlon E. Sorge, Jamie Morin & Robert S. Wilson, *Space Traffic Management in the New Space Era*, 6 J. SPACE SAFETY ENG'G 80, 80 (2019).

<sup>7</sup> See Adam Mann, *Space Is All Yours—for a Hefty Price*, MIT TECH. REV. (Feb. 21, 2022), <https://www.technologyreview.com/2022/02/21/1044909/commercial-space-tourism-cost/> [<https://perma.cc/PXD9-TX7B>].

<sup>8</sup> See Justin St. P. Walsh & Alice Gorman, *Private Space Stations Are Coming. Will They Be Better than Their Predecessors?*, CONVERSATION (Dec. 5, 2021, 2:12 PM), <http://theconversation.com/private-space-stations-are-coming-will-they-be-better-than-their-predecessors-170871> [<https://perma.cc/Z9B4-2UNU>].

<sup>9</sup> See Carmen Pardini & Luciano Anselmo, *Evaluating the Impact of Space Activities in Low Earth Orbit*, 184 ACTA ASTRONAUTICA 11, 11 (2021); Aaron C. Boley & Michael Byers, *Satellite Mega-Constellations Create Risks in Low Earth Orbit, the Atmosphere and on Earth*, 11 SCI. REPS. 1, 1–2 (2021); Andy Lawrence et al., *The Case for Space Environmentalism*, 6 NATURE ASTRONOMY 428, 428–29 (2022).

<sup>10</sup> See, e.g., Space Policy Directive-3, National Space Traffic Management Policy, 83 Fed. Reg. 28969, 28969–74 (June 21, 2018) (using strong wording in the Space Policy Directive); *Joint Communication to the European Parliament and the Council: An EU Approach for Space Traffic Management*, at 1–4, COM (2022) 4 final (Feb. 15, 2022) [hereinafter *EC Joint Communication*] (recognizing an urgent need for a space traffic management system).

<sup>11</sup> The Satellite Industry Association, which represents many of the world's largest private satellite operators, is pushing for better space traffic management on behalf of its members. See Theresa Hitchens, *SIA Calls for Space Traffic Rules ASAP*, BREAKING DEF. (Sep. 24, 2020, 2:21 PM), <https://breakingdefense.sites.breakingmedia.com/2020/09/sia-calls-for-space-traffic-rules-asap/> [<https://perma.cc/ZR5W-CMFK>].

<sup>12</sup> See Corinne Contant-Jorgenson, Petr Lála & Kai-Uwe Schrogl, *The IAA Cosmic Study on Space Traffic Management*, 22 SPACE POL'Y 283, 283–85 (2006); William H. Ailor, *Space Traffic Management: Implementations and Implications*, 58 ACTA ASTRONAUTICA 279, 279–86 (2006).

<sup>13</sup> See Contant-Jorgenson et al., *supra* note 12, at 284 (“Space traffic management means the set of technical and regulatory provisions for promoting safe access into outer space, operations in outer space and return from outer space to Earth free from physical or radio-frequency interference.”).

tem to emerge.<sup>14</sup> This Article focuses exclusively on available avenues for a legal basis for the emergence of required regulation.

The core of the regulatory side of space traffic management consists of the substantive traffic rules regulating the interactions and coordination between traffic actors in space, commonly referred to as “rules of the road.”<sup>15</sup> Historically, norms have emerged across human traffic domains in response to increased activity, collision risk, and congestion.<sup>16</sup> From the informal norm of standing to the right on an escalator, to the formalized rules governing traffic on roads, at sea, and in airspace, rules of the road play an essential role in creating a safe, efficient, and predictable environment for traffic participants.<sup>17</sup> The need for common norms and predictable behavior to avoid collisions in space is widely recognized, but there is little agreement to be found about what the actual rules or norms should be.<sup>18</sup> In addition, avoidance maneuvers have costs in terms of precious fuel and lost mission time, and operators will therefore usually prefer having the right-of-way.<sup>19</sup> Rules of the road are needed to avoid scenarios where operators essentially “play chicken”<sup>20</sup> with satellites to avoid the economic burden of maneuvering.

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<sup>14</sup> See P.J. Blount, *Space Traffic Coordination: Developing a Framework for Safety and Security in Satellite Operations*, 2021 SPACE: SCI. & TECH. 1, 2–3 (2021), <https://spj.sciencemag.org/journals/space/2021/9830379/> [https://perma.cc/2J3Z-FJQ6].

<sup>15</sup> See Kai-Uwe Schrogel, *Space Traffic Management: The New Comprehensive Approach for Regulating the Use of Outer Space—Results from the 2006 IAA Cosmic Study*, 62 ACTA ASTRONAUTICA 272, 274 (2008); Paul B. Larsen, *Space Traffic Management Standards*, 83 J. AIR L. & COM. 359, 361 (2018).

<sup>16</sup> See Hjalte Osborn Frandsen, *Looking for the Rules-of-the-Road of Outer Space: A Search for Basic Traffic Rules in Treaties, Guidelines and Standards*, 9 J. SPACE SAFETY ENG'G 231, 232–33 (2022).

<sup>17</sup> See *id.* at 232.

<sup>18</sup> See *id.*

<sup>19</sup> See *The Cost of Avoiding Collisions*, EUR. SPACE AGENCY [ESA] (Feb. 24, 2021), [https://www.esa.int/ESA\\_Multimedia/Images/2021/02/The\\_cost\\_of\\_avoiding\\_collision](https://www.esa.int/ESA_Multimedia/Images/2021/02/The_cost_of_avoiding_collision) [https://perma.cc/Y95M-W97N] (providing an infographic to demonstrate the cost of maneuvering).

<sup>20</sup> The “game of chicken” is a model of conflict for two players in game theory. In the most basic version of the game, two cars are driving on a collision course and whoever swerves first loses the game. Of course, if none of the drivers swerve, the result is a fatal collision. For a deeper look at the history and application of the concept, see WILLIAM POUNDSTONE, PRISONER’S DILEMMA 197–201 (1st ed. 1992).

Autonomous collision avoidance is frequently touted as the solution to the issue of growing congestion in orbit.<sup>21</sup> However, although autonomous systems will likely be integral to traffic safety, they do not dispense with the need for aligned rules of the road.<sup>22</sup> Like human operators, algorithms must be able to predict the actions of other traffic actors to successfully plan and execute avoidance maneuvers.<sup>23</sup> Even in a hypothetical future scenario with flawless automation and information sharing, rules of the road would be needed to allocate priority and right-of-way.<sup>24</sup>

To complicate matters further, a traffic regime must apply to all or most space actors and be adequately harmonized globally to be effective.<sup>25</sup> Therefore, to solve the issue of safe space traffic, one must venture beyond the legal order of the nation-state and into the domain of public international law.<sup>26</sup> The management of traffic and debris in Earth's orbits thus becomes an issue of global governance, with the implied difficulties and complexities.<sup>27</sup> The investigation in this Article concerns potential avenues for globally aligned orbital rules of the road to emerge in the future.

In the growing body of legal literature discussing the future of space traffic management and rules of the road, the focus has mostly been on binding law originating from the original or new space treaties or on various forms of soft-law instruments, guidelines, and standards.<sup>28</sup> Customary international law, another primary source of international law, has received much less

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<sup>21</sup> See Kerianne L. Hobbs, Alexander R. Collins & Eric M. Feron, *Towards a Taxonomy for Automatic and Autonomous Cooperative Spacecraft Maneuvering in a Space Traffic Management Framework* 1, 3 (2020) (presented at ASCEND 2020 virtual conference).

<sup>22</sup> See MAUI ECON. DEV. BD., OTR 2022-00292, SSA/STM AMOS WORKSHOP 3 (2021), [https://amostech.com/wp-content/uploads/2022/01/2021-AMOS-SSA\\_STM-Data-Operator-Exchange-Workshop-Key-Findings.pdf](https://amostech.com/wp-content/uploads/2022/01/2021-AMOS-SSA_STM-Data-Operator-Exchange-Workshop-Key-Findings.pdf) [https://perma.cc/L5TG-SDJ] (identifying the key issue of “[w]ho moves, or who moves first?” in regards to developing autonomous collision avoidance systems).

<sup>23</sup> See Chris Tennant et al., *Code, Culture, and Concrete: Self-Driving Vehicles and the Rules of the Road*, FRONTIERS (Nov. 18, 2021), <https://www.frontiersin.org/articles/10.3389/frsc.2021.710478/full> [https://perma.cc/6QMB-2PBA].

<sup>24</sup> See *id.*

<sup>25</sup> See Paul B. Larsen, *Profit or Safety: Where Is Outer Space Headed?*, 86 J. AIR L. & COM. 531, 537 (2021).

<sup>26</sup> See *id.*

<sup>27</sup> See *id.*

<sup>28</sup> See, e.g., Larsen, *supra* note 15, at 361–68; Michael P. Gleason, *Establishing Space Traffic Management Standards, Guidelines and Best Practices*, 7 J. SPACE SAFETY ENG'G 426, 427–28 (2020); Schrogl, *supra* note 15, at 273–74.

scrutiny even though traffic rules have historically emerged through international custom in other domains, most notably at sea.<sup>29</sup> The bleak outlook for a multilateral, treaty-based solution to the issue of space traffic coordination compels us to investigate alternative paths to international governance.

The dearth of binding international solutions is not isolated to the issue of space traffic. Arguably, the international community's failure to create binding accords for the most pressing global challenges of our times, such as climate change<sup>30</sup> and cyber law,<sup>31</sup> indicates that the goal of identifying alternatives to treaty law is a generally applicable one.<sup>32</sup> This should not be mistaken for an argument against multilateralism. Historically, many treaties build upon and formalize principles originally formed as customary norms.<sup>33</sup> Looking to customary norms as a source for new binding law is not looking away from multilateralism; it is merely recalling that there are other paths leading to international accord. Since the blossoming of international institutions in the wake of Allied victory in World War II,<sup>34</sup> customary international law has seldom been heralded as a viable path to regulation of new issues facing the international community.<sup>35</sup> It may be time to reexamine this ancient source of international law between states that the international community may come to lean on when treaty solutions seem still more difficult to achieve.

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<sup>29</sup> See RICHARD BARNES, DAVID FREESTONE & DAVID M. ONG, *THE LAW OF THE SEA: PROGRESS AND PROSPECTS* 13 (4th ed. 2006).

<sup>30</sup> See Robert Falkner, *A Minilateral Solution for Global Climate Change? On Bargaining Efficiency, Club Benefits, and International Legitimacy*, 14 *PERSPS. ON POL.* 87, 87 (2016).

<sup>31</sup> See Kubo Macák, *Is the International Law of Cyber Security in Crisis?*, 8TH INT'L CONF. ON CYBER CONFLICT 127, 127–30 (2016).

<sup>32</sup> For a general discussion of the failure of the international system in solving modern global-governance issues, see IAN GOLDIN, *DIVIDED NATIONS: WHY GLOBAL GOVERNANCE IS FAILING, AND WHAT WE CAN DO ABOUT IT* 2 (2013); Thomas Hale, David Held & Kevin Young, *Gridlock: From Self-Reinforcing Interdependence to Second-Order Cooperation Problems*, 4 *GLOB. POL'Y* 223, 224–25 (2013); THOMAS HALE, DAVID HELD & KEVIN YOUNG, *GRIDLOCK: WHY GLOBAL COOPERATION IS FAILING WHEN WE NEED IT MOST* (2013) [hereinafter HALE ET AL., *COOPERATION IS FAILING*].

<sup>33</sup> See, e.g., Bing Bing Jia, *The Relations Between Treaties and Custom*, 9 *CHINESE J. INT'L L.* 81, 93–94 (2010).

<sup>34</sup> Thomas G. Weiss, *The United Nations: Before, During and After 1945*, 91 *INT'L AFFS.* 1221, 1221 (2015).

<sup>35</sup> See Daniel H. Joyner, *Why I Stopped Believing in Customary International Law*, 9 *ASIAN J. INT'L L.* 31, 33 (2019).



The aim of this Article is, accordingly, twofold: (1) to gauge the potential for space traffic norms to emerge as binding customary law, and (2) to put forward the argument that customary international law in general may come to play a significant role in the future governance of global issues. The argument includes premises specific to space law, as well as some that can be generalized to apply to the broader discussion of the role of custom in modern global-governance issues beyond space law.

Before laying out the main argument, this Article makes a short account of the issue of debris and congestion in Earth's orbits as well as the current legal regime. This is followed by the main argument of this Article, which is structured in three sections: (1) a doctrinal assessment of the potential for orbital rules of the road based in customary law, including how and where to look for evidence of their emergence; (2) an investigation of the potential for private actors to create or shape emerging customary international law; and (3) a look beyond traditional legal science at the stages of norm emergence preceding and leading up to customary law formation. Finally, the conclusion sums up and integrates the findings.

#### A. THE GLOBAL ISSUES OF CONGESTION AND COLLISION RISK

Artificial satellites are placed in different orbits around Earth depending on their purpose.<sup>36</sup> The orbital space around Earth is generally categorized into three regions based on altitude: LEO, Medium Earth Orbit, and Geosynchronous Earth Orbit (GEO).<sup>37</sup> The majority of new satellites are placed in LEO, and the traffic there is more complex, faster, and less regulated than in GEO.<sup>38</sup> This Article will focus on traffic in LEO, as it is both the least regulated and the busiest region of orbital space.<sup>39</sup> The issue of overcrowding in LEO is comprised of two separate but interrelated issues, both of which lead to increased risk of collisions in space: (1) space debris and (2) active-to-active satellite conjunctions.

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<sup>36</sup> See Lawrence et al., *supra* note 9, at 429.

<sup>37</sup> *Id.*

<sup>38</sup> For a comparison of the legal regimes governing LEO and GEO, see Alice Rivière, *The Rise of the LEO: Is There a Need to Create a Distinct Legal Regime for Constellations of Satellites?*, in 1 LEGAL ASPECTS AROUND SATELLITE CONSTELLATIONS 39, 43–49 (Annette Froehlich ed., 2019).

<sup>39</sup> See Pardini & Anselmo, *supra* note 9, at 11.

## B. SPACE DEBRIS—AN ENVIRONMENTAL ISSUE

Space debris consists of remains of human space activities left in orbit, such as spent rocket stages, dead satellites, and wreckage from anti-satellite tests.<sup>40</sup> The exact quantity of space debris currently circling Earth is unknown and estimates vary.<sup>41</sup> The European Space Agency (ESA) currently tracks approximately 30,000 debris objects and estimates the total amount of debris in space to be approximately 130,000,000 objects.<sup>42</sup> The size of debris objects varies from several tons of heavy dead satellites to minuscule flecks of paint.<sup>43</sup> However, even very small objects can wreak havoc when they travel at velocities of several thousand kilometers an hour.<sup>44</sup> The hazards to astronauts, satellites, and other space assets posed by space debris have long been recognized as a serious global issue.<sup>45</sup> Across the globe, private and public actors are investing in infrastructure and technology development to improve the identification, characterization, and tracking of debris.<sup>46</sup> In addition, some actors are experimenting with methods for removing debris,<sup>47</sup> but cleaning up space is difficult and costly.<sup>48</sup>

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<sup>40</sup> For background information about space debris, including statistics on the different sources and types, see *About Space Debris*, ESA, [https://www.esa.int/Space\\_Safety/Space\\_Debris/About\\_space\\_debris](https://www.esa.int/Space_Safety/Space_Debris/About_space_debris) [https://perma.cc/VAW9-ZXQL].

<sup>41</sup> For continual updates on space debris population statistics, see *Space Debris by the Numbers*, ESA, [https://www.esa.int/Safety\\_Security/Space\\_Debris/Space\\_debris\\_by\\_the\\_numbers#.YY00rRU8KmY.link](https://www.esa.int/Safety_Security/Space_Debris/Space_debris_by_the_numbers#.YY00rRU8KmY.link) [https://perma.cc/JL9P-2SA7] (Aug. 11, 2022).

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

<sup>43</sup> See U.N. Off. for Outer Space Affs., *UNOOSA and ESA Space Debris Infographics and Podcasts* (Feb. 10, 2021), <https://www.unoosa.org/oosa/en/informationfor/media/unoosa-and-esa-release-infographics-and-podcasts-about-space-debris.html> [https://perma.cc/3UBH-6QM9].

<sup>44</sup> See William P. Schonberg, *Protecting Spacecraft Against Meteoroid/Orbital Debris Impact Damage: An Overview*, in 1 *SPACE DEBRIS* 195, 195 (2001).

<sup>45</sup> See, e.g., G.A. Res. 62/217, at 2 (Feb. 1, 2008) (noting “space debris is an issue of concern to all nations,” and endorsing proposed debris mitigation guidelines).

<sup>46</sup> See David Giordano, *Space Debris: Another Frontier in the Commercialization of Space*, COLUM. J. TRANSNAT'L L. (Oct. 31, 2021), <https://www.jtl.columbia.edu/bulletin-blog/space-debris-another-frontier-in-the-commercialization-of-space> [https://perma.cc/XP4T-QM84].

<sup>47</sup> For a status on current debris-removal initiatives in 2021, see Leonard David, *Space Junk Removal Is Not Going Smoothly*, SCI. AM. (Apr. 14, 2021), <https://www.scientificamerican.com/article/space-junk-removal-is-not-going-smoothly/> [https://perma.cc/UDQ7-7L3T].

<sup>48</sup> As debris removal is still experimental, the actual cost of cleaning up space is unknown. The \$102 million price tag for removing a single piece of debris in a

Technological developments in tracking and removal aside, the cheapest and safest way to mitigate the issue is to prevent the generation of debris in the first place.<sup>49</sup> Several international initiatives have been created to limit the generation of space debris, such as the widely supported IADC Space Debris Guidelines<sup>50</sup> and the technical standard ISO 24113:2019 Space Systems—Space Debris Mitigation.<sup>51</sup> Although the issue of space debris is far from fixed, the successful soft-law initiatives and agreement on technical standards mark the issue as a mature area of space policy with a relatively high degree of international collaboration and alignment.<sup>52</sup> In GEO orbits, most actors now conduct their missions in alignment with the debris mitigation standards, but compliance is much lower in LEO.<sup>53</sup> At its core, debris is an environmental issue, and the aim of regulation is relatively straightforward: Reduce the amount of junk left in orbit.<sup>54</sup>

### C. ACTIVE-TO-ACTIVE SATELLITE CONJUNCTIONS—A TRAFFIC ISSUE

Compared to the quantity of space debris, the less than 5,000 active satellites in orbit is minuscule.<sup>55</sup> Accordingly, most ran-

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contract between ESA and a private party indicates that it will be prohibitively expensive, even if only large pieces are targeted for removal. *See* Andy Tomaszewicz, *ESA Is Going to Spend \$102 Million to Remove a Single Piece of Space Junk*, UNIVERSE TODAY (Nov. 27, 2020), <https://www.universetoday.com/148963/esa-is-going-to-spend-102-million-to-remove-a-single-piece-of-space-junk/> [<https://perma.cc/32JA-U4FB>].

<sup>49</sup> *See* NAT'L RSCH. COUNCIL, ORBITAL DEBRIS: A TECHNICAL ASSESSMENT 136 (1995).

<sup>50</sup> Inter-Agency Space Debris Coordination Comm. [IADC], *IADC Space Debris Mitigation Guidelines*, at 4, IADC-02-01 (Sept. 2007), [https://www.unoosa.org/documents/pdf/spacelaw/sd/IADC-2002-01-IADC-Space\\_Debris-Guidelines-Revision1.pdf](https://www.unoosa.org/documents/pdf/spacelaw/sd/IADC-2002-01-IADC-Space_Debris-Guidelines-Revision1.pdf) [<https://perma.cc/GN78-LH2L>].

<sup>51</sup> Int'l Org. for Standardization [ISO], *Space Systems—Space Debris Mitigation Requirements*, ISO Doc. 24113:2019 (July 2019), <https://www.iso.org/standard/72383.html> [<https://perma.cc/GGC9-QXXS>].

<sup>52</sup> *See* Jennifer Ann Urban, *Soft Law: The Key to Security in a Globalized Outer Space*, 43 *TRANSP. L.J.* 33, 46–48 (2016).

<sup>53</sup> ESA tracks compliance and developments in behavior. *See* ESA SPACE DEBRIS OFF., *ESA'S ANNUAL SPACE ENVIRONMENT REPORT 7* (2022).

<sup>54</sup> *See* Mitigation of Orbital Debris in the New Space Age, 85 *Fed. Reg.* 52422, 52422–23 (Aug. 25, 2020).

<sup>55</sup> The NGO Union of Concerned Scientists maintains a record of all operational satellites. *See* *UCS Satellite Database*, UNION CONCERNED SCIENTISTS, <https://www.ucsusa.org/resources/satellite-database> [<https://perma.cc/7WMJ-UDJS>] (May 1, 2022).

dom collisions in space happen between pieces of debris, and the most prominent risk of collision for active satellites is posed by debris. However, the orbital environment is undergoing rapid change, with active-to-active satellite encounters becoming much more frequent due to the rapid expansion of the satellite population in LEO.<sup>56</sup>

As the population of active satellites swells, conjunctions between active satellites will develop into a greater risk and be a common cause for maneuvers.<sup>57</sup> Compared to the environmental issue of space debris, active-to-active satellite conjunctions are a very immature area of policy development without clear, globally accepted norms or standards.<sup>58</sup> In simple terms, without better governance, the risk of direct collisions is climbing rapidly in stride with the growing population of active satellites.<sup>59</sup>

#### D. THE NEED FOR UNIFORM, TRANSNATIONAL NORMS

The issues of debris and active-to-active satellite collisions are intertwined because debris hazards complicate satellite maneuvers and collisions create new clouds of debris.<sup>60</sup> Debris reduces both the safety and the capacity for traffic on the orbital highways.<sup>61</sup> Nonetheless, from a regulatory perspective, the issues of debris and active satellite conjunctions are dissimilar in a fundamental sense. Space debris is an environmental issue that can be mitigated through national regulation of the design of spacecraft or missions and by requiring operators to conform to guidelines<sup>62</sup> and standards<sup>63</sup> in national licensing schemes.<sup>64</sup>

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<sup>56</sup> See Muelhaupt et al., *supra* note 6, at 81.

<sup>57</sup> See Beyza Unal, *Collision Risks in Space Due to Mega-Constellations*, CHATHAM HOUSE (Oct. 26, 2021), <https://www.chathamhouse.org/2021/10/collision-risks-space-due-mega-constellations> [<https://perma.cc/V5BY-T84A>].

<sup>58</sup> See Frandsen, *supra* note 16, at 237.

<sup>59</sup> See Unal, *supra* note 57.

<sup>60</sup> Brian Dunbar & Judy Corbett, *Micrometeoroids and Orbital Debris (MMOD)*, NASA, [https://www.nasa.gov/centers/wstf/site\\_tour/remote\\_hypervelocity\\_test\\_laboratory/micrometeoroid\\_and\\_orbital\\_debris.html](https://www.nasa.gov/centers/wstf/site_tour/remote_hypervelocity_test_laboratory/micrometeoroid_and_orbital_debris.html) [<https://perma.cc/LF5G-BJ7K>] (Aug. 6, 2017).

<sup>61</sup> See Lawrence et al., *supra* note 9, at 430.

<sup>62</sup> An example is the Guidelines for the Long-Term Sustainability of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space formally endorsed by the U.N. General Assembly and recommended for implementation in national law. See Comm. On The Peaceful Uses of Outer Space, Guidelines for the Long-term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/CRP.20, at 2 (2018).

<sup>63</sup> An example is the ISO 24113:2019 Space Systems—Space Debris Mitigation standard, which is referenced in many national legislations. See Sergio Ventura,

This type of environmental regulation does not require an international agreement to be effective. Each nation is able to regulate how much polluting debris it will tolerate from its national actors. The goal of debris mitigation can be reached through various forms of national or regional regulations, and their effectiveness is not directly impacted by international homogeneity or harmonization of approaches.<sup>65</sup> In contrast, the issue of active-to-active satellite conjunctions cannot be effectively mitigated by unilateral regulation.<sup>66</sup> As a systemic coordination issue, active-to-active satellite collision risk can only be mitigated through transnational, agreed rules of the road, which, as argued below, need to be essentially uniform.<sup>67</sup>

For rules of the road to deliver safety and efficiency, a large share of traffic participants must adhere to them with a high degree of compliance.<sup>68</sup> For terrestrial road traffic, the rules of the road ensure safety, but just as importantly, they also ensure traffic capacity, speed, and efficiency.<sup>69</sup> Cars can travel fast and close together on motorways in relative safety with minimal co-

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*ESA Space Debris Mitigation and Re-entry Safety Framework—Status and Novelties*, ESA (Sept. 21, 2021), <https://indico.esa.int/event/321/contributions/6330/attachments/4389/6614/>

ESA%2520Space%2520Debris%2520Mitigation%2520and%2520Re-entry%2520Safety%2520Regulatory%2520Framework%2520-%2520Status%2520and%2520Novelties%2520%282021%29%2520-%2520Presentation.pdf [<https://perma.cc/SCPS-42WH>].

<sup>64</sup> It is indeed the trend for national space legislations and national authorities responsible for licensing space activities to require adherence to some form of space debris mitigation guideline or technical standard. For an overview of how this requirement has been implemented in each state, see generally U.N. Off. for Outer Space Affs. [UNOOSA], *Compendium of Space Debris Mitigation Standards Adopted by States and International Organizations*, <https://www.unoosa.org/oosa/en/ourwork/topics/space-debris/compendium.html> [<https://perma.cc/NM5J-WERJ>].

<sup>65</sup> See NAT'L SCI. & TECH. COUNCIL, NATIONAL ORBIT DEBRIS IMPLEMENTATION PLAN 3–8 (2022), <https://www.whitehouse.gov/wp-content/uploads/2022/07/07-2022-NATIONAL-ORBITAL-DEBRIS-IMPLEMENTATION-PLAN.pdf> [<https://perma.cc/36T2-V7F4>].

<sup>66</sup> See Unal, *supra* note 57.

<sup>67</sup> See *id.*

<sup>68</sup> In international air law, the need for uniformity in rules of the road is reflected in Annex 2 of the Chicago Convention, containing the “Rules of the Air,” which is the only Annex that is generally considered implicitly mandatory out of the Convention’s 18 Annexes. See RUWANTISSA ABEYRATNE, AIR NAVIGATION LAW 69–70 (2012); Int’l Civ. Aviation Org. [ICAO], *Annex 2 to the Convention on International Civil Aviation: Rules of the Air*, (10th ed. 2005). Likewise, the uniform application of rules of the road in the law of the sea is considered essential for their efficiency. See SAMIR MANKABADY, THE LAW OF COLLISION AT SEA 71 (1987).

<sup>69</sup> See ABEYRATNE, *supra* note 68, at 70; Frandsen, *supra* note 16, at 232.

ordination because all traffic participants adhere to the same basic rules. A key advantage of rules of the road is the creation of a predictable environment for traffic participants. With shared and uniform rules, each actor can predict the actions of other actors in the orbital domain based on its knowledge of the rules, with no requirement of establishing direct communication for each encounter. The need for global uniformity is a major challenge for regulating space traffic management, as national or even regional rules will not provide much in terms of predictability and safety when they only apply to a subset of the traffic actors in orbit.<sup>70</sup> Whether based in international law, alignment of national rules, technical standards, or informal norms, functional rules of the road require a high degree of global alignment and acceptance.<sup>71</sup> In short, humanity's space traffic management regime, including orbital rules of the road, must have global reach to achieve its purpose.<sup>72</sup>

## II. THE CURRENT STATE OF REGULATION OF SPACE TRAFFIC IN INTERNATIONAL LAW

The natural starting point for characterizing the international space traffic regime is international law. At the core of international space law lies the five original space treaties concluded during the Cold War. When the first of the treaties, the Outer Space Treaty,<sup>73</sup> was passed in 1967, there was a very limited number of spacefaring nations.<sup>74</sup> At the time of negotiation of the Treaty, the focus was on avoiding national appropriation of celestial bodies; preventing the placement of weapons of mass destruction in space; and ensuring the freedom of access, exploration, and use of outer space for all nations.<sup>75</sup> Environ-

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<sup>70</sup> See Larsen, *supra* note 15, at 361.

<sup>71</sup> See Larsen, *supra* note 25, at 583.

<sup>72</sup> Preliminary modeling shows that the unilateral implementation of rules of the road norms by the United States would reduce the risk of collisions, but higher compliance would lead to better results. See Mariel Borowitz, Brian C. Gunter, Megan Birch & Richard J. Macke, *An Investigation into Potential Collision Maneuver Guidelines for Future Space Traffic Management*, AMOS § 7 (2021), <https://amostech.com/TechnicalPapers/2021/Conjunction-RPO/Borowitz.pdf> [<https://perma.cc/2K5P-K2PR>].

<sup>73</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

<sup>74</sup> Alex S. Li, *Ruling Outer Space: Defining the Boundary and Determining Jurisdictional Authority*, 73 OKLA. L. REV. 711, 715, 717 (2021).

<sup>75</sup> See Paul G. Dembling & Daniel M. Arons, *The Evolution of the Outer Space Treaty*, 33 J. AIR L. & COM. 419, 427 (1967).

mental and traffic issues in space were not yet widely recognized as important problems to tackle, and debris and traffic regulation are therefore absent from the Outer Space Treaty.<sup>76</sup> Ever since the signing of the Outer Space Treaty, the group of nations with access and interests in space continually has expanded.<sup>77</sup> As the number of nations with an interest in and access to space grew, the task of creating common agreements with broad support grew ever-more difficult.<sup>78</sup>

The last of the five original space treaties, the Moon Agreement of 1978,<sup>79</sup> was never ratified by any major space power and is widely considered a failed treaty.<sup>80</sup> The failure of the Moon Agreement is generally seen as a turning point for international space law because no multilateral treaties with global reach have been concluded since.<sup>81</sup> Instead, soft-law instruments, in the form of U.N. General Assembly Resolutions,<sup>82</sup> guidelines, and nonbinding principles have been the dominant form of new international space law.<sup>83</sup> A growing number of the soft-law instruments are targeted at space sustainability; however, there are, as of yet, no instruments providing actual, operational rules of the

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<sup>76</sup> See Frandsen, *supra* note 16, at 234.

<sup>77</sup> The expanded state interest is reflected in the membership in the primary multilateral forum for space matters, the Committee on the Peaceful Uses of Outer Space. Since its inception in 1958 with 18 members, the Committee membership reached 100 states in 2021, making it one of the largest specialized committees in the U.N. system. See Comm. on the Peaceful Uses of Outer Space, COPUOUS Membership Evolution, <https://www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html> [<https://perma.cc/HYJ3-HXBN>].

<sup>78</sup> See Vladlen S. Vereshchetin & Gennady M. Danilenko, *Custom as a Source of International Law of Outer Space*, 13 J. SPACE L. 22, 22–23 (1985). Since 1985, the international community has not come closer to agreeing on any binding laws for space. See U.N. Off. for Outer Space Affs., *Space Law Treaties and Principles*, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties.html> [<https://perma.cc/MAK9-UQUY>] (noting that the last major space treaty was entered into force in 1984).

<sup>79</sup> Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, *opened for signature* Dec. 18, 1979, 1363 U.N.T.S. 3, 18 I.L.M. 1434.

<sup>80</sup> See Fabio Tronchetti, *The Moon Agreement in the 21st Century: Addressing Its Potential Role in the Era of Commercial Exploitation of the Natural Resources of the Moon and Other Celestial Bodies*, 36 J. SPACE L. 489, 491–93 (2010).

<sup>81</sup> See Stephan Hobe, *International Space Law in Its First Half Century*, 57th Int'l Astronautical Cong. 2 (Oct. 2006).

<sup>82</sup> For a thorough review of the most important space principles adopted in U.N. Resolutions, see 3 COLOGNE COMMENTARY ON SPACE LAW (Stephen Hobe, Bernhard Schmidt-Tedd & Kai-Uwe Schrogl eds., 2015).

<sup>83</sup> See Frandsen, *supra* note 16, at 235.

road for space traffic.<sup>84</sup> Some authors lament the lack of hard law in the face of the rapid technological development in space,<sup>85</sup> while others deem soft-law instruments to be useful and adequate to ensure order in space if further developed.<sup>86</sup>

In sum, there is a clear need for rules of the road in orbit to preserve current and future access and use of space. While no such rules can be found in international space law today, in either soft or hard law, it should be noted that nothing in the current body of international space law precludes or hinders the formation of traffic rules in the future, as long as they do not transgress on the basic principles laid out in the original Outer Space Treaty, such as the freedom of exploration and use of outer space.<sup>87</sup>

It is clearly understood by all major space powers that to retain access to space and to unlock value promised by the host of ambitious space projects currently being developed all over the world, we will need rules of the road for orbit, lest the risk of collision will spiral out of control.<sup>88</sup> As argued above, the traffic rules will need global, binding reach to serve their purpose, and they have yet to emerge. It is therefore worthwhile to consider how new international law with general binding force comes into being.

#### A. THE AVENUES FOR NEW INTERNATIONAL SPACE LAW

Before one can delve into a discussion of the emergence of international traffic rules in space, a brief review of the foundation of international law is in order. A fundamental difference between the national legal orders and the international legal system is that the international community is not under the authority of a unified legislature and no international courts have universal jurisdiction.<sup>89</sup> In lieu of a constitutional basis to determine the source of law, Article 38 of the Statute of the Interna-

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<sup>84</sup> See Hjalte Osborn Frandsen, *Agreeing on the Rules-of-the-Road: Distilling Building Blocks from Proposed Space Traffic Management Treaties, Guidelines and Standards*, 72 INT'L ASTRONAUTICAL CONG. § 4.2.2 (2021).

<sup>85</sup> See Jack M. Beard, *Soft Law's Failure on the Horizon: The International Code of Conduct for Outer Space Activities*, 38 U. PA. J. INT'L L. 335, 352–414 (2017).

<sup>86</sup> See Brian Wessel, *The Rule of Law in Outer Space: The Effects of Treaties and Nonbinding Agreements on International Space Law*, 35 HASTINGS INT'L & COMPAR. L. REV. 289, 314–21 (2012); Urban, *supra* note 52, at 34–35, 47–49.

<sup>87</sup> Outer Space Treaty, *supra* note 73, art. I.

<sup>88</sup> See sources cited *supra* note 10.

<sup>89</sup> Malcom Shaw, *International Law*, ENCYC. BRITANNICA, <https://www.britannica.com/topic/international-law> [<https://perma.cc/KL8T-5URN>].



tional Court of Justice (ICJ),<sup>90</sup> enumerating the sources of applicable law for the Court, is often referred to when discussing the sources of international law.<sup>91</sup> Article 38(1) of the ICJ Statute lists three primary sources of international law: treaties, customs, and general principles.<sup>92</sup> Although the weight of the analysis here is on international custom, the potential for rules to emerge through the two other major sources, treaties and general principles, will be briefly touched upon to justify the focus on custom.

Since the conclusion of World War II, the bulk of new international law has been created through treaties and conventions negotiated and concluded by states.<sup>93</sup> In the field of space law, academics have discussed various forms of treaty-based, multilateral space traffic regimes over the years.<sup>94</sup> However, an international space traffic management treaty or convention seems unlikely in the near term. States have been unwilling to commit beyond soft law in space for decades, and the consensus among academics is that no treaty is forthcoming.<sup>95</sup> Several factors conspire to make a treaty seem implausible, including the need to get a large and growing group of spacefaring nations to agree,<sup>96</sup> cold air between the major space powers,<sup>97</sup> and the growing securitization<sup>98</sup> and militarization<sup>99</sup> of space. The failure of treaty-borne multilateralism over the last five decades has been especially palpable in the space domain, but some authors

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<sup>90</sup> Statute of the International Court of Justice art. 38, June 26, 1945, 59 Stat. 1031, 33 U.N.T.S. 993 [hereinafter ICJ Statute].

<sup>91</sup> GLEIDER HERNÁNDEZ, *INTERNATIONAL LAW* 34 (2d ed. 2022).

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

<sup>93</sup> *See id.* at 41; Martti Koskenniemi, *History of International Law, Since World War II*, OXFORD PUB. INT'L L., <https://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e714> [<https://perma.cc/649H-ZBSB>] (June 2011).

<sup>94</sup> *See* Larsen, *supra* note 15, at 367–68, 384–87; Contant-Jorgenson et al., *supra* note 12, at 286–87; Ailor, *supra* note 12, at 281–86.

<sup>95</sup> *See* Sophie Goguichvili, Alan Linenberger, Amber Gillette & Alexandra Novak, *The Global Legal Landscape of Space: Who Writes the Rules on the Final Frontier*, WILSON CTR. (Oct. 1, 2021), <https://www.wilsoncenter.org/article/global-legal-landscape-space-who-writes-rules-final-frontier> [<https://perma.cc/2XUT-V95M>]; Frandsen, *supra* note 16, at 235 n.20.

<sup>96</sup> *See* Goguichvili et al., *supra* note 95.

<sup>97</sup> *See id.*

<sup>98</sup> *See* Columba Peoples, *The Securitization of Outer Space: Challenges for Arms Control*, 32 CONTEMP. SEC. POL'Y 76, 80 (2011).

<sup>99</sup> Arne Sønnichsen, *Militarization and Securitization of Outer Space*, in A RSCH. AGENDA FOR SPACE POL'Y 89, 89–96 (Kai-Uwe Schrogl, Christina Giannopapa & Ntorina Antoni eds., 2021).

would argue that it represents a general trend in international relations.<sup>100</sup>

The “general principles of law recognized by civilized nations” listed in Article 38(1)(c) of the IJC Statute refer to basic legal principles, such as “good faith” or “impartiality of judges,” that have migrated from the national legal orders and have become universal to law.<sup>101</sup> Although the general principles of international law can certainly have an impact on a future space traffic regime, through concepts such as the requirement for international law to be equitable, the principles are more helpful for judges in applying the often-incoherent body of international law, rather than providing specific rules.<sup>102</sup> Rules of the road provisions for orbit fall outside of the category of general principles of international law, and we therefore have to look to the remaining primary source of international law, international custom.

### III. ASSESSMENT OF CUSTOM AS A BASIS FOR ORBITAL TRAFFIC RULES

Customary international law refers to binding obligations arising from international established practices, and it binds states independently from treaties and other formalized obligations.<sup>103</sup> Rules of the road across various domains, from sea to roads, have roots in custom.<sup>104</sup> In this Part, it will be argued that customary international law presents a conceivable path to the creation of an international space traffic regime. Specifically, this Part will highlight the historical precedents of custom in space law and traffic regulation in general, the ability of customary

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<sup>100</sup> See Harlan Grant Cohen, *Multilateralism's Life Cycle*, 112 AM. J. INT'L L. 47, 47 (2018); Jutta Brunnée, *Multilateralism in Crisis*, 112 PROC. ASIL ANN. MEETING 335, 336–39 (2018); see also GOLDIN, *supra* note 32, at 1–10; HALE ET AL., COOPERATION IS FAILING, *supra* note 32, *passim*.

<sup>101</sup> ICJ Statute, *supra* note 90, art. 38(1)(c); see also *General Principles of Law*, INT'L LEGAL RSCH. INST., [https://law.duke.edu/ilrt/cust\\_law\\_10.htm#:~:text=Examples%20of%20these%20general%20principles,other%20sources%20of%20international%20law](https://law.duke.edu/ilrt/cust_law_10.htm#:~:text=Examples%20of%20these%20general%20principles,other%20sources%20of%20international%20law) [<https://perma.cc/ZV9Z-4YQP>].

<sup>102</sup> See Michael Akehurst, *Equity and General Principles of Law*, 25 INT'L & COMPAR. L.Q. 801, 807–08, 813–14 (1976).

<sup>103</sup> See JEFFREY L. DUNOFF, MONICA HAKIMI, STEVEN RATNER & DAVID WIPPMAN, *INTERNATIONAL LAW: NORMS, ACTORS, PROCESSES* 63–64 (Rachel E. Barkow et al. eds., 5th ed. 2020).

<sup>104</sup> See John King Gamble, Jr. & Maria Frankowska, *The 1982 Convention and Customary Law of the Sea: Observations, a Framework, and a Warning*, 21 SAN DIEGO L. REV. 491, 491–92 (1984); Lon L. Fuller, *Human Interaction and the Law*, 14 AM. J. JURIS. 1, 11–13 (1969).

norms to emerge between geopolitical adversaries, the fact that customary rules are by definition internationally aligned, and, finally, the notion that specific customary rules can emerge to govern fast-moving issues in a timely manner.

#### A. THE CENTRAL ROLE OF CUSTOMARY LAW IN SPACE

Customary international law has, from the beginning of the space age, constituted an important element in the international regulation of space.<sup>105</sup> ICJ judge and esteemed space law scholar Manfred Lachs argued that the fundamental principles laid down in the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, adopted by the U.N. General Assembly in 1963,<sup>106</sup> became binding international custom, even before the international community enshrined the same principles in the binding Outer Space Treaty of 1967.<sup>107</sup> It is the general consensus among space law scholars that several of the principles laid down in the Declaration and affirmed by the Outer Space Treaty, such as the principles of non-appropriation and freedom of access, exploration, and use, have customary law status today and thus bind all nations.<sup>108</sup>

#### B. THE CUSTOMARY ROOTS OF TRAFFIC REGULATIONS

Looking beyond space law, customary traffic rules have historically emerged in response to issues of growing traffic and later been transformed into hard law.<sup>109</sup> Specifically, the law of the sea is often the analogy of choice for space, legally and generally.<sup>110</sup> The law of the sea has strong roots in customary interna-

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<sup>105</sup> See Steven Freeland & Yun Zhao, *Rules of the "Space Road:" How Soft Law Principles Interact with Customary International Law for the Regulation of Space Activities*, 42 J. SPACE L. 405, 409, 419 (2020).

<sup>106</sup> G.A. Res. 1962 (XVIII) (Dec. 13, 1963).

<sup>107</sup> MANFRED LACHS, *THE LAW OF OUTER SPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING* 128 (Tanja Masson-Zwaan & Stephen Hobe eds., 2010).

<sup>108</sup> Ram S. Jakhu & Steven Freeland, *The Relationship Between the Outer Space Treaty and Customary International Law*, 67TH INT'L ASTRONAUTICAL CONG. 7 (2016), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3397145](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3397145) [<https://perma.cc/7JVS-ZNWN>].

<sup>109</sup> See Fuller, *supra* note 104, at 11–13.

<sup>110</sup> See Patricia Minola, Comment, *The Moon Treaty and the Law of the Sea*, 18 SAN DIEGO L. REV. 455, 466 (1981). For example, space is traversed using *spaceships* launched from *spaceports*.

tional law,<sup>111</sup> with traffic and navigational norms emerging as customary principles.<sup>112</sup> Legal terminology from the international law of the sea rules for navigation has been adopted by the space industry<sup>113</sup> and academics<sup>114</sup> for space traffic.

It can be argued that one of the very first generally applicable pieces of space traffic regulation was the right of overflight by satellite.<sup>115</sup> The right to orbit satellites over other countries' territories gained customary status through the repetitive acts of overflight by the only two space powers of the time, the United States and the Soviet Union, with no protest from overflown countries.<sup>116</sup> The right of overflight for space vessels was not a given.<sup>117</sup> Although the customary law principles of the right of innocent passage<sup>118</sup> and freedom of navigation<sup>119</sup> had long been established in the international law of the sea, the more recently developed body of international air law has no general allowance for overflight.<sup>120</sup> The early establishment of the right of access and use of space<sup>121</sup> was crucial in enabling the rapid development of satellite technology during the space race.<sup>122</sup> The freedom of access and use of space remains an important principle of space law and an important context for the issue of growing traffic.<sup>123</sup> Like the establishment of the right to overflight was essential for the development in the early space age,<sup>124</sup> the

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<sup>111</sup> JAMES HARRISON, *MAKING THE LAW OF THE SEA: A STUDY IN THE DEVELOPMENT OF INTERNATIONAL LAW* 13–15 (2011).

<sup>112</sup> *Id.* at 1.

<sup>113</sup> See Minola, *supra* note 110, at 466–70.

<sup>114</sup> Ruth E. Stilwell, Diane Howard & Sven Kaltenhauser, *Overcoming Sovereignty for Space Traffic Management*, 7 J. SPACE SAFETY ENG'G 158, 159 (2020); Contant-Jorgenson et al., *supra* note 12, at 285.

<sup>115</sup> MICHAEL P. SCHARF, *CUSTOMARY INTERNATIONAL LAW IN TIMES OF FUNDAMENTAL CHANGE: RECOGNIZING GROTIAN MOMENTS* 127–28 (2013).

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

<sup>117</sup> See *id.*

<sup>118</sup> See Martin Lishexian Lee, *The Interrelation Between the Law of the Sea Convention and Customary International Law*, 7 SAN DIEGO INT'L L.J. 405, 410–11 (2006).

<sup>119</sup> The concept of free navigation and passage in the international law of the sea can be traced back to Hugo Grotius's concept of *Mare Liberum*. See Albert J. Hoffmann, *Freedom of Navigation*, OXFORD PUB. INT'L L. paras. 2–3, <https://cil.nus.edu.sg/wp-content/uploads/2017/11/A.J.Hoffmann-Freedom-of-Navigation-EPIL.pdf> [<https://perma.cc/4KC2-33SE>] (Apr. 2011).

<sup>120</sup> Thomas Gangale, *How High The Sky?*, in 13 *STUD. SPACE L.* 321, 326 (F.G. von der Dunk et al. eds., 2018).

<sup>121</sup> See SCHARF, *supra* note 115, at 127–28.

<sup>122</sup> See *id.*

<sup>123</sup> See Outer Space Treaty, *supra* note 73, art. I.

<sup>124</sup> See SCHARF, *supra* note 115, at 127–28.

formation of rules of the road is indispensable for the sustainable development of space activities today. The question is whether the necessary governance of space traffic will emerge from custom, as has historically happened in other traffic domains when traffic reached a level where order and alignment were needed to ensure safe and efficient interactions between traffic actors.

1. *Customary International Law as Unimpeded by Geopolitical Tensions*

Before the emergence of the United Nations and its host of treaty-based institutions, most of international law was based in custom.<sup>125</sup> Customary law is arguably the oldest source of international law, yet the very nature of the concept still divides legal scholars to this day.<sup>126</sup> Despite its intangible and debated nature, international custom is still an important source of international law and is recognized as such by courts<sup>127</sup> and scholars.<sup>128</sup> Compared to the meticulous and deliberate work put into ensuring that every word in an international treaty reflects the will of the parties, the process of customary international law's emergence can seem esoteric.<sup>129</sup> Esteemed legal theoretician Hans Kelsen described the process of law creation through custom as "unconscious and unintentional lawmaking. . . . The rule of law is the effect and not the purpose."<sup>130</sup> This description captures an important tenant of customary law: that it emerges as a byproduct of conduct and is not deliberately created.

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<sup>125</sup> See Omri Sender & Michael Wood, *The Emergence of Customary International Law: Between Theory and Practice*, in RESEARCH HANDBOOK ON THE THEORY AND PRACTICE OF INTERNATIONAL LAWMAKING 133, 134 (Catherine Brölmann & Yannick Radi eds., 2016).

<sup>126</sup> See, e.g., Monica Hakimi, *Making Sense of Customary International Law*, 118 MICH. L. REV. 1487, 1489–1527 (2020); Roozbeh (Rudy) B. Baker, *Customary International Law in the 21st Century: Old Challenges and New Debates*, 21 EUR. J. INT'L L. 173, 173–74 (2010); Michael Akehurst, *Custom as a Source of International Law*, in 47 BRITISH Y.B. INT'L L. 1974–1975, at 1, 1 (Oxford Univ. Press 1977).

<sup>127</sup> Courts and states often refer to and rely on customary principles in international disputes. See, e.g., North Sea Continental Shelf Cases (Ger./Den.; Ger./Neth.), Judgment, 1969 I.C.J. 3, 23–43 (Feb. 20).

<sup>128</sup> See Omri Sender & Michael Wood, *Custom's Bright Future: The Continuing Importance of Customary International Law*, in CUSTOM'S FUTURE: INTERNATIONAL LAW IN A CHANGING WORLD 360, 360 (Curtis A. Bradley ed., 2016).

<sup>129</sup> See Brian D. Lepard, *Customary International Law as a Dynamic Process*, in CUSTOM'S FUTURE: INTERNATIONAL LAW IN A CHANGING WORLD, *supra* note 128, at 62, 63–67.

<sup>130</sup> HANS KELSEN, PRINCIPLES OF INTERNATIONAL LAW 308 (1952).

As the emergence of customary law does not depend on intent or explicit consent, states may through their actions contribute to the formation of rules that they would not otherwise have agreed to.<sup>131</sup> The process of customary law creation is therefore not necessarily hindered by geopolitical tensions, which might block progress on the development of treaty-based regulation in the space sector.<sup>132</sup> In truth, an important role of international custom can be filling holes in the body of international law when written agreements prove difficult to establish due to political or diplomatic reasons.<sup>133</sup> This feature of customary law might prove significant in a time where urgent need for space governance coincides with serious strain in the international relations between the major space powers.

## 2. *The Inherent Uniformity of Customary International Law*

Treaties and conventions only bind the signatories, while a norm, once established as customary international law, “is binding on all states, even those new to a type of activity, so long as they did not persistently object” during the formation of the rule.<sup>134</sup> This feature of custom is significant in the space domain, as new actors continuously enter the league of spacefaring nations and the newcomers will be bound by the customary rules already in place.<sup>135</sup> While creating a global traffic regime via an international convention would in principle require all current and future spacefaring nations to agree and ratify, a regime based on custom would be universal by default and require states to actively and persistently object to avoid being bound.<sup>136</sup>

Though states can in principle avoid being bound by custom in this manner, states cannot unilaterally withdraw from a cus-

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<sup>131</sup> See Paul B. Stephan, *Privatizing International Law*, 97 VA. L. REV. 1573, 1586–88 (2011).

<sup>132</sup> See discussion *supra* Section II.A.

<sup>133</sup> HERNÁNDEZ, *supra* note 91, at 46.

<sup>134</sup> SCHARF, *supra* note 115, at 30.

<sup>135</sup> It should be noted that although this feature of customary law is an advantage in terms of providing the global uniformity of space traffic rules, it potentially skews the regime unjustly in favor of the currently dominant space powers relative to nations venturing into space in the future. For an expansion of this argument as a critique of international law in general, see Makau Mutua & Antony Anghie, *What Is TWAIL?*, 94 PROC. 112TH ANN. MEETING (AM. SOC'Y INT'L L.) 31, 31 (2000).

<sup>136</sup> U.N. Inst. for Disarmament Rsch., Conf. Rep.: Security in Space: The Next Generation, U.N. Doc UNIDIR/2008/14, at 161 (2008), <https://unidir.org/sites/default/files/publication/pdfs//security-in-space-the-next-generation-conference-report-31-march-1-april-2008-342.pdf> [<https://perma.cc/8QAZ-JBAX>].

tomary rule once they have been bound.<sup>137</sup> Traffic rules based on custom, therefore, have the advantage of being stable and able to maintain the universalism required for their effectiveness.<sup>138</sup>

### 3. *Speed of Customary Law Formation and Its Backward-Looking Nature*

There has been a long-running debate in legal scholarship on the time required for customary norms to form with positions ranging from instant formation,<sup>139</sup> to over-accelerated formation,<sup>140</sup> to requiring decades to pass.<sup>141</sup> Customary law is historical in nature in that it builds on state acts,<sup>142</sup> and on that ground it can be argued that custom is unsuited to regulate a fast-developing issue such as congestion in space. Some courts have indeed held that international custom requires a specific number of years to be formed.<sup>143</sup> However, the ICJ has held that a short time period does not preclude customary law formation as long as the relevant state practice is extensive and uniform.<sup>144</sup> The trajectory of societal and technological development, leading to faster and more frequent interactions between states and im-

<sup>137</sup> Jonathan I. Charney, *The Persistent Objector Rule and the Development of Customary International Law*, in 56 BRITISH Y.B. INT'L L. 1985, at 1, 2 (1986).

<sup>138</sup> Vincy Fon & Francesco Parisi, *Stability and Change in International Customary Law*, 17 SUP. CT. ECON. REV. 279, 282 (2009).

<sup>139</sup> This was famously argued to be the case for the basic principles contained in the 1963 U.N. Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space. See Bin Cheng, *United Nations Resolutions on Outer Space: "Instant" International Customary Law?*, 5 INDIAN J. INT'L L. 23, 27–38 (1965).

<sup>140</sup> This may be argued under certain conditions of rapid societal or technological change. See SCHARF, *supra* note 115, at 30; Michael P. Scharf, *Seizing the "Grotian Moment": Accelerated Formation of Customary International Law in Times of Fundamental Change*, 43 CORNELL INT'L L.J. 439, 439–44 (2010).

<sup>141</sup> See Michael P. Scharf, *Accelerated Formation of Customary International Law*, 20 ILSA J. INT'L & COMPAR. L. 305, 306 (2014).

<sup>142</sup> Echoing this assessment of custom, ICJ Judge Koretsky describes the historical nature of customary international law by stating that "by and large, customary international law turns its face to the past." *North Sea Continental Shelf Cases* (Ger./Den.; Ger./Neth.), Judgment, 1969 I.C.J. 3, 156 (Feb. 20) (Koretsky, J., dissenting).

<sup>143</sup> For example, German and French jurisprudence generally requires thirty to forty years of consistent state practice for a new customary rule to be recognized. The International Law Commission also earlier supported this view of slow crystallization. See Scharf, *supra* note 141, at 306.

<sup>144</sup> *North Sea Continental Shelf Cases*, 1969 I.C.J. at 43 ("[T]he passage of only a short period of time is not necessarily, or of itself, a bar to the formation of a new rule of customary international law . . .").

proved transparency of actions, also supports the thesis of accelerated formation of custom.<sup>145</sup> In conclusion, while customary law cannot, by its nature, be formed proactively in anticipation of a regulatory need as is the case with treaty law, it can, under certain conditions, emerge rapidly in response to an issue if the required state practice and *opinio juris* are present.<sup>146</sup>

#### IV. THE FORMATION OF CUSTOMARY TRAFFIC RULES FOR EARTH'S ORBITS

The preceding Sections have established that a traffic regime based wholly or partly on customary rules would have a number of advantages in terms of its global uniformity, binding force, timely development, and ability to emerge even in a frosty geopolitical climate.<sup>147</sup> Having established that customary rules can theoretically form the basis for a future space traffic regime, we now turn to the specifics of how and where to look for the emergence of customary rules of the road for orbital space.

It is generally accepted that two components of customary international law must be present for a rule to emerge as a binding custom.<sup>148</sup> First, it must embody the general practice of states (*usus*), and, second, it must be accepted by states as law (*opinio juris*).<sup>149</sup> From a doctrinal, legal positivist perspective, both components can be evidenced by observing the factual conduct and public communications of states.<sup>150</sup>

State practice (*usus*) is demonstrated by showing widespread, uniform, and repetitive acts by states over time.<sup>151</sup> State acts, for the purpose of identifying customs, are broadly construed to include both international acts such as conduct towards other states, and internal acts, such as administrative processes, legisla-

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<sup>145</sup> See Scharf, *supra* note 140, at 446.

<sup>146</sup> See *id.*

<sup>147</sup> See discussion *supra* Sections III.B.1–.3.

<sup>148</sup> Int'l Law Comm'n, Rep. on the Work of Its Seventieth Session, U.N. Doc. A/73/10, at 129 (2018).

<sup>149</sup> Customary international law is defined in Article 38(1)(b) of the ICJ Statute as "international custom, as evidence of a general practice accepted as law." ICJ Statute, *supra* note 90, art. 38(1)(b). For an authoritative review of the meaning of the terms, see Rep. of the Int'l Law Comm'n, *supra* note 148, at 122–23.

<sup>150</sup> The traditional view of *usus* and *opinio juris* as the only relevant elements for formation of international custom is being challenged by recent studies. For a survey of nontraditional scholarship that argues for customary international law emerging from other sources, such as the rulings of international tribunals, see Baker, *supra* note 126.

<sup>151</sup> See Int'l Law Comm'n, *supra* note 148, at 129, 129 n.688.



tion, or court decisions.<sup>152</sup> The keystone of the *usus* element is the notion of practice; it requires the actual conduct of states, as opposed to mere pronouncements, statements, and the like.<sup>153</sup> It is therefore possible to have states evincing practice in disharmony with the official, communicated stance of the state on an issue or rule.<sup>154</sup>

The second requirement for a rule to emerge as custom is that the states believe they are legally bound by the rule (*opinio juris*).<sup>155</sup> The determination of the subjective attitude or beliefs of a state can be based upon a broad range of sources, such as internal and external diplomatic communications, guidelines to public servants, pleadings before international tribunals, or positions taken in international organizations such as the United Nations.<sup>156</sup> The distinction between the two tightly intertwined elements that must be present for a customary rule to exist is largely a theoretical construct and can be difficult to draw in practice.<sup>157</sup> However, the categories of *usus* and *opinio juris* are well-established in legal scholarship and the precedents of international courts and tribunals.<sup>158</sup> In addition, the elements serve as useful categories for structuring the analysis of international law.<sup>159</sup> In the next Section, it will be demonstrated that the proposition of rules of the road for orbit is characterized by traits that fit well within the requisite components of customary law status.

#### A. PRACTICE: CONJUNCTIONS WILL PROVIDE LOTS OF REPETITIONS

With increasing regularity, operators of satellites in LEO will need to make decisions about the prioritization of traffic, with no clear right-of-way norms like the ones present in other traffic domains such as the sea, roads, and airspace.<sup>160</sup> For example, on

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<sup>152</sup> See HERNÁNDEZ, *supra* note 91, at 37–38.

<sup>153</sup> See Int'l Law Comm'n, *supra* note 148, at 135.

<sup>154</sup> See *id.*

<sup>155</sup> See *id.* at 139.

<sup>156</sup> See HERNÁNDEZ, *supra* note 91, at 37–38.

<sup>157</sup> Cf. Omri Sender & Michael Wood, *A Mystery No Longer? Opinio Juris and Other Theoretical Controversies Associated with Customary International Law*, 50 ISR. L. REV. 299, 302 (2017).

<sup>158</sup> For a review of the current status of *usus* and *opinio juris* in international law, see Int'l Law Comm'n, *supra* note 148, at 129.

<sup>159</sup> See Michael N. Schmitt & Sean Watts, *State Opinio Juris and International Humanitarian Law Pluralism*, 91 INT'L L. STUD. 171, 176 (2015).

<sup>160</sup> See Frandsen, *supra* note 16, at 232–33.

the sea, rules of the road allow ships to make right-of-way decisions based on propulsion systems—motor-driven ships must give way to sailboats.<sup>161</sup> It is beyond the scope of this Article to analyze the many potential parameters that could be used to decide right-of-way and similar essential traffic principles for satellites,<sup>162</sup> but yet, no clear norms have emerged.

In the gradually more congested orbits, there is an increasing number of conjunctions between satellites in which operators must choose an appropriate maneuver to mitigate the risk of collision.<sup>163</sup> As there are no international norms or rules for right-of-way or similar norms of traffic prioritization, each encounter is handled on an ad hoc basis based on the discretion and risk appetite of the individual operators.<sup>164</sup>

It is the nature of orbital mechanics that some altitudes and inclinations are easier to reach or especially suited for specific purposes; therefore, the population of satellites is not evenly distributed in Earth's orbits.<sup>165</sup> Specific regions of LEO can be characterized as orbital highways in which a large proportion of satellites are operated.<sup>166</sup> Operators with several satellites or constellations operating in the same orbital region will often experience multiple conjunctions with each other.<sup>167</sup> A practice can therefore quickly have a documented history of repeated similar interactions that could, if they follow discernible principles, provide evidence for the emergence of a norm.

As the absolute number of conjunctions, as well as the number of conjunctions per satellite in LEO, continue to grow at a

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<sup>161</sup> For the rules governing prioritization of vessels at sea based on propulsion, see U.N. Convention on the International Regulations for Preventing Collisions at Sea, Rule 18, Oct. 20, 1972, 1050 U.N.T.S. 17. Note that the international rules of the road at sea use different parameters for guiding traffic, including positional ones.

<sup>162</sup> For a list of potential parameters that future right-of-way rules in orbit could build on, see Martin Michel & Reinhold Bertrand, *Assessment of Inter-Operator Rule-Based Collision Avoidance Operations*, 8 PROC. EUR. CONF. ON SPACE DEBRIS §§ 3.3–4.2 (2021).

<sup>163</sup> Yan Zhang, Bin Li, Hongkang Liu & Jizhang Sang, *An Analysis of Close Approaches and Probability of Collisions Between LEO Resident Space Objects and Mega Constellations*, 25 GEO-SPATIAL INFO. SCI. 104, 104–06 (2022).

<sup>164</sup> See Borowitz et al., *supra* note 72, at 2.

<sup>165</sup> Elisa Maria Alessi, Giulia Schettino, Alessandro Rossi & Giovanni B. Valsecchi, *Natural Highways for End-of-Life Solutions in the LEO Region*, 130 CELESTIAL MECHS. & DYNAMICAL ASTRONOMY 33, 34–35 (2018).

<sup>166</sup> See Lawrence et al., *supra* note 9, at 428.

<sup>167</sup> See *id.* at 433.

significant pace,<sup>168</sup> so will the observable practice of operators' decisions on who has the right-of-way in different situations. If patterns emerge in how operators choose to handle conjunctions, so might customs, as they did on the seas centuries past.<sup>169</sup>

#### B. DOCUMENTED STATE PRACTICE THROUGH BETTER SPACE DATA

For state practice to potentially serve as evidence of the crystallization of a norm, the acts must be observable and documented.<sup>170</sup> All over the globe, private, public, and military installations are being built and expanded to provide better "space domain awareness."<sup>171</sup> The improvement of space domain awareness<sup>172</sup> technology and the resulting better data on maneuvers in space make documenting practices easier. Private service providers<sup>173</sup> and non-governmental initiatives<sup>174</sup> increasingly make data about traffic in space broadly available. The United States possesses the largest and most capable space domain awareness network and is committed to making the data available to operators globally through an open data sharing platform under development.<sup>175</sup> A large number of bilateral

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<sup>168</sup> *Id.*

<sup>169</sup> See Blount, *supra* note 14, at 8.

<sup>170</sup> See Int'l Law Comm'n, *supra* note 148, at 133.

<sup>171</sup> See John A. Kennewell & Ba-Ngu Vo, *An Overview of Space Situational Awareness*, 16th Int'l Conf. on Info. Fusion 1029, 1034–35 (2013), [http://ba-ngu.vo-au.com/vo/KV\\_SSA\\_FUSION13.pdf](http://ba-ngu.vo-au.com/vo/KV_SSA_FUSION13.pdf) [<https://perma.cc/J24F-MB73>]; Mariel Borowitz, *Strategic Implications of the Proliferation of Space Situational Awareness Technology and Information: Lessons Learned from the Remote Sensing Sector*, 47 SPACE POL'Y 18, 18–20 (2019).

<sup>172</sup> "Space domain awareness" is also often referred to as "space situational awareness" or "space surveillance and tracking." The terms all refer to the technical capability to monitor assets and activities of the orbital domain around earth. These capabilities are essential to space traffic management and are increasingly seen as critical to national security. See Kennewell & Vo, *supra* note 171, at 1029; Borowitz, *supra* note 171, at 18.

<sup>173</sup> The number of private companies providing space situational awareness services is growing. See, e.g., *Tracking and Monitoring: Protect Your Fleet, Your Business, and Your Bottom Line*, LEO LABS, <https://leolabs.space/> [<https://perma.cc/7ALD-NUS>]; NORTHSTAR, <https://northstar-data.com/> [<https://perma.cc/GJ8J-QJM7>]; *Free Collision Risk Assessment: No Strings Attached*, PRIVATEER, <https://mission.privateer.com> [<https://perma.cc/W8CH-Y729>].

<sup>174</sup> See ASTRIAGRAPH, <http://astria.tacc.utexas.edu/AstriaGraph/> [<https://perma.cc/E9FS-3TL2>].

<sup>175</sup> See Diane Howard, U.N. Comm. on the Peaceful Uses of Outer Space, Sci. & Tech. Subcomm., *Open Architecture Data Repository* 3–4 (Apr. 28, 2021), <https://www.unoosa.org/documents/pdf/copuos/stsc/2021/tech-55E.pdf> [<https://perma.cc/9QVG-RKDD>].

space domain awareness data sharing agreements already have been concluded between the United States and other countries.<sup>176</sup> The traffic conduct of operators therefore becomes gradually more transparent and available as evidence of practice for the purpose of identifying emerging norms.

In addition to enabling the documentation of norms, transparency of traffic conduct can, in itself, facilitate norm emergence, as it allows operators to observe, learn from, and potentially emulate each other's approaches.<sup>177</sup> As new space actors join the traffic in orbit, they may look to the increasing volume of available data about how more experienced actors handle conjunctions and other traffic incidents. The build-out of space domain awareness capabilities by states and commercial actors and the growing public availability of data about space traffic can therefore have the unintended effect of contributing to the emergence of customary traffic norms.

### C. THE DOCTRINE OF SPECIALLY AFFECTED STATES

According to the doctrine of "specially affected states" developed by the ICJ in *North Sea Continental Shelf*, the acts of certain states might carry increased weight in the formation of custom, if they are specially affected.<sup>178</sup> The concept of specially affected states has been criticized for being theoretically underdeveloped and for being misapplied in favor of powerful states in the Global North.<sup>179</sup> This critique is especially relevant in relation to space because many states in the Global South are not yet spacefaring.<sup>180</sup> When considering which states are specially affected, the interests of emerging and future spacefaring nations, in a sustainable space traffic regime, should not be overlooked.

The United States is the nation with the greatest number of active satellites in space,<sup>181</sup> the largest public and private space

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<sup>176</sup> See Debra Werner, *International SSA Agreements Could Pave the Way for Further Space Cooperation, Panelists Said*, SPACENEWS (Apr. 18, 2018), <https://spacenews.com/international-ssa-agreements-could-pave-the-way-for-further-space-cooperation-panelists-said/> [<https://perma.cc/DA5P-VXZQ>].

<sup>177</sup> See Blount, *supra* note 14, at 8.

<sup>178</sup> *North Sea Continental Shelf Cases* (Ger./Den.; Ger./Neth.), Judgment, 1969 I.C.J. 3, 4 (Feb. 20).

<sup>179</sup> See Kevin Jon Heller, *Specially-Affected States and the Formation of Custom*, 112 AM. J. INT'L L. 191, 199–200 (2018), for a systematic and critical analysis of the concept.

<sup>180</sup> See *id.* at 205–06.

<sup>181</sup> Estimating the exact number of satellites in orbit varies according to different sources. Union of Concerned Scientists (UCS), an NGO, maintains an online

sector, and the most-developed space domain awareness capabilities. The clearly dominant position of the United States in space increases the norm-setting power of U.S. traffic practice, in the same way that Great Britain's then-dominant position defined the rules of the road on the seas during the formation period.<sup>182</sup>

It is difficult to envision emergence of specific traffic norms in space as binding if they are in opposition to U.S. practice, although the objections of one state would not in general prevent the formation of a customary rule.<sup>183</sup> In addition, the advent of commercial mega-constellations means that a small number of commercial operators, such as SpaceX and OneWeb, control the majority of active satellites.<sup>184</sup> Until more nations and companies realize their own plans for mega-constellations, the dominant commercial operators and their state regulators might greatly influence traffic norms by establishing practices.

#### D. SOURCES OF *OPINIO JURIS* FOR SPACE TRAFFIC NORMS

The second component that must be demonstrated for a customary rule to emerge is the *opinio juris*—the evidence that states consider themselves bound by the norm.<sup>185</sup> It is this sense of legal duty that distinguishes the customary rules from mere habits or traditions of states.<sup>186</sup> Determining the subjective reasoning of a state in relation to space traffic is not straightforward, and many different sources can be considered relevant, from communications between operators to space agency guidelines.<sup>187</sup>

Although it can be challenging to discern if state proclamations in the U.N. General Assembly are meant as an expression

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database tracking active satellites. As of May 1, 2022, UCS determined there are 5,465 active satellites in orbit, of which 3,433 are American. See UNION CONCERNED SCIENTISTS, *supra* note 55.

<sup>182</sup> HERNÁNDEZ, *supra* note 91, at 39.

<sup>183</sup> See Shelly Aviv Yeini, *The Specially-Affecting States Doctrine*, 112 AM. J. INT'L L. 244, 244–45 (2018).

<sup>184</sup> See Therese Wood, *Who Owns Our Orbit: Just How Many Satellites Are There in Space?*, WORLD ECON. F. (Oct. 23, 2020), <https://www.weforum.org/agenda/2020/10/visualizing-earth-satellites-space-spacex/> [<https://perma.cc/8XQY-EUP2>] (finding the top 5 commercial operators now control more than 50% of all active satellites).

<sup>185</sup> SCHARF, *supra* note 115, at 47.

<sup>186</sup> Int'l Law Comm'n, *supra* note 148, at 140.

<sup>187</sup> See *id.* at 120.

of *lex lata* or *lex feranda*,<sup>188</sup> the forum remains a primary forum for states to share their considered opinions on international norms. The General Assembly and the specialized forums for outer space, such as the U.N. Committee on the Peaceful Uses of Outer Space (UNCOPUOS), are therefore, a primary source for identifying *opinio juris* of states.<sup>189</sup> In recognition of the issue of increasing traffic and congestion in space, space traffic management since 2016 has been a fixed point on the agenda at the annual meetings of the UNCOPUOS Legal Subcommittee.<sup>190</sup> Statements by states hereunder, as well as in the general discussions during the sessions, can shed light on developing *opinio juris*. The statements and discussions of space traffic in U.N. forums<sup>191</sup> reflect the international consensus that better governance of space traffic is needed to ensure sustainable access to space, but any substantial discussions of actual rules of the road for orbit have yet to materialize.

When national space agencies make public agreements or proclamations about how they will handle space traffic, it can be taken as evidence for how the state views norms for space traffic. The National Aeronautics and Space Administration (NASA), the European Space Agency (ESA), and other major space agencies have published handbooks and guidelines on handling con-

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<sup>188</sup> See generally U.N. Secretary-General, *Reducing Space Threats Through Norms, Rules and Principles of Responsible Behaviours*, ¶¶ 41–44, U.N. Doc. A/76/77 (July 13, 2021). In this context, *lex lata* expresses an opinion about what the law currently is, while *lex feranda* refers to an opinion about what the law *ought* to be, i.e., an expression of desire to change the current law. AARON X. FELLMETH & MAURICE HORWITZ, *GUIDE TO LATIN IN INTERNATIONAL LAW* 168–169 (2009).

<sup>189</sup> See Int'l Law Comm'n, *supra* note 148, at 120.

<sup>190</sup> Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Ninth Session, U.N. Doc. A/AC.105/1113, at 2, 30 (Apr. 27, 2016); Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixtieth Session, U.N. Doc. A/AC.105/1122, at 1 (Apr. 18, 2017); Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixty-First Session, U.N. Doc. A/AC.105/1177, at 3 (Apr. 30, 2018); Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixty-Second Session, U.N. Doc. A/AC.105/1203, at 2 (Apr. 18, 2019); Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixty-Fourth Session U.N. Doc. A/AC.105/1243, at 2 (June 24, 2021); Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Sixty-Fifth Session, U.N. Doc. A/AC.105/1260, at 1 (Apr. 19, 2022).

<sup>191</sup> See Comm. on the Peaceful Uses of Outer Space, Annotated Provisional Agenda of the Sci. & Tech. Subcomm., U.N. Doc. A/AC.105/C.1/L.392, at paras. 8, 13 (Dec. 9, 2021); U.N. Secretary-General, *Reducing Space Threats Through Norms, Rules and Principles of Responsible Behaviours*, U.N. Doc. A/76/77, § 5 (July 13, 2021).

junctions.<sup>192</sup> Although the public space agencies are not regulators tasked with creating law, their published materials can be used to ascertain *opinio juris*.<sup>193</sup> Some of the technical guidelines published by space agencies have wording that could be construed to imply legal obligations. Formulations found in a Handbook published by NASA, such as “[t]he ascending/descending spacecraft that is equipped to maneuver needs to yield the right-of-way to existing on-orbit assets by performing risk mitigation maneuvers or ascent/descent trajectory alterations,”<sup>194</sup> have the form and meaning of a rule of the road provision. Trends across such technical materials published by state agencies provide evidence of *opinio juris*.<sup>195</sup>

Another source to consider when ascertaining *opinio juris* is technical standards published by, referred to, or endorsed by states.<sup>196</sup> A large body of international technical standards relates to space sustainability and debris management, which are at least partially relevant to space traffic. Several of these technical standards, for example, the ISO Standard 24113, on space debris mitigation,<sup>197</sup> have significant state support evident through national legislation and endorsement by public space agencies.<sup>198</sup> When states make explicit reference and demand adherence to specific technical standards, inter alia as part of licensing requirements, it is reasonable to consider the standards as relevant to *opinio juris*.<sup>199</sup> Some authors argue that technical standards have come to play a central role in international law for regulating technology when states are unable to agree

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<sup>192</sup> See J.D. Harrington, *NASA Releases Best Practices Handbook to Help Improve Space Safety*, NASA, <http://www.nasa.gov/press-release/nasa-releases-best-practices-handbook-to-help-improve-space-safety> [<https://perma.cc/9FEA-FA9J>] (Jan. 4, 2021); Jessica, *ESA Publishes Guidelines for Safe Close-Proximity Operations*, CLEAN SPACE BLOG (Nov. 15, 2021), <https://blogs.esa.int/cleanspace/2021/11/15/esa-publishes-guidelines-for-safe-close-proximity-operations/> [<https://perma.cc/X4QG-TK7U>].

<sup>193</sup> Int'l Law Comm'n, *supra* note 148, at 120.

<sup>194</sup> NASA, *NASA SPACECRAFT CONJUNCTION ASSESSMENT AND COLLISION AVOIDANCE BEST PRACTICES HANDBOOK* 13 (2020).

<sup>195</sup> Int'l Law Comm'n, *supra* note 148, at 120.

<sup>196</sup> ANDREA BARRIOS VILLARREAL, *INTERNATIONAL STANDARDIZATION AND THE AGREEMENT ON TECHNICAL BARRIERS TO TRADE* 58 (2018).

<sup>197</sup> H. Stokes et al., *Evolution of ISO's Space Debris Mitigation Standards*, 7 J. SPACE SAFETY ENG'G 325, 326 (2020).

<sup>198</sup> F. Alby, *30 Years of Space Debris Mitigation Guidelines in Europe*, in *SPACE SAFETY IS NO ACCIDENT* 3, 10 (Tommaso Sgobba & Isabelle Rongier eds., 2015).

<sup>199</sup> Int'l Law Comm'n, *supra* note 148, at 125.

through traditional means.<sup>200</sup> It is an explicit policy goal of several leading space powers to develop technical standards and guidelines for space traffic,<sup>201</sup> and some are under development in international standardization bodies.<sup>202</sup> The engagement of states in the development of international technical standards through international standardization bodies and the implementation of standards in national governance of space traffic may be central to identifying *opinio juris* for rules of the road.

The preceding Sections surveyed the sources of state practice and state *opinio juris* in relation to identifying emerging customary traffic rules for Earth's orbit. To gain legal effect, a custom requires evidence of pervasiveness and uniformity in both practice and *opinio juris*, although the amount and form of evidence needed are debated.<sup>203</sup> It is beyond the scope of this Article to conduct an in-depth investigation of these sources to precisely determine their current status. Even though there is definite potential for customary traffic rules, as supported by the arguments above, the cautious assessment of this author is that no customary norms are yet discernible in state practice in the traditional, doctrinal sense.

Before we can close the investigation, we must turn our attention to the rapidly rising private space industry and gauge its influence on the object of this study: the emergence of customary traffic rules.

## V. CUSTOMARY LAW EMANATING FROM PRIVATE ACTORS

The rise to prominence of private actors in the space sector is undeniable. The massive increase in active satellites is primarily driven by commercial actors whose launch activities now dwarf both military and other government uses in terms of assets launched.<sup>204</sup> For most of human history, placing assets in orbit

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<sup>200</sup> VILLARREAL, *supra* note 196, at 3.

<sup>201</sup> See, e.g., Space Policy Directive-3, National Space Traffic Management Policy, 83 Fed. Reg. 28969, 28969–74 (June 21, 2018); *EC Joint Communication*, *supra* note 10, at 10–11.

<sup>202</sup> For example, ISO is working on a standard for Space Traffic Coordination. See ISO, *supra* note 51.

<sup>203</sup> JACK L. GOLDSMITH & ERIC A. POSNER, *THE LIMITS OF INTERNATIONAL LAW* 23 (2006).

<sup>204</sup> UNION CONCERNED SCIENTISTS, *supra* note 55. It should be noted that public actors are still responsible for the largest share of investment in the space industry, and public sector customers continue to be an important source of revenue for the private space industry. Organisation for Economic Co-operation and De-



was a capability limited to a few militaries and state-sponsored space agencies.<sup>205</sup> However, in recent years, this has been changing rapidly, and commercial space companies now account for more than eighty percent of all new payloads placed in LEO.<sup>206</sup> In addition to the sheer quantitative increase in activities, the diversity and scope of commercial space missions are expanding, with, inter alia, mega-constellations, space tourism, on-orbit servicing, and refueling.<sup>207</sup> All around the globe, commercial actors are working on mega-constellations with various purposes, from world-spanning internet to Earth observation.<sup>208</sup> If just a fraction of the planned constellations is realized in the coming years, we will witness a further acceleration in the quantitative and qualitative dominance of commercial satellites in Earth's orbit. The private space industry has a significant interest in how the regulation of space develops and is actively seeking to influence it through extensive lobbying efforts,<sup>209</sup> and by seeking to influence technical standards committees.<sup>210</sup>

However, it is not clear if and how the mounting financial and technical power of the private sector translates to influence over international regulation of space traffic. The influence of commercial firms on international regulation is an active and well-developed field of study, with extensive writings on, inter alia, the role of lobbying in international law,<sup>211</sup> commercial firms'

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velopment [OECD], *Space Economy for People, Planet and Prosperity*, at 6, (Sept. 2021), <https://www.oecd.org/sti/inno/space-forum/space-economy-for-people-planet-and-prosperity.pdf> [<https://perma.cc/RZ88-KE9L>].

<sup>205</sup> See Wood, *supra* note 184.

<sup>206</sup> For an updated overview of data about developments in the number of active satellites, launch traffic, and other metrics, see ESA, *ESA'S ANNUAL SPACE ENVIRONMENT REPORT 4* (2022), [https://www.sdo.esoc.esa.int/environment\\_report/Space\\_Environment\\_Report\\_latest.pdf](https://www.sdo.esoc.esa.int/environment_report/Space_Environment_Report_latest.pdf) [<https://perma.cc/T4Q2-L968>].

<sup>207</sup> Gil Denis et al., *From New Space to Big Space: How Commercial Space Dream Is Becoming a Reality*, 166 *ACTA ASTRONAUTICA* 431, 435 (2020).

<sup>208</sup> Aaron C. Boley & Michael Byers, *Satellite Mega-Constellations Create Risks in Low Earth Orbit, the Atmosphere and on Earth*, 11 *SCI. REPS.* 1, 1 (2021).

<sup>209</sup> Anna Massoglia & Julia Forrest, *Lobbying Spending Skyrockets as Billionaire Space Race Takes Off*, *OPEN SECRETS*, (July 30, 2021, 11:21 AM), <https://www.opensecrets.org/news/2021/07/lobbying-spending-skyrockets-as-billionaire-space-race-takes-off/> [<https://perma.cc/32ZE-99UB>].

<sup>210</sup> See, e.g., Streamlining Licensing Procedures for Small Satellites, 85 *Fed. Reg.* 43711 (July 20, 2020) (to be codified at 47 C.F.R. pts. 1, 25).

<sup>211</sup> SUSAN K. SELL, *PRIVATE POWER, PUBLIC LAW: THE GLOBALIZATION OF INTELLECTUAL PROPERTY RIGHTS* 78 (Steve Smith et al. eds., 2003); Melissa J. Durkee, *International Lobbying Law*, 127 *YALE L.J.* 1742, 1742 (2018).

regulatory power through technical standards,<sup>212</sup> and trends toward privatization of international law.<sup>213</sup> In comparison to the growing body of legal scholarship and other social science studies into the regulatory power of nonstate actors and institutions,<sup>214</sup> the role of private firms in the emergence of uncodified customary international law is relatively unexplored.

Conventionally, private organizations have not been seen as relevant to the formation of customary international law, as new norms could only emanate from states, i.e., the subjects and creators of international law.<sup>215</sup> However, this view is being challenged by a few legal scholars expanding on private actors' potential influence on customary law.<sup>216</sup> The attempts at theorizing around private actors' influence on custom can generally be divided into (1) doctrinally based approaches focusing on how private acts can be ascribed to state actors as evidence of customary norms, and (2) socio-legal approaches departing fully from the traditional state-centric view by investigating private companies as "norm entrepreneurs."<sup>217</sup> The approaches are not mutually exclusive but represent two fundamentally different conceptualizations of what legal norms are, how they emerge, and how they influence state behavior. Both perspectives shine light on significant aspects of how customary rules of the road for space traffic might evolve the role of nonstate entities in their emergence.

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<sup>212</sup> TIM BÜTHE & WALTER MATTLI, *THE NEW GLOBAL RULERS?: THE PRIVATIZATION OF REGULATION IN THE WORLD ECONOMY* 1–9 (2011).

<sup>213</sup> See Stephan, *supra* note 131, at 1618.

<sup>214</sup> The field of study into regulation beyond the traditional command-and-control legislative powers of the state is developed under different terms such as "new governance." See Jason M. Solomon, *New Governance, Preemptive Self-Regulation, and the Blurring of Boundaries in Regulatory Theory and Practice*, 591 WIS. L. REV. 591, 596–97 (2010); Julia Black, *Critical Reflections on Regulation*, 27 AUSTL. J. LEGAL PHIL. 1, 14–15 (2002).

<sup>215</sup> Christopher Greenwood, *Sources of International Law: An Introduction*, § 2 (2008), [https://legal.un.org/avl/pdf/ls/greenwood\\_outline.pdf](https://legal.un.org/avl/pdf/ls/greenwood_outline.pdf) [<https://perma.cc/GFJ5-FUE3>].

<sup>216</sup> See Melissa J. Durkee, *Interstitial Space Law*, 97 WASH. U. L. REV. 423, 426 (2019); Karol Wolfke, *Some Persistent Controversies Regarding Customary International Law*, in 24 NETH. Y.B. INT'L L. 1, 4 (1993); Paul Przemyslaw Polanski, *Cyberspace: A New Branch of International Customary Law?*, 33 COMPUT. L. & SEC. REV. 371, 375 (2017); Isabelle R. Gunning, *Modernizing Customary International Law: The Challenge of Human Rights*, 31 VA. J. INT'L L. 211, 221–22 (1991).

<sup>217</sup> Martha Finnemore & Kathryn Sikkink, *International Norm Dynamics and Political Change*, 52 INT'L. ORG. 887, 896–97 (1998); Durkee, *supra* note 216, at 427–28.

A. MODERNIZING THE DOCTRINAL APPROACH TO CUSTOMARY INTERNATIONAL LAW

“[W]hen nations do not exploit the choice to proactively develop international law, private actors can shape it instead. The attributed lawmaking theory shows that private actors can contribute to formal lawmaking by standing in the shoes of the state—they are lawmakers by attribution.”<sup>218</sup>

In the presentation of the theory of attributed lawmaking, Durkee argues that the actions of private actors, when authorized and supervised by a state, can be attributed to a state and contribute to the creation of customary law.<sup>219</sup> Although the conduct and opinions of nonstate actors are traditionally not seen as directly relevant to the formation of customary international law, Durkee’s approach does not overturn the traditional theory of custom.<sup>220</sup> Rather, it is a natural extension or modernization of the doctrinal view of customary law to reflect the real norm-setting power of private actors in modern international relations.<sup>221</sup> The theory does not confer lawmaking power directly onto the private actors but rather adds their actions to the list of sources from which to glimpse state practice to establish customary norms.<sup>222</sup> The argument for attributed lawmaking is firmly based on formalist and positivist legal reasoning and does not challenge the core logic of customary law theory.<sup>223</sup>

In her original presentation of the theory of attributed lawmaking, Durkee supports her argument with a case study of private firms’ influence on the international regime governing natural resource appropriation in outer space.<sup>224</sup> The issue of ownership and acquisition of space resources is principally important, but due to technical realities, it is very far from being a practical problem anytime soon.<sup>225</sup> The issue of congestion in orbit, on the other hand, has materialized already and has moved from the realm of speculative legal conundrums to real-

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<sup>218</sup> Durkee, *supra* note 216, at 429.

<sup>219</sup> *Id.* at 443–45.

<sup>220</sup> *See id.* at 440–42.

<sup>221</sup> *Id.* at 443.

<sup>222</sup> *Id.*

<sup>223</sup> *Id.* at 473–74.

<sup>224</sup> *Id.* at 449–71.

<sup>225</sup> *See* Atossa Araxia Abrahamian, *How the Asteroid-Mining Bubble Burst*, MIT TECH. REV. (June 26, 2019), <https://www.technologyreview.com/2019/06/26/134510/asteroid-mining-bubble-burst-history/> [<https://perma.cc/Q9XS-W3BN>].

world issues with real parties needing answers.<sup>226</sup> In terms of theory validation and development for the still-novel concept of attributed lawmaking, the case of orbital traffic rules has the benefit of a much larger pool of data, as all spacefaring nations have an acute and current interest in the underlying issue.

### B. STATE RESPONSIBILITY FOR PRIVATE ACTORS

Durkee argues that states are responsible for the acts of their legal and natural persons under the basic rules of international law and that the theory of attributed lawmaking is generally applicable.<sup>227</sup> Additionally, due to *lex specialis* considerations arising from core principles of international space law, the theory of attribution is particularly strong for space law, as will be explicated below.

A core principle of the Outer Space Treaty provides:

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.<sup>228</sup>

This provision explicitly makes states responsible for the actions of non-governmental entities, such as commercial firms. The state responsibility established here includes accountability for private actors' conduct in orbit.

Article VI goes on to specify that “[t]he 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.”<sup>229</sup> Therefore, states are not only responsible for private actors in space, but they are also under an obligation to authorize and

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<sup>226</sup> Recently, there have been several reports of near collisions between assets in LEO, including manned space stations. See *ESA Spacecraft Dodges Large Constellation*, ESA (Mar. 9, 2019), [https://www.esa.int/Space\\_Safety/ESA\\_spacecraft\\_dodges\\_large\\_constellation](https://www.esa.int/Space_Safety/ESA_spacecraft_dodges_large_constellation) [<https://perma.cc/9EAW-5PJC>]; Bojan Pancevski, *Elon Musk's Satellite Internet Project Is Too Risky, Rivals Say*, WALL ST. J. (Apr. 19, 2021, 6:16 AM), <https://www.wsj.com/articles/elon-musks-satellite-internet-project-is-too-risky-rivals-say-11618827368> [<https://perma.cc/89UA-GVBN>]; Chen Lan, *The Starlink-China Space Station Near-Collision: Questions, Solutions, and an Opportunity*, SPACE REV. (Feb. 28, 2022), <https://www.thespacereview.com/article/4338/1> [<https://perma.cc/3QNT-FSFZ>].

<sup>227</sup> Durkee, *supra* note 216, at 427–29.

<sup>228</sup> Outer Space Treaty, *supra* note 73, art. VI (emphasis added).

<sup>229</sup> *Id.* (emphasis added).

continuously supervise their activities. This obligation makes it difficult for states to claim that they are not aware of the actions of their non-governmental actors in space. By extension, the traffic norms followed by the private actors are supervised and authorized by their state and can be attributed as state practice. Any emerging traffic norms, such as the resolution of conjunction maneuvers, would be visible to and legally authorized by states even if the satellites are technically and practically controlled by private entities.<sup>230</sup>

### C. STATE LIABILITY FOR PRIVATE ACTORS

The liability regime in space also aligns with the assertion of state accountability for the conduct of private actors. The Outer Space Treaty makes states responsible for damage caused by any object launched from their territory, irrespective of whether it is operated by the state or a private company:

[E]ach State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the moon and other celestial bodies.<sup>231</sup>

The liability established here is further elaborated on by the Convention on the International Liability for Damage Caused by Space Objects (Liability Convention),<sup>232</sup> which clarifies that states are liable for any damage in space resulting from the fault of legal persons they are responsible for.<sup>233</sup> This entails state liability for damages resulting from private actors' failure to adhere to any established traffic norms.

Additionally, a state must, under international law, retain control of objects registered to them: "A State Party to the Treaty on whose registry an object launched into outer space is carried shall *retain jurisdiction and control* over such object, and over any personnel thereof, while in outer space . . ." <sup>234</sup> The obligation to control extends to non-governmental objects, such as commercial satellites and space stations in LEO. As part of the Inter-

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<sup>230</sup> See Durkee, *supra* note 216, at 447–48.

<sup>231</sup> Outer Space Treaty, *supra* note 73, art. VII.

<sup>232</sup> Convention on the International Liability for Damage Caused by Space Objects art. III, *opened for signature* Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187.

<sup>233</sup> *Id.*

<sup>234</sup> Outer Space Treaty, *supra* note 73, art. VIII (emphasis added).

national Law Commission's<sup>235</sup> long-running work to clarify state responsibility, the Commission developed and adopted draft articles on the responsibility of states for internationally wrongful acts.<sup>236</sup> It follows from Article 8 that actions of private actors can be attributed to states if the conduct is under the control of the state.<sup>237</sup> Although the articles deal specifically with wrongful acts, the principle of attribution for acts of private persons under state control is generally applicable.<sup>238</sup> Again, this aligns well with the assertion that the acts of the controlled, private parties are attributable as state behavior to identify emerging customary traffic norms.

Article IX of the Outer Space Treaty imposes a duty on states to conduct all of their space activities with "due regard" to other state parties' corresponding interests, and it specifically requires states to undertake international consultations before they or their nationals proceed with any actions that may cause potential harmful interference in the peaceful exploration and uses of outer space.<sup>239</sup> It follows that states are under an obligation to seek international consultation if one of their private actors is planning a traffic maneuver that may pose a risk to other space actors.

In sum, international law confers responsibility for, liability for, and the obligation to authorize, supervise, and control national private space actors and their conduct in orbit. These responsibilities, rights, and obligations regarding private space actors support the claim that their traffic conduct can be attributed to nations as state practice to identify emerging customs.

Visible and consistent trends in traffic conduct of participants in orbit, that is, how traffic interactions are handled regularly, can become traffic norms. If the patterns become clear and repeated enough, these traffic norms can be conceptualized as orbital rules of the road. If private actors, in the interest of their safety or from a sense of legal obligation, start consistently complying with rules of the road, and this conduct is legally state

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<sup>235</sup> The International Law Commission is a U.N. organization that the General Assembly has tasked with "promotion of the progressive development of international law and its codification." G.A. Res. 174 (II), art. 1.1 (Nov. 17, 1947).

<sup>236</sup> G.A. Res. 56/83, arts. 1–2 (Jan. 28, 2002).

<sup>237</sup> See *id.* art. 8.

<sup>238</sup> See Rüdiger Wolfrum, *State Responsibility for Private Actors: An Old Problem of Renewed Relevance*, in INTERNATIONAL RESPONSIBILITY TODAY: ESSAYS IN MEMORY OF OSCAR SCHACHTER 423, 424 (Maurizio Ragazzi ed., 2005).

<sup>239</sup> Outer Space Treaty, *supra* note 73, art. IX.

practice, these traffic rules, may, in time, become elevated to international custom. It may seem far-fetched now, but considering the historical precedent of navigational rules for the analogous law of the sea, the possibility of customary rules of the road for orbit should not be discarded prematurely.

D. CONTOURS OF *OPINIO JURIS* FOR STATE RESPONSIBILITY FOR PRIVATE SPACE TRAFFIC

As the populations of satellites burgeon, satellites will have to maneuver more frequently to avoid collisions. The surge in conjunctions between satellites makes the space domain more hazardous and already causes tensions, both among national private operators<sup>240</sup> and internationally.<sup>241</sup> The reactions by states concerning hazardous traffic incidents in orbit where their nationals are affected potentially reveal *opinio juris*. The publicly available correspondences between states about specific orbital traffic encounters are still sparse; however, states seem to accept the international responsibility for the traffic conduct of their commercial actors, as illustrated in the case below.

One of the rare cases with public, interstate communication about a specific conjunction is the U.S.–China exchange about a possible conjunction between a satellite operated and owned by a private U.S. company and the public Chinese space station Tiangong.<sup>242</sup> The custom of treating private actors as representing their state is illustrated by the exchange in the United Nations where China in a note verbale claimed, “Starlink satellites launched by Space Exploration Technologies Corporation (SpaceX) of the United States of America have had two close encounters with the China Space Station. For safety reasons, the China Space Station implemented preventive collision avoid-

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<sup>240</sup> For example, a number of SpaceX competitors have complained and filed petitions with the Federal Communications Commission (FCC) contending that SpaceX’s growing fleet of satellites creates collision danger. See Pancevski, *supra* note 226.

<sup>241</sup> The ESA has been forced to move satellites to avoid collision danger with SpaceX’s mega-constellation satellites. See ESA, *supra* note 226.

<sup>242</sup> See Rhoda Kwan & Jon Henley, *China Berates US After ‘Close Encounters’ with Elon Musk Satellites*, GUARDIAN (Dec. 28, 2021, 7:35 AM), <https://www.theguardian.com/science/2021/dec/28/china-complains-to-un-after-space-station-is-forced-to-move-to-avoid-starlink-satellites> [https://perma.cc/NS3B-4FRW].

ance control . . . .”<sup>243</sup> The note verbale treats the conjunction and the perceived collision risk as a matter between states governed by international law.

The United States accepts the responsibility for the conduct of private actors in space as a signatory to the relevant treaties, and its response states that the United States “is committed to sustainable, rules-based activities in outer space, whether those activities are performed by Governments or by non-governmental entities, including the private sector.”<sup>244</sup> In the communication, the privately owned and operated Starlink satellites are consistently referred to as representing the United States: “In the specific instances cited in the note verbale from China to the Secretary-General, the United States Space Command did not estimate a significant probability of collision between the China Space Station and the referenced United States spacecraft.”<sup>245</sup> Both states in the exchange treat the practice of private space actors as governed by international law, and this strengthens the theory of attributed lawmaking in the case of space traffic. The cases also clearly demonstrate the need for agreed rules of the road to govern this type of traffic incident. There are currently no formal internationally binding rules of the road that could have obligated the private actor (SpaceX) to maneuver to avoid the conjunction, but as the number of satellites grow, all nations with crewed space stations will have an interest in traffic norms to avoid dangerous conjunctions with operators. Space is a naturally hazardous environment for humans, and there is no need to add traffic collisions to the list of lethal risks. For a maneuver to be relevant in identifying *opinio juris*, there must be evidence that operators conducted the maneuver due to a sense of legal obligation.<sup>246</sup> Therefore, it is pertinent to monitor the language used by states when they discuss these types of traffic events in the United Nations and other international forums in the future.

The SpaceX satellite implicated in the case was part of the private firm’s Starlink mega-constellation consisting of several

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<sup>243</sup> Comm. on the Peaceful Uses of Outer Space, Note Verbale Dated Dec. 3, 2021, from the Permanent Mission of China to the United Nations (Vienna) Addressed to the Secretary-General, U.N. Doc. A/AC.105/1262, at 1 (Dec. 6, 2021).

<sup>244</sup> General Assembly, Note Verbale Dated Jan. 28, 2022, from the Permanent Mission of the United States of America to the United Nations (Vienna) Addressed to the Secretary-General, U.N. Doc. A/AC.105/1265, at 1 (Jan. 28, 2022).

<sup>245</sup> *Id.* at 2.

<sup>246</sup> See Int’l Law Comm’n, *supra* note 148, at 138.



thousand satellites.<sup>247</sup> SpaceX owns and operates almost half of all active satellites, and its Starlink satellites are parties to a large share of conjunctions in LEO.<sup>248</sup> The approach of SpaceX in handling traffic incidents, therefore, has a great influence on the formation of norms. The company has signed a joint public agreement with NASA regulating how the two entities handle conjunctions between their satellites.<sup>249</sup> The agreement effectively obligates SpaceX to “[p]erform evasive action by on-orbit Starlink satellites to mitigate close approaches and avoid collisions with all NASA assets.”<sup>250</sup> Translating the agreement to “rules of the road” terminology, SpaceX accepts that their satellites must always give way and that NASA assets have the right-of-way in orbit. As a contractual agreement between two parties, the direct legal rights and obligations do not extend beyond the parties. However, the very clear assignment of an obligation for the commercial satellites to give way for the satellites and space stations of the public actor could potentially be the beginning of a crystallization of a rule of the road. A trend of private actors giving public assets priority in space traffic is an example of a right-of-way rule with the potential to gain customary status through attributed lawmaking. The implication would be that a state would be responsible for a collision resulting from one of their private actors not giving adequate priority to a public asset of another state.

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<sup>247</sup> See Joseph Guzman, *SpaceX Mega Constellation Raises Concerns of Increased Satellite Collisions*, HILL (Feb. 14, 2022), <https://thehill.com/changing-america/resilience/smart-cities/594187-spacex-mega-constellation-raises-concerns-of/> [<https://perma.cc/QZ3N-U7SB>].

<sup>248</sup> See *Starlink Statistics*, JONATHAN’S SPACE PAGES, <https://planet4589.org/space/stats/star/stats.html> [<https://perma.cc/2UGB-BSXL>] (Sept. 20, 2022, 1:02 AM) (SpaceX owns and operates 2,664 satellites); UNION CONCERNED SCIENTISTS, *supra* note 55 (there are 5,465 total operating satellites).

<sup>249</sup> The agreement is publicly available and officially called the “Nonreimbursable Space Act Agreement Between the National Aeronautics and Space Administration and Space Exploration Technologies Corp for Flight Safety Coordination with NASA Assets.” See NASA, *Nonreimbursable Space Act Agreement Between the National Aeronautics and Space Administration and Space Exploration Technologies Corp for Flight Safety Coordination with NASA Assets* art. 2 (2021), [https://www.nasa.gov/sites/default/files/atoms/files/nasa-spacex\\_starlink\\_agreement\\_final.pdf](https://www.nasa.gov/sites/default/files/atoms/files/nasa-spacex_starlink_agreement_final.pdf) [<https://perma.cc/F88S-595M>].

<sup>250</sup> *Id.* art. 3.

E. THE COMMON INTEREST IN SOLVING THE COORDINATION  
PROBLEM

The argument here is not that the private parties can legislate and create global law but rather that the actions of private actors can, under certain circumstances, be seen as evidence of an emerging or existing customary norm. States retain the power to prevent the norms from forming or gaining customary status by, *inter alia*, internationally protesting a practice or requiring different practices through legislation or guidelines.<sup>251</sup> However, if states are passive in the face of space traffic practices forming clear patterns of repetition, their passivity might be taken as acceptance of the emerging norm.<sup>252</sup>

Rules of the road in orbit would be valuable for all actors in space simply by creating predictability about the conduct of other actors in different traffic situations. Traffic in space presents a very pure form of the legal archetype of “coordination problems,” in which the value of having a common solution is often more important than how the problem is solved.<sup>253</sup> The classic example of a coordination problem is what side of the road one must drive.<sup>254</sup> Here, the value of the rule of the road in question is to provide all actors with a salient perception of what other actors will do. Although some may prefer driving on either the left or right, all actors will value any solution that provides consistency and predictability.<sup>255</sup> Rules of the road for satellites in space are, of course, much more complicated than the given example, but they retain the nature of a coordination problem. Major space powers who have been unwilling to accept right-of-way rules either dictated or proposed by another state might accept, through passivity and conduct, a customary norm as they realize the benefit of common rules. By having the rules emerge through the practice of public and private space actors, no nation will have to bow to any other authority or directly negotiate with adversaries. This is indeed a strength of customary law over treaty law—mutual consent can be reached with no need to recognize the other party.<sup>256</sup>

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<sup>251</sup> See Int'l Law Comm'n, *supra* note 148, at 138.

<sup>252</sup> State passivity or acquiescence is generally accepted as evidence for both *usus* and *opinio juris*. See Akehurst, *supra* note 126, at 38–39.

<sup>253</sup> Leslie Green, *Law, Co-ordination and the Common Good*, 3 OXFORD J. LEGAL STUD. 299, 302–03 (1983).

<sup>254</sup> See *id.*

<sup>255</sup> See *id.*

<sup>256</sup> See Blount, *supra* note 14, at 7.

In sum, there is a theoretical possibility of future space traffic rules emerging as customary rules binding on all states based partially on private space activities. The sources of evidence to draw from are not limited to the acts and communications of states, as the conduct of non-governmental space actors can also be attributed to the states.<sup>257</sup> For the case of orbital traffic rules, the proposition of attributed lawmaking seems both convincing and relevant. The theory shines light on a potential path for rules of the road to emerge, encompassing the growing influence of private actors while retaining states as the primary subjects and creators of international law. Still, it must be recalled that the arguments here are limited to identifying *potential* avenues for rules of the road to emerge in the future, based on what is known today.

## VI. NORMS AS PRECURSOR AND SCAFFOLDING OF INTERNATIONAL LAW

As argued above, a future scenario with customary rules of the road for space is not unthinkable, given the pressure for governance and the unlikelihood of a timely treaty solution. This Part of the Article moves beyond doctrinal legal thinking and seeks to trace the path from norm inception to customary law. It argues that norm emergence is an essential step on the path to formation of customary international law and that private actors can play a crucial role in instigating the informal norms that become precursors for international customary rules. The objective here is not to investigate how norms influence the behavior of private space actors generally, but rather to uncover how states, as regulators and subjects of international law, are influenced by norms created or advanced by private actors. By going beyond the black letter approach, private actors can be seen as international norm creators in their own right, forming international practices that over time and through various paths might end up as legal reality. First, to lay a proper foundation for the analysis, we turn to the distinction between norms and laws.

### A. THE RELATIONSHIP BETWEEN NORMS AND LAW IN LEGAL SCIENCE

The emergence of international norms has been the subject of expansive academic literature in various nonlegal social sci-

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<sup>257</sup> See Durkee, *supra* note 216, at 427–29.

ence disciplines from political science to sociology.<sup>258</sup> The exact definition of “norms” varies between disciplines and frameworks, but it can be roughly defined as relatively stable expectations about how certain actors should conduct themselves in certain situations.<sup>259</sup>

The emergence of global norms does not happen in isolation from norm development in domestic spheres.<sup>260</sup> Norms percolate from the national to the international level and vice versa.<sup>261</sup> National norms can be seeds of global norms, and states can champion certain norms in the international arena and support their wider acceptance.<sup>262</sup> Conversely, international norms exert influence on the national level, and research shows that national leadership is often influenced by the normative judgments of the international community.<sup>263</sup>

In international law scholarship, the term “norm” is often used synonymously with “law.”<sup>264</sup> However, it is useful for this Article’s objective of identifying potential paths to space traffic governance as well as legal science in general to be able to recognize emerging norms before they become black letter law. The dogmatic, legal dichotomy, where norms either exist as binding law or are devoid of legal relevance, is an unhelpful oversimplification. Rather, the gradual emergence and diffusion of a norm often precedes and provides the scaffolding and structure of customary law formation.<sup>265</sup>

The distinction between norms and laws is easy to draw in domestic legal systems, where breaking norms might lead to furrowed brows while breaking laws has legal consequences from fines to imprisonment. In international law, no such unequivocal distinction between law and norm can be easily drawn.<sup>266</sup> Na-

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<sup>258</sup> For discussions of the relationship between international law and international norms, see *THE POWER OF HUMAN RIGHTS: INTERNATIONAL NORMS AND DOMESTIC CHANGE* 1–2 (Thomas Risse, Stephen C. Ropp & Kathryn Sikkink eds., 1999); *FRIEDRICH V. KRATOCHWIL, RULES, NORMS, AND DECISIONS* 45, 46 (Steve Smith et al. eds., 1989).

<sup>259</sup> See Finnemore & Sikkink, *supra* note 217, at 891.

<sup>260</sup> *Id.* at 893.

<sup>261</sup> *Id.* at 893–94.

<sup>262</sup> *Id.*

<sup>263</sup> See Scott N. Romaniuk & Francis Grice, *Norm Evolution Theory and World Politics*, *E-INT’L RELS.* (Nov. 15, 2018), <https://www.e-ir.info/2018/11/15/norm-evolution-theory-and-world-politics/> [<https://perma.cc/8XF4-KDY5>].

<sup>264</sup> See Finnemore & Sikkink, *supra* note 217, at 916.

<sup>265</sup> *Id.* at 901.

<sup>266</sup> See KRATOCHWIL, *supra* note 258, at 189–90.

tions cannot be put in prison and no world police with global jurisdiction exists. Indeed, the lack of direct enforcement leads some to question whether international law is law at all.<sup>267</sup> However, to assert that international law is unenforceable or can be ignored by states would be a mistake. Generally, states comply with international law but the extent of compliance and reason(s) for it are subject to longstanding scholarly debates.<sup>268</sup> The three major rationalist explanations for state compliance are (1) *reciprocity* (states comply because they want other states to comply); (2) *retaliation* (states comply because they fear sanctions from other states); and (3) *reputation* (states comply because they care about their international reputation).<sup>269</sup> It is important to note here that none of these reasons for compliance by states require a sharp distinction between law and other norms. For states, international legal norms exist on a scale from the inviolate *jus cogens* to the merely suggestive power of soft-law principles.<sup>270</sup>

Over time, the legal weight of norms can ebb or intensify, and new norms can emerge. Most legal scholars accept the premise that customary international law changes over time,<sup>271</sup> and much scholarly attention has been expended in pursuit of a clear definition of when an international norm can be said to have been elevated to binding customary law.<sup>272</sup> However, the discussions generally concern the thresholds or characteristics in terms of *opinio juris* or *state practice* while the *process* of customary law's emergence is not very well described in theory or practice.<sup>273</sup> In other words, the focus has been on how to recognize a customary international rule when you see it, rather than on the steps preceding or leading up to the formation of a customary rule. To find theoretical lenses suited to identifying nascent

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<sup>267</sup> Anthony D'Amato, *Is International Law Really 'Law'?*, 79 NW. U. L. REV. 1293, 1293 (1984).

<sup>268</sup> See *id.* at *passim*.

<sup>269</sup> ANDREW T. GUZMAN, *HOW INTERNATIONAL LAW WORKS: A RATIONAL CHOICE THEORY* 211 (2008).

<sup>270</sup> *Id.* at 213–14.

<sup>271</sup> W. Czaplinski & G. Danilenko, *Conflicts of Norms in International Law*, 21 NETH. Y.B. INT'L L. 4, 4–5 (E.A. Alkema et al. eds., 1990).

<sup>272</sup> See Int'l Law Comm'n, *supra* note 148, at 122–23, 222 n.664. Customary international law is defined in Article 38(1)(b) of the ICJ Statute as “international custom, as evidence of a general practice accepted as law.” ICJ Statute, *supra* note 90, art. 38(1)(b).

<sup>273</sup> See, e.g., Int'l Law Comm'n, *supra* note 148, at 118–21.

norms as potential seeds of future customary traffic rules, we look beyond legal science to the broader field of social science.

### B. THE THREE STAGES OF NORM EMERGENCE

The formation and maturation of a norm can be understood as developing through the three stages—*norm emergence*, *norm cascade*, and *internalization*—as presented by Finnemore and Sikkink in their influential 1998 paper regarding the dynamics of international norms.<sup>274</sup> According to the framework, the first stage of the norm’s “life cycle” is characterized by the conscious effort of “norm entrepreneurs” to persuade states to embrace a new norm.<sup>275</sup> In the second stage, the states that have adopted the norm act as norm leaders championing the norm and applying pressure on other states to follow their lead in adopting the norm.<sup>276</sup> Finally, if the adoption of the norm reaches a critical threshold among states, the norm becomes internalized as an internationally accepted, uncontroversial, and unquestioned standard of behavior.<sup>277</sup> Importantly, the three-step process described in the model is not a deterministic, one-way path where all norms march towards universality. Not all norm entrepreneurs succeed in fostering state support for their proposed norm, and not all states championing new norms manage to elevate them to the level of general internalization by the international community.<sup>278</sup>

The concept of internalized norms overlaps with the legal concept of customary norms, but they are not synonymous; their origin in two different disciplines should be recalled.<sup>279</sup> That said, examples of internalized norms often coincide with customary norms.<sup>280</sup> For example, Finnemore and Sikkink use the prohibition against slavery and the immunity of medical personnel during war as instances of internalized norms,<sup>281</sup> both of which are enshrined in customary international law.<sup>282</sup> The

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<sup>274</sup> Finnemore & Sikkink, *supra* note 217, at 895.

<sup>275</sup> *Id.*

<sup>276</sup> *Id.*

<sup>277</sup> *Id.* at 904.

<sup>278</sup> *Id.* at 895.

<sup>279</sup> *Id.* at 913, 916.

<sup>280</sup> *Id.* at 904–05.

<sup>281</sup> *Id.* at 895.

<sup>282</sup> Fritz Allhoff & K. Potts, *Medical Immunity, International Law and Just War Theory*, 165 J. ROYAL ARMY MED. CORPS 256, 258 (2019); A. Yasmine Rassam, *Contemporary Forms of Slavery and the Evolution of the Prohibition of Slavery and the Slave Trade Under Customary International Law*, 39 VA. J. INT’L L. 303, 305–06 (1999).

norm life cycle framework provides theoretical tools to work with norm development as a process and allows for more nuance than the binary logic of the dogmatic approach to norms in traditional legal science.<sup>283</sup> The general theoretic integration of the notions of customary law and internalized norms are beyond the scope of this Article. It is enough to assert that if informal rules of the road for orbit were to develop and approach the stage of internalized norms, it would resemble a customary traffic regime in effect.

### C. FRAMING OF THE ISSUE OF SPACE TRAFFIC

The critical first step of the norm-emergence process occurs when norm entrepreneurs act to “call attention to issues or even ‘create’ issues by using language that names, interprets, and dramatizes them.”<sup>284</sup> The framing of space traffic as an important international issue is being advanced by potential norm entrepreneurs hailing from NGOs, industry, and academia.<sup>285</sup> Competing but often overlapping framings are being used in the discussions of increasing orbital traffic with different normative connotations. The issue can be framed as, inter alia, a classic “tragedy of the commons” situation,<sup>286</sup> a commercial competition issue, a sustainability problem,<sup>287</sup> a question of ancestral and cultural heritage,<sup>288</sup> or simply a matter of technical capacity

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<sup>283</sup> Finnemore & Sikkink, *supra* note 217, at 895.

<sup>284</sup> *Id.* at 897.

<sup>285</sup> See, e.g., Darrell Etherington, *Why Maxar CTO Walter Scott Thinks Now Is the Time to Address the Orbital Traffic Boom*, TECHCRUNCH (Sept. 27, 2019, 11:03 AM), <https://social.techcrunch.com/2019/09/27/why-maxar-cto-walter-scott-thinks-now-is-the-time-to-address-the-orbital-traffic-boom/> [<https://perma.cc/KD3K-U6EY>]; Theresa Hitchens, *SIA Calls for Space Traffic Rules ASAP*, BREAKING DEF. (Sept. 24, 2020, 2:21 PM), <https://breakingdefense.sites.breakingmedia.com/2020/09/sia-calls-for-space-traffic-rules-asap/> [<https://perma.cc/9ZYG-5VKU>]; Jamie Morin, *Four Steps to Global Management of Space Traffic*, 567 NATURE 25, 25–26 (2019).

<sup>286</sup> Sylvain Béal, Marc Deschamps & Hervé Moulin, *Taxing Congestion of the Space Commons*, 177 ACTA ASTRONAUTICA 313, 314 (2020); SCOTT J. SHACKELFORD, GOVERNING NEW FRONTIERS IN THE INFORMATION AGE: TOWARD CYBER PEACE 309 (2020).

<sup>287</sup> Mino Rathnasabapathy et al., *Space Sustainability Rating: Designing a Composite Indicator to Incentivise Satellite Operators to Pursue Long-Term Sustainability of the Space Environment*, 71 INT’L ASTRONAUTICAL CONG. 1, 1–2 (2020).

<sup>288</sup> Aparna Venkatesan, James Lowenthal, Parvathy Prem & Monica Vidaurri, *The Impact of Satellite Constellations on Space as an Ancestral Global Commons*, 4 NATURE ASTRONOMY 1043, 1047 (2020).

optimization.<sup>289</sup> The framing of the issue at the early stages of norm formation influences the potential solutions and rules considered, and it sets the direction of the development of the norm.<sup>290</sup>

One way to frame an issue is through the use of analogies. Analogies play a central role in the formation and spread of a norm.<sup>291</sup> When actors face new issues with no applicable prior established norms, analogies can serve to guide their behavior and provide the scaffolding for a new norm.<sup>292</sup> Finnemore and Sikkink argue that norm entrepreneurs can influence which analogies come to dominate and claim that the general adoption of an analogy in turn influences emerging norms.<sup>293</sup> For space traffic in general, the analogy of seafaring is ubiquitous, but it is important to maintain that this is far from the only possible analogy, nor always the most appropriate one. It seems trivial to point out that space traffic is vastly different from the traffic on Earth's oceans, roads, or even airspace, but it is worth pointing out so policymakers do not bring over norms and assumptions when contemplating the future rules of the road for space traffic.<sup>294</sup>

The impact of framing on the shape of the future traffic regime can be illustrated with the example of the competing narratives of *space traffic management* and *space traffic coordination*.<sup>295</sup> The term space traffic management connotes a system where some authority can direct and *manage* traffic, much like the case with airspace, where air traffic controllers oversee and direct flights.<sup>296</sup> In contrast, space traffic coordination is a framing pointing to a system relying on decentralized coordination between actors, more akin to the rules sailors apply when ships meet on the open sea.<sup>297</sup> Norm entrepreneurs favoring one ap-

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<sup>289</sup> Stijn Lemmens & Francesca Letizia, *Space Traffic Management through Environment Capacity*, in HANDBOOK OF SPACE SECURITY: POLICIES, APPLICATIONS AND PROGRAMS 845, 847 (2020).

<sup>290</sup> See Finnemore & Sikkink, *supra* note 217, at 897.

<sup>291</sup> Robert Sugden, *Spontaneous Order*, 3 J. ECON. PERSPS. 85, 93–94 (1989).

<sup>292</sup> *Id.*

<sup>293</sup> Finnemore & Sikkink, *supra* note 217, at 908.

<sup>294</sup> Admittedly, the danger of missing essential differences between these domains is more acute for legal scholars and policymakers compared to technical experts whose work will often remind them how foreign an environment space truly is.

<sup>295</sup> Blount, *supra* note 14, at 2–3.

<sup>296</sup> *Id.* at 3.

<sup>297</sup> For a discussion of the normative implications of space traffic management and space traffic coordination, see *id.* at 2–3. For a review of the historical devel-



proach of regulation over another can strategically support the corresponding framing.

#### D. IDENTIFYING THE NORM—ENTREPRENEURS

Some policy areas have strong, institutionalized norm entrepreneurs who naturally champion norm development, such as the Red Cross for humanitarian issues.<sup>298</sup> Although no major international NGOs are dedicated specifically to space traffic management, several nonstate institutions are actively working to develop space traffic norms, in addition to the state-sponsored agencies and multilateral forums.<sup>299</sup> For space traffic, much of the impetus for international norm activism seems to originate in academic and technical circles.<sup>300</sup> Studies indicate that for technically complex policy areas, transnational networks of scientific and technical experts often play a role in shaping policy.<sup>301</sup> Spacefaring is a highly technical endeavor characterized by high levels of international scientific cooperation.<sup>302</sup> It therefore comes as no surprise that the scientific community seems a likely source for norm entrepreneurs.

In addition to the scientific community, norm entrepreneurs with strong domain knowledge can also hail from the commercial space sector. The commercial firms driving the innovation and growth in the space sector are directly impacted by the growing risk of collisions resulting from the absence of basic

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opment of the concept, see Quentin Verspieren, *Historical Evolution of the Concept of Space Traffic Management Since 1932: The Need for a Change of Terminology*, 56 *SPACE POL'Y* 1, 4 (2021).

<sup>298</sup> ANNE PETERS, LUCY KOECHLIN & GRETTA FENNER ZINKERNAGEL, *NON-STATE ACTORS AS STANDARD SETTERS: FRAMING THE ISSUE IN AN INTERDISCIPLINARY FASHION* 5 (Anne Peters et al. eds., 2009).

<sup>299</sup> The Secure World Foundation is one NGO dedicated to space sustainability, including space traffic. See generally SECURE WORLD FOUND., <https://swfound.org/> [<https://perma.cc/T8NP-PN76>].

<sup>300</sup> For example, the International Institute of Space Law, the International Academy of Astronautics, and the International Astronautical Federation all have working groups and committees dedicated to furthering the development of space traffic management norms and standards. See *Space Traffic Management Committee*, INT'L ASTRONAUTICAL FED'N, <https://www.iafastro.org/about/iaf-committees/technical-committees/space-traffic-management-committee.html> [<https://perma.cc/M4H6-M4PF>].

<sup>301</sup> For an overview of studies on the dynamics of experts and epistemic communities and their role in shaping policy, see Peter M. Haas, *Introduction: Epistemic Communities and International Policy Coordination*, 46 INT'L ORG. 1, 11 (1992).

<sup>302</sup> See, e.g., JAMES CLAY MOLTZ, *CROWDED ORBITS: CONFLICT AND COOPERATION IN SPACE* 148–49 (2014).

traffic norms in space.<sup>303</sup> In another highly technical and commercially driven area, cyberspace, the strong private and commercial entities that drive the technological development in the field have, to a large degree, been able to shape norms and governance structures.<sup>304</sup> As described in Part V, private actors currently control and operate the majority of space assets and can therefore influence norm development directly through their actions. In addition, industry and NGOs stimulate norm development through participation in international conferences, industry initiatives, and standard-development bodies such as the ISO.<sup>305</sup> With initiatives such as the Space Safety Coalition,<sup>306</sup> Net Zero Space,<sup>307</sup> and Space Sustainability Rating,<sup>308</sup> nonstate actors are building the institutional infrastructure needed to push proposed norms to the international level.<sup>309</sup> It can be convincingly argued that a future space traffic management system is more likely to emerge gradually from operators coordinating to enhance safety rather than through a top-down application of rules defined by states.<sup>310</sup>

Private actors, including commercial operators and academics, can, as norm entrepreneurs, lead users to plant the seeds of future customary rules by pushing for specific rules of the road. Even if they do not manage to push states to adopt specific rules, private actors can increase the pressure on states to engage in *some* form of governance. Not having or following rules may increasingly be seen as irresponsible behavior in space.

#### E. STATES JOSTLING TO BE NORM LEADERS IN SPACE

If the norm entrepreneurs succeed in convincing a critical mass of states to become norm leaders, the norm cascade kicks in.<sup>311</sup> In this second stage of the norm lifecycle, the norms become formalized in national and institutional policies and pro-

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<sup>303</sup> See *id.* at 114–16.

<sup>304</sup> See Polanski, *supra* note 216, at 375–76.

<sup>305</sup> ISO, *supra* note 51.

<sup>306</sup> See *Best Practices for the Sustainability of Space Operations*, SPACE SAFETY COAL., <https://spacesafety.org/> [<https://perma.cc/HZV7-R4TG>].

<sup>307</sup> *Net Zero Space*, PARIS PEACE F., <https://parispeaceforum.org/en/initiatives/net-zero-space/> [<https://perma.cc/373T-6Z8B>].

<sup>308</sup> *Space Sustainability Rating*, WORLD ECON. F., <https://www.weforum.org/projects/space-sustainability-rating/> [<https://perma.cc/Q7VH-7FD9>].

<sup>309</sup> Finnemore & Sikkink, *supra* note 217, at 899–900.

<sup>310</sup> Blount, *supra* note 14, at 6.

<sup>311</sup> Finnemore & Sikkink, *supra* note 217, at 901.

moted by the norm-leader states.<sup>312</sup> Such a tipping point of state support has not yet been met for any specific norms for orbital rules of the road. However, the recent deluge of state declarations of the importance of norms in space and states' eagerness to proclaim themselves norm leaders<sup>313</sup> seem to indicate that a crystallization of norms could happen relatively rapidly. It is a stated policy goal for several major space powers to champion new norms for space.<sup>314</sup>

In conclusion, the pressure for space traffic norms is mounting internationally. Norm entrepreneurs from NGOs, the scientific community, and the commercial sector are pushing for states to develop or commit to norms in space to ensure safety and sustainability. A catastrophic collision or a crafty coalition of norm entrepreneurs might push states over the threshold and initiate a norm cascade leading to the global adoption of traffic norms. However, a crucial missing component for such a cascade to happen is the formalization of norms upon which a global accord could crystalize. Therefore, norm entrepreneurs with sustainable traffic practices on their agenda would do well to start developing and finding support for concrete and specific rules of the road. Correspondingly, legal scholars and practitioners seeking to identify emerging customary rules of the road for space should observe framings and analogies pushed forward by norm entrepreneurs.

## VII. CONCLUSION

In ten or fifteen years, we will likely have reasonably standardized rules of the road with high levels of compliance in the orbital domain, as they are a prerequisite for public and private ambitions in space. To a future observer looking back after the rules of the road are established, the trajectory of their emergence might look obvious and natural—be it through custom or

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<sup>312</sup> *Id.* at 902.

<sup>313</sup> For example, U.S. Vice President Harris recently declared, "We must write the new rules of [the] road. And we will lead by example." Kamala Harris, *Remarks by Vice President Harris on the Ongoing Work to Establish Norms in Space*, WHITE HOUSE (Apr. 18, 2022, 5:18 PM), <https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/04/18/remarks-by-vice-president-harris-on-the-ongoing-work-to-establish-norms-in-space/> [<https://perma.cc/HQY6-HG75>].

<sup>314</sup> For example, the two European Commission initiatives explicitly tasked with suggesting international guidelines for space traffic are SpaceWays and European Union Space Traffic Management. See generally SPACEWAYS, <https://spaceways-h2020.eu/> [<https://perma.cc/5MUM-PY5J>]; EUROPEAN UNION SPACE TRAFFIC MGMT., <https://eustm.eu/> [<https://perma.cc/9JZE-B3LG>].

treaty. Today, we can only observe a great necessity for filling a serious and urgent gap in space governance, and squint in an attempt to distinguish the faint contours of future norms.

At present, the gap in global space governance seems unlikely to be filled by a multilateral convention in time to avert traffic chaos in LEO as the commercial and technological developments proceed at breakneck speed. Whether the unlikeliness of an international treaty is explained as an effect of the current strain in international relations or as a symptom of a general crisis of multilateralism, it is worthwhile to contemplate alternative paths to international regulation.

As demonstrated here, customary international law has the potential to provide the legal basis for rules of the road with global reach, even if states fail to formally agree. Customary rules would be based on repeated practice and would therefore embody tried and tested practices. In highly technical areas, such as coordination of space traffic, rules based on the common conduct of operators might be seen as both legitimate and efficient. In the best-case scenario, the future customary rules of the road would reflect a hardened best practice based on experienced operators' technical knowledge. However, the LEO satellite industry is highly concentrated, with a few commercial actors operating a large share of satellites.<sup>315</sup> Therefore, the possibility of special interests of specific groups influencing norms should be considered.

The private entities that increasingly dominate the space sector may contribute to the emergence of customary rules directly by having their conduct attributed to their respective states. The conduct of corporate space companies is thus relevant for gathering evidence for the emergence of customary rules of the road in space. The theory of attributed lawmaking does not break with the dogmatic approach to customary law. However, the greater influence of private actors on international law implied by the theory raises questions of legitimacy, and further work is warranted to integrate the approach into the still largely Westphalian foundations of international law.

Traditional customary law scholarship focuses on the evidence of international norms as *usus* and *opinio juris* but struggles to explain why customary norms emerge or change over time. By applying the lens of the norm's life cycle, this Article argues that informal norms championed by nonstate norm en-

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<sup>315</sup> See Wood, *supra* note 184.

preneurs can become precursors of international customary rules. An implication of understanding the path from norm seed to international custom is that the initiative for shaping future international rules is not exclusive to states. Rather, local and international nonstate actors play an important role in articulating and championing norms early in the life cycle. In the space traffic area, there is pervasive support for the notion of better governance, but few specific rules of the road norms are being publicly discussed.<sup>316</sup> This presents an opportunity for NGOs, activist academics, and other nonstate actors to act as norm entrepreneurs and influence the future traffic regime by developing and proposing concrete rules of the road norms, and then pushing them to the international community.

As orbital traffic issues are essentially about coordination, having rules in place might be more important than what exactly the rules are. However, to get there, we need to start formulating the basic rules.<sup>317</sup> Here is an opportunity for norm entrepreneurs to grasp and, by proposing concrete rules, to set the ball rolling on the traffic rules to govern our continued expansion into the cosmos.

#### A. PERSPECTIVES BEYOND SPACE TRAFFIC

Although the analysis here is focused on space law and the specific issue of space traffic regulation, the findings and questions raised reach beyond the space sector. The parallels to other major global-governance issues facing the international community abound. Arguably, the international community has been unable to reach binding accords on several of the most pressing global issues of our time, such as climate change and internet governance.<sup>318</sup>

The argument that technological developments, such as better space domain awareness capabilities, can further the development of customary norms by making trends in practice more visible can be extended beyond the issue of space traffic. Many technological developments, from Earth observation satellites to

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<sup>316</sup> See Borowitz et al., *supra* note 72, § 2.

<sup>317</sup> Examples of such principles could be that spacecraft performing active maneuvers should give way to spacecraft in stable orbit, or spacecraft with higher mass have the right-of-way over spacecraft with lower mass. These are not proposed rules but merely examples of the type of basic rules of the road we need to model after other traffic domains. See *id.* § 7; Michel & Bertrand, *supra* note 162, §§ 3–4.4.

<sup>318</sup> See *supra* notes 30–31 and accompanying text.

social media, potentially provide transparency and documentation that are useful as evidence of emerging norms. Everything from warfare to forestry is now being documented with phones and satellites, and the pronouncements of state officials are being made available online in real time. This reduces the difficulty of documenting state practices and *opinio juris* to identify emerging customs across policy areas.

Customary international law might experience a renaissance, as it presents a viable path to regulating global issues in a time where multilateralism through formal treaties seems to have lost some of its potency and momentum. Importantly, the different sources of international law are not and have never been in competition or mutually exclusive. Rather, the sources can complement each other to strengthen the general rule of law in the international community.

The potential primacy of custom as the avenue to create binding law for current and future global-governance issues may require policymakers, NGOs, activists, academics, and others with an interest in shaping international law to rethink their methods for influencing lawmaking. Exploring alternative ways to create binding international law is not giving up on multilateralism. Rather, it is ensuring that all tools available to us are employed in the difficult but essential task of building and maintaining a world order based on the rule of law. It is not a symptom of the fragmentation of global cooperation, it is about expanding the possible ways of finding international accord on the most important issues facing our global community. Customary international law may increase in relevance in response to a more-fragmented international community with weakened multilateral institutions. More scholarship is needed to understand the role of international customs in regulating global issues resulting from rapid technological development and the roles that private actors can play in shaping their emergence.