

## ARTICLES

# CONFLICT ON THE FINAL FRONTIER: DEFICIENCIES IN THE LAW OF SPACE CONFLICT BELOW ARMED ATTACK, AND HOW TO REMEDY THEM

ROSS BROWN\*

### ABSTRACT

*In 1945, as delegates signed the United Nations Charter, the world was still more than ten years from Sputnik 1 and more than 20 years from the cold war's Outer Space Treaty. In the new millennium, nations have increasingly placed their national security in the delicate hands of satellites subject to jamming, cyber-attack, laser attack, and other forms of near-instantaneous technological conflict scarcely imagined by the Charter's drafters.*

*This Article examines the law of international conflict applied to internationally wrongful interference with national security satellites. Specifically, it addresses the most likely category of wrongful interference—interference below armed attack. This Article shows why countermeasures are currently the best-suited response to internationally wrongful interference below armed attack; it also argues weaknesses in the law of countermeasures, most prominently the prohibition on the use of force and the requirement of injury-centric proportionality, render countermeasures ill-equipped to address conflict in outer space.*

*After examining the weaknesses of the traditional regime as applied to outer space, this Article proposes a fix: defensive counteractions. Defensive counteractions recognize the risk that, if pressed, states will likely protect their vital national security interests regardless of whether international law seems to allow it. Defensive counteractions build upon the existing law of countermeasures to create a framework for nations to operate within instead of having nations disingenuously assert they have been victims of armed attack and are*

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\* Ross Brown is a United States Air Force judge advocate, currently assigned to the United States Space Force as the Chief of Space, International, and Operations law for the Space Force's Space Operations Command. In that capacity, he also serves as a legal advisor for United States Space Command's Combined Force Space Component Command. Mr. Brown holds an LL.M. in Air and Space Law from McGill University's Institute of Air and Space Law. The conclusions expressed in this Article are solely those of the author writing in his personal capacity. They are not intended and should not be thought to represent official ideas, attitudes, or policies of the U.S. Space Force, the U.S. Air Force, the Department of Defense, or the U.S. Government. The author has used only information available to the public in the researching and presentation of this Article. © 2020, Ross Brown.

thus entitled to full self-defense. Defensive counteractions modernize old law for new challenges.

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### I. INTRODUCTION

#### A. *The Goal*

In 1954, three years before the launch of *Sputnik 1* and less than ten years after the signing of the United Nations Charter, Phillip Jessup examined the state of the law governing international conflict and found it wanting.<sup>1</sup> He believed the world had changed and, asking whether the legal regime needed to be updated, said there was a basic question of “whether our concepts, our terminology, our law, have kept pace with the evolution of international relations.”<sup>2</sup> As Jessup saw it, the problem was rooted in “the legal necessity of fitting every situation into one of the two traditional categories of peace or war,” and he asked “whether it would not be useful to break away from the old dichotomous approach, acknowledging in law as in fact that there is a third status intermediate between peace and war.”<sup>3</sup>

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1. Philip C. Jessup, *Should International Law Recognize an Intermediate Status between Peace and War?*, 48 AM. J. INT’L L. 98 (1954).

2. *Id.* at 102.

3. *Id.* at 100.

So too with countermeasures and self-defense in outer space. More than sixty years after Jessup penned his query, it is time to ask whether the evolution of outer space and its related technologies have outpaced “our concepts, our terminology, our law.” Humankind’s utilization of outer space, and the technology that supports that utilization, has expanded in ways far beyond that of *Sputnik 1*’s pinging orbits around the earth. Over sixty years after the Soviets’ twenty-three-inch ball of polished metal left the grip of earth, more than 5,300 satellites orbit the globe,<sup>4</sup> and the technological vulnerability of many state national security satellites is matched and surpassed by the strategic vulnerability that can result if the national security satellites fall victim to wrongful interference.<sup>5</sup>

As states seek ways to protect their national security satellites from hostile acts,<sup>6</sup> the international community must ask whether it should break away from the “old dichotomous approach,” not necessarily of peace versus war as concerned Jessup, but of armed attack versus no armed attack, which in turn forces states into an ill-fitted response dichotomy of countermeasures versus self-defense. In outer space, there should be a middle ground response between countermeasures and self-defense, a buffer zone protecting against armed conflict that allows states to protect their national security satellites without forcing states to declare they have come under armed attack and are therefore entitled to full self-defense. That middle ground is the subject of this Article.

This Article proposes a response between countermeasures and self-defense, whereby states whose national security satellites are facing internationally wrongful interference may take what this Article calls defensive counteractions.<sup>7</sup> Defensive counteractions are responses aimed at the offending state’s interfering mechanism, be it a ground-

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4. *Satellite Box Score*, 24 ORBITAL DEBRIS Q. NEWS 1, 16 (February 2020) (information as of January 4, 2020, catalogued by the U.S. Space Surveillance Network).

5. This Article uses the term “national security satellites” to refer to communication, navigation, and reconnaissance satellites operated by militaries and State intelligence agencies. The rationale behind this designation is discussed more in *infra* Section IV.B(1).

6. Some states assign specific definitions to the phrase “hostile act” as it relates to military activity and use the phrase as a specific term of art. *See, e.g.*, DEP’T OF DEFENSE, CHAIRMAN OF THE JOINT CHIEFS OF STAFF INSTRUCTION 3121.01B: STANDING RULES OF ENGAGEMENT/STANDING RULES FOR THE USE OF FORCE FOR U.S. FORCES enclosure A, ¶ 3.E (2005). This article does not adopt any one State’s specific definition of hostile act and instead uses the phrase’s plain language meaning.

7. The term “defensive counteractions” is meant to reflect the fact that the responses should be restricted by their limited protective goals. The term intentionally does not include words that indicate force, since defensive counteractions may be either forceful or non-forceful.

based jammer or a space-based directed energy weapon. As will be discussed in Section IV, defensive counteractions are more permissive than countermeasures in some ways but more restrictive in others. They apply only to hostile acts that fall below armed attack and are intended to rectify the use of force “response gap” that exists between countermeasures and self-defense, as well as other deficiencies in the current system. Ultimately, this author’s aim is to provide a framework for states to act within while protecting their national interests and respecting the rule of law.

### B. *The Setting*

Before analyzing defensive counteractions and their place in international law, it is important to have a conceptual context for the discussion. It is therefore appropriate to briefly address the legal setting for this Article, specifically recognizing several assumptions that undergird the legal analysis then briefly examining the types of satellites implicated in defensive counteractions and how those satellites may be interfered with.

#### 1. The Legal Setting

This Article examines internationally wrongful interference with a state’s national security satellites and, more specifically, how victim states may respond to such interference. To narrow and clarify the analysis, this article acknowledges several ambiguities in outer space law or general international law and removes them from consideration. The reader will be reminded of these assumptions later, but it is important to acknowledge this at the outset as part of the conceptual framework. These ambiguities have been removed solely for the purpose of this Article and would have to be considered on a case-by-case basis in real-world situations.

First, any wrongful interference is assumed here to be attributable to a state. It is possible for non-state actors to interfere with satellite systems,<sup>8</sup> and it may be difficult to determine where interference originates (especially if the interference is cyber-based), but this analysis assumes interference can be attributed to a state.

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8. It is particularly easy to jam navigation satellite signals, for instance. As one author has stated, “anyone with \$50 and a soldering iron can buy parts from a radio store and make a jammer to destroy the GPS signal for a hundred miles.” Langhorne Bond, *The GNSS Safety and Sovereignty Convention of 2000 AD*, 65 J. AIR L. & COM. 445, 446 (2000).

Second, all interference is assumed to fall short of an armed attack. As will be discussed in Section II,<sup>9</sup> determining whether armed attack has taken place in outer space can be a difficult process and there is no generally agreed-upon standard as to what constitutes such an attack. Armed attack is an important threshold, since most international actors believe it determines whether a victim state may use force in self-defense to repel the attack.<sup>10</sup> Since defensive counteractions are designed to be responses to hostile actions below armed attack, all precipitating interference here is assumed to fall below that threshold.<sup>11</sup> Interference that crosses the armed attack threshold would allow a victim state to use self-defense, paving the way to a more robust response.

Third, the victim state's satellite is assumed here to be a single use satellite, dedicated solely to state national security purposes. This is in contrast to dual use satellites, which are used for national security (typically military) and civilian purposes and can affect legal analyses regarding what it means to interfere with the satellites and how the satellites may be protected.<sup>12</sup> While defensive counteractions may be permissible when protecting dual use satellites, this Article does not address that possibility. Single use satellites are assumed here for clarity of legal analysis in describing and advocating for defensive counteractions.

Finally, the victim state satellites are presumed to be engaging in internationally permissible activity such that the offending state has no legal justification for interfering with them. This assumption is the flipside of the requirement that the precipitating interference be internationally wrongful. Of the three national security satellite activities contemplated in defensive counteractions—navigation, communications, and reconnaissance—the legality of reconnaissance was debated for a time within the international community, but it has since become generally accepted as lawful under international law.<sup>13</sup>

## 2. The Technological Setting

As will be discussed later, the technological nature of conflict in outer space is one of several factors supporting defensive

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9. See *infra* Section II.B.

10. U.N. Charter art. 51; see also *infra* Section II.B.

11. In fact, it is not generally agreed whether interference could ever constitute a use of force at any level, let alone an armed attack. See *infra* Section III. A.2.d.

12. See generally Christopher M. Petras, *The Use of Force in Response to Cyber-Attack on Commercial Space Systems - Reexamining Self-Defense in Outer Space in Light of the Convergence of U.S. Military and Commercial Space Activities*, 67 J. AIR L. & COM. 1213 (2002).

13. See generally BIN CHENG, *STUDIES IN INTERNATIONAL SPACE LAW* 109–13 (1997) (discussing the evolution of the legality of reconnaissance from outer space).

counteractions. This is due, in part, to the combination of speed, potential vulnerability, and operational significance that have come to characterize space technology in international conflict. To provide a working understanding of the technology implicated in defensive counteractions, this introduction addresses technological aspects of national security satellites and possible interference they may face.

*a. Satellite Technology*

This Article asserts three types of state national security satellites should have the benefit of defensive counteractions protection: navigation satellites, communications satellites, and reconnaissance satellites. This section describes the functionality of each. While all satellites have some common characteristics, such as the need for a controlling ground station to provide telemetry, tracking, and command (TT&C) functions,<sup>14</sup> each of the three types of satellites described below have technological distinctions that are important to understand.

i. Navigation Satellites

Global Navigation Satellite Systems (GNSS), such as the United States' Global Positioning System (GPS), Russia's Global Navigation Satellite System, China's BeiDou Navigation Satellite System,<sup>15</sup> or the European Union's Galileo navigation system, have become critical for those militaries with access to GNSS capabilities. GNSS functions by using navigational satellites to broadcast the satellites' location and time; using that information, receivers on the ground, in precision munitions, in cellular phones, or elsewhere, can triangulate their own position using the signals and data broadcast from multiple orbiting GNSS satellites.<sup>16</sup> The accuracy of GNSS satellite signals depends on initial input information the constellation satellites occasionally receive from ground control stations. The satellites then use that information to calibrate the information they send to receivers by way of satellite signals.<sup>17</sup> An example of the importance of GNSS to modern militaries is

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14. DAVID WRIGHT, LAURA GREGO & LISBETH GRONLUND, *THE PHYSICS OF SPACE SECURITY: A REFERENCE MANUAL* 112 (2005).

15. China's BeiDou navigation system is transitioning from regional coverage to global coverage. China aims to complete full global coverage in 2020. *China launches latest Beidou satellite for global navigation system*, SPACENEWS (June 24, 2019), <https://spacenews.com/china-launches-latest-beidou-satellite-for-global-navigation-system>.

16. See Günter W. Hein, *Satellite Navigation*, in 211 UTILIZATION OF SPACE: TODAY AND TOMORROW 251, 253–56, 263 (Berndt Feuerbacher & Heinz Stoewer eds., 2006).

17. See AHMED EL-RABBANY, *INTRODUCTION TO GPS: THE GLOBAL POSITIONING SYSTEM* § 1.5-1.6 (2002).

Ricky Lee and Sarah Steele's observation that U.S. reliance on its GPS constellation in the War on Terror "cannot be understated," noting how the U.S. military suffered in 2010 when over 10,000 GPS receivers were rendered inoperable for several days.<sup>18</sup>

ii. Communications Satellites

Satellites are extremely useful for communication purposes. Three communications satellites, properly-positioned, can reach nearly the entire earth (barring only extreme polar regions),<sup>19</sup> and can provide near-instantaneous connection between points spread out across vast swaths of the earth's surface.<sup>20</sup> Satellite communications are accomplished through a combination of uplinks and downlinks, whereby a signal is transmitted to the satellite from a transmitting station (uplink) and relayed back down to a receiving terminal (downlink), or to another relay satellite (crosslink), via the relaying satellite that acts as a transmission medium.<sup>21</sup> The relaying satellite can either mirror the received signal back to a wide footprint on the ground within which a receiving terminal sits, or it can process the information, for instance by enhancing its quality or redirecting it to a specific location.<sup>22</sup> Communications satellites have become extremely important for both military and civilian communications. Without effective satellite communications, for instance, it "would be difficult for the [U.S. military] to operate in a coordinated fashion or exchange information critical to situational awareness."<sup>23</sup>

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18. Ricky J. Lee & Sarah L. Steele, *Military Use of Satellite Communications, Remote Sensing, and Global Positioning Systems in the War on Terror*, 79 J. AIR L. & COM. 69, 84 (2014) (citing Dan Elliot, *Glitch Highlights U.S. Military Reliance on GPS*, NBC NEWS (June 1, 2010), [http://www.nbcnews.com/id/37451462/ns/us\\_news-security/t/glitch-highlights-us-military-reliance-gps/#.WXEIVOkpDIU](http://www.nbcnews.com/id/37451462/ns/us_news-security/t/glitch-highlights-us-military-reliance-gps/#.WXEIVOkpDIU)).

19. Edward Ashford, *Communications*, in 211 UTILIZATION OF SPACE: TODAY AND TOMORROW 225, 229 (Berndt Feuerbacher & Heinz Stoewer eds., 2006).

20. Joseph N. Pelton, *Overview of Satellite Communications*, in SATELLITE COMMUNICATIONS IN THE 21ST CENTURY: TRENDS AND TECHNOLOGIES 1, 2 (Takashi Iida, Joseph N. Pelton & Edward Ashford eds., 2003); BRUCE A. HURWITZ, THE LEGALITY OF SPACE MILITARIZATION 88 (1986).

21. Edward Ashford, *Principles of Satellite Communications Systems*, in SATELLITE COMMUNICATIONS IN THE 21ST CENTURY: TRENDS AND TECHNOLOGIES 19, 25–26 (Takashi Iida, Joseph N. Pelton & Edward Ashford eds., 2003).

22. *Id.* at 26.

23. Loren B. Thompson, *Lack of Protected Satellite Communications Could Mean Defeat for Joint Force in Future War*, LEXNEXT: THE LEXINGTON POL'Y BLOG (Apr. 14, 2010), <http://www.lexingtoninstitute.org/lack-of-protected-satellite-communications-could-mean-defeat-for-joint-force-in-future-war/>.



iii. Reconnaissance Satellites

Reconnaissance satellites, as that term is used here, refer to satellites that gather signals and imagery for national security purposes. The types of reconnaissance satellites and information that can be gathered from them include:

[O]ptical satellites that use a mirror to gather visible light for photography; infrared and ultraviolet satellites that record imagery in those parts of the spectra; radar imagery satellites that use microwave signals to scan the surface of the Earth; and signal-intercepting satellites that detect and record radio, telephone, and data transmissions on the Earth and transmissions relayed by communications satellites.<sup>24</sup>

In colloquial terms, they are what would be called “spy satellites.” Reconnaissance is distinguished here from more general remote sensing, which does not necessarily have the same national security connotations.<sup>25</sup> Similar to other types of satellites, reconnaissance satellite systems require a TT&C station, one or more ground receiving stations to receive downlink information, one or more reconnaissance satellites, and a data interpretation center.<sup>26</sup> With the wide range of information that can be gathered and the insightful conclusions that can be reached through the use of reconnaissance satellites, they are of significant importance to militaries and governmental decision-makers.<sup>27</sup>

*b. Satellite Interference Technology*

Interference, as contemplated in this Article, refers to ongoing degradation of a satellite’s ability to execute its normally-intended

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24. Lee & Steele, *supra* note 18, at 81 (citing R.D. Hudson & Jacqueline W Hudson, *The Military Applications of Remote Sensing by Infrared*, 63 PROC. IEEE 104, 106–08 (1975)); Mark van Persie et al., *Use of Remote Sensing Imagery for Fast Generation of Military Maps and Simulator Databases*, in INTERNATIONAL ARCHIVES OF PHOTOGRAMMETRY AND REMOTE SENSING 573–76 (2000); Brian Crothers et al., *US Space-Based Intelligence, Surveillance, and Reconnaissance*, in SPACE PRIMER 167, 168, 176 (2009).

25. Remote sensing has been defined by the international community as “the sensing of the Earth’s surface from space by making use of the properties of electromagnetic waves emitted, reflected or diffracted by the sensed objects, for the purpose of improving natural resources management, land use and the protection of the environment.” Principles Relating to Remote Sensing of the Earth from Outer Space, G.A Res. 41/65, princ. I(a) (Dec. 3, 1986).

26. Michel Bourbonnière, *Law of Armed Conflict (LOAC) and the Neutralisation of Satellites or “Ius in Bello Satellitis”*, 9 J. CONFLICT & SEC. L. 43, 55 (2004).

27. Lee & Steele, *supra* note 18, at 81–82.

function. Because the focus is on ongoing degradation, defensive counteractions do not apply to hostile acts that destroy or disable satellites in a single quick act, such as high-speed impact from kinetic weapons or electromagnetic pulses (EMPs) produced by high-altitude nuclear explosions.<sup>28</sup> Since defensive counteractions are intended to halt ongoing interference, they are of no use if the interference has already accomplished its goal or otherwise will not continue. Excluding from the beginning acts of “instantaneous degradation” such as kinetic attacks, the interference technologies envisioned here will be signals-based interference such as jamming and spoofing, directed energy-based interference such as blinding or dazzling with lasers, and cyber-based interference such as cyber hacking.

### i. Signals-Based Interference

Signals-based interference occurs when electronic signals are used to interfere with satellite uplinks or downlinks, by either jamming or spoofing.<sup>29</sup> In jamming, the instigating party can jam a downlink relatively easily by emitting a signal that overpowers the signal emitted from the satellite, therefore rendering ground receivers unable to properly receive and understand the legitimate signal being sent from the satellite.<sup>30</sup> Uplink jamming is more difficult, however, because the jamming entity cannot simply overpower the legitimate signal as it arrives to earth from a satellite thousands of miles away, and must instead target the satellite receiving the uplink. To do so, the jamming entity “must know the direction and receiving frequency of the targeted satellite transponder in order to overwhelm the signal.”<sup>31</sup> If the satellite has more than one user operating at different frequencies, “the attacker needs to know which frequency to target, or use enough power to jam a range of frequencies (and risk jamming other users unintentionally).”<sup>32</sup>

Spoofing is similar to jamming in that it involves overpowering signal interference, except instead of muddling the legitimate uplink or downlink signal, spoofing replaces it. A spoofed receiver, in other words, “processes fake signals (e.g., those produced by an enemy) as if

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28. Bourbonnière, *supra* note 26, at 56–57; NATIONAL RESEARCH COUNCIL, TECHNOLOGY, POLICY, LAW, AND ETHICS REGARDING U.S. ACQUISITION AND USE OF CYBERATTACK CAPABILITIES 296 (2009).

29. WRIGHT, GREGO & GRONLUND, *supra* note 14, at 118.

30. Laura Grego, *A History of Anti-Satellite Programs*, UNION OF CONCERNED SCIENTISTS 1, 15 (Jan. 2012), [https://www.ucsusa.org/sites/default/files/2019-09/a-history-of-ASAT-programs\\_lo-res.pdf](https://www.ucsusa.org/sites/default/files/2019-09/a-history-of-ASAT-programs_lo-res.pdf); WRIGHT, GREGO & GRONLUND, *supra* note 14, at 118–19.

31. WRIGHT, GREGO & GRONLUND, *supra* note 14, at 121–23; Grego, *supra* note 30, at 15.

32. WRIGHT, GREGO & GRONLUND, *supra* note 14, at 121–23; Grego, *supra* note 30, at 15.

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they were the desired signals.”<sup>33</sup> Thus, for instance, navigation satellite signal users may believe they are headed in their desired direction when they are in fact far from where they intend to be.<sup>34</sup>

### ii. Directed Energy-Based Interference

Directed energy weapons include laser or radio frequency weapons that direct their energy at a victim satellite.<sup>35</sup> Damage can include temporarily impairing the satellite’s sensors (dazzling), permanently damaging the sensors (blinding), or otherwise physically harming the satellite components.<sup>36</sup> Directed energy weapons can be desirable for states that wish to interfere with another State’s satellites since the beams travel at the speed of light and thus reach their targets quickly. Additionally, the power used in the weapon can be tailored for desired effect depending on whether the offending state wishes to create permanent damage or only to temporarily interfere with the target satellite’s capabilities.<sup>37</sup>

### iii. Cyber-Based Interference

Finally, satellites can theoretically face cyber interference through hacking. For instance, an unencrypted command link would make satellite functionality vulnerable to manipulation from an adversary,<sup>38</sup> or a ground station could be hacked directly and the satellite control or data could be manipulated.<sup>39</sup> In 2001, the U.S. named cyber hacking of the Department of Defense as a sign of the vulnerability of its space assets.<sup>40</sup> The danger can be expected to persist today. That said, cyberattacks sufficient to manipulate satellite functionality can be expected to be more difficult to execute than other acts of interference.

## C. *The Path Forward*

This Article contains three core sections. The first, Section II, discusses the current state of the law regarding how victim states may

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33. SCOTT PACE ET AL., *THE GLOBAL POSITIONING SYSTEM: ASSESSING NATIONAL POLICIES* 219 n. 3 (1995).

34. *Id.*

35. Bourbonnière, *supra* note 26, at 57.

36. Bruce M. DeBlois et al., *Space Weapons: Crossing the U.S. Rubicon*, 29 INT’L SECURITY 50, 58 (2004).

37. WRIGHT, GREGO & GRONLUND, *supra* note 14, at 123.

38. NATIONAL RESEARCH COUNCIL, *supra* note 28, at 297.

39. WRIGHT, GREGO & GRONLUND, *supra* note 14, at 133.

40. DONALD RUMSFELD ET AL., Report of the Commission to Assess United States National Security Space Management and Organization 22–23 (2001).

respond to hostile acts, including discussion of some current ambiguities or controversies. The majority of the discussion centers on countermeasures, although time is also spent on self-defense and the plea of necessity.

Section III takes a more critical look at necessity, self-defense, and countermeasures as they apply to victim states facing satellite interference below armed attack. Specifically, the section focuses on why the current legal regime, as executed through necessity, self-defense, and countermeasures, is inadequate to meet the challenges of national security satellite interference. Section III also discusses principles and pragmatic factors that argue for the recognition of defensive counteractions.

Section IV starts by discussing the fact that defensive counteractions are not a completely foreign concept in international law and in fact have a basis in minority positions and other analogous proposals. The second part of the section then moves into a detailed description of defensive counteractions, including its conditions precedent, main characteristics, and restrictions. Finally, the article closes with a conclusion that summarizes the need for defensive counteractions.

## II. THE LAW AS IT IS: SELF-HELP IN INTERNATIONAL LAW

This section provides an overview of self-help principles within international law that will be most relevant when applied in subsequent sections to outer space.<sup>41</sup> Since this Article addresses state responses to internationally wrongful interference with a victim state's national security satellites, Section II will address the most potentially relevant self-

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41. The phrase "self-help" is used by different scholars, in a not uniform way, to describe a range of state actions. See, e.g., *Addendum to the eighth report on State responsibility*, [1980] II(1) Y.B. Int'l L. Comm'n ¶ 8 n. 14, U.N. Doc. A/CN.4/318/ADD.5-7 [hereinafter *Eighth Report Addendum*] (briefly discussing, somewhat critically, what various scholars consider to be "self-help," including self-help as a category that includes mere circumstances that preclude wrongfulness). A less controversial definition of self-help might include affirmative actions such as countermeasures and self-defense (Derek Bowett, *Reprisals Involving Recourse to Armed Force*, in *THE USE OF FORCE IN INTERNATIONAL LAW* 219, 220–21 (Tarcisio Gazzini & Nikolaos K. Tsagourias eds., 2012)) but not include defenses characterized by the mere existence of circumstances precluding wrongfulness, such as necessity. See, e.g., Sarah Heathcote, *Circumstances Precluding Wrongfulness in the ILC Articles on State Responsibility: Necessity*, in *THE LAW OF INTERNATIONAL RESPONSIBILITY* 491, 492 (James Crawford et al. eds., 2010). Put another way, one may view countermeasures and self-defense as *actions* and thus properly in the category of self-help but view necessity as a *justification* for an action and thus not belonging in the self-help category. This Article uses the phrase "self-help" in a way that includes countermeasures, self-defense, and necessity primarily because of its ease of reference in describing a category of situations where a state unilaterally acts to protect its rights using methods that would otherwise be internationally wrongful.

help principles for that scenario—necessity, self-defense, and counter-measures. Other principles that generally preclude the wrongfulness of a victim state’s response will also be addressed briefly to show why they are not applicable to the situation at hand.

A. *Necessity*

Necessity stands for the proposition that, if certain conditions and restrictions are met, states may commit an otherwise wrongful act if that act is the only way for the state to protect an “essential interest” against “grave and imminent peril.”<sup>42</sup> Necessity is a valid excuse for an otherwise wrongful act when the necessary act “is the only way for the State to safeguard an essential interest against a grave and imminent peril,” and does not “seriously impair” the essential interests of the state to which the duty is owed or to the international community as a whole.<sup>43</sup> Necessity is a controversial concept<sup>44</sup> that has been abused in the past<sup>45</sup> and, as the International Court of Justice (ICJ) stated in the *Gabčíkovo-Nagymaros Project* case, is to be invoked only on an “exceptional basis.”<sup>46</sup>

Of the various requirements imposed on necessity, the most difficult to meet in satellite interference scenarios will be that of an essential state interest. Sarah Heathcote describes essential interests as “not a fixed category.”<sup>47</sup> She says declaring something an essential interest is a

42. U.N., MATERIALS ON THE RESPONSIBILITY OF STATES FOR INTERNATIONALLY WRONGFUL ACTS, art. 25(1)(a), U.N. Doc. ST/LEG/SER.B/25, U.N. Sales No. E.12.V.12 (2012) [hereinafter ARTICLES ON STATE RESPONSIBILITY]; *Gabčíkovo-Nagymaros Project* (Hung. v. Slov.), Judgment, 1997 I.C.J. 7, ¶ 52 (Sept. 25) [hereinafter Hung. v. Slov.]; ANTONIO CASSESE, INTERNATIONAL LAW 257 (Oxford Univ. Press, 2d ed. 2005); For early use and development of necessity as a defense, see also Letter from Russian Ambassador Chichkine to the British Ministry of Foreign Affairs (February 12/24, 1893), in LXXXVI BRITISH AND FOREIGN STATE PAPERS 1893-1894 217, 220 (Augustus H. Oakes & Willoughby Maycock eds., 1899). *But see* Rainbow Warrior Affair (N.Z. v. Fr.), 20 R.I.A.A. 215, 254 (Fr.-N.Z. Arb. Trib. 1990) (expressing some doubt as to whether necessity in general is a valid principle. The reader will note Rainbow Warrior took place seven years before the ICJ’s detailed and positive examination of necessity in *Gabčíkovo-Nagymaros Project*).

43. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 25(1); Hung. v. Slov., 1997 I.C.J. ¶ 52; M/V Saiga (No. 2) (St. Vincent v. Guinea), Case No. 2, Judgment of July 1, 1999, 2 ITLOS Rep. 10, 56 ¶ 133.

44. See Heathcote, *supra* note 41, at 492–94 for a discussion of controversies regarding necessity, including “the abuses that have been committed in its name,” “the rule’s foundation or the policy arguments used to support it,” and whether necessity has actually “crossed the normativity threshold.”

45. For instance, Heathcote lists 14 annexations or occupations of one state by another that have been dubiously justified under the concept of necessity since 1846. *Id.* at 492–93.

46. Hung. v. Slov., 1997 I.C.J. ¶ 51.

47. Heathcote, *supra* note 41, at 496.

difficult balance between a state's discretion to characterize something as an essential interest, good faith limits on that discretion, and perhaps a need for some "social consensus" in the international community as to whether the interest is in fact essential.<sup>48</sup> A state's economic survival, its ability to feed its people, and its "ecological order" have all been considered essential interests of a state,<sup>49</sup> and other essential interests may be found as fact-specific situations arise. The difficulty of legitimately invoking necessity in outer space will be discussed in more detail in Section III,<sup>50</sup> but suffice to say that *necessity* will not play a significant role in the type of scenarios addressed in this Article.

### B. *Self-Defense*

Article 21 of the International Law Commission (ILC) Articles on Responsibility of States for Internationally Wrongful Acts (Articles on State Responsibility) states that self-defense precludes the wrongfulness of a State's otherwise wrongful act "if the act constitutes a lawful measure of self-defence taken in conformity with the Charter of the United Nations."<sup>51</sup> The right of self-defense existed before it was memorialized in the U.N. Charter, which recognizes what the drafters of the U.N. Charter already considered to be an "inherent right."<sup>52</sup> The right to self-defense is not unlimited, however, and the U.N. Charter says states may only invoke self-defense if they have been the victims of what the Charter calls an "armed attack."<sup>53</sup> Even then, according to the Charter, self-defense is only permitted until the U.N. Security Council has taken appropriate measures to restore peace and security.<sup>54</sup> If a state is lawfully practicing self-defense in compliance with the Article 51 requirements, including the condition precedent of having suffered an armed attack, then the Article 2(4) prohibition on the use of force by states is not a bar for a victim state that resorts to self-defense.<sup>55</sup> The traditional view has been that, under the U.N. Charter, a state must actually suffer

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48. *Id.* at 497.

49. *Eighth Report Addendum*, *supra* note 41, ¶ 78.

50. *See infra* Section III.A.1.

51. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 21.

52. U.N. Charter, *supra* note 10, art. 51; Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 226, ¶ 38 (July 8, 1996); ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 21 cmt. ¶ 1.

53. U.N. Charter, *supra* note 10, art. 51.

54. *Id.*

55. *Id.*, arts. 2(4), 51; Legality of the Threat or Use of Nuclear Weapons, *supra* note 52, ¶ 38-40; ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 21 cmt. ¶ 1; JAMES CRAWFORD, BROWNIE'S PRINCIPLES OF PUBLIC INTERNATIONAL LAW 747-48 (8th ed. 2012).

armed attack before it may exercise its right to self-defense, though the speed of attack made possible by modern warfare technology has prompted actual state practice, and subsequent acquiescence by the UN, to generally allow for “anticipatory self-defense” when an armed attack is imminent but has not yet begun.<sup>56</sup> Anticipatory self-defense as a legal concept is not a new development, however, and has existed under customary international law at least since it was discussed and described by the United States (U.S.) Secretary of State Daniel Webster in relation to the *Caroline* incident of 1837.<sup>57</sup>

Given the linchpin role of an armed attack in determining whether self-defense may be exercised, it is important to understand what constitutes an armed attack. Although “armed attack” is not defined in the Charter<sup>58</sup> and no “clear and agreed definition” exists,<sup>59</sup> the phrase can

Note that even actions under self-defense are subject to the limitations of *jus in bello*, also often called humanitarian law or the law of armed conflict, which dictates *how* war may be fought once the determination of *whether* war may be fought has been made. See Steven Freeland, *The Applicability of the Jus in Bello Rules of International Humanitarian Law to the Use of Outer Space*, PROCEEDINGS OF 57TH INT’L AERONAUTICAL CONG. 338, 339–40 (2006). The main and most readily agreed upon restrictions of *jus in bello* are often considered to be 1) military necessity, 2) distinction, 3) proportionality, and 4) humanity See Antonio Cassese, *The Character of the Violated Obligation*, in THE LAW OF INTERNATIONAL RESPONSIBILITY 414, 417 (James Crawford et al. eds., 2010); Bourbonnière, *supra* note 26, at 46–51. In brief, 1) military necessity requires attacks be necessary to help defeat the enemy’s military capability, 2) distinction prohibits the targeting of non-combatants, 3) proportionality prohibits attacks whose expected military advantage is disproportionate to the expected collateral civilian damage, and 4) humanity dictates that unnecessary suffering must be avoided. See Legality of the Threat or Use of Nuclear Weapons, *supra* note 52, ¶ 41 (as to military necessity); Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I) art. 52, June 8, 1977, 1125 U.N.T.S. 3 (as to military necessity) [hereinafter Additional Protocol I]; Freeland, *supra*, at 341 (as to military necessity); Legality of the Threat or Use of Nuclear Weapons, *supra* note 52, ¶ 78 (as to distinction); Additional Protocol I, *supra* note, art. 48 (as to distinction); Legality of the Threat or Use of Nuclear Weapons, *supra* note 52, ¶ 78 (as to proportionality and humanity); Additional Protocol I, *supra*, art. 37 (as to proportionality and humanity); Ramey, *supra*, at 40–44 (as to proportionality and humanity). *Jus in bello* is examined only briefly in this article since defensive counteractions are responses to hostile acts below the level of armed attack and therefore do not implicate *jus in bello*.

56. THOMAS M. FRANCK, RECOURSE TO FORCE: STATE ACTION AGAINST THREATS AND ARMED ATTACKS 50 (2002). Franck notes “how little the advances in the technology of war had informed the drafters [of the U.N. Charter], making it necessary thereafter for the Charter to adapt in practice.”

57. *Id.* at 97–98.

58. See U.N. Charter, *supra* note 10; Military and Paramilitary Activities in an Against Nicaragua (Nicar. v. U.S.), Judgment, 1986 I.C.J. Rep. 14, ¶ 176 (June 27).

59. Jean-Marc Thouvenin, *Circumstances Precluding Wrongfulness in the ILC Articles on State Responsibility: Self-Defence*, in THE LAW OF INTERNATIONAL RESPONSIBILITY 455, 463 (James Crawford et al. eds., 2010) (also stating that “the definition of an ‘armed attack’ is elusive).



generally be seen as one that “implies the use of arms or military force and constitutes an action of an offensive, destructive, and illegal nature.”<sup>60</sup> Although the classic view has been that a hostile act that does not result in kinetic effect such as an explosion cannot be an armed attack, even the more conservative approaches to armed attack generally agree that hostile acts that harm life or property, even if the harm is not kinetic (e.g., chemical or biological attacks), may at least constitute uses of force.<sup>61</sup>

However, a hostile act that constitutes a use of force does not necessarily amount to an armed attack. As the ICJ stated in its *Nicaragua* opinion and confirmed in *Oil Platforms*, not all uses of force qualify as armed attack; only the “most grave forms” of use of force are considered armed attacks.<sup>62</sup> One must look to the “scale and effects” of the hostile act and determine whether the forceful actions are significant enough to constitute armed attack.<sup>63</sup> Thus, it is possible for a state to be the victim of an unlawful use of force but not the victim of an armed attack. In those instances, most in the international legal community believe the victim state would only be permitted to respond with non-forceful actions, since use of force may only be invoked if the use of force from the aggressor state is so egregious as to rise to the level of an armed attack that therefore justifies self-defense.<sup>64</sup> This results in what can be

60. Jackson Nyamuya Maogoto & Steven Freeland, *Space Weaponization and the United Nations Charter Regime on Force: A Thick Legal Fog or a Receding Mist?*, 41 INT’L LAWYER 1091, 1113 (2007) (citing J. N. SINGH, USE OF FORCE UNDER INTERNATIONAL LAW 15 (1984)).

61. See, e.g., IAN BROWNLIE, INTERNATIONAL LAW AND THE USE OF FORCE BY STATES 362 (1st ed. 1963) (employing a two-part test that notes the means used are generally referred to as weapons and the weapons are “employed for the destruction of life and property”); see also Russell Buchan, *Cyber Attacks: Unlawful Uses of Force or Prohibited Interventions*, 17 J. CONFLICT & SEC. L. 211, 217 (2012) (favorably citing Brownlie and noting Brownlie’s position has “gained considerable traction”).

62. *Nicar. v. U.S.*, 1986 I.C.J. ¶ 191; *Oil Platforms (Iran v. U.S.)*, Judgment, 2003 I.C.J. 161, ¶¶ 51, 64, 72 (Nov. 6, 2003).

63. *Nicar. v. U.S.*, 1986 I.C.J. ¶ 195. Note that, while the *Nicaragua* view is the dominant view, not all commentators believe uses of force must meet a “scale and effects” threshold before they can be considered armed attacks. See, e.g., David Kretzmer, *The Inherent Right to Self-Defence and Proportionality in Jus ad Bellum*, 24 EUR. J. INT’L L. 235, 243 (2013) (listing and briefly discussing commentators who believe either that there is no difference between use of force and armed attack or that, if there is a difference, it is negligible).

64. Note the United States has rejected the ICJ’s assertion that a gap exists between the threshold for unlawful use of force and for armed attack. See Harold Hongju Koh, *International Law in Cyberspace: Remarks as Prepared for Delivery by Harold Hongju Koh to the USCYBERCOM Inter-Agency Legal Conference Ft. Meade, MD, Sept. 18, 2012*, 54 HARV. INT’L L.J. ONLINE 1, 7 (Dec. 2012), <https://harvardilj.org/wp-content/uploads/sites/15/2012/12/Koh-Speech-to-Publish1.pdf> (speech on cyber warfare by former State Department Legal Adviser Harold Koh); see also Schmitt, *supra* note



called a response gap, whereby the victim state is not permitted to provide a response that matches the hostile acts it faces.

The ICJ's Judge Simma's separate opinion in the *Oil Platforms* case attempted to address the response gap problem by saying states that are the victims of force that does not rise to the level of armed attack may respond with force that also stays below armed attack.<sup>65</sup> This is not the majority view, however, since most see Article 2(4) of the U.N. Charter as a comprehensive prohibition on the use of force unless used in self-defense in response to armed attack per Article 51 or unless authorized by the U.N. Security Council per Articles 39 and 42.<sup>66</sup> The potential response gap between use of force and armed attack, with its problems and potential fixes in the outer space context, will be discussed further in Section III.

While a discussion of where use of force and armed attack lay on the continuum of hostile acts is helpful, a precise identification of those boundaries is not needed for purposes of this Article since defensive counteractions are meant as a response only to acts that fall below the armed attack threshold. So while the armed attack threshold will form a boundary, beyond which self-defense is already permitted under international law, it is limited in how much it informs the "inner workings" of defensive counteractions. Instead, those inner workings are defined much more by the strengths and shortcomings of countermeasures, to which this Article turns next.

### C. Countermeasures

Countermeasures are not defined in the ILC Articles on State Responsibility, and commentators have remarked on the difficulty in pinning down a precise definition.<sup>67</sup> One good definition comes from Michael Schmitt, who describes countermeasures as "State actions, or omissions, directed at another State that would otherwise violate an obligation owed to that State and that are conducted by the former in

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68, for other commentators who downplay the importance of a scale and effects test to distinguish use of force from armed attack.

65. *Oil Platforms* (Iran v. U.S.), 2003 I.C.J. 161, 333 (Nov. 6, 2003) (separate opinion by Simma, J.).

66. Jay P. Kesan & Carol M. Hayes, *Mitigative Counterstriking: Self-Defense and Deterrence in Cyberspace*, 25 HARV. J.L. & TECH. 429, 513 (2011) ("[t]here are only two exceptions to this absolute prohibition on the use of force: acts authorized by the Security Council and acts undertaken in self-defense") (also citing additional authors of the same opinion).

67. Denis Alland, *The Definition of Countermeasures*, in THE LAW OF INTERNATIONAL RESPONSIBILITY 1127, 1127–29 (James Crawford et al. eds., 2010) (commenting on the difficulty of defining countermeasure and surveying its development as a term in public international law).

order to compel or convince the latter to desist in its own internationally wrongful acts or omissions.”<sup>68</sup>

Assuming the preconditions for necessity do not apply in a typical satellite interference scenario as previously discussed, and assuming the wrongful interference falls below armed attack, countermeasures are the only remaining option for a victim state that wishes to respond with measures that are not already lawful.<sup>69</sup> As discussed in Section II,<sup>70</sup> necessity requires “grave and imminent peril” to an “essential interest” of a victim state before it can be invoked—mere wrongfulness is not enough.<sup>71</sup> In contrast, countermeasures may be used in a wider range of circumstances, but they are also subject to restrictions that apply to neither necessity nor self-defense. Countermeasures are said to have four “fundamental conditions” that must be met to be lawful.<sup>72</sup> These are: (1) that the countermeasures be a response to an internationally wrongful act by another state, (2) that the victim state ask the offending state to cease its precipitating conduct or make reparations, (3) that the countermeasures be reversible, and (4) that the countermeasures be proportionate.<sup>73</sup> These and other requirements are discussed in this section.

68. Michael N. Schmitt, “*Below the Threshold*” *Cyber Operations: The Countermeasures Response Option and International Law*, 54 VA. J. INT’L L. 697, 700 (2014); see also ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 22, pt. 3 ch. II cmt. ¶ 1; Hung. v. Slov., 1997 I.C.J. ¶¶ 83–84.

69. According to the ILC Articles on State Responsibility, the other self-help doctrines that can preclude the wrongfulness of an otherwise wrongful act are consent, *force majeure*, and distress. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, arts. 20, 23, 24. Consent, *force majeure*, and distress are not addressed at any length here because they do not apply to the factual scenario this article contemplates. The Articles on State Responsibility also list compliance with peremptory norms as a condition that can preclude wrongfulness, *id.* art. 26, but this author does not classify the Article 26 provision as falling under the self-help umbrella since its focus is not on one state taking an affirmative action to counter another state’s action but rather on justifying an otherwise wrongful action through what is essentially a conflict of laws analysis where if an obligation owed to a state conflicts with an obligation owed to the international community, the obligation owed to the international community takes precedence. *Id.*; Vienna Convention on the Law of Treaties art. 53, *opened for signature* May 23, 1969, 1155 U.N.T.S. 331 [hereinafter 1969 Vienna Convention]; Maja Ménard, *Circumstances Precluding Wrongfulness in the ILC Articles on State Responsibility: Compliance with Peremptory Norms*, in THE LAW OF INTERNATIONAL RESPONSIBILITY 449, 450–51 (James Crawford et al. eds., 2010).

70. See *supra* Section II.A.

71. See *supra* Section II.A.; see also ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 25(1) (a); Hung. v. Slov., 1997 I.C.J. ¶ 52.

72. Maurice Kamto, *The Time Factor in the Application of Countermeasures*, in THE LAW OF INTERNATIONAL RESPONSIBILITY 1167, 1174 (James Crawford et al. eds., 2010).

73. *Id.* at 1174–75 (citing Hung. v. Slov., 1997 I.C.J. ¶ 55).

## 1. Precipitating Act

Only internationally wrongful acts, committed by one state against another, justify countermeasures.<sup>74</sup> Additionally, the internationally wrongful act must have already taken place—anticipatory countermeasures are not permitted.<sup>75</sup> In the kind of scenario that forms the basis of this Article, where one state interferes with the national security satellite functions of another state, this threshold requirement is relatively easy to meet.<sup>76</sup> It is possible for intentional interference to constitute an internationally wrongful act under, for instance, International Telecommunication Union rules prohibiting non-interference,<sup>77</sup> Outer Space Treaty provisions guaranteeing the free use and exploration of outer space,<sup>78</sup> the customary international law principle of non-intervention in a State's sovereign affairs,<sup>79</sup> or the requirement that a state not knowingly allow its territory to be used to violate the rights of another state.<sup>80</sup> For the sake of this analysis, it is assumed that an internationally wrongful act has occurred and that the wrongful acts are attributable to a state.<sup>81</sup>

74. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 49 cmt. ¶ 2; Hung. v. Slov., 1997 I.C.J. ¶ 83; Naulilaa Incident (Port. v. Germ.), 2 R.I.A.A. 1011, 1057 (1928).

75. Hung. v. Slov., 1997 I.C.J. ¶ 83.

76. Sarah M. Mountin, *The Legality and Implications of Intentional Interference with Commercial Communication Satellite Signals*, 90 INT'L L. STUD. 101, 185 (2014) (listing, as sources of international obligations that may be violated in the course of satellite interference: ITU rules, certain treaties pertaining to outer space, and the principles of non-intervention and State responsibility for activities taking place within a State's territory).

77. Constitution and Convention of the International Telecommunication Union art. 45, Oct. 1, 1994, 1825 U.N.T.S. 31251 (2014); Int'l Telecomm. Union [ITU], Radio Regulations, art. 15 (2012), <http://handle.itu.int/11.1002/pub/8029c1bf-en> [hereinafter ITU Regulations].

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

79. Nicar. v. U.S., 1986 I.C.J. ¶ 206.

80. Corfu Channel (U.K. v. Alb.), Judgment, 1949 I.C.J. 4, 22 (Apr. 9 1949) [hereinafter *Corfu Channel*].

81. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 2(a); Schmitt, *supra* note 68, at 707–08. This is not to say attribution will necessarily be easy. *See, e.g.*, Mountin, *supra* note 76, at 179–80 (“With regard to attributing an act to a State, ‘the problem is not . . . the legal process of imputing the act to a particular State . . . but the prior process of tracing material proof of the identity of the perpetrator.’ Thus, even though satellite signal interference can be detected by using antennas to co-locate the source of the jamming signal, it may be challenging to pinpoint the precise source of the interference in a timely manner. What is more, even if the location of the interference is discovered, it may still be difficult and time-consuming to identify the person who operated the jamming equipment or to ‘identify the real “mastermind” behind the attack.’”) (quoting Nicar. v.

2. Preconditions

In general, before a state may execute countermeasures it must demand reparation,<sup>82</sup> notify the offending state of its intent to take countermeasures,<sup>83</sup> and offer to negotiate with the offending state.<sup>84</sup> However, and of special importance in the outer space environment where significant harm can be turned on or off with the flip of a switch or the push of a button, the rule requiring prior notification, offer for negotiation, and demand for reparation is not required in all circumstances.

As Article 52(2) of the Articles on State Responsibility says, “[n]otwithstanding [the prior notification requirement], the injured State may take such urgent countermeasures as necessary to preserve its rights.”<sup>85</sup> The commentary to the Articles on State Responsibility notes that the right to urgent countermeasures may be especially important where the victim state fears its countermeasures will be blocked, negated, or otherwise rendered useless if the offending state learns of them ahead of time.<sup>86</sup> Neither the text of Article 52, nor subsequent cases interpreting the urgency exception, say that is the sole basis for a right to urgent countermeasures, however, only that the normal preconditions may be chronologically skipped<sup>87</sup> if “necessary to preserve

U.S., 1986 I.C.J. ¶ 119–20); Nicholas Tsagourias, *Cyber Attacks, Self-Defence and the Problem of Attribution*, 17 J. CONFLICT & SEC. L. 229, 223 (2012).

82. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, arts. 43, 52(1)(a); Hung. v. Slov., 1997 I.C.J. ¶ 84.

83. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 52(1)(b); Yuji Iwasawa & Naoki Iwatsuki, *Procedural Conditions*, in THE LAW OF INTERNATIONAL RESPONSIBILITY 1149, 1151–52 (James Crawford et al. eds., 2010) (noting the requirement to notify and also stating it is anchored in the need to avoid conflict escalation).

84. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 52(1)(b); Iwasawa & Iwatsuki, *supra* note 83, at 1150–51.

85. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 52(2).

86. *Id.* art. 52 cmt. ¶ 6.

87. This author uses the phrase “chronologically skipped” since the duty to call for reparations, to notify of the countermeasures, and to offer negotiations presumably continues, but may be executed as soon as practicable after the countermeasures have been initiated. This interpretation aligns with the overall purpose of countermeasures to deescalate hostile situations and restore the situation as much as possible to how it was before the precipitating act. *See id.* pt. 3 ch. II cmt. ¶¶ 1, 6. This interpretation also aligns with “the general principle . . . whereby States are under the general obligation to settle their disputes peacefully.” CASSESE, *supra* note 42, at 302. Note that while the commentary to Article 49 implies the duty to notify may disappear after countermeasure is executed since “a requirement of notification of some activity is of no value after the activity has been undertaken,” ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 49 cmt. ¶ 9, even ex post facto notification in some scenarios such as cyber counterstrikes can have the benefit of notifying the offending state why its instrument of attack is no longer effective and who is responsible for neutralizing that instrument.

[the state's] rights."<sup>88</sup> One can then conclude that urgent countermeasures may also be appropriate when the victim state's rights or interests are so imperiled that the countermeasure must be executed before the right or interest is permanently destroyed or suffers long-term damage. In an outer space context, this means, for instance, that directed energy weapon use against a national security satellite could justify an urgent countermeasure. This is the case not just because of a fear that the offending State might negate the countermeasure if it knew about the countermeasure ahead of time, but also because of a fear that the satellite would be disabled long term if the directed energy weapon were permitted to continue its attack. Ultimately, while the preconditions are important and generally required, their timing should not defeat the purpose the countermeasures are meant to ultimately serve.

### 3. Restrictions

#### *a. Human Rights and Peremptory Norms*

Perhaps least controversial among the countermeasures restrictions is the fact that countermeasures must not violate humanitarian law, human rights, or "other obligations under peremptory norms of general international law."<sup>89</sup> As one scholar has noted, "the idea that the performance of certain obligations which protect the 'requirements of humanity' may not be suspended by way of countermeasure has become firmly entrenched in the international legal system,"<sup>90</sup> and the importance of peremptory norms as being protected even from countermeasures is "self-evident"<sup>91</sup> given their status as norms that may not

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88. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 52(2).

89. *Id.* art. 50(1). See also *Port. v. Germ.*, 2 R.I.A.A. at 1026 (countermeasures must be "limited by the requirements of humanity"); Institut de Droit Int'l, *1934 Resolution*, in 38 ANNUAIRE DE L'INSTITUT DE DROIT INT'L, at 710 (1934) (States taking countermeasures must "abstain from any harsh measure which would be contrary to the laws of humanity or the demands of the public conscience."); ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 26 (States must continue to uphold peremptory norms even when circumstances permit them to take actions that would otherwise be wrongful).

90. Silvia Borelli & Simon Olleson, *Obligations Relating to Human Rights and Humanitarian Law*, in THE LAW OF INTERNATIONAL RESPONSIBILITY 1177, 1177 (James Crawford et al. eds., 2010) (referring specifically to human rights and humanitarian law). For a thorough discussion of human rights and humanitarian law in the context of countermeasures, see *id.* at 1177–96.

91. Charles Leben, *Obligations Relating to the Use of Force and Arising from Peremptory Norms of International Law*, in THE LAW OF INTERNATIONAL RESPONSIBILITY 1197, 1198 (James Crawford et al. eds., 2010).

be derogated from.<sup>92</sup> These are restrictions that apply even in warfare and should therefore be expected to also apply to the more constrained field of countermeasures.<sup>93</sup>

*b. Reversibility*

The remaining restrictions imposed upon the use of countermeasures warrant more discussion. The goal of countermeasures is to “ensure cessation and reparation by the responsible State,”<sup>94</sup> a goal that is a good lens for viewing and understanding the remaining restrictions. The requirement that the effects of countermeasures be reversible<sup>95</sup> is one such restriction, as it attempts to maintain the possibility of returning to the *status quo ante* after the countermeasures cease. However, the commentary to the Articles on State Responsibility states that reversibility is not required in all circumstances and that reversible measures need only be used “as far as possible.”<sup>96</sup> The commentary goes on to state that if it is possible to take an effective reversible countermeasure, that reversible countermeasure must be used instead of any irreversible countermeasures.<sup>97</sup> Michael Schmitt, quoting James Crawford, notes the focus should not be so much on whether the specific physical effects of the countermeasure, if any, can be reversed, but instead on whether the “future legal relations between the two States” can be reversed back to where they were prior to the precipitating act.<sup>98</sup>

92. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 50(1); *see also* Leben, *supra* note 91, at 1198–99.

93. *See, e.g.*, International Covenant on Civil and Political Rights art. 4, Dec. 16, 1966, 999 U.N.T.S. 171 (regarding human rights); Convention for the Protection of Human Rights and Fundamental Freedoms art. 15, *done* Nov. 4, 1950, 213 U.N.T.S. 221 (regarding human rights); American Convention on Human Rights art. 27, Nov. 21, 1969, 1144 U.N.T.S. 123 (regarding human rights); Stefan Oeter, *Methods and Means of Combat*, in THE HANDBOOK OF HUMANITARIAN LAW IN ARMED CONFLICTS 105, 476–79 (Dieter Fleck & Michael Bothe eds., 1999) (regarding humanitarian law; also citing multiple sources of humanitarian law applicable in wartime); ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 26 (regarding peremptory norms).

94. JAMES CRAWFORD, ARTICLES ON RESPONSIBILITY OF STATES FOR INTERNATIONALLY WRONGFUL ACTS 8–9 (2012) (introductory note).

95. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 49(3); Hung. v. Slov., 1997 I.C.J. ¶ 87.

96. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 49 cmt. ¶ 9. *But see* Kamto, *supra* note 72, at 1175 (noting the ICJ does not appear to have taken the ILC’s position but also asserting the ICJ may do so in the future).

97. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 49 cmt. ¶ 9.

98. Schmitt, *supra* note 68, at 714 (quoting JAMES CRAWFORD, THE INTERNATIONAL LAW COMMISSION’S ARTICLES ON STATE RESPONSIBILITY: INTRODUCTION, TEXT, AND COMMENTARIES 283 (James Crawford ed., Cambridge Univ. Press 2002)).

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Crawford and Schmitt's position seems to soften the requirement considerably, but the softening is reasonable given the fact that Article 49 does not explicitly mention reversibility, only that countermeasures must "be taken in such a way as to permit the resumption of performance of the obligations in question."<sup>99</sup>

### *c. Proportionality*

Proportionality as a concept has long been applied to countermeasures,<sup>100</sup> and has also been applied to self-defense both in terms of whether self-defense is justified (*jus ad bellum*) and whether the means utilized in self-defense (*jus in bello*) are proportionate.<sup>101</sup> However, the proportionality applicable to countermeasures is different from *jus ad bellum* and *jus in bello* proportionality applicable to self-defense in that countermeasures must be proportionate to the *injury suffered* by the victim state.<sup>102</sup> In contrast, the qualitative aspect of *jus ad bellum* proportionality looks to the legitimate end goal and says the force used must be "necessary and appropriate to repel the attack and [entail] acceptable side-effects on other interests and values affected by the response."<sup>103</sup> Put differently, while *jus in bello* proportionality "considers harm caused by an attack in light of the military gain," countermeasures proportionality "gauges harm relative to the injury suffered" during the precipitating act.<sup>104</sup> Thus, whereas a response designed to achieve a military end might be considered proportionate if executed in self-defense, the same response executed as a countermeasure could be disproportionate if it surpassed the level of harm originally suffered from the precipitating act. This injury-centric focus can present

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99. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 49(3). *But see* Hung. v. Slov., 1997 I. C.J. ¶ 87 (stating simply that countermeasures must be reversible, with no mention of the reversibility requirement being optional in some circumstances or that the requirement's focus is on the ability of the breaching state to resume its international obligations rather than on the effect of the countermeasure).

100. *See also* Port. v. Germ., 2 R.I.A.A. at 1028; Air Service Agreement of 27 March 1946 between the United States and France (U.S. v. Fr.), 18 R.I.A.A. 417, 443–444 (1978) [hereinafter *Air Service Agreement*]; *see* Hung. v. Slov., 1997 I.C.J. ¶ 85.

101. *See generally* Nicar. v. U.S., 1986 I.C.J. ¶ 194 (distinguishing between whether self-defense is merited in response to the precipitating acts and whether acts taken in self-defense are proportional); *see also generally*, Thomas M. Franck, *On Proportionality of Countermeasures in International Law*, 102 AM. J. INT'L L. 715, 719–34 (2008).

102. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 51; Hung. v. Slov., 1997 I.C.J. ¶ 85.

103. Enzo Cannizzaro, *Contextualizing Proportionality: Jus ad Bellum and Jus in Bello in the Lebanese War*, 88 INT'L REV. RED CROSS 779, 783 (2006).

104. Schmitt, *supra* note 68, at 724.



problems in outer space, which will be addressed in Section III.<sup>105</sup>

*d. Limited Duration*

True to the goal of stopping wrongful conduct without exacerbating the situation, there is a general rule that countermeasures must cease once the precipitating wrongful act ceases. This requirement is evident in Articles 52 and 53 of the Articles on State Responsibility. Article 52 says countermeasures must cease if “(a) the internationally wrongful act has ceased; and (b) the dispute is pending before a court or tribunal which has the authority to make decisions binding on the parties.”<sup>106</sup> Article 53 makes a similar statement, but references reparations and omits reference to a court or tribunal. It states, “[c]ountermeasures shall be terminated as soon as the responsible State has complied with its obligations [of cessation and reparation]<sup>107</sup> under Part Two in relation to the internationally wrongful act.”<sup>108</sup> The commentary to Article 53 asserts the requirement that countermeasures cease once the wrongful act ceases and the matter is referred to a court or tribunal is based on the assumption that the court or tribunal will have the “power to order provisional measures,”<sup>109</sup> though the actual article makes no such qualification.

105. Section III.A.2.c.

106. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 52(3) (emphasis added); *Air Service Agreement*, *supra* note 100, at 445–46 (discussing how and when court or tribunal proceedings negate a state’s right to take countermeasures).

107. Reparations include “full reparation” for “any damage, whether material or moral,” and must put the injured State wholly back in the position it would have been in had the internationally wrongful act not occurred. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 31. *See also* *Factory at Chorzów (Ger. v. Pol.)*, 1928 P.C.I.J. (ser. A) No 17, at 47 (Sept. 13). International wrongs that entitle a State to reparation can include “Unlawful action against non-material interests, such as acts affecting the honor, dignity or prestige of a State . . . even if those acts have not resulted in a pecuniary or material loss for the claimant State.” *N.Z. v. Fr.*, 20 R.I.A.A. at 267.

108. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 53; Appellate Body Report, *United States—Continued Suspension of Obligations in the EC – Hormones Dispute*, ¶ 382, WTO Doc. WT/DS320/AB/R (adopted Oct. 16, 2008).

109. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 52 cmt. ¶ 8. *See also* Kamto, *supra* note 72, at 1173 (speaking favorably of the interpretation that there is an underlying assumption the court or tribunal can implement provisional measures). Reparations may come in the form of “restitution, compensation and satisfaction, either singly or in combination.” ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 34; *see also* *CMS Gas Transmission Company v. Argentine Republic*, ICSID Case No. ARB/01/8, Annulment Proceeding, ¶ 49 (Sept. 1, 2006); *Case Concerning Pulp Mills on the River Uruguay (Arg. v. Uru.)*, Judgment, 2010 I.C.J. Rep. 14, ¶ 270–73 (Apr. 20, 2010).



Michael Schmitt, speaking to the duration restriction, says countermeasures “may not be taken in response to an internationally wrongful act that is complete and unlikely to be repeated,” but also notes countermeasures may continue if reparations are due and have not been given.<sup>110</sup> Schmitt also states “countermeasures remain available when the internationally wrongful act is but one in a series of wrongful acts” and that countermeasures are a permissible way of stopping the pattern of attacks in such instances. Schmitt cites as an example the repeated denial of service cyber-attacks where the victim state reasonably concludes the pattern of repeated attacks will continue.<sup>111</sup> If one accepts Schmitt’s analysis, the same basic analysis can apply in outer space satellite scenarios where jamming effects, for instance, are turned off and on repeatedly. A challenge, however, would be in determining whether the outer space asset is suffering a pattern of ongoing and repeated wrongful acts, whether the wrongful acts are so random as to apparently be individual acts instead of a singular series of connected acts, or whether the final wrongful act has taken place and no more will be forthcoming regardless of whether countermeasures are employed.

In the end, the nature of harm suffered in outer space operations may make such an analysis less important and only truly necessary in a few circumstances. David Bederman states, “[d]espite the fact that the illegal conduct has ceased, its effects may well continue, and the obligation to provide reparation remains,” and when the right to reparation remains, so does the right to countermeasures.<sup>112</sup> Therefore, if hostile acts disable a satellite, for instance, one may consider the harm ongoing and the need for reparation to thus continue as well. If the need for reparation is ongoing, then the right to execute countermeasures continues until the offending state has met its obligations of cessation and reparation.<sup>113</sup>

*e. Non-Use of Force*

Finally, it is generally held that countermeasures may not include the use of force, even when the precipitating act constitutes a use of

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110. Schmitt, *supra* note 68, at 715.

111. *Id.* at 715–16.

112. David J. Bederman, *Counterintuiting Countermeasures*, 96 AM. J. INT’L L. 817, 825 (2002). See also ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 53 cmt. ¶ 1.

113. This may create a problem of self-interested interpretation, where a state is incentivized to assert broad ongoing harm. This will be discussed in Section IV.

force.<sup>114</sup> Victim states may fight fire with water, but not with fire. The general prohibition on the use or threat of force is clearly laid out in Article 2(4) of the U.N. Charter, and its applicability to countermeasures has been labeled customary international law<sup>115</sup> and a peremptory norm.<sup>116</sup> Yet, the opinion is not entirely unanimous. Perhaps the best-known statement of the minority position that force may sometimes be used in countermeasures comes from the ICJ's Judge Simma and his separate opinion in the *Oil Platforms* case. There, Judge Simma stated his belief that, in instances where one state uses force against another state in a way that does not amount to armed attack, the victim state is allowed to use force in a responding countermeasure so long as the responding force strictly adheres to principles of necessity, proportionality, and immediacy, and does not rise to the level of an armed attack.<sup>117</sup> Most scholars, however, have rejected this view as contrary to the U.N. Charter and pronouncements of the ICJ.<sup>118</sup> That is not to say Judge Simma's view has been wholly rejected, as will be discussed in Section IV.<sup>119</sup>

So long as states using countermeasures are barred from employing force and so long as the *Nicaragua* gap between use of force and armed attack remains, countermeasures will be characterized by a response gap and there will be a question, especially in the cyber and outer space domains, of what activities constitute a use of force and an armed

114. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 50(1)(a); U.N. Charter, *supra* note 10, art. 2(4); *Corfu Channel*, 1949 I.C.J. at 35; *Nicar. v. U.S.*, 1986 I.C.J. ¶ 249; Arbitration between Guyana and Suriname (*Guy. v. Surin.*), I.C.G.J. 370 ¶ 263, 267, Award, (Perm. Ct. Arb. 2007); G.A. Res. 2625 (XXV), Declaration on Principles of International Law concerning Friendly Relations and Cooperation among States in Accordance with the Charter of the United Nations (Oct. 24, 1970). *See also* S.C. Res. 171, ¶ 1–2 (Apr. 9, 1962); S.C. Res. 188, ¶ 1–4 (Apr. 9, 1964); S.C. Res. 573, ¶ 4 (Oct 4, 1985); G.A. Res. 41/38, ¶ 2–4 (Nov. 20, 1986).

115. Schmitt, *supra* note 68, at 718; MARCO ROSCINI, CYBER OPERATIONS AND THE USE OF FORCE IN INTERNATIONAL LAW 44 (Merel Alstein & Anthony Hinton eds., 2014).

116. *See, e.g.*, Leben, *supra* note 91, at 1202–03. Note Leben labels the prohibition against the use of force as a simple peremptory norm, vice a reinforced peremptory norm. As Leben states, simple peremptory norms do not prevent central authorities from carrying out the prohibited acts, whereas reinforced peremptory norms (such as prohibitions against torture) prevent even central authorities from committing the prohibited acts.

117. *Iran v. U.S.*, 2003 I.C.J. at 333 (separate opinion by Simma, J.).

118. *See, e.g.*, ROSCINI, *supra* note 115, at 104–05; Michael N. Schmitt, *Cyber Operations in International Law: The Use of Force, Collective Security, Self-Defense, and Armed Conflicts*, in PROCEEDINGS OF A WORKSHOP ON DETERRING CYBER ATTACKS: INFORMING STRATEGIES AND DEVELOPING OPTIONS FOR U.S. POLICY 151, 160 (Nat'l Research Council eds., 2010) (noting the majority of scholars believes countermeasures may not be forceful, and criticizing Judge Simma's analysis).

119. Section IV.B.2.a.

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attack. Both these issues were discussed briefly in this section and will be discussed further in the next.

### III. THE LAW'S LIMITS: SELF-HELP IN OUTER SPACE

Having examined the relevant black letter law on self-help, it is appropriate to now examine the difficulties encountered in applying that law to internationally wrongful interference with a state's national security satellites when the interference does not rise to the level of an armed attack.

The proposal to be outlined in Section IV will use countermeasures as its base line, adapting as necessary to meet the unique requirements of outer space. Much time will therefore be spent in this section examining the difficulties in applying the law of countermeasures to outer space and how those difficulties may be best rectified. Self-defense will not be discussed since it applies only as a response to an armed attack.<sup>120</sup> Necessity will be discussed only briefly, since necessity may only be invoked in the rare circumstances where the "essential interests" of a state are in "grave peril."<sup>121</sup>

#### A. Difficulties in the Law

It is widely accepted that general public international law applies in outer space unless displaced by *lex specialis* specific to outer space.<sup>122</sup> The general public international law applicable to outer space "includes not only long-established rules of customary international law . . . but also basic and explicit tenets of international law that have found their way into the UN Charter."<sup>123</sup> State parties to the Outer Space Treaty need only refer to Article III of the treaty to find their obligation to explore and use outer space and its celestial bodies "in accordance with international law, including the Charter of the United Nations."<sup>124</sup> For the minority of countries not party to the Outer Space

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120. See Section II.B. Note also that many scholars assert the "response" to armed attack can sometimes take place before the armed attack actually occurs. This is anticipatory self-defense.

121. See Section II.A.

122. See Olivier Ribbelink, *Article III*, in COLOGNE COMMENTARY ON SPACE LAW: IN THREE VOLUMES 64, 67–68 (Stephan Hobe et al. eds., 2009); MANFRED LACHS, THE LAW OF OUTER SPACE: AN EXPERIENCE IN CONTEMPORARY LAW-MAKING 13–15 (Tanja L. Masson-Zwaan & Stephan Hobe eds., 2010).

123. Ribbelink, *supra* note 122, at 67; see also Ian Brownlie, *The Maintenance of International Peace and Security in Outer Space*, 40 BRIT. Y.B. INT'L L. 1, 1 (1964).

124. Outer Space Treaty, *supra* note 78, art. III.

Treaty,<sup>125</sup> Judge Lachs has observed that the Outer Space Treaty's incorporation of international law into the space regime created no new legal obligations. Judge Lachs rather noted that the Treaty simply memorialized "the obvious consequence of the nature and functions of international law" and that the incorporation of international law therefore occurs as a matter of customary international law.<sup>126</sup> That is to say, general international law binds state actors in outer space even if they are not parties to the Outer Space Treaty or to the Moon Agreement, which also incorporates general international law through its Article 2.<sup>127</sup> As mankind and its objects entered space, so too entered the law. Since general public international law accompanies states into outer space, unless displaced by more specialized law, this Article turns to the international law of self-help as it applies to outer space.

### 1. Necessity

As discussed in Section II,<sup>128</sup> there are likely few situations where necessity will be legitimately available to defend a state's national security satellites from interference that does not amount to or is not otherwise part of an armed attack justifying self-defense.<sup>129</sup> While it is possible the impaired functions of national security satellites will be so vital to the state that interference with those satellites raises the specter of necessity, that situation will be rare. The primary difficulty for a victim state will be in showing that the ability for a national security satellite to continue its activities unimpeded constitutes an essential interest. As Antonio Cassese has stated, necessity is a situation where "the *whole State or its population* (or part of the population)" is threatened.<sup>130</sup> While one may argue a state's population can be threatened when certain civilian functions on dual use civilian/military satellites

125. See Comm. On the Peaceful Uses of Outer Space, Status of Int'l Agreements relating to Activities in Outer Space as at 1 Jan. 2019, U.N. Doc A/AC.105/C.2/2019/CRP.3, at 10 (Apr. 1, 2019) (showing 109 states that have ratified the Outer Space Treaty and 23 additional states that have signed but not yet ratified the treaty).

126. LACHS, *supra* note 122, at 14; see also CHENG, *supra* note 13, at 228–29 (stating the international legal regime "follows States as they advance, four hundred years after Christopher Columbus, into another new world").

127. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies art. 2, *entered into force* July 11, 1984, 1363 U.N.T.S. 3 [hereinafter Moon Agreement].

128. Section II.A.

129. States may make a disingenuous classification of an emergent situation (perhaps best labeled a "classification") as a situation where necessity can be invoked, one of the dangers defensive counteractions seek to avoid.

130. CASSESE, *supra* note 42, at 255.

are degraded, it becomes harder to make the same argument when only reconnaissance, communications, or navigation capabilities provided by national security assets are impaired,<sup>131</sup> unless degradation of those national security functions can be shown to threaten and have an imminent impact upon a state's civilian population.

Further reducing the potential usefulness of necessity is the fact that if national security satellite interference *were* to somehow constitute grave peril to an essential interest, one may be able to argue the interference also constitutes an armed attack on the state, depending on its overall scale and effects.<sup>132</sup> This would largely depend on the uncertain answer to the question of what an armed attack in outer space looks like, as discussed below in this section. If the interference did constitute an armed attack, self-defense would be permitted and necessity would not need to be invoked.<sup>133</sup>

Ultimately, while necessity has some superficial attractiveness, it will be rarely useful in the types of scenarios addressed here, either because it is inapplicable or because other more favorable responses are available. This Article turns, then, to countermeasures and the difficulties inherent in using them to defend national security satellites.

## 2. Countermeasures

As discussed in Section II,<sup>134</sup> countermeasures come with specific requirements if they are to be used. Those requirements are discussed below as applied to national security satellite defense. The requirements addressed first provide small but generally surmountable obstacles, whereas the other requirements, especially injury-focused

131. As Heathcote notes, some have said protection of political systems, territory, or military interests should never be considered an essential interest sufficient to invoke necessity. Heathcote, *supra* note 41, at 497 (citing ITALIAN YEARBOOK OF INTERNATIONAL LAW 286 (5th eds. 1980-1981)). The better view is that the magnitude of a threat to a state's territory or military interests would need to be considered before making a definitive determination that essential interests were or were not threatened. For instance, interference that somehow constituted a threat to the effective existence of the state's territory or military would reasonably be considered a threat of grave peril to an essential interest of the state. *See also* BROWNLIE, *supra* note 61, at 42 (necessity applies "when action is necessary for the security or safety of the state."); Jonathan Bellish, *In Principle But Not In Practice: The Expansion of Essential State Interests In The Doctrine Of Necessity Under Customary International Law*, 41 DENV. J. INT'L L. & POL'Y 127, 135-36 (2012) (stating that, successfully or not, states historically invoked necessity only as a response to major threats of a primarily military nature).

132. *See generally* *Nicar. v. U.S.*, 1986 I.C.J. ¶ 195.

133. *See* KRIANGSAK KITTICHAISAREE, PUBLIC INTERNATIONAL LAW OF CYBERSPACE 193-94 (2017) (making a similar statement regarding necessity in a cyber context).

134. Section II.C.

proportionality and the prohibition on the use of force, are more problematic and argue in favor of defensive counteractions as a middle ground between countermeasures and self-defense.

*a. Constrained in Time*

As discussed in Section II, countermeasures have a time constraint whereby they must cease either 1) once the precipitating internationally wrongful act has ceased and any owed reparations have been made, or 2) if reparations have not been made, once the precipitating act has ceased and the matter is pending before an appropriate court or tribunal.<sup>135</sup> The technological nature of space, where internationally wrongful acts can be turned off and on with the flip of a switch or the press of a button, will at times make it difficult to know whether wrongful interference has ceased or is simply in a lull. This can, in turn, create ambiguity and uncertainty when a victim state attempts to determine whether an act has ceased and how that affects the state's right to take countermeasures. This is the case especially if the victim state is unsure as to whether it is owed any reparations that would otherwise extend its right to take countermeasures.

For instance, communications jamming that occurs once for twenty-four hours, and then is discontinued and six months later is reinitiated for another twenty-four hours, would almost certainly be considered two separate acts of jamming. However, if communications jamming occurs for twenty-four hours, is discontinued for five minutes, then is reinstated for another twenty-four hours and continues that pattern for the following six months, that would reasonably be considered a single internationally wrongful act occurring over a period of six months. Therefore, after four months of repeated jamming in that hypothetical pattern, it would be difficult to say a state that executed a countermeasure during one of the intervening five-minute periods was doing so after the wrongful act had already ceased. The difficulty exists in the gray zone between those extreme examples.

There is also potential difficulty in determining whether harm is ongoing or has ceased. If harm is limited to whether the victim satellite remains disabled or impaired, for instance, harm and its cessation are relatively easy to identify. But the more difficult question is how secondary effects impact the harm and reparations analysis as it pertains to countermeasures. If communications or navigation satellites are disabled for a time and then later re-enabled, can a military end user assert

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135. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 52(3); *see also* discussion *supra* Section II.C.3.d.

ongoing harm suffered by units that were unable to coordinate or execute logistical missions in the down time, resulting in logistics backlogs? If a reconnaissance satellite is dazzled during a series of orbits over a target location, can the intelligence end user assert ongoing harm from the lack of situational awareness created by the inability to compare future data with data that would have been obtained during those dazzled orbits? The technological nature of space may make the issue of harm and reparations ripe for abuse and creative interpretation, as space is a place where hostile acts can be turned off and on much faster than bands of armed soldiers could ever be inserted and withdrawn from a frontier incident and where the adverse impact of hostile acts can be broad and unpredictable.

One can foresee how it may be helpful for a state suffering national security satellite interference to characterize a series of interfering acts as one ongoing act that thereby allows it to take countermeasures even during lulls between the component interfering acts. However, other aspects of the law of countermeasures, as encapsulated in Articles 52 and 53 of the Articles on State Responsibility, will often mitigate characterization difficulties and render the need to accurately characterize less important. This is due to the previously-mentioned rule that, even if a wrongful act has ceased, a victim state is not required to discontinue its countermeasures until the state responsible for the precipitating acts provides reparation for harm inflicted or, if no reparations are forthcoming, until the matter is before an appropriate court or tribunal. These processes take a comparatively long time relative to the potentially rapid-fire process of turning on or off many forms of satellite interference, and therefore extend the window of time within which countermeasures may be used.

The Tallinn Manual 2.0 also highlights a somewhat controversial requirement, summarized in Article 30(b) of the Articles on State Responsibility,<sup>136</sup> which may prove helpful in satellite interference scenarios—namely, that an offending state may be required to provide assurances or guarantees that it will not repeat its internationally wrongful acts.<sup>137</sup> A victim state's ability to require the precipitating state to

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136. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 30(b).

137. TALLINN MANUAL 2.0 ON THE INTERNATIONAL LAW APPLICABLE TO CYBER OPERATIONS, (Michael N. Schmitt ed., 2d ed. 2017), at 142 r. 27, 143, ¶ 4 [hereinafter TALLINN MANUAL 2.0]; *see also* Trail Smelter (U.S. v. Can.), 3 R.I.A.A. 905, 1934 (Apr. 16, 1938 and Mar. 11, 1941) (declaring Canada must take preventative measures to help ensure future pollution of American environment by Canada's Trail Smelter did not occur); *LaGrand* (F.R.G. v. U.S.), 2001 I.C.J. 466, 512–14 (June 27, 2001) (implicitly acknowledging a state's potential right to assurances in some situations but deciding earlier measures taken by the United States made it so the Court did not



provide assurances or guarantees of non-repetition before the victim state ceases its countermeasures would be useful in scenarios where the victim state does not know whether the interference is ongoing or will otherwise continue.

Assuming a requirement to provide assurances or guarantees, the requirement would only apply when “circumstances so require.”<sup>138</sup> There is no clear standard as to when circumstances require assurances or guarantees, and the commentary to Article 30 notes that “[m]uch will depend on the circumstances of the case, including the nature of the obligation and of the breach.”<sup>139</sup> This fact-driven balancing requirement again introduces ambiguity and uncertainty for states that find themselves the victims of unlawful interference trying to determine how and when they may respond without committing an internationally wrongful act.

Finally, even in light of the reparation, adjudication, and assurances/guarantees requirements, one should note the countermeasures proportionality requirement means a victim state would need to decrease the intensity of its countermeasures once the precipitating act has ceased and only the requirements of reparation, adjudication, or assurances/guarantees remain unfulfilled.<sup>140</sup> Thus, the ability to characterize an act as ongoing would still hold some importance for the victim state. Proportionality is discussed in more detail below.<sup>141</sup> Ultimately, the time constraints placed on countermeasures introduce a level of ambiguity and uncertainty for victim states that seek to respond lawfully to wrongful acts taken against them. While the requirements of reparation, adjudication, and assurances/guarantees

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need to determine if the United States presently owed Germany assurances). *LaGrand* has been called the ICJ’s first recognition that states may be entitled to assurances or guarantees of non-repetition. See, e.g., Christian J Tams, *Recognizing Guarantees and Assurances of Non-Repetition: LaGrand and the Law of State Responsibility*, 27 YALE J. INT’L L. 441, 444 (2002). For a thorough critique of *LaGrand* as overreaching with regard to assurances and guarantees, see generally Scott M. Sullivan, *Changing the Premise of International Legal Remedies: The Unfounded Adoption of Assurances and Guarantees of Non-Repetition*, 7 UCLA J. INT’L L. & FOREIGN AFF. 265 (2002).

138. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 30(b).

139. *Id.* art 30 cmt. ¶ 13.

140. Roger O’Keefe, *Proportionality*, in THE LAW OF INTERNATIONAL RESPONSIBILITY 1158, 1158 (James Crawford et al. eds., 2010) (saying, regarding satisfaction as part of reparation, that “[t]he ILC did not consider unlawful *per se* countermeasures taken in order to induce the giving of satisfaction. That said, the condition of proportionality would render highly dubious all but the most sparing of such measures. . . . The requirement of proportionality is relevant both to the type of countermeasure that may be adopted and to its degree of intensity”).

141. Proportionality is discussed below in sub-section A.2.c of this section.



can mitigate that ambiguity and uncertainty when applicable, the time constraint requirement will remain a hindrance to victim states.

*b. Reversible*

In the *Gabčíkovo-Nagymaros Project* case, the ICJ said the purpose of a countermeasure “must be to induce the wrongdoing state to comply with its obligations under international law,” and that “the measure must therefore be reversible.”<sup>142</sup> Article 49(3) of the Articles on State Responsibility is more pliable in its summation of the law, stating that countermeasures must “as far as possible, be taken in such a way as to permit the resumption of performance of the obligation in question”<sup>143</sup> and clarifying in the commentary that countermeasures must be reversible only “as far as possible.”<sup>144</sup> James Crawford, writing on reversibility, focuses on the relationship between the states in question, saying countermeasures must be “reversible in their effects in terms of future legal relations between the two States.”<sup>145</sup> While a relationship-centric calculus may be an appropriate consideration for legal disputes over international infrastructure agreements<sup>146</sup> or international aviation agreements,<sup>147</sup> the situation can be quite different during real-time national security space operations. The question of whether irreversible harm will fall upon the relations of two states is better suited for statesmen rather than military commanders or others deciding whether they may execute a countermeasure during active space operations. Nevertheless, an emphasis on the reversibility of broader legal relationships has some benefit in that it does not require the physical effects of the countermeasure to be reversible, and it seems to reflect the broad-minded tone of Article 49’s admonition that countermeasures should “permit the resumption of performance of the obligations in question” as far as possible.<sup>148</sup> Ultimately, although the requirement is not absolute, and although it requires reversible measures only if an effective reversible option exists, the emphasis on future relations between the two states makes for a cumbersome and vague analysis for real-time decision makers.

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142. *Hung. v. Slov.*, 1997 I.C.J. ¶ 87.

143. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 49(3).

144. *Id.* art. 49 cmt. ¶ 9.

145. CRAWFORD, *supra* note 98, at 283, para. 6.

146. *See generally* *Hung. v. Slov.*, 1997 I.C.J.

147. *See generally* *Air Service Agreement*, *supra* note 100.

148. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 49(3).

*c. Proportional*

Proportionality is a significant factor in state responses to internationally wrongful actions since “[i]f a response, even to an unlawful action, is disproportionate, it would be as unlawful as (or *even more unlawful than*) the provocation itself.”<sup>149</sup> A victim state’s countermeasures may thus be subjected to an *ex post facto* “second opinion” whereby the ICJ, for example, decides whether the victim state’s countermeasure was disproportionate and therefore internationally wrongful.<sup>150</sup> Making things more difficult for victim states is the idea that proportionality is “not an easy task,” and is “best... accomplished by approximation.”<sup>151</sup> Cassese states “it is always difficult to ascertain whether [countermeasures] are strictly commensurate with the wrongdoing.”<sup>152</sup> Though he disagrees with the premise, Thomas Franck notes that “[i]t is said about the principle of proportionality that, like beauty, it exists only in the eye of the beholder.”<sup>153</sup>

The textbook rule regarding countermeasures proportionality is that countermeasures must be proportionate to the injury suffered, without contemplating whether the countermeasures are sufficient to make the offending state stop its wrongful act.<sup>154</sup> Cassese speaks critically of the injury-centric focus espoused in the *Naulilaa* incident, the *Air Services Agreement* arbitration, and the *Gabčíkovo-Nagyymaros Project* case, saying the focus should be on the countermeasure’s purpose of making the activity cease, not on the injury suffered. However, Cassese applies his analysis to a scenario where the scope and intensity of a countermeasure necessary to make the precipitating act cease is *less than* the scope and intensity that would be on par with the injury. It is unclear whether Cassese would still prefer a results-centered proportionality analysis if the scope and intensity of such a countermeasure went beyond that which would be permitted under an injury-centric proportionality test.<sup>155</sup>

Perhaps further muddying the waters, Michael Newton and Larry May state that “[d]eterrence is an inevitable aspect of the proportionality

149. Franck, *supra* note 101, at 763.

150. *Id.* at 738–39 (referencing *Gabčíkovo-Nagyymaros Project*, where the ICJ found *ex post facto* that Czechoslovakia’s countermeasures had been disproportionate and therefore wrongful).

151. *Air Service Agreement*, *supra* note 100, at 443–44.

152. CASSESE, *supra* note 42, at 305.

153. Franck, *supra* note 101, at 716.

154. See ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 51; TALLINN MANUAL 2.0, *supra* note 137, at 127, r. 23 (regarding proportionality in countermeasures response to cyberattack); *Air Service Agreement*, *supra* note 100, at 443–44; see also *Hung. v. Slov.*, 1997 I.C.J. ¶ 85-87; Section II.C.3.c.

155. CASSESE, *supra* note 42, at 306.

decision” and, after discussing how in their opinion the ICJ has done little to clarify countermeasure proportionality requirements, say simply, “[p]roportionality in the law of countermeasures is best understood as a prohibition against excesses rather than a requirement for equivalence or mathematical equity.”<sup>156</sup> Omer Elagab takes it further and appears to cast doubt on the necessity of an injury-centric focus at all in some situations, saying,

[W]hen the underlying motivation for counter-measures is to induce a defaulting party to reach an expedited settlement, the measures involved can be maintained in an asymmetrical ratio to the breach. Such a position is justified by the need to nudge the defaulting party to perform its obligation or to agree to third party settlement procedure. As regards the scope of the permissible measures, when the motivation is a speedy settlement, it is clear from what has been said so far that the action taken may go beyond reciprocity.<sup>157</sup>

Yet, despite commentaries such as those above, the mainstream view of countermeasures proportionality remains that they must be injury-centric. Countermeasures’ focus on injury suffered may be surprising when considering that the purpose of countermeasures is to make the offending state comply with its obligations and to gain reparations for the victim state.<sup>158</sup> To limit countermeasures to injury-centric proportionality thus may be seen as cutting against the very purpose of countermeasures. As Enzo Cannizzaro states, under the injury-centric approach, “reaction to wrongful conduct tends to coincide with private revenge and appears only indirectly, by means of dissuasion, to produce compliance.”<sup>159</sup> Roger O’Keefe has observed that the historical basis for this may be the fact that countermeasures were originally intended to be commensurate with the injury suffered because they were seen as a way of reclaiming the “debt” owed to the state by virtue of the wrongful act taken against it.<sup>160</sup> To take more than what was “owed” to a state by way of its injury would therefore itself be a wrongful act. As the

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156. MICHAEL NEWTON & LARRY MAY, *PROPORTIONALITY IN INTERNATIONAL LAW* 185–86 (2014) [hereinafter NEWTON & MAY].

157. OMER YOUSIF ELAGAB, *THE LEGALITY OF NON-FORCIBLE COUNTER-MEASURES IN INTERNATIONAL LAW* 90 (1988).

158. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 49(1), art. 49 cmt. ¶¶ 1, 8.

159. Enzo Cannizzaro, *The Role of Proportionality in the Law of International Countermeasures*, 12 *EUR. J. INT’L L.* 889, 891 (2001).

160. O’Keefe, *supra* note 140, at 1159.

purpose of countermeasures evolved into stopping the precipitating act and obtaining reparations, the proportionality requirement retained its focus on injury suffered. As O’Keefe describes it, this continued injury-centric focus is now seen as an appropriate result of the desire to avoid inequitable results, to protect against abuse of the countermeasures remedy, and to avoid aggravating what will often be an already contentious international situation.<sup>161</sup>

Some factors do soften the injury-centric proportionality restriction. Article 51 of the Articles on State Responsibility says countermeasures are to be proportionate to the injury suffered, “taking into account the gravity of the internationally wrongful act and the rights in question.”<sup>162</sup> The ICJ has also made statements to the same effect.<sup>163</sup> This approach to injury, which goes beyond a mere ledger-type accounting of what harm was inflicted, is often referred to as taking into account both the quantitative and the qualitative characteristics of the injury.<sup>164</sup> The “rights in question” part of the qualitative factors analysis, as the commentary to Article 51 describes, “has a broad meaning, and includes not only the effect of a wrongful act on the injured State but also on the rights of the responsible State. Furthermore, the position of other States which may be affected may also be taken into consideration.”<sup>165</sup>

Of note, the peaceful uses nature of space<sup>166</sup> and the international community’s right to the free use and exploration of space<sup>167</sup> could have a potentially significant, though difficult to assess, impact on the qualitative portion of a wrongful interference countermeasures analysis. The importance of the peaceful uses and free exploration and use principles may be amplified further if, as the commentary to the Articles on State Responsibility says, “the position of other States which may be affected may also be taken into consideration.”<sup>168</sup> In a national security satellite interference scenario, one can argue that the position

161. *Id.* at 1160.

162. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 51.

163. *Hung. v. Slov.*, 1997 I.C.J. ¶ 85 (“the effects of a countermeasure must be commensurate with the injury suffered, taking account of the rights in question”).

164. *See, e.g.*, ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, cmt. to art. 51, ¶¶ 4-6; Int’l Law Comm’n, *Fourth rep. on State responsibility*, by Mr. Gaetano Arangio-Ruiz, *Special Rapporteur*, ¶¶ 55-56, U.N. Doc. A/CN.4/444 and Add.1-3 (May 12 and 25 and June 1 and 17, 1992) [hereinafter *Fourth Report*]; O’Keefe, *supra* note 140, at 1160-65.

165. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 51 cmt. ¶ 6.

166. *See generally* Outer Space Treaty, *supra* note 78, pmb., arts. III, IV; Moon Agreement, *supra* note 127, art. 3(1).

167. *See generally* Outer Space Treaty, *supra* note 78, pmb., art. I; Moon Agreement, *supra* note 127, art. 4(1).

168. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 51 cmt. ¶ 6.

of other states would be effected vis-à-vis peaceful uses because all spacefaring states, if not all states in general, have an interest in keeping the outer space environment peaceful and therefore less of a threat to international stability. Regarding free exploration and use, while few if any states would be directly negatively impacted by interference with another state's national security satellites, the international community would still suffer by having the arguably *erga omnes* obligation of free exploration and use weakened by another state's unchecked satellite interference activities.<sup>169</sup>

Though these broad qualitative factors soften the hard edges of an injury-centric proportionality analysis, they also run the risk of being so indistinct as to not provide meaningful guidance to states trying to keep their countermeasures lawful. Those factors, along with the ICJ's acknowledgment that proportionality "can at best be accomplished by approximation,"<sup>170</sup> make it difficult, especially in an ongoing operational environment, for victim states to accurately assess how expansive of a view they can take of injury. For other states, the temptation may be the opposite: instead of feeling restrained by the ambiguities of the various qualitative factors, they may feel empowered to stretch injury and its significance to the limits of credulity.

Even if a victim state arrives at an honest and accurate assessment of the qualitative and quantitative injury inflicted by the offending state's wrongful acts, the majority view remains that the victim state's response cannot exceed that injury suffered, even if the response is clearly inadequate to convince the offending state to halt its wrongful actions.<sup>171</sup> This can in essence create two response gaps that build upon each other. First is a proportionality gap whereby the victim state may only respond to the level of injury suffered but not to the level needed to actually effectuate the countermeasure and stop the wrongful activity.

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169. Regarding free exploration and use as an *erga omnes* obligation, see LACHS, *supra* note 122, at 43 ("All countries are beneficiaries of the [free use/exploration and other] rights thus laid down.").

170. *Air Service Agreement*, *supra* note 100, at 443–44.

171. For a critical look at how the ILC crafted Article 51, see Bederman, *supra* note 112, at 820–22 (critiquing the ILC's proportionality summation in Article 51 and its commentary for, among other things, changing the proportionality burden from a negative restraint to a positive duty such that states must ensure their countermeasures are proportionate instead of ensuring they are not disproportionate). The focus on injury is less problematic in situations such as trade agreements, where states can take carefully considered countermeasures and know that they can take their case to a tribunal or other such body if their countermeasures do not get a satisfactory response. That is not the case in outer space, however, where costs may mount quickly and, if not tempered, the hostile acts may boil over into armed attack and self-defense.

This is then compounded by a use of force gap whereby the victim state may find itself the victim of force but be unable to respond with force as discussed below.

*d. Non-Forceful*

Even when a state crafts a proportionate countermeasure, most commentators agree the victim state may not exercise that countermeasure if it constitutes a use of force.<sup>172</sup> This is the case even if the offending state is using force.<sup>173</sup> Thus, victim states potentially find themselves hamstrung both by the fact that their countermeasures must be proportional to the injury even if that renders the countermeasure insufficient to halt the precipitating act and by the fact that they are prohibited from responding to a use of force with action in kind.

Derek Bowett states this response gap has created a “credibility gap,” manifest primarily in various Middle Eastern conflicts, because of a “divergence between the norm and the actual practice of states.”<sup>174</sup> Indeed, when states are faced with unlawful forceful actions taken against them, many states will eventually feel compelled to respond with similar force. This is the case especially in instances where the wrongful behavior is being repeated or otherwise continuing with no indication it will cease, or in environments where the effects of the wrongful behavior can be easily escalated or magnified with little to no warning, or where the targeted asset performs key functions for the state users. All these factors can apply in a national security satellite interference scenario.

It is difficult to predict if, when, and how states will determine they need to respond to force with force. For his part, Michael Schmitt believes the current response gap will ultimately compel states to either adopt the minority view expressed by Judge Simma in his separate *Oil Platforms* opinion that states in fact *are* allowed to use force below armed

172. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 50(1)(a); *Corfu Channel*, 1949 I.C.J. 35; Bowett, *supra* note 41, at 219 (“[f]ew propositions about international law have enjoyed more support than the proposition that, under the Charter of the United Nations, the use of force by way of reprisals is illegal”); see *Nicar. v. U.S.*, 1986 I.C.J. ¶ 249; see also discussion *supra* in Section II.C.3.e.

173. This is the majority view. However, there is a minority view, expressed perhaps most famously by Judge Simma in his separate *Oil Platforms* opinion, that victim states may respond to force that falls below armed attack with forceful countermeasures that also fall below armed attack, being also “bound to necessity, proportionality, and immediacy in time in a particularly strict way.” *Iran v. U.S.*, 2003 I.C.J. at 332–33 (separate opinion by Simma, J.). This general view will be discussed more in Section IV in the context of defensive counteractions.

174. Bowett, *supra* note 41, at 219.

attack to respond to force below an armed attack, or adopt the U.S. position that use of force and armed attack occupy the same space such that any time force is used, an armed attack has automatically occurred as well.<sup>175</sup> Regardless of how the departure from the majority view comes about, it stands to reason that if states are not able to satisfactorily mitigate their national security satellite vulnerabilities, they will feel compelled to protect their assets by using force if force is used against them and is necessary to stop the precipitating activity.

Compounding the response gap problem, ambiguities of how use of force and armed attacks are characterized in a technological environment make it such that a state will not necessarily know when it has crossed the line into a use of force or armed attack. Thus, under the response gap, a state would not be able to confidently respond to an offending state's wrongful action with the exact same action since, if the offending state's act was indeed a use of force, the victim state would commit an internationally wrongful act by replicating it. Not knowing when one has crossed the line into force or armed attack therefore presents a difficult scenario for states.

Though this Article does not seek to define force or armed attack in outer space, some discussion of the topic will highlight how its ambiguous nature argues for the defensive counteractions concept set forth in Section IV. It can be easily accepted that acts that would constitute use of force or armed attack on earth would also constitute the same in outer space. For instance, Freeland and Maogoto assert that "the laser blinding of satellites and certainly the deployment of hyper-velocity kinetic weapons" would constitute armed attacks,<sup>176</sup> but state that "[o]f even more technical and legal uncertainty is the question of whether detonations in an orbital plane that generate Electro-Magnetic Pulse (EMP) or Van Allen radiation belts that impair the operation of satellites of a third state would constitute an armed attack."<sup>177</sup> Other

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175. Schmitt, *supra* note 68, at 731–32.

176. A better view is that the two example attacks would certainly constitute uses of force but that a determination of armed attack would need to take into account additional details as to the scale and effects of the hostile act that are not provided in Freeland and Maogoto's example. The armed attack threshold test is also commonly phrased in terms of scope, duration, and intensity of the hostile act. Matthew J. Sklerov, *Solving the Dilemma of State Responses to Cyberattacks: A Justification for the Use of Active Defenses Against States Who Neglect Their Duty to Prevent*, 201 MIL. L. REV. 1, 51–52 (2009) (referencing THE GENEVA CONVENTIONS OF 12 AUGUST 1949: COMMENTARY, VOL. IV, 17–21 (Jean S Pictet ed., 1958)) [hereinafter Sklerov]. This difference in opinion with Freeland and Maogoto, however, depends on scale and effects, not whether the hostile act takes place on earth or in outer space.

177. Maogoto & Freeland, *supra* note 60, at 1114.



scholars take a perhaps more conservative approach in outer space, raising the question of whether any hostile activity that does not have kinetic results, even when repeated multiple times, can be an armed attack.<sup>178</sup> What is clear is that the response gap previously discussed is compounded by the fact that even states seeking to stay below the use of force threshold may not know if they have been successful until the ICJ or some other body makes an ex post facto determination that the victim state, in attempting to defend itself from wrongful acts, committed one itself. This puts states in a precarious position. It is important, then, to create a legal structure that enables states to address the emerging challenges of outer space security in a way that promotes international peace and security.

It is apparent that countermeasures, while currently the most useful *lex lata* response for states experiencing internationally wrongful interference with their national security satellites, come with restrictions whose difficulties are amplified in outer space. The time restrictions and reversibility requirement are relatively minor hindrances to the effective use of countermeasures in space, and injury-centric proportionality and the use of force gap create significant hurdles. These problems, combined with the uncertain question of where use of force or armed attack in outer space even begin, create legal uncertainty with potentially significant results. These difficulties and ambiguities in the countermeasures regime illustrate the fact that states need a framework that allows them to lawfully respond in an effective way. Other broader factors generally unique to outer space also argue for the recognition of defensive counteractions in outer space and are addressed next.

### B. Policy-Based Reasons for Updating the Regime

This Article asserts that two prominent outer space characteristics help compel the recognition of defensive counteractions: the technological nature and the peaceful nature of outer space. These can be called foundational factors because they are key influencers in how outer space operates and is utilized, and because they are broad but key concepts that provide a theoretical underpinning for defensive counteractions. In addition to the foundational factors, there are also more pragmatic influencing factors that do not necessitate defensive counteractions in and of themselves, but that nevertheless support the

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178. RAM JAKHU, CASSANDRA STEER & KUAN-WEI DAVID CHEN, CONFLICTS IN SPACE AND THE RULE OF LAW 8 (2016).



## CONFLICT ON THE FINAL FRONTIER

creation of a defensive counteractions framework and influence what it should look like. This Article turns first to the foundational factors.

### 1. Foundational Factors

#### *a. Technological Nature of Outer Space*

The technology-driven nature of outer space presents a new challenge: to reshape and adapt traditional laws of conflict to an operating environment where it is possible to cripple a state's space systems through purely non-kinetic means.<sup>179</sup> While the drafters of the Charter worked in a world of bullets and bombs, today's practitioners work in a world that still has bullets and bombs but has also added cyberattacks and particle-beam weapons to the mix. In many ways, Japanese Zeros have been replaced by cyber 1's and 0's, and the legal regime is struggling to catch up.

Freeland and Maogoto are two of many scholars to note the strain the technological nature of space has placed on the U.N. Charter regime governing the use of force, noting "significant advances in space technology—including the development of space weaponization systems—that have left the legal principles lagging behind."<sup>180</sup> Maogoto summarizes the problem in *Technology and the Law on the Use of Force*, saying,

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179. For examples of this ability, see the technical discussion in Section I.B.2.b.

180. Maogoto & Freeland, *supra* note 60, at 1118; *see also* Steven Freeland, *In Heaven as on Earth? The International Legal Regulation of the Military Use of Outer Space*, 8 US-CHINA L.REV. 272, 276 (2011) (saying the international legal and regulatory regime's failure to keep pace with technological developments in outer space "represents a major challenge in relation to the ongoing development of effective legal principles, all the more in view of the strategic and military potential of outer space in an era of globalization."); JACKSON NYAMUYA MAOGOTO, *TECHNOLOGY AND THE LAW ON THE USE OF FORCE: NEW SECURITY CHALLENGES IN THE TWENTY FIRST CENTURY* 4, 28 (2015) (observing the U.N. Charter regime on use of force "leaves room for ambiguities" due to the fact that "its focus at founding was kinetic force [physical destruction] and not non-kinetic force [electronic intrusions]," and also noting on page 28 that "[t]he unique nature of the threat and the ability for militarization and weaponisation of outer and cyber spaces to inflict physical and non-physical injury through space and time strains traditional definitions of the use of force.") [hereinafter MAOGOTO]; Nina Tannenwald, *Law Versus Power on the High Frontier: The Case for a Rule-Based Regime for Outer Space*, 29 YALE J. INT'L L. 363, 363–64 (2004) ("The legal regime that guides commercial, military, and scientific activities in space is fragmented and increasingly inadequate to meet the challenges posed by the growing number of actors seeking to exploit space."); Jakhu, Steer, and Chen, *supra* note 180, at 17 ("[D]evelopments in technology and the range of activities that are taking place in outer space are far outpacing the laws that are currently in place.").

The peculiarity and challenge of [outer space and cyber space] is that they tend to defy and cut across standard boundaries/jurisdictions and distinctions between war and peace, civilian and military responses and ultimately legal and illegal. This means that events or activities in outer and cyber spaces cause legal consequences, which are often not captured in the bright line distinctions of classical statist defined military applications and processes.<sup>181</sup>

By way of analogous illustration, Thomas Franck discusses the history of anticipatory self-defense in his book *Recourse to Force* and argues the drafters of the U.N. Charter were unable to anticipate how technological developments such as “nuclear warheads and long range rocketry” would render the regime’s original intended approach to self-defense inadequate.<sup>182</sup> How much more is the legal regime challenged and rendered inadequate, now that satellites critical to national security can be rendered inoperable more quickly than a rocket can be launched from one continent to another, with less warning, and with the added difficulty of attributing the attack to a state actor?

The speed, ease, and relatively low financial and logistical cost of an attack on satellites renders them particularly vulnerable, and the key role national security satellites play in a state’s affairs renders them particularly valuable. When those factors are combined with the ambiguity

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181. MAOGOTO, *supra* note 180, at 3.

182. FRANCK, *supra* note 56, at 50. Franck references a revealing exchange between members of the American delegation to the San Francisco Conference whereby one delegate asked the U.S. State Department’s legal advisor whether the Charter would allow for anticipatory self-defense if a foreign fleet had set sail to attack U.S. territory. The legal advisor responded that the U.N. Charter intentionally precludes anticipatory self-defense in such a scenario but that the U.S. could send its own fleet to be ready to launch a counterattack immediately after the foreign fleet had begun its own attack. Franck notes the U.N. Charter regime ultimately had to adapt through state practice to anticipatory self-defense. *Id.* at 50 (citing U.S. Delegation, *Minutes of the Forty-Eighth Meeting (Executive Session), of the United States Delegation, Held at San Francisco, Sunday, May 20, 1945, 12 Noon*, in FOREIGN RELATIONS OF THE UNITED STATES: DIPLOMATIC PAPERS, 1945, GENERAL: THE UNITED NATIONS, VOL. I 813, 818 (Velma Hastings Cassidy, Ralph R. Goodwin, & George H. Dengler eds., 1967); also citing U.S. Delegation, *Minutes of the Thirty-Eighth Meeting of the United States Delegation, Held at San Francisco, Monday, May 14, 1945, 9:05 a.m.*, in CASSIDY, *supra* at 709). Similarly regarding the Outer Space Treaty, one official involved with the drafting of the Outer Space Treaty has said, “one can say that the outer space treaty was agreed upon and adopted at a time when many of the scientific and technological activities, and in particular the military or military-support activities, were not known, except to a few space scientists and perhaps to futurists. . . .” A.H. Abdel-Ghani, *The United Nations and Outer Space: Some Observations*, in MAINTAINING OUTER SPACE FOR PEACEFUL USES: PROCEEDINGS OF A SYMPOSIUM HELD IN THE HAGUE, MARCH 1984 54, 55 (Nandasiri Jasentuliyana ed., 1984).

technology introduces into use of force and armed attack response legal analyses, the situation calls for the law to modernize and adapt. The peaceful nature of outer space, to which this Article turns next, also informs the question of whether the legal regime in space can continue as it is, or, whether it must adapt.

*b. Peaceful Nature of Outer Space*

It is important to note at the outset that the peaceful nature of outer space is not as all-encompassing as sometimes thought. While the preamble to the Outer Space Treaty exhorts and seeks to promote the “common interest of all mankind” in the “exploration and use of outer space for peaceful purposes,”<sup>183</sup> the only article that specifically reserves a portion of outer space for peaceful purposes is Article IV, which prohibits placing certain weapons into orbit around the earth and which dictates that the moon and other celestial bodies may only be used for peaceful purposes.<sup>184</sup> Thus, while the preamble is informative for the overall tenor of the Outer Space Treaty and must be taken into account for purposes of *pacta sunt servanda*,<sup>185</sup> its exhortation of peaceful uses of space does not expand any concrete “peaceful purposes” requirements beyond the moon and other celestial bodies.<sup>186</sup> The same is true for the Moon Agreement, except it omits references to peaceful purposes in its preamble (though it does refer to preventing the moon from “becoming an area of international conflict.”)<sup>187</sup>

Setting aside the question of what peaceful purposes means when applied specifically to the moon and other celestial bodies,<sup>188</sup> there is

183. Outer Space Treaty, *supra* note 78, preamble.

184. *Id.*, art. IV.

185. 1969 Vienna Convention, *supra* note 69, 1155 U.N.T.S. arts. 26, 31.

186. See also G.S. Raju, *Military Use of Outer Space: Towards Better Legal Controls*, in MAINTAINING OUTER SPACE FOR PEACEFUL USES: PROCEEDINGS OF A SYMPOSIUM HELD IN THE HAGUE 90, 91 (Nandasiri Jasentuliyana ed., 1984) (“[States may] use outer space, excluding the Moon and other celestial bodies, for purposes that may not be regarded as peaceful. This provision was designed to permit states to carry on many activities of a military nature, such as the use of reconnaissance and surveillance satellites for military purposes.”).

187. Moon Agreement, *supra* note 127, pmb., art. 3.

188. The peaceful purposes question is a long ongoing debate that focuses largely on whether the peaceful purposes language of the Outer Space Treaty and the Moon Agreement prohibit military use of the celestial bodies entirely or whether they simply prohibit “aggressive” use of the celestial bodies. For a reasoned discussion and analysis of the debate, see Bin Cheng, *The Legal Status of Outer Space and Relevant Issues: Delimitation of Outer Space and Definition of Peaceful Use*, 11 J. SPACE L. 89, 98–105 (1983). See also Carl Q. Christol, *The Common Interest in the Exploration, Use and Exploitation of Outer Space for Peaceful Purposes: The Soviet-American Dilemma*, 18 AKRON L. REV. 193, 195–99 (1984); Ramey, *supra* note 55, at 78–82; Kai-Uwe Schrogl & Julia Neumann, *Article IV*, in 1

still enough discussion in the international instruments to support the notion that the broad international community desires outer space to be a place for peace. The preamble to the Outer Space Treaty asserts that all mankind has a common interest in peaceful use and exploration of outer space,<sup>189</sup> and similar assertions are made in the preambles to the Rescue and Return Agreement,<sup>190</sup> the Liability Convention,<sup>191</sup> and the Registration Convention.<sup>192</sup> More persuasively, since it comes in the form of an affirmative obligation in the main body of the Outer Space Treaty, Article IX of the Outer Space Treaty grants special protections to states while using outer space for peaceful exploration and use.<sup>193</sup> Thus the international community has asserted a special interest in the exploration and use of all outer space for peaceful purposes, though the most well-defined restrictions concern prohibiting certain orbital weapons and protecting the moon and other celestial bodies.

The peaceful nature of outer space can be viewed in at least two ways as it relates to defensive counteractions. One approach is to view anything that provides an avenue for intensified conflict, such as could be the case with defensive counteractions, as violating the spirit of the peaceful nature of outer space that the international outer space instruments seek to protect. This is a reasonable view, but it relies too much on ideal state conduct at the expense of being prepared for actual state conduct, which will be discussed below.

Alternately, the peaceful nature of outer space can be seen as placing a peacefulness ordinance on outer space. Like a city ordinance that imposes stricter rules than that of the surrounding area, outer space's peacefulness ordinance imposes expectations of peacefulness that do not apply to earth. The result of the peacefulness ordinance is stricter policing of violations of that peacefulness. Thus, if one state wrongfully

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COLOGNE COMMENTARY ON SPACE LAW: IN THREE VOLUMES 70, 71–93 (Stephan Hobe et al. eds., 2009). Note that while the peaceful purposes concept employed with regard to the moon and other celestial bodies is uncommon in international law, there are close analogies to the Antarctic Treaty, which served as a reference in the drafting of the Outer Space Treaty. CHENG, *supra* note 13, at 518–19.

189. Outer Space Treaty, *supra* note 78, preamble.

190. Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space preamble, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119.

191. Convention on the International Liability for Damage Caused by Space Objects, preamble, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187.

192. Convention on the Registration of Objects Launched into Outer Space, preamble, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15.

193. Outer Space Treaty, *supra* note 78, art. IX (requiring states whose space activities might harmfully interfere with the activities of states engaging in “peaceful exploration and use of outer space” to first consult with the other State before initiating potentially harmful activities).

interferes with another state's legitimate peaceful free use of outer space, the victim state and the international space community have a strong interest in halting that internationally wrongful conduct without further escalation.<sup>194</sup> With the only available quick response coming in the form of countermeasures, which are restricted by injury-centric proportionality and a use of force response gap, the victim state and the international space community may find it difficult to enforce the peacefulness ordinance. Thus, defensive counteractions allow for the effective response for which victim states will be looking, and defensive counteractions can also act as a final barrier protecting the threshold of armed attack, giving states one more method of restoring peace to outer space.<sup>195</sup> This, along with the fear of escalation and the need to avoid it, brings this Article to the pragmatic "influencing factors" that also call for a defensive counteractions construct.

## 2. Pragmatic Influencing Factors

Beyond the legal restrictions in the current regime and the foundational factors discussed above, realpolitik factors should also be considered. While realpolitik must not persuade the international community to take up an otherwise unlawful action, it should be allowed to shape a new lawful approach and, if necessary, be used to help convince the international community that the new approach should be taken at all.

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194. For a similar assertion, see Department of Defense, DEPARTMENT OF DEFENSE DIRECTIVE 3100.10: SPACE POLICY, OCTOBER 18, 2012 (INCORPORATING 4 NOVEMBER 2016 CHANGES) 4.b ("It is DoD policy that: . . . The sustainability and stability of the space environment, as well as free access to and use of space, are vital to U.S. national interests. Purposeful interference with U.S. space systems, including their supporting infrastructure, will be considered an infringement of U.S. rights").

195. The discussion of the peaceful nature of outer space and its influence on defensive counteractions may bring to mind contextualist arguments by those such as Michael Reisman, who argues the legality of force should depend on whether the use of force promotes or detracts from international world order. In Reisman's words, "The critical question, in a decentralized international security system such as ours, is not whether coercion has been applied but whether it has been applied in support of or against community order and basic policies, and whether it has been applied in ways whose net consequences include increased congruence with community goals and minimum order." W. Michael Reisman, *Criteria for the Lawful Use of Force in International Law*, 10 YALE J. INT'L L. 5, 284 (1985). That contextualist approach can be seen as complementing defensive counteractions' invocation of the peaceful nature of outer space, though it is important to note that Reisman's approach relies on more amorphous considerations of community and international order than does the peaceful nature of outer space. While the exact contours and legal implications of the outer space regime's peacefulness requirements are frequently debated, the debate nevertheless centers on objective and specific texts in specific international instruments rather than on broad and malleable ideas of community and cooperation.

For these reasons, this Article refers to the following factors as influencing factors—factors that help shape defensive counteractions and provide additional support for them, but do not alone justify a new approach.

*a. State Pressure to Find Armed Attack*

First among these influencing factors is the fact that states, if they believe their national security assets are being compromised too much and they have no effective response, will come under pressure to declare they have fallen victim to an armed attack and are thus entitled to exercise their Article 51 right to self-defense,<sup>196</sup> which will open up avenues of attack much wider in scope and greater in intensity and effects than those which would be permitted under the defensive counteractions concept proposed in Section IV. The pressure may be especially great given the prominent role outer space and national security satellites have assumed, not just in space activities but in terrestrial activities as well. Even in 1986, before the first Gulf War, which has been often called the first “space war” due to its reliance on satellite capabilities, it was observed that “reliance on space communications by the military has reached enormous proportions and, therefore, satellites have become prime targets for attack.”<sup>197</sup> More recently, Jackson Maogoto referred to the gathering, synthesis, and distribution of information, to which satellites are integral, as “a crucial nexus in the integration of sea-based, air-based, and land-based resources into one battleground platform.”<sup>198</sup> He further observed that information gathering and synthesis capabilities (and, by extension, satellites) “are now central to the planning and execution of military operations as a force multiplier that aids preservation of military superiority and advantage across a broad variety of military operations.”<sup>199</sup> It is difficult to overstate the importance of national security satellites to the military and intelligence activities of states with those assets. They have become vital to the security of many space states in a modern world.

It can be expected, then, that states will exert great effort to protect their national security satellites and in times of tension determine that interference is in fact an armed attack granting the victim state the

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196. U.N. Charter, *supra* note 10, art. 51.

197. HURWITZ, *supra* note 20, at 136.

198. MAOGOTO, *supra* note 180, at 2.

199. *Id.*

right to self-defense.<sup>200</sup> Depending on the reality of the precipitating act, this determination would come at the expense of the law, the facts, or both, which may be distorted so the victim state can arrive at what it believes to be a pragmatically necessary conclusion.<sup>201</sup> An armed attack “classification” would of course be new only in the fact that it takes place in outer space since, as Cassese has observed, there is no shortage of past instances where states have used force against another state and “tried to justify their action by relying upon (and abusing) Article 51 [of the U.N. Charter].”<sup>202</sup> Yet, if the legal regime is adapted to meet and directly address the modern difficulties and factual scenarios outer space presents, the international community will increase the likelihood that it can contain and direct victim state responses. It will also increase the predictability of those responses by reducing ambiguities in the law, thereby giving states less room to engage in classification.<sup>203</sup>

*b. Deterrent Effect*

Additionally, a wider range of options provides a stronger deterrent effect, which can thereby decrease the chance of wrongful interference occurring in the first place.<sup>204</sup> To the extent defensive counteractions

200. For the possibility of finding armed attack in an other non-traditional hostile act, namely economic aggression, see the discussion by Paul Stephen Dempsey, *Economic Aggression & Self-Defense in International Law: The Arab Oil Weapon and Alternative American Responses Thereto*, 9 CASE W. RES. J. INT'L L. 253, 306–14 (1977).

201. Additionally, it has been proposed that under the “pin-prick” theory of armed attack, a series of hostile acts below armed attack may cumulatively amount to an actual armed attack. ROSCINI, *supra* note 115, at 108 (discussing the pin-prick theory and listing examples of when it has been adopted); see also YORAM DINSTEIN, *WAR, AGGRESSION, AND SELF-DEFENCE* 547 (5th ed. 2012) (citing *Nicar. v. U.S.*, 1986 I.C.J. ¶ 120); *Iran v. U.S.*, 2003 I.C.J. ¶ 64; *Armed Activities on the Territory of the Congo (Dem. Rep. Congo v. Uganda)*, Judgment, 2005 I.C.J. 168, 223 (Dec. 19); TOM RUIJS, “ARMED ATTACK” AND ARTICLE 51 OF THE UN CHARTER: EVOLUTIONS IN CUSTOMARY LAW AND PRACTICE 174 (2010); HEATHER DINNISS, *CYBER WARFARE AND THE LAWS OF WAR* 93–95 (2012). If the theory were to be accepted, a victim State would not need to disingenuously assert armed attack if the cumulative effects of the hostile acts amounted to an armed attack. The acceptance of a pin-prick theory of armed attack would further argue for the international community accepting a defensive counteractions concept that would allow victim states to bring the pin-pricks to a halt before they cumulatively amounted to an armed attack that justified full self-defense.

202. Antonio Cassese, *Ex Iniuria Ius Oritur: Are We Moving towards International Legitimation of Forcible Humanitarian Countermeasures in the World Community?*, 10 EUR. J. INT'L L. 23, 24 (1999).

203. See generally Sean D. Murphy, *The Doctrine of Preemptive Self-Defense*, 50 VILL. L. REV. 699, 704–05 (2005) (implying clear legal guidelines in international law can increase the predictability of state actions).

204. See Kesan & Hayes, *supra* note 66, at 525 (making a similar argument regarding the right to self-defense).



eliminate the use of force response gap and other problems inherent in applying countermeasures to satellite defense, offending states will be deterred by the knowledge that there no longer exists a “sweet spot” of ambiguity and legal deficiency where they can wrongfully interfere with victim state satellites, knowing their victims are prohibited from responding with a commensurate act. If offending states know their wrongful interference may be met with a response unrestrained by the full list of traditional countermeasures requirements, it follows that offending states will tend to show more restraint. Similarly, “[t]he greater the range and scope of possible responses, assuming they are properly and wisely employed, the less likely a situation involving international tension is to deteriorate further.”<sup>205</sup> Defensive counteractions not only produce a deterrent effect, but also place another tool in the toolbox of victim states wishing to stop wrongful satellite interference without resorting to full self-defense.

*c. Harmful Response Gap*

Finally, as has already been largely addressed earlier in this section, the response gaps that exist between countermeasures and self-defense, especially regarding proportionality and use of force, harm victim states that act under the law and that do not distort law or facts to justify stronger responses to wrongful interference. This places a heavy burden on those states that follow the current deficient regime in good faith. As Thomas Franck noted, “[w]hen law permits or even requires behavior that is widely held to be unfair, immoral, or unjust, it is not only persons but also the law that suffers. So, too, if law prohibits that which is widely believed to be just and moral. Consequently, it is in the law’s self-interest to serve the bridging function.”<sup>206</sup> Offending states should not be allowed to leverage the legal regime’s ambiguities and weaknesses at the expense of victim states trying to lawfully protect their national security satellites.

Thomas Franck wrote, almost fifty years ago, that “[m]odern warfare . . . tends. . . to proceed along two radically different lines, one too small and the other too large to be encompassed effectively by Article 51.”<sup>207</sup> It appears now that hostile acts not rising to the level of armed attack, taken against national security satellites, occupy a strange space where

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205. Schmitt, *supra* note 68, at 732 (referencing countermeasures as an alternative to self-defense).

206. FRANCK, *supra* note 56, at 178.

207. Thomas M. Franck, *Who Killed Article 2(4)? Or: Changing Norms Governing the use of Force by States*, 64 AM. J. INT’L L. 809, 812 (1970).

the acts themselves are too small to be encompassed by the current legal structure but the effects of those acts can surpass what the drafters of the legal structure likely ever considered. If their capabilities are sufficiently threatened, most states will defend what they deem to be their vital assets either by stretching the law and distorting the facts or by ignoring the law altogether. The international community, in response, should work to adapt the current legal regime in a way that will preserve the intent to protect peace and deescalate conflict, maintain the integrity of the system by avoiding self-interested loosening and stretching of definitions and facts, and provide modernized legal structure for states to act within. The international community must do this rather than insist, unsuccessfully, that victim states stay within old unworkable constraints, with the international community facing the unpredictable results that may follow when victim states refuse to do so. There needs to be a fix. For that, this Article turns to Section IV.

#### IV. THE PROPOSAL: DEFENSIVE COUNTERACTIONS

In response to a legal regime ill-fitted for conflict in outer space, this section proposes a middle ground, defensive counteractions, which would adapt self-help principles of international law to the unique technological and legal environment of outer space. This author acknowledges at the outset, and reminds the reader, that defensive counteractions lie squarely in the territory of *lex ferenda*. That said, one may find that the core principles of defensive counteractions already exist as minority views on countermeasures or self-defense, or may otherwise be resorted to in exceptional circumstances. Thus, in many ways defensive counteractions are not a wholly new concept, but are instead an amalgamation of existing exceptions and minority positions.

Even if one were to conclude all the components of defensive counteractions already exist in international law, defensive counteractions should still be recognized as a distinct concept. This is because, as components of defensive counteractions generally only exist in minority positions or exceptional circumstances, recognizing defensive counteractions as a distinct concept would reduce ambiguities for states wishing to avail themselves of their remedies without risking a violation of international law, and provide some restrictions that do not exist in countermeasures or self-defense but that will be helpful in avoiding escalation of conflict when the more permissive aspects of defensive counteractions are employed. For example, though defensive counteractions are permissive in that they allow states to use force in response

to force below armed attack, that right is restricted by insisting that such forceful responses may only target the actual instruments of interference, a restriction that exists in neither countermeasures nor self-defense.

Before transitioning into the details of defensive counteractions, it is appropriate to offer a brief sketch here. As described previously, defensive counteractions as envisioned in this Article will only apply during instances of attributable internationally wrongful interference with a victim State's single use (i.e., not dual civilian-military use) national security satellites. Additionally, the precipitating interference will not amount to an armed attack as that phrase is understood by most scholars in light of the *Nicaragua* case, since if it was an armed attack, the permissions and restrictions of self-defense would then apply instead. Additionally, while the international community could ultimately determine that defensive counteractions should apply to a broader range of scenarios than described here, this Article does not address that possibility.

Once the above requirements are met, defensive counteractions provide a response that allows force below armed attack in response to the same, restricted by objective-centric proportionality. Any defensive counteractions must target the interfering instrument (e.g., jamming device, etc.) as narrowly as reasonably possible and may include long-term disabling of that instrument in certain circumstances. Any defensive counteractions must meet requirements of necessity, proportionality, and immediacy, and they may not create space debris or otherwise create significant harmful interference with the peaceful use of outer space by third-party states. More detailed discussion of defensive counteractions will come later in this section. First, however, this section turns to a discussion of several concepts that are analogous to or otherwise provide helpful insight with respect to defensive counteractions, thus showing where defensive counteractions can fit in international jurisprudence. The second part of the section contains a detailed discussion of the defensive counteractions concept and its supporting rationales.

#### A. *Analogous and Informative Concepts*

The ideas proposed in the defensive counteractions construct, while unique when taken as a whole, also have analogies in other areas of the law. Part one discusses minority positions and exceptional circumstances that share some characteristics with defensive counteractions. Part

two discusses sovereignty in outer space and how sovereignty can be informative as a background consideration for defensive counteractions.

### 1. Minority Views

The minority views discussed here show that other scholarship has proposed ideas similar in certain ways to defensive counteractions. These views, while not shared by the majority, nevertheless illustrate that the concepts in defensive counteractions are not without precedent. One relevant minority view is Yoram Dinstein's "on-the-spot reaction[s]," which deserves examination for its similarities to defensive counteractions.<sup>208</sup> Dinstein adopts the view that one may use force both in countermeasures and in more time-constrained on-the-spot reactions.<sup>209</sup> Dinstein's on-the-spot reactions are similar to defensive counteractions in that they allow a forceful response to hostile acts that, under a majority analysis, would not constitute an armed attack and thus would not permit a responsive use of force.<sup>210</sup> Dinstein describes such responses as "the case in which a small-scale armed attack elicits at once, and *in situ*, the employment of counter-force by those under attack or present nearby."<sup>211</sup> Dinstein says on-the-spot reactions are restrained by traditional conditions of necessity, proportionality, and immediacy, and he especially emphasizes immediacy, since "the employment of counter-force [in on-the-spot reactions] must be temporally interwoven with the armed attack triggering it."<sup>212</sup> Furthermore, a "[g]enuine on-the-spot reaction closes the incident," and, while the offending state may respond to the victim state's reaction with force, "if the fighting fades away soon, the closed episode may still be reckoned as on-the-spot reaction."<sup>213</sup> The on-the-spot reaction must be in direct response to a precipitating hostile act, designed to make the hostile act stop, limited in level of force used, and occur either during or shortly

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208. DINSTEIN, *supra* note 201, at 242–44.

209. *Id.* at 242–55.

210. Dinstein does this by essentially lowering the armed attack threshold, criticizing the *Nicaragua* court's distinction between "a mere frontier incident" and an armed attack. *Id.* at 210–12.

211. *Id.* at 242. The reader should keep in mind that Dinstein's precipitating "small scale armed attack" is a hostile act that would not qualify as an armed attack under a majority analysis and would instead likely be considered a "mere frontier incident." *Id.* at 243. Dinstein states his position is supported by the assertions of commentators and the ICJ that ships may use force to respond to attacks from other ships, aircraft, or coastal batteries. *Id.* at 243–44 (citing BROWNLIE, *supra* note 61 at 305; *Corfu Channel*, 1949 I.C.J. 31).

212. DINSTEIN, *supra* note 201, at 244.

213. *Id.*

after the attack. In these ways, on-the-spot reactions are like defensive counteractions and provide a helpful comparison.

Another minority position is that the U.N. Security Council's relative ineffectiveness makes it such that force short of armed attack may be used when the U.N. regime can't or won't adequately address a persistent problem. One of the clearer descriptions of this view comes in the Fourth Report on State Responsibility from Gaetano Arangio-Ruiz, who ends up rejecting the view.<sup>214</sup> As Arangio-Ruiz describes it, the argument is that the U.N. Security Council has failed to implement Articles 42-47 of the Charter, which provide for the Security Council to assemble an armed force and take forceful action "by air, sea, or land forces as may be necessary to maintain or restore international peace and security."<sup>215</sup> Since the Security Council has failed to implement those Articles, states are therefore entitled to use force in some situations other than self-defense.<sup>216</sup> The opinions on when force could be used outside self-defense vary, though Arangio-Ruiz asserts the only potentially viable option would be as an expansion of self-defense employing force in certain "grave emergency situations."<sup>217</sup>

Thomas Franck has noted a similar argument, saying that state practice and ideas of justness make it such that forceful action may be used to respond to hostile acts less than armed attack "in circumstances not anticipated by drafters of the Charter."<sup>218</sup> According to Franck, the unanticipated circumstances could explicitly include "the failure of the UN system to redress an egregious wrong recognized as such by international law."<sup>219</sup> Franck goes on, saying, "[p]rotracted failure may give rise to a limited right of self-help on the part of a *bona fide* injured party, even when the injury does not rise to the threshold of an 'armed attack.'"<sup>220</sup> Similarly, Richard Lillich says some "sanctions that were built into the United Nations Charter,

214. *Fourth Report*, *supra* note 164, ¶¶ 62-69 (with special emphasis ¶ 62).

215. U.N. Charter, *supra* note 10, art. 42. Some commentators have questioned whether the specification of "air, sea, or land forces" and "operations by air, sea, or land," excludes U.N. Security Council action in outer space. Ricky J. Lee, *The Jus Ad Bellum In Spatialis: The Exact Content and Practical Implications of the Law on the Use of Force in Outer Space*, 29 J. SPACE L. 93, 109-10 (2003) (describing how some believe this excludes outer space action while others disagree, and concluding that "consistent and uniform practice by States on the Security Council" can alter any Article 42 restrictions and grant the Security Council the authority to initiate forceful actions in outer space).

216. *Fourth Report*, *supra* note 164, ¶ 62.

217. *Id.*

218. *See id.* ¶¶ 110-12; FRANCK, *supra* note 56, at 112.

219. FRANCK, *supra* note 56, at 112.

220. *Id.*

or were to be implemented through the United Nations Charter, have not actually been implemented. The charter is not wholly effective.”<sup>221</sup> Thus, he states, the international community should “consider whether, in effect, some of these previous precharter doctrines [such as forceful countermeasures] could not be revised.”<sup>222</sup> Though he admits it is a minority position, Lillich appears to believe when the U.N. “either cannot act or refuses to act in a given situation,”<sup>223</sup> there should be room for limited forcible reprisals beyond what is currently permitted in international law.<sup>224</sup> In the sense that this minority position asserts force below armed attack should be allowed when the existing legal regime is unable or unwilling to keep the peace, it too is similar to defensive counteractions and provides helpful context.

## 2. Sovereignty and National Security Satellites

When considering defensive counteractions, one should note that the entire interference and response discussion takes place against a backdrop of sovereignty and a state’s right to protect its sovereignty. While sovereignty does not create rights that did not already exist in a satellite interference scenario, it highlights the importance of the matter. Sovereignty is a foundational concept of international law and, as noted in the *Island of Palmas* arbitration, “signifies independence. Independence in regard to a portion of the globe is the right to exercise therein, to the exclusion of any other State, the functions of a State.”<sup>225</sup> Assuming national security satellites launched into outer space retain the sovereignty of their launching state,<sup>226</sup> and depending

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221. Richard B. Lillich, *Forcible Self-Help under International Law*, 62 in U.S. NAVAL WAR COLLEGE INTERNATIONAL LAW STUDIES: READINGS IN INTERNATIONAL LAW FROM THE NAVAL WAR COLLEGE REVIEW 1947-1977 129, 130 (1980).

222. *Id.* at 130.

223. *Id.* at 132.

224. *Id.* at 133.

225. *Island of Palmas (U.S. v. Neth.)*, 2 R. Int’l Arb. Awards 829, 838 (Perm. Ct. Arb.1928).

226. The sovereign status of satellites is not completely clear, though it makes sense for national security satellites in outer space, which remain under the jurisdiction and control of their launching states, to have sovereign status similar to a State’s vessel on the high seas. Christopher Petras offers a good analysis of whether states exercise sovereignty over satellites registered in their name in his article, “The Use of Force in Response to Cyber-Attack on Commercial Space Systems—Reexamining ‘Self-Defense’ in Outer Space in Light of the Convergence of U.S. Military and Commercial Space Activities.” Petras, *supra* note 12, at 1255–56. Robert Ramey, in a footnote, also discusses satellite sovereignty. He does not come to a firm conclusion, and says “the question may become acute as the prospect of military confrontation in space increases,” but his analysis of the relevant law indicates states would most likely retain sovereignty over their satellites. Ramey, *supra* note 55, at 143–44 n. 611. *See also* Mountin, *supra*

on the kind of interference a satellite suffers, it is possible that satellite interference could constitute a violation of national sovereignty. For instance, laser interference that damages a reconnaissance satellite's optical instruments may be considered a violation of the victim state's sovereignty since physical damage was inflicted upon a sovereign asset.<sup>227</sup> By way of cyber analogy, Michael Schmitt has written that "interference with cyber infrastructure aboard a sovereign platform is . . . a violation of the respective State's sovereignty no matter where the platform is located."<sup>228</sup> Schmitt also notes "[s]ome international law experts take the position that sovereignty can at times be violated when no damage results, as in the case of emplacement of malware designed to monitor a system's activities."<sup>229</sup>

Depending on its nature, interference with a national security satellite may constitute a violation of the victim state's sovereignty. Such a violation magnifies the seriousness of the internationally wrongful act. Instead of simply violating a treaty obligation or failing to uphold some other international obligation, the offending state violates a bedrock principle of the international legal regime—that states must be allowed to conduct internationally lawful activity within their own territory or from their sovereign platforms without wrongful interference from other states. This is a principle that Antonio Cassese has described as "the linchpin of the whole body of international legal standards, the fundamental premise on which all international relations rest."<sup>230</sup> With the linchpin significance of sovereignty vis-à-vis international law and its satellite implications in mind, then, this Article turns to a more detailed description of defensive counteractions.

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note 76, at 143 (stating without discussion that "States retain sovereignty and control over satellites and other objects they launch into space, including those launched by their nationals"). This author believes it is highly likely states exercise sovereignty over their satellites. For its part, the U.S. has asserted in the past that interference with its "space systems" would be considered an infringement of its sovereign rights, Department of Defense, DEPARTMENT OF DEFENSE DIRECTIVE 3100.10: SPACE POLICY, JULY 9, 1999 4.2.1, but has since altered the wording of its policy to simply say interference with U.S. space systems is considered an infringement of "U.S. rights," without specific reference to sovereignty. Department of Defense, *supra* note 194, at 4.b.

227. However, mere jamming of a communications signal, with no resulting damage to the communications satellite, would seem less likely to implicate sovereignty. As Sarah Mountin notes, "international law does not specifically address whether sovereignty exists in a satellite signal, and no State ever claimed satellite signal interference violated its sovereignty." Mountin, *supra* note 76, at 155.

228. Schmitt, *supra* note 68, at 704–05; see also Anders Henriksen, *Lawful State Responses to Low-Level Cyber-Attacks*, 84 NORDIC J. INT'L L. 323, 332 (2015).

229. Schmitt, *supra* note 68, at 705.

230. CASSESE, *supra* note 42, at 48.



B. *Defensive Counteractions: A Description*

1. Required Conditions Precedent

As previously discussed, defensive counteractions are designed as a response to internationally wrongful interference by one state<sup>231</sup> with another state's national security satellites. The satellites are described as national security satellites, vice military satellites, because not all states will place their militaries in charge of reconnaissance and other intelligence-gathering space assets. Defensive counteractions therefore explicitly apply to defense of state intelligence satellites operated by state entities other than the military, in addition to military satellites. Furthermore, "national security satellites" is only meant to encompass those satellites responsible for communications, navigation, and reconnaissance. Even if a military has its own weather satellites, for instance, defensive counteractions could not be used to protect them. The three satellite categories were selected because, as it concerns satellite capabilities, this author has assessed them to be the most critical to a state's national security and the literature generally agrees.<sup>232</sup>

Additionally, defensive counteractions are meant to apply only to interference that falls below the threshold of armed attack, wherever the international community decides that may be.<sup>233</sup> This is more of a practical matter than a restriction, though, since responses to armed attack would permit more robust self-defense and there would be little reason for a state to consider itself restricted only to defensive counteractions when full self-defense was also a lawful option. Also, this Article focuses on single use satellites primarily for clarity of legal analysis. Though it is possible that defensive counteractions could also apply to dual use satellites, the dual civilian-military nature of those satellites implicates

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231. Attribution to a state is required to invoke defensive counteractions, and is assumed here in order to clarify and focus the legal analysis. This is not to say attribution will always be an easy task, as discussed *supra* note 81.

232. See, e.g., Lee & Steele, *supra* note 18, at 84–85 (analyzing dual civilian-military use of satellites with a special focus on communications, remote sensing, and navigation satellites); Lee, *supra* note 215, at 93 (listing communications, global positioning and navigation, and remote sensing as three satellite functions that are important to militaries and the civilian sector); MAOGOTO, *supra* note 180, at 25 (stating military powers are devoting significant resources to space capabilities dedicated to navigation, remote sensing, and "multi-dimensional reconnaissance and surveillance," though not specifically listing communications).

233. See *supra* Section III.A.2.d for discussion of the ambiguities surrounding armed attack in outer space.

additional legal considerations that are beyond the scope of this Article.<sup>234</sup>

Beyond the initial factors discussed above, there are two additional factors that have not been addressed and that stem from the necessity requirement to be discussed below. The first is that the victim state must be able to show that countermeasures either have been ineffective in stopping the interference or are reasonably expected to be ineffective. The second is that the interference must either be ongoing at the time a defensive counteraction is initiated, or has subsided but the victim state has a reasonable belief the break is only a temporary lull, tactical or otherwise, and will resume in the near future.

Also, the focus with regard to both of these factors is on the actual interference, not corollary issues such as reparations. Thus, the question of whether the countermeasures are effective in compelling the offending state to make reparations or whether the offending state is expected to fulfill its obligation to make reparations will be inconsequential to the question of whether defensive counteractions may be initiated. The focus when initiating defensive counteractions is solely on making the actual satellite interference stop. Once the interference has ceased and is not reasonably expected to resume in the near future, victim states may of course pursue reparations, but they must do so in connection to countermeasures or other lawful mechanisms.

## 2. Primary Characteristics

Defensive counteractions are in many ways an adaptation of countermeasures. This is in part because defensive counteractions are meant to remedy the deficiencies between countermeasures and self-defense but only apply as responses to hostile acts less than armed attack. If there is a question of what defensive counteractions restrictions or characteristics apply, and that question is not answered here, then one should apply the law as it would normally apply in the absence of defensive counteractions. The defensive counteractions characteristics that will be discussed here are permissible use of force in certain circumstances, objective-centric proportionality, and permissible long-term disabling of interfering instruments in certain circumstances.

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<sup>234</sup>. For a good discussion of the legal implications of dual use satellites, see Lee & Steele, *supra* note 18, at 85–86.

## CONFLICT ON THE FINAL FRONTIER

### *a. Permissible Use of Force*

In a defensive counteractions response, victim states would be permitted to use force in response to force,<sup>235</sup> so long as the responsive force did not amount to an armed attack. This eliminates the use of force response gap discussed in Section III.<sup>236</sup>

A defensive counteractions response also alleviates, but does not eliminate, the difficulty presented by the ambiguity surrounding the threshold for use of force. Because defensive counteractions allow force in response to force, a victim state that was able to closely match the scale and intensity of the precipitating attack would not have to worry about whether it was crossing the force threshold because it would simply be matching a precipitating attack that was itself either above or below the threshold. If the precipitating attack crosses the armed attack threshold, then the victim state would be entitled to self-defense and any ambiguity related to the armed attack threshold would similarly have little import.

A problem remains in the fact that, perhaps unless the precipitating interference is coming from an offending state satellite, victim states will not be able to simply mirror and replicate the unlawful interference that is being taken against them. Therefore, they cannot know for sure that their response will be considered *ex post facto* to have matched or fell below the scale and effects of the precipitating act. This would be problematic, for instance, where a precipitating act approached but fell below the use of force threshold and the victim state's defensive counteraction crossed the threshold. Therefore, the threshold ambiguity problem, though mitigated by allowing force in response to force, will not be entirely eliminated. At the same time, defensive counteractions' requirement that victim state responses target only the offending state's interfering instrument will help the victim state match or stay below the scale and effects of the precipitating act.

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235. It should be noted that not all "force" is force as that term is understood in the Article 2 (4) prohibition against force and threats of force. Below a certain level of "force," as that word is used colloquially, the act in question is instead considered a police action or some other sub-forceful act but not a use of force in Article 2(4) terms. Some have proposed, or argued for the current existence of, a higher threshold whereby more small scale clashes and territorial incursions could fall below the use of force threshold. See generally Tom Ruys, *The Meaning of "Force" and the Boundaries of the Jus Ad Bellum: Are "Minimal" Uses of Force Excluded from UN Charter Article 2 (4)?*, 108 AM. J. INT'L L. 159 (2014) (analyzing and ultimately rejecting a higher threshold in most circumstances, but accepting the existence of some police actions as below the existing threshold).

236. *Supra* Section III.A.2.d.

As discussed briefly in Sections II and III, it is not a new idea to use force in response to force that falls below an armed attack.<sup>237</sup> Though the majority opinion is that force may not be used in those situations,<sup>238</sup> Judge Simma and others have asserted otherwise.<sup>239</sup> Judge Simma stated in his *Oil Platforms* separate opinion that he believed force could be used in countermeasures responding to hostile acts that use force but fall below an armed attack.<sup>240</sup> According to Judge Simma, this is permitted so long as the countermeasure is “bound to necessity, proportionality, and immediacy in time in a particularly strict way.”<sup>241</sup> Similarly, the Tallinn Manual 2.0 notes that a minority of its International Group of Experts were of the opinion that “forcible countermeasures are appropriate in response to a wrongful use of force that itself does not qualify as an armed attack (whether by cyber means or not).”<sup>242</sup> The minority group based their position on Judge Simma’s separate opinion in the *Oil Platforms* case and on the negative policy implications created by the existence of a response gap where states are not permitted to use force to respond to force.<sup>243</sup>

Yoram Dinstein also believes forceful countermeasures are permissible,<sup>244</sup> and he asserts the *Nicaragua* court did not rule out forceful countermeasures by victim states and that the ICJ in fact “strongly suggested” that forceful countermeasures may be permitted.<sup>245</sup> In contrast with

237. *Supra* Section II.C.3.e; Section III.A.2.d. In fact, if forceful countermeasures or the use of force in defensive counteractions becomes accepted, that evolution will be similar to the development of anticipatory self-defense taken under the expectation of imminent armed attack, which in the view of some scholars has evolved away from strictly textual application of Articles 2(4) and 51 and is now accepted by those who take a counter-restrictionist view of Article 51. See Christopher C. Joyner & Catherine Lotrionte, *Information Warfare as International Coercion: Elements of a Legal Framework*, 12 EUR. J. INT’L L. 825, 857 (2001); MAOGOTO, *supra* note 180 at 11–13 (regarding the restrictionist and counter-restrictionist distinction).

238. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 50(1)(a); *Corfu Channel*, 1949 I.C.J. at 35; see also discussion *supra* Section III.A.2.d.

239. *Oil Platforms* (Iran v. U.S.), 2003 I.C.J. at 161, 333 (Nov. 6, 2003) (separate opinion by Simma, J.) (Simma, J., separate opinion); see also DINSTEIN, *supra* note 201, at 244–55.

240. Iran v. U.S., 2003 I.C.J. at 332–33 (separate opinion by Simma, J.).

241. *Id.* at 333.

242. TALLINN MANUAL 2.0, *supra* note 137, at 125–26, ¶ 12.

243. *Id.* at 125–26, ¶ 12–15 (noting also that some states have asserted the position that any use of force automatically constitutes an armed attack). The Tallinn Manual 2.0 also notes a split within the IGE and the international law community in general as to whether forceful countermeasures may be executed based on a plea of necessity. *Id.* at 140, ¶ 18 (citing ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, cmt. to art. 25, ¶ 21).

244. DINSTEIN, *supra* note 201, at 254.

245. *Id.* at 209 (citing *Nicar. v. U.S.*, 1986 I.C.J. ¶ 110); John Lawrence Hargrove, *The Nicaragua Judgment and the Future of the Law of Force and Self-Defense*, 81 AM. J. INT’L L. 135, 138 (1987)).

Judge Simma, however, Dinstein believes forceful countermeasures are permissible “not because they are ‘below the level of Article 51,’ but because (and to the extent that) they conform to the requirements of self-defence in response to an armed attack.”<sup>246</sup> Antonio Cassese, for his part, asserted in 1999 that the North Atlantic Treaty Organization’s use of force during the Kosovo crisis on humanitarian grounds was an illegal violation of the U.N. Charter’s prohibition on the use of force, but also asserted forceful countermeasures in the service of humanitarian intervention may gradually become permitted as a general rule of international law despite the fact that they are not allowed for in the U.N. Charter.<sup>247</sup> Other scholars have observed that a humanitarian intervention exception to the Article 2(4) prohibition on the use of force may be developing or may have already developed.<sup>248</sup> While defensive counteractions’ permitted use of force in response to force is outside the mainstream approach to force, it is not wholly outside the bounds of what the international legal community has deemed appropriate.

*b. Objective-Centric Proportionality*

A second characteristic of defensive counteractions is that they allow for objective-centric proportionality, rather than injury-centric proportionality. In other words, the level of force used, if at all, may surpass the injury suffered by the victim state, but it must remain proportional to the goal of halting the interference. In this sense, defensive counteractions proportionality mirrors the *jus ad bellum* proportionality requirement applicable to self-defense.<sup>249</sup>

Michael Newton and Larry May describe *jus ad bellum* proportionality well in their discussion of cyber conflict.<sup>250</sup> As Newton and May state,

246. DINSTEIN, *supra* note 201, at 254 (quoting Iran v. U.S., 2003 I.C.J. at 332 (separate opinion by Simma, J.)).

247. Cassese, *supra* note 202, at 23, 27–29; *see also* Cassese’s follow up article, Antonio Cassese, *A Follow Up: Forcible Humanitarian Countermeasures and Opinio Necessitatis*, 10 EUR. J. INT’L L. 791, 796–98 (1999).

248. For a lengthy analysis of humanitarian intervention, its history, and its current status, *see* Jean-Pierre L. Fonteyne, *The Customary International Law Doctrine of Humanitarian Intervention: Its Current Validity under the U.N. Charter*, 4 CAL. INT’L L.J. 203 (1974).

249. Strictly speaking, defensive counteractions proportionality is not *jus ad bellum* proportionality because there is no “*ad bellum*”—all defensive counteractions must stay below force equal to armed attack.

250. *Jus ad bellum* proportionality helps govern whether one can resort to armed conflict, and *jus in bello* proportionality helps determine what actions one may take while in an armed conflict. As Yoram Dinstein has observed, *jus ad bellum* proportionality “has little in common with proportionality as applied and understood by the *jus in bello*. Consequently, any attempt to transplant rules or caveats from one domain to the other is likely to cause confusion.” DINSTEIN,

The *jus ad bellum* framing of proportionality requires that a lawful resort to force be proportional to the asserted *casus belli*. This is proportionality in the narrowest sense, i.e., that which is necessary and limited to the means directly related to eliminating the threat presented. A provocation sufficient to trigger a right to use military force in self-defense in turn warrants a cyber attack that is designed to eliminate the threat presented. In the words we have often quoted by Daniel Webster, the act ‘justified by the necessity of self-defense, must be limited by that necessity, and kept clearly within it.’ Lawful self-defense is delimited by the desired diplomatic objective.<sup>251</sup>

In defensive counteractions, the *casus belli* is not armed attack implicating self-defense, but internationally wrongful national security satellite interference. The threat presented is continued interference, and the diplomatic objective is the cessation of that wrongful interference.

That objective means defensive counteractions proportionality allows a counter response proportionate to the goal of stopping the interference so long as that interference continues to take place or is reasonably expected to resume in the near future. Once that precondition no longer exists, however, the basis for defensive counteractions no longer exists and the victim state must revert to traditional countermeasures, including the injury-centric proportionality that countermeasures are typically said to be bound by.

Objective-centric proportionality is needed in satellite interference scenarios because, as discussed in Section III,<sup>252</sup> the only other option is the injury-centric proportionality of countermeasures that undermines a primary goal of countermeasures by not permitting victim states to take action sufficient to make the unlawful activity stop. Additionally, though victim states may consider the “gravity of the internationally wrongful act and the rights in question”<sup>253</sup> when assessing their injury, that qualitative question feeds much more ambiguity into the overall analysis than does a simpler question of whether the wrongful interference has been brought to a halt.

Beyond the pragmatic advantages to objective-centric proportionality, it is important to keep in mind the approximating and principle-specific flexibility even of injury-centric countermeasures proportionality, as was

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*supra* note 201, at 233. For a discussion of the different focuses of the two types of proportionality, see NEWTON & MAY, *supra* note 156, at 63–74.

251. NEWTON & MAY, *supra* note 156, at 270.

252. *Supra* Section III.A.2.c.

253. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 51.

discussed in Section III.<sup>254</sup> Though the majority rule is that proportionality for countermeasures must be injury-centric,<sup>255</sup> commentators and even the ICJ have also emphasized proportionality's malleability.<sup>256</sup> These qualitative considerations mean victim states might attempt to stretch the bounds of their response to satellite interference, but they do so with the uncertainty of not knowing whether their expansive readings will withstand *ex post facto* review. The qualitative considerations of injury-centric proportionality also mean permitting objective-centric proportionality for defensive counteractions in outer space would not be a complete aberration from international law. One of the benefits to explicitly recognizing objective-centric proportionality is that it allows for an honest assessment of proportionality and does so within the structure of defensive counteractions instead of implicitly encouraging victim states to disingenuously characterize their injury in an overly expansive way and frame their response as pressing against but not exceeding the outer limits of injury-centric proportionality.

*c. Permissible Long-Term Disabling of Interfering Instruments*

The last permissive characteristic left to highlight is that, in some instances, defensive counteractions allow for the long-term disabling of the offending state's interfering instruments. Long-term disabling is only permitted, however, if the offending state refuses to provide assurances or guarantees of non-repetition.<sup>257</sup> Additionally, the disabling must abide by principles of necessity and proportionality, as discussed briefly above. Thus, with long-term disabling permitted, a victim state will have the option of using measures that render the interfering instrument inoperable by proportional and necessary destruction, by physical damage or cyber activity that requires time-consuming efforts to remedy, or by other similar means. Whether kinetic effects are permitted to effectuate the disabling will depend on a fact-based analysis of

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254. *Supra* Section III.A.2.c.

255. *Hung. v. Slov.*, Judgment, 1997 I.C.J. 7, ¶ 85 (Sept. 25); *see also* discussion *supra* Section III.A.2.c.

256. *Air Service Agreement*, *supra* note 100, at 443–44. Furthermore, Newton and May assert even countermeasures proportionality inevitably takes into account deterrence and that the real focus of countermeasures proportionality is “a prohibition against excesses.” NEWTON AND MAY, *supra* note 158 at 185–86.

257. Assurances and guarantees are discussed *supra* Section III.A.2.a. They are tied to the cessation of countermeasures, and when applicable they require offending states to either promise the offending conduct will not be repeated or take actual concrete steps to ensure it will not be repeated.



proportionality and necessity. However, space debris-creating effects or other effects that produce significant harmful interference with third-party space activities should never be permitted under defensive counteractions.

The availability of long-term disabling in the absence of assurances or guarantees is important because the swiftly repeatable nature of satellite interference makes it such that long-term disabling may be necessary to ensure the interference is not repeated in the foreseeable future. Though this may be seen as a deviation from the reversibility requirements applicable to countermeasures, it is important to remember the flexibility of the reversibility requirement even in countermeasures means long-term disabling does not represent as significant of a deviation from *lex lata* requirements as one might initially think.<sup>258</sup> As mentioned previously, though the general rule is that countermeasures must be reversible,<sup>259</sup> commentators have emphasized the requirement only applies “as far as possible” and should focus more on whether the legal relationship between the conflicting states can be preserved or otherwise rebuilt after the countermeasures have ceased rather than whether physical effects can be reversed.<sup>260</sup>

### 3. Restrictions

In addition to basic restrictions that one would expect to accompany any use of force,<sup>261</sup> defensive counteractions also contain some restrictions that are tailored to factors more particular to satellite interference. Restrictions specific to defensive counteractions are designed to mitigate the difficulties that stem from the permissive characteristics of defensive counteractions, and in the case of debris mitigation, are designed to alleviate risks specific to outer space.

#### *a. Necessity and Proportionality*

As with self-defense, defensive counteractions must be necessary and proportional. Proportionality has already been discussed above in section II.B.2—as envisioned in this Article, defensive counteractions proportionality mirrors *jus ad bellum* proportionality and therefore requires the response to be proportional to the goal of halting the wrongful interference. Likewise, necessity in defensive counteractions mirrors *jus ad bellum* necessity and requires that the level of response mounted to

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258. Reversibility flexibility is discussed *supra* Section III.A.2.b.

259. *Hung. v. Slov.*, 1997 I.C.J. ¶ 87; *see also* discussion *supra* Section III.A.2.b.b.

260. *See* discussion *supra* Section III.A.2.b.

261. This is not to say all defensive counteractions will involve the use of force.

stop the interference be necessary to make the interference cease.<sup>262</sup> The measures taken need not be the only measures available, but lesser measures must be inadequate to halt the interference. The ICJ has said there is a “specific rule whereby self-defence would warrant only measures which are proportional to the armed attack and necessary to respond to it, a rule well established in customary international law”; so too with defensive counteractions.<sup>263</sup> In defensive counteractions, however, the proportionality and necessity requirements are applied to responses below traditional self-defense and are implicated not because of armed attack, but because of satellite interference below armed attack. Proportionality and necessity are widely accepted as requirements under international law and it should be expected that those executing defensive counteractions would be bound by them as well.

*b. Immediacy*

Defensive counteractions also carry an immediacy requirement, tied to their purpose of halting ongoing wrongful interference. To meet the immediacy requirement, a victim state’s response must “be temporally

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262. Legality of the Threat or Use of Nuclear Weapons, *supra* note 52, 1996 I.C.J. ¶ 41; Iran v. U.S., 2003 I.C.J. ¶ 76; *see* Nicar. v. U.S., Merits, 1986 I.C.J. 14, ¶ 176, 194; *see also* Sklerov, *supra* note 176, at 32. A survey of relevant literature reveals necessity is mostly, if not solely, discussed as a requirement in use of force situations. This contrasts with proportionality, which is discussed as a requirement in both non-forceful countermeasures and uses of force. This may be because, according to most scholars, countermeasures proportionality must focus on the injury suffered, not the objective sought. Thus there is only a question of whether the response equates to the injury, not whether the response is “necessary” to match the injury suffered, since necessity is a question of what is required to achieve an ends, not an analysis of whether two actions (injury and response) are equal. This author has considered the question of whether necessity should restrict defensive counteractions only when force is used or also in defensive counteractions that do not constitute a use of force. This author has ultimately decided the necessity requirement should apply even to non-forceful defensive counteractions because, in contrast to countermeasures, defensive counteractions proportionality is objective-centric, not injury-centric. Therefore it is appropriate to ask whether the defensive counteractions means are necessary to the ends, regardless of whether the means involve force. Just as the purpose of defensive counteractions is to either persuade the offending state to stop interfering or to disable its ability to do so, the background behind force, and a main underlying objection to force in international jurisprudence, is that another State is being unduly coerced against its will. *See generally* Myres S. McDougal & Florentino P. Feliciano, *International Coercion and World Public Order: The General Principles of the Law of War*, 67 YALE L.J. 771 (1958) (examining the interrelation of coercion and armed conflict). Since necessity restricts coercive force, and defensive counteractions have coercive elements even when not technically forceful, necessity should restrict all defensive counteractions because of defensive counteractions’ goal of imposing an action or result upon another state regardless of whether the methods employ force.

263. Nicar. v. U.S., 1986 I.C.J. ¶ 176.

interwoven with the [interference] triggering it.”<sup>264</sup> Though immediacy is often not emphasized as much as proportionality and necessity, immediacy appears to receive increased attention when using force in situations outside of traditional self-defense. For instance, while the *Nicaragua* court did not explicitly mention immediacy in its discussion of self-defense,<sup>265</sup> Judge Simma wrote in his separate *Oil Platforms* opinion that any force used in response to force below armed attack must be “bound to necessity, proportionality, and immediacy in time in a particularly strict way.”<sup>266</sup> Similarly, Yoram Dinstein requires immediacy in his on-the-spot reactions,<sup>267</sup> and observes generally that “[i]mmediacy has not been expressly recognized by the Court, but customary international law fully confirms its existence.”<sup>268</sup> Though the *Nicaragua* court only explicitly mentioned necessity and proportionality, it did implicitly recognize the importance of immediacy when it criticized the fact that the United States’ alleged self-defense “continued long after the period in which any presumed armed attack by Nicaragua could reasonably be contemplated.”<sup>269</sup>

The immediacy requirement should be easily met in defensive counteractions since one of the stated conditions precedent for defensive counteractions is that the interference must either be ongoing or reasonably expected to resume in the near future.<sup>270</sup> This also means immediacy as applied and analyzed in defensive counteractions may be stricter than immediacy as applied in other areas of international law. Even if the general international law immediacy requirement is interpreted in a looser manner that allows for a response after “a tedious process of information-gathering or diplomatic negotiations,”<sup>271</sup> for instance, the requirement that defensive counteractions only be used

264. DINSTEIN, *supra* note 201, at 244. Dinstein’s full quotation cites an armed attack, rather than interference. The requirement of immediacy is the same in either situation, however, and Dinstein’s expansive definition of armed attack would quite possibly include the kind of national security satellite interference addressed in this Article.

265. *See, e.g.,* *Nicar. v. U.S.*, 1986 I.C.J. ¶ 237. Paragraph 237 is a helpful illustration in that it explicitly mentions and discusses necessity and proportionality but only obliquely references immediacy in one sentence at the end of the paragraph and does so without specifically naming it.

266. *Iran v. U.S.*, 2003 I.C.J. at 333 (separate opinion by Simma, J.).

267. DINSTEIN, *supra* note 201, at 244; *see also supra* Section IV.A.1.

268. DINSTEIN, *supra* note 201, at 230–31.

269. *Nicar. v. U.S.*, 1986 I.C.J. ¶ 237; *see also* DINSTEIN, *supra* note 201, at 233 (reaching the same conclusion regarding the *Nicaragua* opinion and immediacy).

270. *See supra* Section IV.B.1.

271. DINSTEIN, *supra* note 201, at 233. In the quoted text, Dinstein appears to be analyzing immediacy as applied to self-defense generally, keeping in mind that Dinstein has a broader definition of self-defense than do most international law scholars.

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against interference that is ongoing or expected to resume in the near future will provide a stricter restraint.

### *c. Sole Targeting of Interfering Instrument*

As referenced earlier in this Article, any defensive counteractions must target only the interfering instrument. As opposed to countermeasures, which need not be directed at an object or obligation connected to the actual wrong suffered,<sup>272</sup> defensive counteractions must as closely as possible target and limit their effects to the interfering instrument.

This is similar to reciprocal countermeasures, which are countermeasures that “involve suspension of performance and obligations towards the responsible state ‘if such obligations correspond to, or are directly connected with, the obligation breached.’”<sup>273</sup> Defensive counteractions are even more narrowly focused than reciprocal countermeasures, and more closely aligned in terms of targeting with what Kesan and Hayes have described in the cyber realm as mitigative counterstriking.<sup>274</sup> As Kesan and Hayes state, mitigative counterstrikes are “active efforts to mitigate harm to a targeted system, in a timely manner strictly limited to the amount of force necessary to protect the victim from further damage.”<sup>275</sup> Kesan and Hayes further explain the goal of mitigative counterstrikes is “to *mitigate* damage from a *current and immediate* threat,” stating further that “whatever measures are deployed must be justifiable under a mitigation framework.”<sup>276</sup> Thus, as a cyber analog to defensive counteractions, mitigative counterstrikes “involve some method of sending data back at the attacker to disrupt the attack.”<sup>277</sup> Similarly, defensive counteractions must directly target the source of interference with the goal of making the interference stop.

Though targeting only the source of interference places a restriction on states that they would not have under countermeasures, it will make it easier for states to meet their necessity and proportionality

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272. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, pt. 3 ch. II cmt. ¶ 5.

273. *Id.* (quoting Willem Riphagen (Special Rapporteur), *Int'l Law Comm'n, Sixth Rep. on (1) The Content, Forms and Degrees of State Responsibility, and (2) The "Implementation" (Mise en Oeuvre) of International Responsibility and the Settlement of Disputes*, at 1, U.N. Doc. A/CN.4/389 (Apr. 2, 1985)).

274. *See generally* Kesan & Hayes, *supra* note 66.

275. *Id.* at 435.

276. *Id.* at 435 (emphasis in original).

277. *Id.* at 475. A notable difference with mitigative counterstrikes is that Kesan and Hayes' proposal calls for a private civilian role in executing counterstrikes overseen by State governments as part of a private-public partnership, whereas defensive counteractions are managed and executed solely by State entities. *Id.* at 535–38.

requirements.<sup>278</sup> Wider targeting options exist for those victim states that choose to execute countermeasures instead of defensive counteractions, but those states will need to decide whether the benefits they receive from the wider targeting options outweigh the benefits they receive from objective-centric proportionality, permissible use of force, and other characteristics of defensive counteractions.

*d. No Space Debris or Significant Harmful Third-Party Interference*

Finally, no defensive counteractions may be taken that the victim state expects, or through due diligence reasonably should expect, to have a more than likely chance of creating space debris or otherwise creating significant harmful interference with a third party's space activities.<sup>279</sup> Space debris have the potential to create significant trouble for space assets,<sup>280</sup> and are recognized as a quickly growing problem.<sup>281</sup> Defensive counteractions' emphasis on mitigating space debris reflects the potentially significant problem of space debris and the fact that it can impact the ability of all spacefaring nations to use their national security satellites or other assets and disrupt a range of civilian capabilities that rely on outer space. The international community's interest in a debris-mitigated environment therefore outweighs the victim state's

278. ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, pt. 3 ch. II cmt. ¶ 5 (regarding countermeasures necessity and proportionality).

279. Space debris have been defined by the United Nations Committee on the Peaceful Uses of Outer Space's Scientific and Technical Subcommittee as "all manmade objects, including their fragments and parts, whether their owners can be identified or not, in Earth orbit or re-entering the dense layers of the atmosphere that are non-functional with no reasonable expectation of their being able to assume or resume their intended functions or any other functions for which they are or can be authorized." Comm. on the Peaceful Uses of Outer Space, Rep. of the Sci. and Tech. Subcommittee on the work of its Thirty-Fourth Session, para 112, U.N. Doc A/AC.105/672 (1997). The space debris prohibition should be of little to no concern in responses to earth-based interference. Instead, the situation would most likely arise when an offending State uses space-based assets to interfere with a victim state's satellites.

280. Nandasiri Jasentuliyana, *Space Debris and International Law*, 26 J. SPACE L. 139, 139–40 (1998) ("[D]ue to large velocities of orbiting objects, the kinetic energy of a 0.1 mm diameter particle is sufficient to cause damage or surface degradation of a typical spacecraft and a collision with larger particles can significantly disturb or even disrupt a satellite's operation. The chance of collision increases with the size of the satellite and its orbital lifetime. This is why space debris are very dangerous for complex scientific satellites like the Hubble Space Telescope and particularly for the manned International Space Station, the largest spacecraft ever built."); *see also* HURWITZ, *supra* note 20, at 147–48 (including space debris as part of a proportionality analysis).

281. Ram Jakhu, *Legal Issues Relating to the Global Public Interest in Outer Space*, 32 J. SPACE L. 31, 95 (2006) ("Due to rapidly increasing space debris, the use of outer space is steadily becoming even more dangerous and expensive").

interest in protecting its satellite from interference below an armed attack.<sup>282</sup>

Similarly, significant harmful impact on third-party states through means other than space debris must be avoided. Thus, for example, a victim state's use of an EMP to disable an interfering satellite would run afoul of the prohibition against significant harmful interference if the EMP was expected to also disable third-party satellites. The requirement to avoid significant harmful interference with third-party space activities reflects, but is not required by, the Outer Space Treaty's requirement that states undertaking outer space activities consult with other states that might suffer harmful interference from the first state's activities.<sup>283</sup> Since victim states executing a defensive counteraction are protecting their national security assets, versus simply exploring or using outer space as contemplated in the Outer Space Treaty's consultation requirement, it is reasonable for victim states to have to refrain only from "significant" harmful interference, versus simple harmful interference.<sup>284</sup> This admittedly still leaves the question of what constitutes "significant" harmful interference, which must be evaluated on a case-by-case basis much as the difference between interference and harmful interference is already evaluated case-by-case.

## V. CONCLUSION

Philip Jessup observed that "[t]he obstacles in the way of obtaining [peace] are many."<sup>285</sup> He believed, therefore, that we must not "increase the number of obstacles by a rigid adherence to traditional concepts which may have been the product of historical situations which do not have their counterpart today."<sup>286</sup> Though Jessup was speaking of traditional categories of war and peace, he could have also spoken of modern conflict in outer space. The current self-help regime is deficient when applied to national security satellites, and states, if they perceive a significant enough threat, will jettison the regime in

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282. This reasoning is similar to one of the restrictions applicable to a plea of necessity, wherein a state may not invoke necessity to justify acting in noncompliance with an international obligation if its noncompliance "seriously impair[s] an essential interest of . . . the international community as a whole." ARTICLES ON STATE RESPONSIBILITY, *supra* note 42, art. 25(1)(b).

283. Outer Space Treaty, *supra* note 78, art. IX.

284. The requirement to first consult with states that face even "simple" harmful interference would still exist under Article IX of the Outer Space Treaty, though that requirement only requires "appropriate" international consultations, which presumably provides a degree of flexibility in quickly-evolving situations involving defense of national security satellites. *Id.*

285. Jessup, *supra* note 1, at 102–03.

286. *Id.* at 103.

times of distress to protect their interests. Rather than cross its collective fingers and hope for state restraint, the international community must meet state actors in their time of crisis and provide a legal structure that allows for state defense while also respecting rule of law and holding off full conflict as steadfastly as possible.<sup>287</sup>

Defensive counteractions can serve as that structure, bridging the gap and patching the cracks between countermeasures and self-defense by fusing principled rule of law with the pragmatic recognition that states have significant interests in protecting their space assets. As this Article has shown, the current legal regime hinders state responses to wrongful interference with their national security satellites by insisting that states use responses that are ill-suited for the situations they face in outer space. Countermeasures are the most likely lawful *lex lata* response to internationally wrongful interference with a state's national security satellites, but countermeasures are limited in ways that render them a poor choice for states seeking to defend their satellites from interference below armed attack. The two most onerous limitations on countermeasures when used to defend satellites is that the countermeasures must be proportionate only to the injury suffered by the victim state instead of to the objective of halting the interference, and that the countermeasures must not use force even if necessary to defend against force. This can place victim states at a significant disadvantage. The risks imposed by that disadvantage are amplified by the reliance states have come to place on their national security satellites, the potential vulnerability of space assets, and the fact that offending states can in many instances turn wrongful interference up, down, on, or off with relative ease and no warning. The interference problem, if unmet, also runs contrary to concepts of state sovereignty and the peaceful nature of outer space.

If pressed into a corner, most states will defend themselves regardless of whether the law seems to allow it. It is important for the international community to create a channel for that response. Instead of letting victim state responses proceed in whichever way the state chooses, perhaps with lip service to existing law or perhaps not, a framework must be set up within which victim states may act. The law must be waiting to greet

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287. It is outside the scope of this Article to discuss the process of establishing defensive counteractions as an accepted principle, but that process could happen through such mechanisms as U.N. Security Council action, Outer Space Treaty amendment, or the slow persistent practice of states. Rule of law would be best served by adopting defensive counteractions through positivist means if the concept gains a level of acceptance within, and is further shaped by, the international legal community.



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states as they move to respond to the new threats of outer space. By giving victim states workable defense options, the international community affirms the role of international law and, in giving victim states another option that can deter offending states, also decreases the chance that tensions in outer space will escalate to full armed conflict.

Defensive counteractions represent an appropriate blend of principle and pragmatism, enabling the international community to meet the goal of modernizing the law for use in space. For instance, defensive counteractions allow states to use force to respond to force and to gauge the proportionality of their responses against the objective of making the interference stop. But victim states also face restrictions commensurate to the additional rights they are given. Their responses must be bound by a strict immediacy to the precipitating interference, and they must stop once the interference stops. Furthermore, only the offending state's interfering instrument may be targeted. No space debris may be created, and other significant harmful interference with third-party space assets may not occur. Defensive counteractions are necessary, and potentially powerful, but they are restrained by the law and by respect for the unique nature of outer space.

When Jessup proposed the recognition of an intermediate status between peace and war, he expected some to fear that his proposal would increase the chances of war by providing a stepping-stone away from peace. His response was, in part, that his proposal "would not be an effort to legalize lawlessness, but rather to bring the law into closer conformity with the facts of international life."<sup>288</sup> The same is true for defensive counteractions. As Jessup exhorted, in our "long quest for peace," let us not hinder ourselves "by rigidities in our thinking about the realities of international affairs."<sup>289</sup> Let us instead recognize the evolution of laws and of technology in outer space, and let us adapt to meet tomorrow's challenges.

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288. Jessup, *supra* note 1, at 102.

289. Philip C. Jessup, *Intermediacy*, 23 *NORDIC J. INT'L L.* 16, 26 (1953).