Dangerous Orbits

Applying the Law of Self-defence to Hostile Acts Against Satellite Systems

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Abstract

The world has found itself in the unsatisfactory position of depending greatly upon the services of satellites, all while the risk of satellites becoming targets during conflict looms ever greater. This paper assesses the *lex lata* of the law of self-defence as enshrined in the Charter of the United Nations, focusing on the *rationae materiae* aspect of the *armed attack* concept. It thereafter applies general conclusions in this regard to the specific context of hostile acts against satellite systems, with an aim to clarify under what conditions such hostile acts justify the exercise force in self-defence.
This work is dedicated to;
Jörgen and Katarina, for kindling my curiosity,
Carolina, for talking me into law,
Sara, my guiding star,
and Eric.
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# Abbreviations

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<tr>
<td>ABM</td>
<td>Anti-ballistic Missile Systems</td>
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<td>ASAT</td>
<td>Anti-satellite weapons</td>
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<td>CD</td>
<td>Conference on Disarmament</td>
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<td>DDoS</td>
<td>Distributed Denial of Service</td>
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<td>GA</td>
<td>(United Nations) General Assembly</td>
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<td>GNSS</td>
<td>Global Navigation Satellite System</td>
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<td>GPS</td>
<td>Global Positioning System</td>
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<td>ICJ</td>
<td>International Court of Justice</td>
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<td>ITU</td>
<td>International Telecommunications Union</td>
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<tr>
<td>NTM</td>
<td>National Technical Means of verification</td>
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<tr>
<td>PNT</td>
<td>Positioning, Navigation and Timing</td>
</tr>
<tr>
<td>SWIFT</td>
<td>Society for Worldwide Interbank Financial Telecommunication</td>
</tr>
<tr>
<td>TT&amp;C</td>
<td>Telemetry, Tracking, and Command</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<tr>
<td>UNCOPUOS</td>
<td>United Nations Committee on the Peaceful Uses of Outer Space</td>
</tr>
<tr>
<td>UNOOSA</td>
<td>United Nations Office for Outer Space Affairs</td>
</tr>
<tr>
<td>US</td>
<td>United States of America</td>
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<tr>
<td>UTC</td>
<td>Coordinated Universal Time</td>
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<tr>
<td>VCLT</td>
<td>Vienna Convention on the Law of Treaties</td>
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1 Introduction
1.1 Background
Since the launch of Sputnik I heralded the dawn of the space age in 1957, society has come to rely heavily on the services of satellites. Telecommunications, remote sensing and global navigation and timing services are rendered possible by satellites, and have become vital components for the functioning of states and private entities alike. Importantly, an increasing number of states rely on satellite systems for military purposes, either by deploying their own assets or by acquiring access to other’s. Additionally, virtually all satellites can be — and often are — used for both military and civilian purposes.\footnote{1} Satellite systems are furthermore inherently fragile and susceptible to interference, disruption and damage.\footnote{2} This intermingling of function, taken together with the fragility of satellite systems, make satellites opportune targets for actors seeking to strike a blow to the vital functions of a state.\footnote{3}

Thus far outer space has remained free from hostilities. Nevertheless, there is no guarantee that it will remain so. In fact, states’ respective space and national defence polices lately reflect a growing concern that conflict involving space is becoming ever more likely.\footnote{4} All the while, an increasing number of states are developing weapons

which can target satellite systems, and certain such technologies are conceivably within the grasp of non-state actors as well.\(^5\)

Clearly, the consequences of interference with or destruction of any given satellite system would fall on a continuum of severity depending on the functions of the system in question and the context in which it operates. For example, the hacking of a weather satellite might rank as an inconvenience, while the disruption of a Global Navigation Satellite System (GNSS) could carry catastrophic consequences and pose a threat to global peace and stability.\(^6\)

With such frightening prospects in mind, the fact that the basic consideration of how international law applies with regard to hostile acts against satellite systems remains largely unclear is cause for grave concern. Over half a century into the Space Age, international legal instruments which effectively deal with issues surrounding the use of force in the outer space context have yet to be developed.\(^7\) The multilateral bodies tasked with upholding space security, namely the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and the Conference on Disarmament (CD), have been deadlocked on the issue of further development of law pertaining to the military uses of outer space for decades.\(^8\) This is due in no small part to the fact that states evidently prefer to preserve the freedom of action that the current legal lacunae provide them. With states firmly entrenched in their respective positions on the matter, a resolution of the issue within the foreseeable future appears unlikely.

This is not to say that such matters are ungoverned by law. To the contrary, international law governs the actions of states wherever they undertake them. However, as further development of the law would appear to be a distant prospect, there is a need to clarify how existing international law might apply to hostile acts against satellite systems, in order to avoid the highly destabilising and potentially devastating effects of states acting in response to such acts without regard to the rule of law.

In particular, there is an urgent need to clarify under what conditions such hostile acts might trigger states’ right to respond in self-defence in accordance with the

\(^5\) See section 2.3.
\(^6\) See section 2.2.
\(^7\) Jakhu, Steer and Chen, pp. 2-8.
\(^8\) Ibid, pp. 11-12 and 17-18.
jus ad bellum provisions of the United Nations Charter, as such responses constitute the exception to the United Nations Charter collective security regime, and thus carry the risk of exacerbating dangerous situations.\textsuperscript{9}

The right of self-defence may only lawfully be invoked in the face of an armed attack. Once the right has been triggered, the exercise of self-defence is furthermore subject to legal constraints. Yet, the precise content and scope of the law of self-defence has been a fiercely contested issue for a very long time. All the same, it is imperative to strive toward, at the very least, a general understanding of how the law of self-defence applies in the context of hostile acts against satellite systems, lest states act recklessly in the face of a \textit{fait accompli}.

\textbf{1.2 Purpose of the Study}

In light of the above, this paper will assess relevant aspects of the law of self-defence as enshrined in the United Nations Charter, with the aim of extrapolating conclusions in this regard to the matter of self-defence \textit{vis-à-vis} hostile acts against satellite systems.

\textbf{1.2.1 Prominent legal issues}

In particular, this paper will examine the \textit{rationae materiae} element of the \textit{armed attack} concept, with an aim to determine how the \textit{armed attack} requirement ought to be understood in relation to hostile acts against satellite systems of various natures. Furthermore, it will examine the jus ad bellum legal constraints on the exercise of force in self-defence, with a view to determine what general limits these will set on states’ freedom of action in responding to armed attacks against their satellite systems.

\textbf{1.3 Delimitation of the Subject}

This paper attempts to determine the \textit{lex lata} of self-defence, in general and in the satellite context. Furthermore, it deals chiefly with the material element of the law of self-defence. The personal and temporal elements of self-defence are left outside its scope. Moreover, its focus is individual self-defence, why implications for collective self-defence will be not be addressed. Other aspects of the jus ad bellum, such as the notion of force, are not examined in greater detail than is required for the present purposes. Considerations pertaining to jus in bello are mentioned tangentially.

\textsuperscript{9} United Nations, Charter of the United Nations, 24 October 1945, 1 UNTS XVI.
1.4 International Law and Legal Method
1.4.1 International Law
This paper deals with a number of issues in international law. In particular, the topic of jus ad bellum — i.e., the law governing the use of force — is examined in relation to a certain context, namely that of force exercised against satellite systems and the surrounding legal issues.

International law differs from domestic legal orders in several important regards. Chiefly, it is not formulated by a central legislator, but arises from a number of different sources.\textsuperscript{10} The starting point for seeking out the sources of international law is found in Art. 38(1) of the Statute of the international Court of Justice, which is regarded as an authoritative list of the generally accepted sources of international law. Art. 38(1) recognises international conventions (i.e. treaty law), customary law, and so-called general principles of law (principles found in most domestic legal orders throughout the world) as primary sources. Furthermore, ”judicial decisions and the teachings of the most highly qualified publicists”, i.e., the findings of courts and renowned legal scholars, are recognised as subsidiary sources of law.

Much of the body of international law consists of treaty rules, which bind those states which consent to be bound.\textsuperscript{11} In this regard, it can be said to be law among equals, horizontal in structure in contrast to the vertical nature of national legal orders.\textsuperscript{12} Apart from treaties, other rules exist in the form of unwritten customary law, which arise over time by states conducting themselves in accordance with norms they perceive themselves to be legally obliged to adhere to.\textsuperscript{13}

Generally speaking, there is not much of a hierarchal relationship between the different sources of international law. Treaty law and customary law exist on the same level, and even though Article 38(1) of the ICJ Statute states that judicial decisions and the teachings of the most highly qualified publicists shall be applied as subsidiary means for the determination of rules of law, the findings of the latter sources often

\textsuperscript{10} See United Nations, Statute of the International Court of Justice, 18 April 1946.
\textsuperscript{12} \textit{Ibid}, p. 4.
\textsuperscript{13} Elaborated \textit{infra}.
themselves influence the interpretation and development of the law to a great extent, blurring the line between "mere" determination of law and modification of the same.\footnote{Ruys, Tom, "Armed Attack" and Article 51 of the UN Charter: Evolutions in Customary Law and Practice’, Cambridge University Press, 2010, p. 12. Shaw, p. 50.}

When several rules of international apply simultaneously, the relationship between them must be determined \textit{ad hoc}, by way of applying principles of interpretation.\footnote{See, e.g., Ruys, 'Armed Attack’, p. 13.} However, certain norms are regarded to inhabit a higher stratus. So-called \textit{jus cogens} norms are regarded by the international community as peremptory, and no derogation is permitted from them.\footnote{See United Nations, Vienna Convention on the Law of Treaties, 23 May 1969, United Nations, Treaty Series, vol. 1155, p. 331, available at: \url{http://www.refworld.org/docid/3ae6b3a10.html}, Art. 53, 64.} Additionally, by virtue of Article 103 of the UN Charter, Charter provisions prevail over conflicting treaty rules.

International law constitutes a legal order governing equal subjects.\footnote{Nota bene, at least as far as states are concerned.} This is to say that states are treated as equals as a matter of law, regardless of their relationships in other regards. States are the primary subjects of international law, but not the only ones.\footnote{Shaw, pp. 143-144.} Modern international recognises certain kinds of international organisations as possessors or legal personality, independent of states.\footnote{Ibid, pp. 179-183 and 188-189.} Individuals, private entities and even non-governmental armed groups are primarily the subjects of their respective sovereign states, but are in some respects endowed with rights and subject to obligations under international law as well.\footnote{VCLT Art. 4.}

\subsection*{1.4.2 International Legal Method}

It should be stressed that determining the precise meaning of international legal norms is not a simple exercise. For treaty rules, the generally accepted point of departure for interpretative method is found in the 1969 Vienna Convention on the Law of Treaties (VCLT). It should be mentioned that the Convention is not formally applicable to treaties antedating it.\footnote{See, e.g., Golder v United Kingdom, Judgment, Merits and Just Satisfaction, European Court of Human Rights, App No 4451/70, A/18, § 29.} However, its provisions on interpretative method are held to constitute a codification of customary law, and are thus regularly applied despite the formal limitation.\footnote{Ruys, Tom, "Armed Attack" and Article 51 of the UN Charter: Evolutions in Customary Law and Practice’, Cambridge University Press, 2010, p. 12. Shaw, p. 50.}
Article 31(1) provides that: "[a] treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose." Thus, the interpreter must make an honest effort to ascertain the meaning of a provision, departing from a literal reading. Importantly, a conscious deviation from the common meaning of a term without the deviation being justified will lead to a dishonest interpretation.\(^{23}\) The meaning of a provision must further be understood in the light of the treaty text in general, together with its preamble and annexes, as well as in the light of any other agreements concluded between the parties in connection with the treaty.\(^{24}\) Together with the context, the interpreter shall also take into account subsequent treaties which might pertain to the interpretation of the provision in question, and, importantly, how the parties have interpreted the treaty, as evidenced by their subsequent practice.\(^{25}\) Additionally, by Article 32, recourse to the preparatory works of a treaty and the circumstances of its conclusion may be had as supplementary means of interpretation.

In many cases the principal issue lies in determining whether a certain norm even exists or not. This is particularly the case when it comes to emerging or otherwise contested customary law. Customary law arises by combination of the material element of state practice, i.e., the conduct of states, and the subjective element of *opinio juris,* i.e., states’ belief that they are conducting themselves in accordance with a legal obligation to act in such a manner.\(^{26}\) There is a Catch-22 to the process, though. For, if states exclusively conducted themselves in accordance with prevailing law, custom would not arise, nor change. The matter is more aptly viewed as a process of states’ testing the waters, awaiting the reactions of their peers. Thus, *opinio juris* is often manifested not only in the rhetoric of the actor, but in the reactions of the metaphorical co-actors and audience. In this way, lack of protest and silent acquiescence by the international community of states is not seldom a more apparent indicator of *opinio juris* with regard to the lawfulness of a given manner of conduct than are overt assertions to that effect by the state which acts.\(^{27}\)

\(^{23}\) See VCLT Art. 31(4)
\(^{24}\) VCLT Art. 31(2); see also Shaw, p. 677.
\(^{25}\) VCLT Art. 31(3) a) and b).
\(^{26}\) Shaw, pp. 51 ff.
\(^{27}\) *Ibid,* pp. 60-65.
These methods for interpretation will be applied conscientiously in the present study, although explicit reference to them cannot, for practical reasons, be made at every juncture.

1.5 Outline
This paper will begin by giving an overview to the functions of satellite systems, and various means of interfering with them, in section 2. Section 3 deals with the law governing the outer space realm, and describes how states’ activities in outer space fit into the overarching order of public international law, in particular with respect to the United Nations Charter and the jus ad bellum.

In order for the final conclusions on how the law of self-defence applies to attacks against satellite systems to be meaningful, it is necessary to clarify precisely what assumptions the study proceeds under. Therefore sections 4 through 7 comprise a comprehensive assessment of the law of self-defence, with emphasis on the armed attack concept and the material threshold at which Article 51 of the Charter is triggered: Section 4 gives an overview of the United Nations Charter collective security regime, and how the right of self-defence serves as a safety valve within that system. Section 5 deals with the ever-present debate on the relationship between customary and treaty jus ad bellum. Thereafter, section 6 delves into the minutiae of the armed attack concept, with an aim to identify it constitutive elements and the placement of the so-called gravity threshold separating the armed attack concept from that of force in the sense of Article 2(4) of the Charter. Section 7 connects the dots between the armed attack concept and the range of permitted uses of force in self-defence.

Finally, the conclusions drawn from sections 4 through 7 are brought to bear upon the specific context of attacks against satellite systems, and how to treat them for jus ad bellum purposes, in section 8. Some tangential, final reflections are given in section 9.
2 Satellite Systems and Anti-satellite Weapons

2.1 Satellite Systems
Satellite systems consist of three segments: a space segment, a ground segment and a link segment. First, the satellite itself comprises the space segment. It orbits the earth, serving as a carrying-platform for whatever equipment its particular mission requires. Certain satellites operate in constellation with other satellites in order to cover a larger ground area. Global Navigation Satellite Systems (GNSS), such as the GPS system, are prominent examples of constellation satellite systems. Secondly, the satellite is monitored and controlled from one or several ground stations. Lastly, the paths used by the ground station to communicate with the satellite and vice versa are called uplinks and downlinks, respectively. The most important function of the link segment is to transmit telemetry, tracking and command information (TT&C) between the satellite and the ground station. The ground station sends commands to the satellite, and continuously monitors its health and status through the TT&C system. Commonly, satellites can only operate autonomously for a limited duration, if at all. Therefore, a satellite which is cut off from essential TT&C information risks becoming unusable. In addition to TT&C, the links are used for transmission of mission-specific information. Generally, the links exist in the form of specific bandwidths on the electromagnetic spectrum through which signals are transmitted as directed radio beams.

2.2 Uses of Satellite Systems
2.2.1 Civilian Uses of Satellite Systems
Since the launch of Telstar 1 in 1962, society has come to rely on communications satellites for television signals, long-distance telephone calls, satellite radio and innumerable other forms of data. Communications satellites enable live news coverage

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28 See Wright, Grego and Gronlund, pp. 109-115.
29 "Telemetry refers to the information the satellite sends the control station about the status of its various components and how they are operating. Tracking refers to knowing where the satellite is; for example, the time for a signal to travel between the satellite and ground can be used to accurately determine the distance to the satellite. Command refers to the signals that are used to tell the satellite what to do."
Ibid, p. 112 at note 11.
32 Ibid, p. 112.
33 Ibid, p. 112.
of events around the world, disaster relief efforts, retail transaction and inventory management, and internet coverage to airplanes in flight, ships at sea and remote land areas. Remote sensing satellites, carrying sensors that watch the Earth below, make possible sophisticated weather forecasting, in turn relied on by agriculture, global shipping, air traffic control, and weather warning systems. Remote sensing is also used to procure environmental monitoring data vital for science as well as inter alia the energy, agricultural, mining and forestry sectors.

Most importantly, the services provided by GNSS such as GPS comprise, without overstatement, a nervous system for our contemporary information society, providing vital Positioning, Navigation and Timing (PNT) information. Although best known for positioning and navigation, the humble timing function actually keeps the world on track. GNSS satellites carry a number of atomic clocks, calibrated by master clocks on Earth. GNSS time, at present chiefly provided by GPS, is then in turn used to disseminate Coordinated Universal Time (UTC) to time keeping systems around the world, including Network Time Protocol servers, which keep internet-connected devices synchronised to the same time standard. That time standard is built into virtually all digitally operated infrastructure, such as transportation systems and electrical grids. It is used to timestamp data packets, such as cell phone and Internet Protocol data. Without the timing signal, cell tower systems can no longer route calls, and internet servers cease to communicate with each other. GNSS-supplied precision timing provides timestamps to trade and financial transactions, such as those managed by the

37 Johnson, pp. 59-62.
38 Ibid, p. 86.
42 Schrogl, et al., 'Handbook of Space Security', p. 34.
43 Johnson, p. 68.
44 Mountin, p. 111.
45 Schrogl et. al., 'Handbook of Space Security', p. 34.
Society for World Interbank Financial Telecommunication (SWIFT) system for international monetary transfer. Without satellite-provided timing, the infrastructure supporting financial markets, businesses and everyday life would be sent into disarray. Apart from this, contemporary reliance on GNSS for navigation is apparent. Shipping, aviation, rail and road transportation all rely on it, as do innumerable other industries, law enforcement, emergency services and indeed individuals.

GNSS is furthermore a prime example of the dual-use nature of satellite systems. The US GPS, Russian GLONASS and Chinese BeiDou-2 (under development) are principally military systems, but are open to civilian use as well. In contrast, the European Union/European Space Agency Galileo system is principally a civilian system, but is open to military use.

2.2.2 Military Uses of Satellite Systems
The Space Race took place in the setting of the Cold War, with the US and the Soviet Union highly aware of the value of outer space as the ultimate high ground. After an initial period of uncertainty, the conclusion of the Outer Space Treaty assured that outer space would not be subject to claims of sovereignty, but would be open to all (see infra). Thus, throughout the Cold War, the competing powers fielded space assets which watched and listened, with the purpose of augmenting their strategic edge on Earth. It would however not be until the end of the Cold War era that satellites provided a tactical one. During the Gulf War, the US-led coalition made extensive and integrated use of satellite communications, satellite reconnaissance and GPS, marking the first time space assets were used in concert to support a large-scale military operation. Thus, the Gulf War is often referred to as ”the first space war”.

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46 Mountin, p. 111.  
47 Johnson, pp. 59-75.  
The militaries of space-faring states operate military communications satellites of their own, yet, in step with military operations’ ever-increasing demand for communications bandwidth, states’ militaries are becoming increasingly reliant on commercially operated communications satellites as well, sometimes even turning to foreign providers despite security concerns.\(^{51}\) During the 2001 war in Afghanistan, commercial satellite operators provided the US with roughly 80 percent of the total bandwidth for military communications, and the trend for increasing inter-mingling of military and civilian space applications shows no sign of abating.\(^{52}\)

The military utility of GNSS can hardly be overstated. GNSS guides troop movements, naval and aerial navigation, and enables targeting for precision munitions. Without it, air and artillery strikes would be left to more precarious line-of-sight targeting. GNSS-enabled timing moreover makes possible precise synchronisation of operations, and a new kind of communications security through split-second frequency-hopping and synchronised encryption of data.\(^{53}\) US military doctrine dubs the information provided by GNSS "a mission essential element in virtually every modern weapon system."\(^{54}\)

Remote sensing satellites provide states with situational awareness of the situation on the ground, tracking troop movements and aiding in targeting.\(^{55}\) Military weather satellites provide pin-point accurate assessments of weather conditions in the field,\(^{56}\) and signals intelligence satellites intercept communications, aiming to augment military commanders’ understanding of the lay of the land.\(^{57}\)

At the strategic level, reconnaissance satellites have provided early-warning missile launch detection and tracking functions since ballistic missiles became a clear and present threat in the early days of the Cold War. During the 1950’s and 60’s,

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\(^{54}\) Joint Publication 3-14, p. II-6.

\(^{55}\) Ibid, pp. II-4, II-5.

\(^{56}\) Johnson, p. 83.

\(^{57}\) Ibid, pp. 83-84.
uncertainty in Washington and Moscow as to the other’s strategic nuclear capabilities
cultivated an atmosphere of compact fear and suspicion, eliciting worst-case
assumptions regarding the other’s capabilities and intentions, and spurring an
accelerating nuclear and conventional arms race.\footnote{Graham, Thomas, and Keith A. Hansen, 'Spy Satellites: And Other Intelligence Technologies that Changed History', University of Washington Press, 2007, pp. 14-20.} Due to the closed nature and
effective security of Soviet society, Western intelligence in particular turned to technical
means, such as high-altitude reconnaissance aircraft and remote sensing satellites, for
deducing the extent Soviet military capabilities.\footnote{Ibid, pp. 15-19.} Thankfully, both sides realised that
the arms race was getting out of hand, and negotiations for arms control and test
banning commenced. At long last, the landmark SALT I agreements\footnote{Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems 944 UNTS 13, UN Reg No I-13446, 23 UST 3435 (the ABM Treaty); and Interim Agreement between the United States of America and the Union of Soviet Socialist Republics on Certain Measures With Respect to the Limitation of Strategic Offensive Arms (with Protocol) 944 UNTS 3, UN Reg No I-13445 (the SALT I Interim Agreement).} were concluded
in 1972, for the first time limiting strategic nuclear arms.

These agreements however only became possible due to the development of
independent technical means — chiefly remote sensing satellites — for verification that
the opposing party was adhering to its obligations, i.e., not cheating.\footnote{See Article XII of the ABM Treaty and Article V of the SALT I Interim agreement (both supra, at note 60). See also Graham and Hansen, pp. 53-57; although note that at p. 54 Article V of the SALT I Interim agreement has been mistakenly cited as Article VI, likely due to a typo.} These spy
satellites and terrestrial sensors, euphemised as ”National Technical Means of
Verification” (NTM), were implicitly recognised as legal, and even explicitly protected
by treaty text. Thus, the second paragraph of the NTM provision common to the two
SALT I agreements obliges the parties ”not to interfere with the national technical
also been included in subsequent strategic arms control treaties.\footnote{See generally Graham and Hansen, pp. 90-122.} This class of satellite
continues to provide an essential function for the purposes of arms control and non-
proliferation to this day.\footnote{See generally Graham and Hansen, pp. 90-122.}
2.3 Anti-satellite Weapons and Methods for Interference

In step with the advent of the use of outer space for military purposes, the powers of the Cold War devised weapons which could be directed at the other’s space assets. Between them, the US and the Soviet Union conducted some fifty tests of such anti-satellite weapons (ASAT) during the Cold War. The specific designs vary, but the underlying principle is to intercept the target satellite with an object that either rams into the target or detonates right next to it, reducing the target to an expanding swarm of orbital debris. The interceptor itself is either launched into space atop a rocket just prior to impact (called a direct-ascent interceptor), or has already lingered in orbit for some time, perhaps disguised as a regular satellite, before commanded to home in on the target (called a co-orbital interceptor, or colloquially, ”space mine”).

These weapons programs continue to be developed to this day, and more states are pursuing these capabilities. China has recently entered the fray, in 2007 overtly demonstrating its ability by destroying one of its own weather satellites with a direct-ascent interceptor lofted into space atop a modified ballistic missile. India is reportedly working towards gaining ASAT capability as well. It is important to recognise that these weapons are conceivably within the grasp of all states possessing ballistic missile systems, and particularly anti-ballistic missile (ABM) systems are easily adapted to intercept satellites rather than missiles. A crude ASAT could even be fashioned out of a missile carrying a mass of gravel or the like. Deposited in orbit, the debris would indiscriminately pose a danger to all satellites traversing that part of space. A more catastrophic scenario would be for a nuclear-capable attacker to detonate a nuclear warhead in low earth orbit. The resulting electromagnetic pulse would destroy all unshielded satellites within line of sight of the detonation, save those at higher-altitude orbits.

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70 Wright, Grego and Gronlund, pp. 138-139.
The weapons outlined above all rely on kinetic energy, physically striking the target with the aim of physically damaging or destroying it. Recently, however, a new class of methods for interference has come into play. Directed energy weapons, such as high-energy lasers or directed microwave radiation, carry the potential to physically damage a satellite if directed at fragile systems such as solar arrays, optics or internal electronics. Directed energy weapons are however quite scaleable with regard to their effects. An attacker wishing merely to temporarily impair a satellite may, for instance, target a remote sensing satellite’s fragile optics with a lower-powered laser “dazzling” it, i.e., supplying the optics system with more incoming light than it is equipped to handle, thus temporarily obscuring from view a portion of the ground corresponding to the position of the laser.

The equipment required for assembling an effective ASAT laser array is surprisingly readily available. In 1997, the US tested its most powerful laser, designated MIRACL, against one of its own satellites. Remarkably, while MIRACL itself failed, a lower-powered companion laser — essentially commercially available equipment — which was used merely to illuminate the target for the purposes of aligning MIRACL, unexpectedly proved powerful enough to temporarily blind the satellite’s sensors without causing permanent damage. There are indications that China possesses equivalent capabilities. In 2006 several US satellites reportedly experienced a significant loss of functionality while overflying China. Although the details of the incident are not publicly known, experts have taken it to signify that the satellites were illuminated by a high-power laser as part of Chinese directed energy ASAT tests. Worryingly, as of 2007, some 30 states were reportedly capable of ASAT lasing, albeit at lower levels of power. It is not a far stretch to assume that the necessary technology has proliferated more widely still in the past decade.

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72 Wright, Grego and Gronlund, pp. 125-128.
75 Koplow, 'Death by Moderation’, p. 171.
High-power lasers might conceivably be placed in orbit at some point in the future. At present, however, the systems required to power such weapons are so large that directed energy-attacks must be mounted from the ground. High-power microwave weapons, which could be used to scramble a satellite’s internal electronics, are ineffective from the ground due to atmospheric interference. It is feasible to base such equipment in space, but the technology is still nascent.

Another method for interference is to attack the link segment of a satellite system through electromagnetic (radio spectrum) interference, aiming to disrupt communications between the satellite and the ground. This is accomplished by overpowering the original signal, called jamming, or by aiming a false mimic signal at the satellite or ground station, thereby tricking the receiver into ignoring the true signal in favour of the false one, called spoofing. Interference can be aimed either at the downlink, uplink, or at the so-called crosslinks which connect satellites in constellation.

Downlink jamming blocks signals from a satellite within a certain ground area, and can by accomplished by simple commercially available or even home-made jammers. This method was employed by the Iraqi military during the 2003 Iraq War in an effort to disrupt US GPS-enabled precision targeting and navigation. GPS downlink jamming has reportedly also been extensively used by North Korea against South Korea, disrupting navigation for hundreds of ships and aircraft, both military and civilian.

Uplink jamming targets the satellite directly, by blocking signals sent to a satellite from the ground. For communications satellites, which route data from one point on the ground to another, uplink jamming would render them temporarily useless, at the very least. For example, Farsi-language Voice of America transmissions from the United States to Iran were jammed in 2003 by Iranian operators in Cuba. This was accomplished by using a ground-based jammer to jam the uplink from the ground

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76 Wright, Grego and Gronlund, pp. 124-125.
77 Ibid, pp. 130-133.
78 Ibid, pp. 116 ff.
79 Mountin, p. 131.
81 Mountin, p. 106.
82 Wright, Grego and Gronlund, p. 121.
station in the U.S. to the Telstar 12 communications satellite in geosynchronous orbit.\footnote{Ibid, pp. 121-122.} In another instance, the Falun Gong group has repeatedly disrupted China Central Television satellite broadcasts directed toward the Chinese mainland by jamming the satellite uplink from positions in Taiwan.\footnote{Ibid, p. 122.} Due to the widespread inter-mingling of different kinds of satellite traffic, uplink jamming can have unexpected effects. In 2007, Libya jammed two commercial communications satellites operated by an Abu Dhabi corporation, with the aim of blocking news broadcasts into Libya. Not only did it succeed in doing so, but it also managed to disrupt US military and diplomatic communications, as well as news broadcasts directed to Europe in the process.\footnote{Mountin, p. 119.}

More serious effects can be achieved by interfering with the TT&C signal. Since the TT&C signal is usually protected by way of encryption and encoding, this is more difficult to accomplish. Nevertheless, a sufficiently strong jamming signal can negate such protection by essentially creating more noise than the satellite is equipped to handle.\footnote{Mountin, pp. 126-127. Wright, Grego and Gronlund, p. 121.} Even a temporary disruption of TT&C information puts satellites at risk of becoming permanently uncontrollable.\footnote{See Mountin, p. 127.}

Lastly, satellites are — as any digitally operated hardware — of course vulnerable to \textit{cyber attacks}. Military satellite systems normally feature a high degree of computer security, but are not immune. Civilian satellites are far less protected, and thus particularly vulnerable to this avenue of attack.\footnote{Petras, Christopher M., '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', vol. 67, Journal of Air Law & Commerce, 2002, pp. 1213, available at \url{http://scholar.smu.edu/jalc/vol67/iss4/6}; p. 1221.}
3 The Outer Space Legal Regime

Outer space is far from lawless. In fact, legal regulation of states’ actions in space is a topic which has been discussed for more than a century, although initially in quite abstract terms. When first brought up, there was a view that a legal regime governing outer space should be kept separate from the existing body of international law. This view was put forward either on the grounds that outer space is fundamentally different from the earth, and thus should be governed in a fundamentally different manner, or that it should be treated as a testing bed for novel notions of law. Practical considerations would soon overtake these lofty ambitions, demanding concrete norms which fit into the existing system of international law.\(^89\)

Following the launch of Sputnik I in 1957, the international community sprang into action, and managed to hammer out a framework for the outer space legal regime in just about a decade’s time. This took place in the context of the Cold War’s military and technological arms race between the United States, the Soviet Union and their respective allies. There was a general apprehension within the international community that outer space would become yet another theatre of competition and conflict. Thankfully, the competing superpowers as well as the international community at large recognised that it was in their mutual interest to seek to establish a legal framework for outer space activities, so as to constrain the other’s actions by a collection of norms with somewhat foreseeable content.\(^90\) Against this backdrop, the framework treaty of space law — the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (the Outer Space Treaty) — was established.\(^91\)

The treaty features a number of key provisions. First, Article I establishes that outer space is open to free and equal use, in accordance with international law, by all states. Secondly, Article II prohibits the appropriation of any part of outer space, thereby ruling out formal or de facto annexation of outer space or any celestial bodies. Thirdly, and most significantly, the Outer Space Treaty affirms that the existing body of

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\(^90\) Ibid, pp. 506-508.

international law applies as much to states’ activities in outer space as it does in any other context. Article III of the Outer Space Treaty holds that:

"States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding.” (Emphasis added).

The implication of the fact that outer space is not the territory or jurisdictional zone of any state is that it — like the legal realms of Antarctica and the High Seas — lacks any territorial lex situs. The quasi-lex situs it can be said to have is international law itself, inasmuch as it regulates the activities of states’ in outer space.\(^{92}\) The content of this area of law is comprised by:\(^{93}\)

i) the lex specialis of space law, as set out by the Outer Space Treaty and the four subsequent space treaties;\(^ {94}\)

ii) general public international law, including the UN Charter, the law of State responsibility, the law of treaties, and jus ad bellum;

iii) and any other rules of international inasmuch as they pertain to states’ conduct vis-à-vis outer space, including jus in bello (i.e. the law of armed conflict), disarmament and non-proliferation norms and international telecommunications law.

What is clear, then, is that outer space is not separate from the rest of international law, but firmly anchored in it. In particular, Article III of the Outer Space Treaty makes plain that states’ actions are governed by the Charter of the United Nations as much in space as they are in any other context, and Article VI establishes that states bear international responsibility for their activities in outer space, whether they are carried out by governmental or non-governmental entities. Thus, private entities and individuals are

\(^{92}\) See Lyall and Larsen, p. 59.

\(^{93}\) See e.g., Jakhu, Steer and Chen, pp. 5-6.

\(^{94}\) Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, New York 19 December 1967, 672 UNTS 119, in force 3 December 1968, (the Rescue Convention);
Convention on International Liability for Damage Caused by Space Objects, New York 29 November 1971, 961 UNTS 187, in force 1 September 1972, (the Liability Convention);
Convention on the Registration of Objects Launched into Outer Space, New York 12 November 1974, 1023 UNTS 15, in force 15 September 1976, (the Registration Convention);
indirectly governed by space law as well, as Article VI expressly provides that states are responsible for the activities of their nationals in space, and as such must authorise and supervise them.

Where is space, precisely? The question is of some importance, since its answer will determine where the regal realm of international aviation law ends and that of space law begins. Significantly, states’ exercise exclusive sovereignty over the airspace above their territory, whereas outer space is beyond the sovereign control of any state. Oddly enough, the Outer Space Treaty and the subsequent space treaties are silent on the matter, and the issue, despite much deliberation on the desirability of delineating outer space, has yet to be resolved. For the purposes of this study, however, it is sufficient to point out that there is a general consensus among states that the boundary lies beneath the lowest possible stable satellite orbit. Thus, we can safely conclude that satellites reside within the legal realm of outer space.

The applicability of general public international law to outer space is all the more clear when the provisions of the Outer Space Treaty are read in conjunction with Article 103 of the UN Charter, which states that obligations imposed by the Charter prevail over obligations under any other treaty, in case of conflict between them. This is further confirmed by the Article 30(1) of the Vienna Convention on the Law of Treaties, which establishes that Charter obligations override the principle of *lex posterior*, are not affected by subsequent treaties.

The Outer Space Treaty deals with military uses of space to a limited extent. Article IV bans the placement of weapons of mass destruction anywhere in outer space, which includes placement in orbit around the earth, on celestial bodies or in any other manner. Furthermore, Article IV provides for a demilitarisation of celestial bodies, including the Moon. Notably, however, the placement or use of conventional weapons in void space, *inter alia* in orbit around the earth, is not prohibited by the Outer Space Treaty. Other than this, the *lex specialis* of space law is silent on matters of military

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96 Lyall and Larsen pp. 165-169.

97 Article IV of the Outer Space Treaty. See also Lyall and Larsen pp. 515-517.
uses of space. Thus, the prevailing view is that military use of space is permitted, so long as it is exercised in accordance with these provisions and does not violate other rules of international law. It should be acknowledged, however, that there is an opposing view in this respect:

The preamble of the Outer Space Treaty ”[recognises] the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes”. "Peaceful purposes” and "peaceful exploration and use” appear throughout the treaty, in reference to states’ activities in space. Similar language was employed in several of the General Assembly resolutions on principles governing states’ activities in space, declared during the negotiation of the Outer Space Treaty. Throughout, the use of "peaceful” appears to serve as aspirational language, as opposed to substantive provisions, save in one instance: In Article IV, it is stated that "[t]he moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes". This is immediately followed by an explicit ban on placing military bases, equipment and the like on the Moon and other celestial bodies.

It is plain from Article IV that the drafters of the treaty intended for the demilitarisation of the Moon and other celestial bodies. In contrast, there is no provision for demilitarisation of void space. Yet, the ubiquitous use of language paying homage to the interest that space should be used peacefully prompted a decades-long debate on whether military uses of space were lawful at all. At present, however, the debate has developed into a consensus among states to the effect that ”peaceful purposes” should be not interpreted as signifying non-military purposes, but rather as non-aggressive purposes. Indeed, the reality is that most states today derive some military utility from space applications, whether by deployment of their own space assets or by

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98 It should be mentioned that the Moon Agreement (see note 94) did go a bit further than the Outer Space Treaty vis-à-vis military uses of the Moon and other celestial bodies. However, the Agreement is widely regarded as ineffective, having suffered a loss of political support immediately following its entry into force. At present time, only a handful of states are parties to the Agreement, none of which are capable of conducting space activities independently. See Lyall and Larsen, p. 518.
securing access to other’s. Thus, in light of such widespread state practice, the point would seem to have become moot.

As of April 2017, the Outer Space Treaty has 105 states parties and an additional 26 signatories which have yet to complete ratification. Importantly, the core elements of the Outer Space Treaty, at minimum the essence of Articles I-IV, are widely regarded to have passed into customary law, thus binding all states.

There is a system in place for making clear to what state a space object, such as a satellite, belongs to. In a situation where several states are involved in the procurement and launch of a space object, or are stakeholders in its continuing mission, there is still only one state which, for the purposes of public international law, ”owns” the object, entailing control, jurisdiction and international responsibility. By Article VIII of the Outer Space Treaty, states retain jurisdiction and control over space objects carried on their national registries. By Article Registration Convention II(1) the launching state shall maintain such a national registry on which all of its space objects are carried. In the event of several states qualifying as ”launching states”, they must jointly determine which one of them shall be the state of registry. Pursuant to Articles III and IV of the Registration Convention, states of registry are required to provide basic information about their space objects, including orbital parameters and general function, to a public-access central register maintained by the Secretary-General of the United Nations. The significance of this is that regardless of what states or private entities de facto own or operate a satellite system, only one state is its owner and operator in the eyes of international law, enjoying the rights and carrying the obligations which follow from it. Of course, it is known that certain (presumably military) satellites never make it onto the central registry, in contravention of the Convention.

Naturally, there are several norms to the effect that states shall refrain from interfering in a harmful manner with each other’s space objects and activities. The Outer

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102 Lyall and Larsen, pp. 70-71.
103 Supra, at note 94.
104 Article II(2) and I of the Registration Convention, supra, at note 94
105 The Outer Space Objects Index is hosted by UNOOSA on authority of the Secretary General, and is available at http://www.unoosa.org/oosa/osoindex/index.jspx?lf_id=
Space Treaty is permeated with language emphasising the use of space in the spirit of co-operation and friendly relations. Article IX substantively but vaguely requires that states conduct themselves “with due regard to the corresponding interests of all other States Parties to the Treaty.” Article VII of the Outer Space Treaty holds states liable to damage caused by their space objects. It does however not extend liability to damage inflicted on the space objects of other’s by objects never launched into space, i.e. from the ground, nor does it cover non-physical damage.\footnote{Mountin, p. 145.}

Some additional protection is provided by international telecommunications law. The Constitution and Convention of the International Telecommunication Union (ITU Constitution) is the founding document of the International Telecommunications Union (ITU). It enjoys the impressive support of over 190 states parties and governs inter alia allocation of orbital slots and satellite telecommunications.\footnote{Constitution and Convention of the International Telecommunication Union, adopted by the 2014 Plenipotentiary Conference, published in Basic Texts, 2015, available at \url{http://www.itu.int/en/history/Pages/ConstitutionAndConvention.aspx}} Article 45 of the ITU Constitution prohibits harmful interference with the radio services or communications of other members. Naturally, this covers satellite communications as well.\footnote{See Mountin, pp. 133-139.}

Thus, there are \textit{lex specialis} legal grounds on which states can stand for the purposes of peaceful dispute resolution regarding interference with their space assets. Above all else, though, are the general provisions of the UN Charter. Among them, the prohibition of threat or use of force enshrined in Article 2(4) of the Charter. It is thoroughly accepted that the Charter’s rules on the use of force extend to states’ activities in outer space, as made plain by Article III of the Outer Space Treaty.\footnote{Petras, p. 1255. Mountin, pp. 172-183. a Lyall and Larsen pp. 525-527. Vermeer, Arjen, ’A Legal Exploration of Force Application in Outer Space’, vol. 46, Military Law and the Law of War Review, 2007, pp. 299; pp. 313-315. Dinstein, Yoram, ‘War, Aggression and Self-Defence’, 5th edn., Cambridge University Press, 2012, (hereinafter simply ”Dinstein”) § 571.} Should a state’s satellites suffer intentional violence or interference amounting to a use of force in the sense of Article 2(4), the United Nations Charter collective security regime comes into play.

To date, there have thankfully been no overt examples of inter-state hostilities in space. Consequently, however, there is great uncertainty as to how the law on the use of force applies in the context of attacks against satellite systems. Yet, in light of states’
clearly demonstrating their capacity to interfere with and wield force against the space assets of their rivals, there is an urgent need to seek to clarify how it does apply. Chiefly, it is vital to understand under what circumstances a state is permitted to exercise force in response to attacks against satellites, lest heavy-handed decisions prompt a dangerous escalation of conflict, eschewing the constraints of law. To do so, it is necessary to comprehensively examine the content and boundaries of the jus ad bellum (discussed infra) before applying our general conclusions to the specific context of attacks against satellite systems (at section 8).
4 The United Nations Collective Security Regime

4.1 The Prohibition of the Threat or Use of Force

Established in the aftermath of the horrors of the second world war, the United Nations Charter aims to "save succeeding generations from the scourge of war".\textsuperscript{111} To this end, a universal collective security regime inspired by and improving upon the earlier League of Nations framework was envisioned.\textsuperscript{112} At its centre is the prohibition of the threat or use of force, enshrined in article 2(4) of the Charter, and supported with a multilateral system of enforcement in chapter VII of the charter.\textsuperscript{113} Though aggressive war had previously been outlawed by the Kellogg-Briand Pact of 1928\textsuperscript{114} (to little practical effect), the introduction of the United Nations Charter in 1945 extended the prohibition of aggression much wider. Whereas the Kellogg-Briand pact had omitted armed reprisals short of war from prohibition, Article 2(4) of the Charter prohibits all nations from exercising force against their peers, as well as threats to that effect.\textsuperscript{115} Article 2(4) reads:

"All Members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the Purposes of the United Nations."

A comprehensive analysis of the intricacies of the Charter prohibition of the threat or use of force is beyond the purview of this paper. However, the general notion must be understood in order to appreciate its exceptions.

4.1.1 The Scope of Article 2(4) and the Notion of Force

The prohibition of inter-state use of force is generally agreed to rank as a \textit{jus cogens} norm.\textsuperscript{116} As the scope of the prohibition hinges on the notion of \textit{force}, naturally the precise meaning of the notion is a hotly debated issue, although there is a great deal of general agreement. The context of the Charter indicates that force in Article 2(4) refers

\begin{footnotesize}
\begin{enumerate}
\item See the Preamble to the Charter of the United Nations.
\item The ICJ has referred to the provision as "a cornerstone of the United Nations Charter"; see Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v. Uganda), Judgment, ICJ Rep. 2005, p. 168; § 148.
\item Treaty Between the United States and Other Powers Providing for the Renunciation of War as an Instrument of National Policy, 94 LNTS 57.
\item See Ruys, 'Armed Attack', p. 55.
\item Dinstein, § 283.
\end{enumerate}
\end{footnotesize}
to armed force. In the preamble, it is mentioned that the restriction of the use of armed force is one of the goals of the United Nations, and in chapter VII the word force is used in explicitly military contexts.\footnote{See § 7 of the Preamble to the UN Charter, and Articles 44-47 of the Charter.} Turning to the Charter’s \textit{travaux préparatoires}, a proposal made during the negotiation of the provision to include economic coercion in the prohibition was rejected, indicating that the drafters of the Charter had a narrow reading in mind.\footnote{See UNCIO vol. 6, §§ 334, 340, 609. Ruys, ‘Armed Attack’, p. 55.} A narrow reading in this respect is further supported by the UN General Assembly Friendly Relations Declaration, which omits mention of non-military actions in the context of the prohibition of the threat or use of force.\footnote{UNGA Res. 2625 (XXV) of 24 October 1970 ("Friendly Relations Declaration"). See also Dörr, Oliver, ‘Use of Force, Prohibition of’, in R Wolfrum (ed), The Max Planck Encyclopedia of Public International Law, Oxford University Press, 2015, available at opil.ouplaw.com/home/EPIL, § 11.} Thus, expressions of power other than armed or military force, such as unfriendly applications of economic or political pressure, would seem to fall entirely outside the ambit of the prohibition.\footnote{Bowett, Derek W., ‘Self-Defence in International Law’, Manchester University Press, 1958, p. 152.} As the prohibition of \textit{force} is to be understood as restricted exclusively to \textit{armed} force, it begs the question whether the object of such force is subject to restriction as well. Indeed, the wording of the Article would seem to imply that the prohibition regards "the threat or use of force against the territorial integrity or political independence of any state", which can be interpreted as a qualifier.

However, this wording is immediately followed by "or in any other manner inconsistent with the Purposes of the United Nations", which appears to rob the former wording of any qualifying substance. Those purposes are enumerated in Article 1 of the Charter: The maintenance of international peace and security, the development of friendly relations among nations and international cooperation. The reference to the purposes of the United Nations was, according to the prevailing view, added with the intention of excluding any loopholes from the ambit of art. 2(4), serving as a "catch-all" provision and thereby discouraging interpretations to the effect that threats or use of force not aimed at the territorial integrity or political independence of a state would, \textit{e contrario}, be lawful.\footnote{Ruys, ‘Armed Attack’, p. 57. Dörr, §§ 13-14.}

What is the meaning, then, of the wording regarding territorial integrity and political independence? A study of the \textit{travaux} yields that it appears to have been added
simply in order to supply emphasis on those two potential targets of force.\textsuperscript{122} Dörr underlines that while the prohibition of force is restricted to armed or military force, it must be interpreted very broadly within the confines of the restriction to encompass all forms of armed force exercised by states.\textsuperscript{123}

It must however be acknowledged in this context that there exist examples of state practice which suggest that there may be a qualifying element to the prohibition.\textsuperscript{124} Correspondingly, Ruys notes, a number of authors have of late fielded the view that there is a threshold under which forcible acts do not constitute uses of force within the meaning of Article 2(4), i.e., a gravity threshold.\textsuperscript{125} Ruys rejects this notion, arguing that even small scale armed confrontations between states are covered by Article 2(4), with the notable exception of in-deliberate acts. This exception is not put forward on the grounds that it falls below a gravity threshold, but on the grounds that behaviour which would otherwise constitute a use of force but which lacks hostile intent is not an exercise of force at all.\textsuperscript{126} The argument is that hostile intent itself constitutes the characterising element of which separates unlawful armed or military conduct — for example in-deliberate incursions into the sovereign territory of another state — from forcible acts in the meaning of Article 2(4).\textsuperscript{127}

As previously stated, the purpose of this study is chiefly to examine the law of self-defence. Thus, the prohibition of the threat or use of force will not be examined in any more detail. We now move on to its exceptions.

\textbf{4.2 Article 39 and the Security Council}

Article 39 of the Charter provide the Security Council mandate to act with respect to threats to the peace, breaches of the peace, and acts of aggression. Charged with the task of upholding international peace and security, the Security Council may impose, largely, any measures it sees fit to restore order, should the provisions for the pacific settlement
of disputes set out by chapter VI fail. Although originally designed to wield forces of its own, the process by which these were to be placed under the disposal of the Security Council was never actually seen through. Resultantly, through a somewhat creative interpretation of its own competence, the Security Council found the right to authorise UN member states to exercise force in its stead, pursuant to loose directions. Thus, states’ use of force by Security Council authorisation constitutes a de facto exception to the prohibition on inter-state use of force.

4.3 The Right of Self-defence under the UN Charter
The second exception to the prohibition on the use of force is the right to use force in self-defence. Article 51 of the Charter provides that:

"Nothing in the present Charter shall impair the inherent right of individual or collective self-defence if an armed attack occurs against a Member of the United Nations, until the Security Council has taken measures necessary to maintain international peace and security. Measures taken by Members in the exercise of this right of self-defence shall be immediately reported to the Security Council and shall not in any way affect the authority and responsibility of the Security Council under the present Charter to take at any time such action as it deems necessary in order to maintain or restore international peace and security."

Thus, despite the ambitious collective security regime, state were left with a safety valve for situations where the Security Council is slow to act or does not act at all. Similar to the case of Article 2(4), Article 51 hinges on the content of a notion — in this case that of armed attack — which the drafters of the Charter did not take any pains to explicitly define. In order to exercise the right to self-defence expressed by Article 51, the "victim" state must first establish that it has suffered an armed attack.

4.3.1 Limits to the exercise of self-defence
The placement of the burden-of-proof upon the presumptive victim state for showing that an armed attack has occurred is part of the condition of necessity, one of several conditions to the exercise of the right to self-defence not written into the text of Article 51 itself. The conditions form part on the customary jus ad bellum which accompanies the Charter rules. Their lineage can be traced back to the arguments put forward by US

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128 See Shaw, pp. 908-913.
129 The placement of the burden-of-proof for showing an armed attack has occurred on the victim state, in as a prerequisite for the use of force in self-defence has been confirmed in several ICJ judgements; see e.g., Oil Platforms § 57.
Secretary of State D. Webster in comment to the 1837 Caroline incident. Although it should be stressed that Webster’s comments were made then in the legal context of extra-territorial law enforcement. Webster’s formula would not be employed in a jus ad bellum context of until the Nuremberg Military Tribunal did so, a century later.  

4.3.1.1 The Condition of Necessity
Apart from the burden-of-proof on the victim to show that it is subject to an armed attack, another aspect of the condition of necessity is the requirement on the victim to be able to confidently attribute the act to the actor. In the practice of the ICJ, the issue of attributability has been most explicitly discussed in cases involving indirect acts. However, the issue was also discussed in the Oil Platforms case, in the context of determining whether a direct armed attack had occurred, an in a manner which goes a long way to illustrate just how high of an evidentiary threshold the presumptive victim of an attack has to overcome in this regard. In conjunction, the victim state must also verify that the presumptive attack was intentional (elaborated infra, at section 6.5).

Importantly, the condition of necessity dictates that force in self-defence only be used as a last resort. Therefore, the victim state must exhaust all possible means by which the situation might reach a peaceful solution, provided, naturally, that there is time for such endeavours and that the attempt would not be obviously futile. For instance, in the case of a full-scale invasion, the condition of necessity is usually

130 Dinstein, §§ 608, 727. For the facts of the Caroline incident and a study of Webster’s formula, see Jennings, Robert Yewdall, 'The Caroline and McLeod Cases', The American Journal of International Law, vol. 32/no. 1, 1938, pp. 82-99.
131 Generally, any state seeking redress from an international wrongful act must be able to attribute the act to the offending state or actor, see International Law Commission, Draft Articles on Responsibility of States for Internationally Wrongful Acts, November 2001, Supplement No. 10 (A/56/10), chp.IV.E.1, available at: http://www.refworld.org/docid/3ddb8f804.html, Art. 1.
133 See ICJ Oil Platforms case, §§ 57-61; in which the United States presented to the ICJ evidence of its claim that a US-flagged merchant vessel was struck by an Iranian missile. The US presented the Court with an eyewitness report of the missile flying in the general direction of its vessel, minutes before it was struck, as well as satellite imagery allegedly showing Iranian missile launch equipment in the general direction from which the witness stated the missile had flown from. The court however found this evidence insufficient, and The Court did furthermore not attach much evidentiary significance to the fact that President Khomeini of Iran had previously threatened to attack the US if it did not withdraw from the region.
134 Dinstein, § 612.
satisfied without the need for the victim to pursue alternate means for redress before employing force in self-defence.  

Lastly, if the armed attack is of the sort which justifies more than an on-the-spot response (see section 7), the condition of necessity does not allow for merely punitive responses, as such would constitute unlawful reprisals. When an armed attack has ceased, the victim may only undertake further defensive measures if it is confident that there is an impending threat of additional attacks. On this condition, measures undertaken with the aim of preventing further attacks fall within the bounds of necessity.

4.3.1.2 The Condition of Proportionality
The condition of proportionality precludes excessive defensive measures from being justified, even though recourse to force in self-defence per se is. It demands that forcible responses bear a reasonable degree of symmetry to the armed attacks which provoke them. It should not, however, be understood as a requirement for the response to be qualitatively symmetrical, i.e., in-kind, as in an-eye-for-an-eye. Indeed, if the armed attack itself is made in breach of not only the jus ad bellum prohibition on the use of force, but also in breach of the law of armed conflict — jus in bello — or other rules of international law which still apply to the conduct of belligerents, then the victim is naturally not permitted to respond in-kind. What is demanded is a reasonable degree of quantitative symmetry between the scale and effects of an armed attack and the scale and effects of the defensive response.

4.3.1.3 The Condition of Immediacy
The condition of immediacy, it should be noted, has not yet been explicitly recognised the International Court of Justice (hereinafter the ICJ, or the Court). However, its

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135 Ibid, § 695.
136 Dinstein, §§ 661 ff.
138 To borrow the term used by the ICJ in Nicaragua (see section 6), but then in the armed attack context.
139 Dinstein, § 613. Ruys, ‘Armed Attack’, pp. 181-182. Too avoid confusion, it is important to distinguish between jus ad bellum principle of proportionality and the principle by the same name in the realm of jus in bello. The principles are not one and the same. Furthermore, a caveat: In a state of “war”, i.e., the comprehensive use of counter-force in response to a very severe armed attack, the jus ad bellum condition of proportionality applies somewhat differently, no longer demanding rough quantitative symmetry, but actually allowing for the victim to thoroughly decimate the aggressor’s ability to commit further aggression. See Dinstein §§ 697 ff.
acceptance as law by states is evident in state practice.\textsuperscript{140} It demands that the time between an armed attack and a defensive response be kept to a minimum.\textsuperscript{141} In the opinion of the present writer, the its function can be described as follows: The condition of immediacy serves to make obvious the link between cause (the armed attack) and effect (the use of force in self-defence).\textsuperscript{142} The purpose of this is to keep an incident or armed conflict temporally contained, in the interest of preventing the line between peacetime and conflict from being blurred. Otherwise, there is the risk of new conflicts springing from the wounds of past transgressions. In the present authors’s opinion, this interest is built into the logic of Article 51. The use of force in self-defence is envisioned as a provisional measure, permitted only until the Security Council steps in. It is submitted that, although the collective security mechanism has failed more often than not due to political deadlocks within the Security Council, it would still go against the logic of Article 51 if the entitlement to invoke the right of self-defence did not fade away with the passage of time following an armed attack.

The time allowed for will of course vary depending on the nature of the armed attack. A certain amount of time will always be required for the victim state to comply with the conditions of necessity and proportionality. That is, to verify that it has been attacked, that the attack was intentional and can be confidently attributed to the presumptive attacker, to exhaust all feasible means of redress other than a recourse to force, and to decide on a necessary and proportionate response aiming to repel ongoing attacks and prevent further impending attacks, all while keeping the response proximate to the scale and effects of the initial armed attack.\textsuperscript{143} In the case of a border-clash, this process would usually be near-instantaneous. In the case of a large-scale territorial incursion, for example, more time must reasonably be allowed.\textsuperscript{144}

\textsuperscript{140} Dinstein, § 608.
\textsuperscript{141} Ibid, § 616.
\textsuperscript{142} See Dinstein, § 730.
\textsuperscript{143} See Ibid, § 616.
\textsuperscript{144} See Gazzini, Tarcisio, ’The Changing Rules on the Use of Force in International Law’, Manchester University Press, 2005, p. 144 f.; noting that the Falklands War provides an apparent example of when \textit{immediacy} must be interpreted in a flexible manner, i.e., allowing the victim to prepare a response.
5 The Relationship between Charter and Customary Jus ad Bellum

Evidently, a significant portion of the right of self-defence enshrined in Article 51 is not found in the text of the Article itself. Instead, it resides as unwritten customary law, continually shaped by the conduct of states. In the *Nicaragua* case, the ICJ confirmed that a definition of the notion of armed attack is not to be found in the Charter, and held that the "*inherent* right of [...] self-defence if an armed attack occurs" (emphasis added) refers to the treaty provision’s corresponding customary rule. An understanding of the customary jus ad bellum is essential for understanding the right to self-defence, and furthermore, the precise content of custom is often contentious. Therefore, it is important at this point to elaborate on a long-time and ongoing methodological dispute regarding the interplay between the respective customary and Charter self-defence rules.

Any analysis of states’ right to self-defence builds on an implicit or explicit assumption regarding the relationship between the jus ad bellum provisions laid out by the UN Charter and the jus ad bellum contained in customary law. It is important in this context to stress the comprehensive nature of the jus ad bellum, whether based in convention or customary law. An extensive right to self-defence is contingent on a correspondingly limited prohibition on the use of force. Conversely, a broad prohibition on the use of force coincides with a restricted right to self-defence. Therefore, any interpretation drawn upon the scope of either the prohibition on the use of force or its exception will bear upon the other side of the coin as well.

The methodological debate on this point features two distinct schools of thought. By one view, the pre-Charter customary law which governs the use of force and states' right to exercise self-defence has continued to exist unaltered in parallel with the United Nations Charter Jus ad bellum regime. In contrast, a majority of scholars are of the view, as expressed by Dinstein, that "[...] pre-Charter customary international law was impacted upon by the Charter and that, *grosso-modo*, customary and Charter *jus ad bellum* have in time converged." The existence of a jus ad bellum regime

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145 ICJ *Nicaragua* case, §§ 176, 194.
148 Dinstein, § 269; referring to the relationship between Article 2(4) and its customary law counterpart. See also Ruys, ‘Armed Attack’, p. 10.
wholly separate from that of the Charter is commonly invoked by those subscribing to
the first view in order to justify allegedly lawful uses of force in instances where no
armed attack has occurred, for example in anticipation of a future armed attack or in
response to uses of force below the threshold of an armed attack in the sense of Article
51. This interpretation rests on the assertion that Articles 2(4) and 51 of the Charter
merely affirm the pre-existing customary jus ad bellum, without necessarily expressing
the entire scope and content of that customary law. Consequently, according to this line
of reasoning, the reference in Article 51 to self-defence "if an armed attack occurs" is
merely an example of one instance where self-defence is lawful.

While the ICJ did attempt to shed light on the relationship between customary
and Charter Jus ad bellum in the Nicaragua judgement, it arguably also managed to
aggravate the above schism by a great deal. In the case, the United States argued that
that customary jus ad bellum was identical to that of the Charter, and that - by virtue of
this identity between the respective systems - customary jus ad bellum was not
applicable to relations between parties to the Charter. In dealing with the United
States' argument, the Court found that the customary law had not been subsumed and
supervened by the Charter, but "continues to exist alongside treaty law" and therefore
retained its separate applicability even if it were found to be identical in content and
scope as the Charter law. Moreover, the Court argued, the two systems were not
identical in content and scope, but differed in several respects. Disappointingly, the
court provided only limited guidance as to in what respects the two systems differ. It did
however point out that the requirements of necessity and proportionality in measures
undertaken in self-defence are found in customary law, as is the precise meaning of the
notion of armed attack. However, while the ICJ did frame the right to self-defence as
a customary right in the, it also asserted that:

149 See Ruys, 'Armed Attack', p. 58.
151 Military and Paramilitary Activities in and against Nicaragua (Nicaragua v. United States of America),
Jurisdiction and Admissibility, Judgment, ICJ Rep. 1984, p. 392, § 73 (not to be confused with the merits,
which are referred to in this work simply as the Nicaragua case)
152 ICJ Nicaragua case, § 176.
153 Ibid, §§ 174-177.
154 ICJ Nicaragua case, §§ 176, 194.
"[…] [customary] law has in the subsequent four decades developed under the influence of the Charter, to such an extent that a number of rules contained in the Charter have acquired a status independent of it. The essential consideration is that both the Charter and the customary international law flow from a common fundamental principle outlawing the use of force in international relations."\(^{155}\)

Thus, the Court stressed that not only had the Charter influenced customary law; there was at the time of the judgement a near-identity between the conventional and customary jus ad bellum, to such an extent that the inapplicability of the Charter to the dispute in the present case did not hinder the Court from applying its provisions, as reflected in customary law.\(^{156}\)

One of the primary precedential findings of the ICJ in \textit{Nicaragua} was the distinction between \textit{armed attack} and less grave uses of \textit{force}. As will be elaborated \textit{infra}, this \textit{dictum} comprises the basis for the view held by a majority of authors, that there is a threshold separating \textit{armed attacks} from other unlawful forcible conduct.\(^{157}\)

Such an interpretation would not seem to be apparent from the text of the Charter, but does not appear to run counter to it either.

However, the Court went a step further. Perplexingly, the Court went on to suggest that, while armed attacks give rise to the right to exercise force in individual or collective self-defence, less grave uses of force, while falling short of an armed attack, \textit{might} still entitle the \textit{direct victim} to lawfully employ counter-measures which themselves fall short of self-defence but nevertheless involve \textit{force}.\(^{158}\)

Regrettably, while the Court explicitly ruled out the legality of \textit{collective} armed responses to such uses of force which do not constitute armed attacks, it did not rule on the permissibility of individual forcible counter-measures by the direct victim, choosing instead to entertain the theoretical possibility that such responses might be lawful without pronouncing thereon.\(^{159}\)

\(^{155}\) \textit{Ibid}, § 181.

\(^{156}\) \textit{Ibid}, § 181.

\(^{157}\) Ruys, 'Armed Attack', pp. 146-147.

\(^{158}\) ICJ \textit{Nicaragua} case, § 210. Hargrove, for his part, is of the view that while the Court did not explicitly assert that the individual counter-measures in response to uses of force not amounting to armed attacks which the Court makes reference to might themselves include the use of force, it was nonetheless "strongly suggested". See Hargrove, John Lawrence, 'The Nicaragua Judgment and the Future of the Law of Force and Self-Defense', The American Journal of International Law, vol. 81/no. 1, 1987, pp. 135; p. 138. In a Separate Opinion to the later \textit{Oil Platforms} case, Judge Simma rejects the view that the Court was referring merely to "pacific reprisals". See Oil Platforms (Islamic Republic of Iran v. United States of America), (Separate Opinion of Judge Simma), ICJ Rep. 2003, p. 324; p. 332.

\(^{159}\) ICJ \textit{Nicaragua} case, §§ 211, 210.
Thus, despite initially asserting that there is a general, albeit not exact, overlap between customary and Charter jus ad bellum,\footnote{Ibid, §§ 174-177.} which the Court considered to "flow from a common fundamental principle outlawing the use of force in international relations";\footnote{Ibid, § 181.} the Court subsequently implied that forcible self-help in the absence of an armed attack \textit{might} nevertheless be lawful, pursuant, apparently, to some legal basis outside the Charter jus ad bellum regime. The reader is left to wonder whether there is any substance to the notion entertained yet not pronounced on by the Court. In the \textit{Oil Platforms} judgement, however, the Court made no reference to it, despite the facts of the case lending themselves quite well to such considerations.

The aforementioned allusion by the Court in \textit{Nicaragua} to a legal basis for lawful uses of counter-force is seemingly incompatible with the Charter jus ad bellum regime, and has resultanty attracted significant criticism from scholars over the years. Dinstein and Ruys express bafflement over the Courts distinctions.\footnote{Dinstein, § 552-553. Ruys, 'Armed Attack', p. 141.} Hargrove is quite vocal in his response to the Courts findings, labelling the findings of \textit{Nicaragua} in its entirety "a misfortune of some magnitude", and lamenting the implications of the "arbitrary announcement" that, when faced with uses of force not rising above the \textit{armed attack} gravity threshold put forward by the Court, "the victim may resist by force, provided it does so alone."\footnote{Hargrove, pp. 135, 141.} In essence, Hargrove accuses the Court of fundamentally weakening the prohibition on the use of force by "invention" of a new exception which he regards to have been artificially developed specifically to accommodate the circumstances of \textit{Nicaragua}.\footnote{Hargrove, pp. 135, 143.}

The present author is in agreement with the aforementioned critics. In particular, Hargrove is correct in identifying the implications of the Court’s rather ambiguous distinctions as undermining the foundations for the very relevance of the Charter law governing the use of force; its comprehensibility and inherent persuasiveness, i.e., its effectiveness as law.\footnote{Ibid, p. 142.} By departing from the written text of the Charter and venturing into the customary realm beyond its purview (as distinct from confining itself to an
examination of the Charter’s corollary customary norms) the Court implicitly invited
states to do the same in pursuit of alternate justifications — sifted from the murky legal
waters of inconclusive customary practice and foreign policy rhetoric — on which to
base forcible conduct against their peers.166 As Hargrove notes, it can be argued that the
Court merely intended to tentatively identify a sole additional exception to the
prohibition on the use of force, and not to lend credence to any further alleged
restrictions to it. While this might very well be true, it can hardly come as any surprise
that states tend to leap at apparent gaps in the law governing the use of force.167 Thus,
whatever the Court’s intentions were with its tentative contribution to the jus ad bellum,
it in effect opened a Pandora’s box of troubles by implicitly paving the way for the
advancement of other supposed legal bases for forcible inter-state conduct; pre-emptive
self-defence, protection of ethnic kinsfolk, re-establishment of historical borders, et cetera.168

It is difficult to ascertain whether the Court at present stands by its proposed
additional exception to the prohibition on the use of force or not. The fact that it went
without mention throughout the ensuing Oil Platforms judgement seems to suggest that
it has abandoned it. At the very least, Judge Simma stood by the Court’s tentative
finding and elaborated on his views of it in his Separate Opinion to the 2003 Oil
Platforms judgement, suggesting:

"[…] a distinction between (full-scale) self-defence within the meaning of Article 51 against an "armed
attack" within the meaning of the same Charter provision on the one hand and, on the other, the case of
hostile action, for instance against individual ships, below the level of Article 51, justifying proportionate
defensive measures on the part of the victim, equally short of the quality and quantity of action in self-
defence expressly reserved in the United Nations Charter."169

Clearly, the above referenced dicta can be viewed as lending credibility to the view that
the pre-Charter customary jus ad bellum was left intact, and simply reiterated by the
Charter. However, the assumptions underpinning such a view can be rebutted:

166 See Ibid, p. 142.
167 In Hargrove’s words: "[…] the natural tendency of governments is likely to be toward expansion, not
containment; and the principle that unilateral force can be used only in self-defence will have been
irreparably breached in any event by this unnecessary and obfuscating step." Hargrove, p. 142, at note 23.
169 See Oil Platforms, Separate Opinion of Judge Simma, pp. 331-332.
As Ruys notes, the entire point in creating the UN collective security regime was to depart significantly from pre-existing custom.170 Prior to the adoption of the Kellogg-Briand Pact and subsequently the UN Charter, inter-state use of force was not prohibited at all.171 States would of course frequently attempt to justify their actions by asserting some casus belli, but such invocations should be viewed as attempts at political, not legal, justification.172 Consequently, prior to the prohibition of inter-state use force, there cannot have been any customary law governing its lawful use in self-defence. Without a legal prohibition, there cannot have existed an exception. Therefore, the argument that Article 51 of the Charter was intended to be merely declarative of a pre-existing customary norm governing lawful uses of force in self-defence, inter alia in response to an armed attack, implicitly presupposes that an elusive customary norm to that effect arose in the early 20th century, subsequent to the 1928 Kellogg-Briand Pact but prior to the 1945 UN Charter. As Dinstein observes, there is little evidence in state practice to support such an assertion.173

Additionally, assuming for the sake of argument that such a customary norm did arise in the inter-war period, the probability that the drafters of the Charter, as Ruys puts it, ”merely desired to state the obvious — that self-defence is lawful against an armed attack — while leaving unaffected other, much more controversial, opportunities for lawful self-defence” is slim indeed, keeping in mind that the purpose of the Charter collective security regime is precisely to restrict states’ unilateral use of force.174 Hence, if the use of the adjective ”inherent” to describe states’ right to self-defence was intended denote the declarative nature of Article 51 and acknowledge the customary character of the right to self-defence, it is nevertheless unlikely that the right thus declared is of any broader scope than that which fits within the textual ambit of Article 51 itself.

170 Ruys, ’Armed Attack’, pp. 11, 12.
171 Ibid, pp. 11, 12.
172 Ibid, pp. 53-54.
173 Dinstein, § 521.
6 The Meaning of the Armed Attack Criterium

6.1 Force, Aggression and Armed attack

Moving on to an analysis of the meaning of armed attack, we need not look further than the text of the Charter itself to make some initial observations. The divergent terminology used by the Charter in relation to states’ use of force is an obvious point of departure.

Regarding the question of difference in scope between Article 2(4) and 51, a textual comparison shows that Article 51 is significantly restricted. While Article 2(4) outlaws the use as well as the threat of force, Article 51 comes into play "if an armed attack occurs" (emphasis added). A textual interpretation of this locution can hardly by any ordinary meaning of the verb be taken to connote mere threats, neither armed attacks which are alleged to occur at some point in the future. Although some authors — and states\textsuperscript{175} — hold that the right to self-defence can hardly be understood as allowing the use of force only if an armed attack has or is presently taking place, this position commonly rests on the assertion that there is a parallel legal basis for self-defence which postulates otherwise. As outlined above (see section 5), the assumptions underpinning this argument can be rebutted. Thus, assuming that contemporary jus ad bellum comprises a \textit{grosso-modo} coherent regime, while Article 2(4) outlaws threats of force, states may not respond with threats or uses of force in such instances, save in compliance with decisions by the Security Council.

In addition to the term force used in the Charter to denote prohibited inter-state conduct and the term armed attack used to qualify those acts against which a state lawfully exercise force in self-defence, the Charter also uses the term aggression in relation to inter-state uses of force. Specifically, Article 39 of the Charter mandates the Security Council to adopt an array of enforcement measures in response to threats to the peace, breaches of the peace and acts of aggression. The term acts of aggression also appears in Article 1(1), which asserts as one of the purposes of the UN to maintain

international peace and security and to that end take measures for *inter alia* "the suppression of *acts of aggression or other breaches of the peace."*\(^\text{176}\)

The mere use of divergent terminology suggests that the drafters of the Charter intended to confer distinct meanings upon *force*, *aggression* and *armed attack*. Taking into account the vision behind the UN collective security regime — which envisages an order where states’ use of force is contingent on Security Council action and forcible self-help is only permitted as a provisional measure — it would seem logical to assume a cascading relationship between the three concepts; *force* being the broadest and *armed attack* being the most narrow, with the object of limiting unilateral action to the most pressing circumstances. Delegates’ statements made during the negotiations of the GA Definition of Aggression as well as a majority of authors support the view that the three concepts are related but not the same, and that there the relationship between them can be viewed as cascading, or, if you will, concentric.\(^\text{177}\)

*Aggression* is furthermore tentatively linked to the notion of *armed attack* in Article 51, due in part to the fact that the equally authentic\(^\text{178}\) French version of the charter uses the term *agression armée* in place of the English version’s *armed attack*, and in part due to the provisional nature of measures undertaken in self-defence, which are permitted "until the Security Council has taken measures necessary to maintain international peace and security", strongly suggesting that an *armed attack* or *agression armée* should be viewed — in the context of the Charter — as bearing some degree of identity with such *acts of aggression* which shall prompt action by the Security Council pursuant to Chapter VII of the Charter.

### 6.2 The Relationship between Armed Attack and Aggression

Precisely what degree of identity the notion of *armed attack* shares with the notion of *aggression* is a long standing issue in scholarly writings on the jus ad bellum, and is subject to some controversy. As previously stated, a cascading relationship between *force*, *aggression*, and *armed attack* can be taken to be implied by the mere use of

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\(^{176}\) "Aggression" also appears in Art. 53(1) of the UN Charter, in relation to measures undertaken by regional defensive arrangements in response to the resurgence of "aggressive policy" by states which had been enemies to the original signatories to the Charter during the Second World War, but this provision is no longer relevant.

\(^{177}\) Ruys, 'Armed Attack’, pp. 138 ff., and cited works.

\(^{178}\) See VCLT, Art. 33.
distinct terminology in the Charter. Although agression armée is linguistically close to agression, it is nevertheless modified by the adjective armée, which can be interpreted as a qualifier, added with the intention to distinguish the former term from the latter. Consequently, there is a long-standing debate on where the notion of aggression fits into the jus ad bellum.

Some insights can be drawn from the 1974 General Assembly Definition of Aggression. During the decades-long process of negotiating the Definition of Aggression, states were in disagreement regarding what concept, precisely, they were attempting to define. Was the object of the endeavour to define agression armée in the sense of Article 51, or to define act of aggression in the sense of Article 39? While some states held that the concepts of aggression and armed attack were the same, a majority of states recognised agression armée/armed attack to be of a narrower scope. It was finally agreed that the resolution should be confined to the definition of aggression for the purposes of Article 39 and the Security Council.

It should however be remembered that the Definition was negotiated during the high tensions of the Cold War. States were highly aware of the fact that, irrespective of what concept the Definition was delimited to, the final product would doubtlessly be viewed as a statement de facto pertaining to both concepts. The negotiators were thus wary of doing much else than stating the obvious manifestations of unlawful uses of force.

Paradoxically, even though the Definition aimed to provide guidelines for Security Council determinations, the Council has thoroughly ignored it. Instead, the Definition has predominantly been cited in the context of self-defence. In Nicaragua, as well as in the later Armed Activities case, the ICJ used the Definition of Aggression as a point of departure in its determination of whether the indirect uses of force in the present cases constituted armed attacks. The Court made reference to the Definition’s

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179 UNGA Res. 3314 (XXIX) of 14 December 1974 (Definition of Aggression).
184 Ibid, § 33.
185 ICJ Nicaragua case, § 195. ICJ Armed Activities case, § 146.
Article 3(g), which states that "[t]he sending […] of armed bands […] which carry out acts of armed force […] of such gravity as to amount to [inter alia, attacks by regular forces]" shall qualify as an act of aggression.\footnote{See Art. 3(g) of the Definition of Aggression, read in conjunction with Art. 3 as a whole.} In Nicaragua, the Court thus used the description of acts constituting acts of aggression according to Article 3(g) of the Definition as a yardstick to argue that such acts, of certain scale and effects, can amount to armed attacks in the sense of Article 51 of the Charter. In this context, the Court also asserted that there appeared to be "general agreement on the nature of the acts which can be treated as constituting armed attacks" (emphasis added), implicitly referring to the acts enumerated in the Definition.\footnote{ICJ Nicaragua case, § 195.}

What is the value, then, of the Definition of Aggression for the present purposes of appreciating the scope of armed attack? While the Court’s statement implying that the Definition reflects a "general agreement" was undoubtedly overly optimistic,\footnote{See Ruys, 'Armed Attack', p. 1.} it might be taken to show that, in the Court’s opinion, the non-exhaustive list of examples of armed force contained in Article 3 of the Definition is illustrative of the nature, or kinds, of acts which can (if sufficiently grave) constitute armed attacks.\footnote{Art. 4 of the Definition of Aggression affirms that the list of acts in Art. 3 does not purport to be in any way exhaustive.} Dinstein appears to be of a similar opinion, asserting that "in practice the specific acts listed in Art. 3 Definition of Aggression are treated as manifestations of an armed attack."\footnote{Dinstein, Yoram, 'Aggression', in R Wolfrum (ed), The Max Planck Encyclopedia of Public International Law, Oxford University Press, 2015, available at opil.ouplaw.com/home/EPIL, § 33.}

It can moreover be argued that, if aggression is understood as a broader notion than armed attack, by implication any restriction to scope of aggression would a fortiori restrict the scope of armed attack as well.\footnote{See e.g. Constantinou, Avra, 'The right of self-defence under customary international law and Article 51 of the UN Charter', Bruylant, 2000, pp. 66 ff.} However, Article 6 of the Definition establishes that the Definition should not be understood to directly modify the scope of Article 51 of the Charter,\footnote{Art. 6 of the Definition of Aggression, stating: "Nothing in this Definition shall be construed as in any way enlarging or diminishing the scope of the Charter, including its provisions concerning cases in which the use of force is lawful."} and Article 4 confirms that the Definition does not purport to cover all forms of aggression.
Nevertheless, even though the precise relationship between *aggression* and *armed attack* is not clear, the ICJ’s treatment of the Definition in self-defence contexts shows that the Definition’s enumeration of acts constituting acts of aggression can be relied on to, at the very least, provide *circumstantial* evidence as to the scope of *armed attack*. Thus, while restrictions to the scope of (acts of) aggression evident in the Definition should not be taken to automatically also lessen the scope of *armed attack*, a general correlation presumably exists.\(^{193}\)

### 6.3 The Relationship between Armed Attack and Force

Interestingly, there is some evidence to suggest that the term *armed attack* was chosen by the drafters of the Charter as condition for self-defence because its meaning was regarded to be "self-evident".\(^{194}\) Prior to the Charter, the term *aggression* and not *armed attack* was regarded as the inverse of self-defence.\(^{195}\) However, numerous attempts to negotiate a legal definition of *aggression* during the League of Nations era had failed, and *aggression* had gained some notoriety for being near-impossible to define.\(^{196}\) It soon became plain that the new term proved to be nearly as elusive. Views diverged as to whether a large-scale attack was required for Article 51 to come into play, or if as little as, for example, a single rifle shot fired by a soldier across a border could qualify.\(^{197}\)

In the Nicaragua judgement, the ICJ confirmed the gap between *force* and *armed attack* by distinguishing between "the most grave forms of the use of force (those constituting an armed attack) from other less grave forms."\(^{198}\) The Court subsequently posited that the characterising element distinguishing the most grave uses of force from less grave ones is the "scale and effects" of the use of force in question, and that "mere frontier incidents" are not to be classified as such most grave forms of the use of force which constitute armed attacks.\(^{199}\) Additionally, in a later part of the judgement, the


\(^{194}\) *Ibid*, p. 96.

\(^{195}\) *Ibid*, p. 95.

\(^{196}\) See Ruys, 'Armed Attack', pp. 128-129.

\(^{197}\) Alexandrov, p. 97.

\(^{198}\) ICJ Nicaragua case, § 191.

\(^{199}\) *Ibid*, § 195.
Court speaks of uses of force which are of insufficient "gravity" to be classified as armed attacks.\textsuperscript{200}

Taken together, these \textit{dicta} express the Court's subscription to the view that \textit{armed attack} denotes a qualified form of force, and that consequently, only the \textit{most grave} uses of force overstep this \textit{de minimis} or \textit{gravity} threshold. This position was confirmed in the \textit{Oil Platforms} judgement by similar \textit{dicta}, with reference given to the findings in \textit{Nicaragua}.\textsuperscript{201} Since the aforementioned findings in \textit{Nicaragua} were made in the context of determining whether support rendered to non-governmental armed groups by a state could be seen as amounting to an armed attack (by the supporting state against the state afflicted by the groups' hostilities), certain authors have taken the Court's \textit{dicta} to be of relevance only in the specific case of \textit{indirect} uses of force.\textsuperscript{202} Yet, as Ruys notes, the reference to "mere frontier incidents" was made in relation to uses of force by the regular armed forces of a state, indicating that the Court regarded the findings to have general applicability.\textsuperscript{203} Furthermore, when the Court reiterated the differentiation between less grave uses of force and those of sufficient scale and effects to be regarded as armed attacks in the \textit{Oil Platforms} judgement, it was done in the context of direct inter-state uses of force between the United States and Iran, suggesting that the Court regards the notion of \textit{armed attack} to be delimited by a gravity threshold in general, and not only in the special case of indirect uses of force.\textsuperscript{204}

Authors have levelled criticism against the Court's assertion that only uses of force of some \textit{scale and effects} amount to armed attacks, and its exclusion of "mere frontier incidents" from this category of force. These essence of the critique put forward by these authors with regard to the Court's delimitation of \textit{armed attacks} by a gravity threshold is threefold: First, it is observed that a textual interpretation of the term \textit{armed attack} does not in itself mandate a conclusion that only attacks of a certain scale qualify.\textsuperscript{205} Secondly, these authors take issue with the Court's elevation of the gravity threshold above "frontier incidents". Rightly pointing out that there is a vast continuum

\begin{footnotesize}
\begin{enumerate}
\item \textit{Ibid}, §§ 247-248.
\item \textit{ICJ Oil Platforms} case, §§ 51, 64.
\item Ruys, "Armed Attack", p. 140.
\item \textit{ICJ Oil Platforms} case, §§ 51 ff.
\item See, e.g., Hargrove, pp. 139-140.
\end{enumerate}
\end{footnotesize}
of acts which could be described as frontier incidents — some of which may involve a significant degree of damage, personal injury and death — the authors inquire as to what quantum of force, border-adjacent or otherwise, the Court had in mind when establishing the *scale and effects* test, and lament the resultant ambiguity of the statement.\footnote{Dinstein, §§ 557-558. Taft, p. 300.} Finally, operating under the assumption that the Court did have quite grave incidents in mind, the authors posit that the gravity threshold has thus been set too high for it to be realistically expected of states’ under assault to respect it.\footnote{See Ruys, 'Armed Attack', pp. 143-144, 148-149.}

The present author agrees with the first two observations. With regard to scholarly opinions on the existence or ideal placement of a gravity threshold delimiting the *armed attack* concept, the present author shares Ruys view; that while the position of the gravity threshold without doubt bears upon the effectiveness of the jus ad bellum itself, scholarly views as to its precise placement are, arguably, often inspired in large part by policy considerations, and thus bear the character of opinions *de lege ferenda*.\footnote{Ibid, pp. 148-149.} The meaning and limit of the notion of *armed attack* is, as asserted by the Court in *Nicaragua*,\footnote{ICJ *Nicaragua* case, §§ 176, 194.} not specified by the Charter but determined by customary law. Indeed, any international law is primarily determined by the conduct of states. Therefore, in order to appreciate the placement of a gravity threshold *de lege lata*, it is appropriate to look to customary practice.\footnote{Ruys, 'Armed Attack', p. 149.}

### 6.4 The Gravity Threshold

#### 6.4.1 Clear and Complex Cases

A divergence of views with respect to the placement of the gravity threshold is admittedly not cause for many problems in instances involving large-scale attacks and territorial incursions, such as those which preceded the 1950 Korean War or the 1990 invasion of Kuwait by Iraq.\footnote{See *Ibid*, p. 152.} Interpretative issues are legion, however, for instance when determining whether small-scale attacks, attacks against the external manifestations of a state, or attacks carried out through unconventional means, constitute *armed attacks* in the sense of Article 51.
As will be shown, attacks against satellites are commonly found at a legally precarious spot at the nexus of those three complicating factors. Satellites are most certainly external from the territory of the state, which raises a host of questions in any self-defence context, as will be elaborated infra. Furthermore, they present a prospective attacker with an array of options for interference, many of which cannot — by any common meaning of the terms — be regarded as either large-scale nor conventional. Consequently, it is necessary to establish as closely as possible where the elusive gravity threshold lies, drawing from terrestrial examples. Our conclusions in this regard will then form the basis for a discussion as to just how the notion of armed attack pertains to various possible attacks against satellite systems.

6.4.2 Examples of Gravity Threshold Determinations
At one end of the gravity spectrum, the Eritrea Ethiopia Claims Commission found that "[l]ocalized border encounters between small infantry units, even those involving the loss of life, do not constitute an armed attack for purposes of the Charter", regarding a series of clashes between the armed forces of Ethiopia and Eritrea between 6 and 12 May 1998.212 The reasoning behind this finding is clearly in line with the view that only massive attacks qualify as armed attacks in the meaning of Article 51, expressed inter alios by Judge Simma in his Separate Opinion to the Oil Platforms judgement.213 Critics have however pointed out that, in casu, the Claims Commission neglected to discuss whether the border encounters taken together, and viewed in the context of constituting a nascent aggressive war, might amount to an armed attack for the purposes of Article 51.214 In this respect then, the Commission deviated from the formula aid out by the ICJ in Nicaragua, which took account of ”the circumstances of these incursions or their possible motivations” in its effort to determine whether the incidents presented in that case amounted ”singly or collectively” to an armed attack (see section 6.5).215

213 See supra, section 5.
215 ICJ Nicaragua case, § 231.
Dinstein vocally regrets the Commission’s finding, holding “[t]he notion that loss of life does not count in appraising an armed attack only because it occurs along the border (and only infantry units are involved?)” to be “flagrantly indefensible”.216

At the other end of the spectrum, there are numerous examples of situations where states have — pursuant to the reporting requirement contained in Article 51 — reported the use of force in self-defence to the Security Council in response to small-scale attacks. For example, an exchange of fire between Indian soldiers and Chinese civilian border guards in 1976 was held by China to constitute an exercise of the Charter-enshrined right to self-defence on China’s part. Similarly, armed responses to border-adjacent fire have been reported as lawful exercises of force in self-defence, by Pakistan against India in 2000, by Israel against Lebanon in 2007, and by Thailand and Cambodia against each other in 2008.217 More controversially, when Sweden detected a foreign submarine submerged deep inside its territorial waters in 1982, it reported its employment of depth charges as a lawful exercise force in self-defence. The response, as well as a subsequent change of instructions mandating Swedish armed forces to respond in such a manner in similar instances, went without explicit protest from the international community, although this lack of protest might be attributable to the context in which the incident took place; against a backdrop of repeated such incursions and in the vicinity of military installations.218

In several instances, armed responses to small-scale attacks which have been framed by states as exercises of force in self-defence have attracted criticism from the international community. However, the criticism in such cases tends to focus on the necessity and proportionality of the response, or doubts to whether the attack can be attributed to the target of the response, rather than the legality of responding with force per se.219 For example, when Israel in 2006 intervened in Lebanon against Hezbollah, which had previously ambushed an Israeli border patrol and wounded civilians with rocket attacks, it did so by a ground operation against Hezbollah positions in Lebanon coupled with air and artillery strikes. While most states held the Israeli response to be

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216 Dinstein, § 556.
disproportionate, importantly, a majority of Security Council members held that the initial Hezbollah attacks did constitute armed attacks in the sense of Article 51, and that Israel was, in principle, entitled to exercise force in self-defence. The necessity and proportionality of armed responses were also contested when the United Kingdom bombed the Yemeni Harib fort in 1964 in response to Yemeni raids against the British protectorate the South Arabian Federation, and again when the United States claimed to have had two military vessels attacked by North Vietnamese torpedo boats in the Gulf of Tonkin incident, subsequently responding by repelling the North Vietnamese boats and moreover bombing coastal targets in North Vietnam. The UK and US armed responses were criticised for overstepping the bounds of necessity and proportion, but interestingly, the international community did not contest, in principle, the invocation of Article 51.

State practice, in combination with implicit expressions of *opinio juris* in the form of silent acquiescence (see supra, section 1.4.2) is arguably the clearest indicator of customary law for the purposes of determining where the gravity threshold lies. The state practice outlined above suggests that the gravity threshold is perhaps not so high a barrier as it is at times made out to be.

### 6.5 The role of Past Events, Intent, and Actual Consequences

The context in which an incident occurs doubtlessly bears upon any effort to determine the existence of an armed attack. In *Nicaragua*, the ICJ considered the contextual aspect of past events in its determination effort. Dealing with a series of incursions by armed bands of *contras*, the Court considered whether the incidents could be regarded to "singly or collectively" (emphasis added) amount to an armed attack. The notion that a series of related events can be treated collectively for the purposes of jus ad bellum determinations — the *accumulation of events* theory — is discernible in state practice and scholarly writings prior to *Nicaragua*. However, as evidenced by statements

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220 See Ruys, 'Armed Attack', p. 157. It should be stressed in regard to this example that there is considerable controversy as to whether the event can be regarded as an armed attack in the *rationae personae* respect, i.e., regarding the attack’s attributability to Lebanon. However, here it is only used to illustrate armed attack in the *rationae materiae* sense, see Ruys, 'Armed Attack', p. 126.


222 ICJ *Nicaragua* case, § 231.

made by the Court in *Nicaragua*, and subsequently also in the *Oil platforms* and *Armed Activities* judgements, it is clear that the theory now enjoys the support of the ICJ.\(^\text{224}\) Thus, a series of acts which individually fall short of the gravity threshold can possibly cumulatively amount to an armed attack, on condition that the evidence of their interconnectedness is sufficiently strong. Telling factors in that regard are, naturally, their attributability to a common attacker, but also whether they occur proximate in time and can be presumed to be linked by a common general intent.\(^\text{225}\)

The latter note brings us to the another important contextual aspect of the *armed attack* concept, namely the role of the subjective element of *hostile intent, or animus aggressionis*. The subjective criterium can be inferred from the term *attack* itself, since mere error, however destructive, would not seem to fit into a common understanding of the word. This requirement was affirmed by the ICJ in *Oil Platforms*, wherein it found the ”specific intention of harming” to be a prerequisite for determining the existence of an armed attack.\(^\text{226}\)

Consider a scenario wherein the allied states A and B conduct joint training exercises in a remote region. Tragically, an error causes state A to train live artillery fire on a unit belonging to state B, killing several soldiers. The act is not an armed attack, because there was never any *hostile intent* on part of state A. What about a case where the forces of state C inexplicably begin to traverse the border *en masse* into neighbouring state D? Since states have all but done away with declarations of war, state D must rely on the facts at hand to infer whether it is being subjected to an attack.

Large-scale acts, such as invasions, generally betray the hostile intent of the invader in and of themselves, whereas smaller incidents must be more carefully examined. In this respect, looking to the relationship between the parties is of guidance, as is the determination of whether a series of incidents appear to be premeditated or part of part of a coherent pattern.\(^\text{227}\) Interestingly, Brownlie appears to view the distinction between *armed attacks* and *frontier incidents* to be valuable chiefly because the minor

\(^{224}\) See ICJ *Nicaragua* case, § 231; ICJ *Oil Platforms* case, § 64; ICJ *Armed Activities* case (DRC v Uganda) §§ 146-147.

\(^{225}\) See Ruys, 'Armed Attack', pp. 168 ff.

\(^{226}\) ICJ *Oil Platforms* case, § 64.

nature of an incident can be taken as evidence, *prima facie*, of an absence of hostile intent.228

Furthermore, the *actual* consequences of an attack seem to be of lesser importance for the purposes of determining whether it reaches the gravity threshold. Instead, states would appear to attach significance primarily to what consequences the attack is *liable to produce*.229 The Yemeni attack which prompted the British response apparently did not result in any deaths but those of some South Arabian Federation camels. Yet, states did not condemn the UK for responding, other than in the regard that the response was excessive.230 Likewise, states were generally supportive of the 1993 US raid against Iraqi intelligence headquarters in response to a failed attempt on former President George H.W. Bush’s life. The US argued that it was responding in self-defence against the assassination attempt, which it labelled as an armed attack attributable to Iraq.231 It should however be stressed that *liable to produce* in this context should not be understood as those potential, extreme consequences which there is a small chance an attack might have, but rather, as put forward by Dinstein, be understood as those effects which are reasonable foreseeable.232

6.6 The role of Weapons Used
In its 1996 Advisory Opinion on the legality of the threat or use of nuclear weapons, the ICJ affirmed that the applicability of Articles 2(4) and 51 are not in any way determined by the weapons employed in the exercise of force.233 In doing so, it confirmed the validity of an earlier assertion by Brownlie; that *force* in the sense of the Charter prohibition must be understood more broadly than denoting only kinetic weapons, and that chemical, biological or any other weapons which can bring about the "destruction of life and property" qualify as *arms* for the purposes of the Charter.234

228 Brownlie, Ian, 'International Law and the Use of Force by States', Oxford University Press, 1963, p. 366. It should be noted that Brownlie was referring to the concept of *frontier incident* as it appeared in scholarly writings and General Assembly discussion before the ICJ had made reference to it in the Nicaragua judgement.
232 See Dinstein, § 551.
234 Brownlie, pp. 362-363.
Recently, the advent of computing has brought with it the possibility for Computer Network Attacks or, in contemporary parlance, cyber attacks. Such attacks are highly problematic in the sense that it is dauntingly difficult to fit them into the Charter’s conception of force. While it is certainly true that cyber attacks have the potential to cause destruction to life and property, most forms of cyber attacks do not affect persons or property in the physical realm. In addition, the cyber attacks that do affect tangible objects can be scaled to only do so in a non-destructive and temporary manner, resulting not in destruction but in denial, adding another layer of complexity to the problem. For example, consider a case where a cyber attack causes a military Unmanned Aerial Vehicle to cease reporting its position and causing it to drift off course, interrupting its mission, but only temporarily. Such an act would neither destroy nor damage the asset, yet still manage to deny its purposefulness from the user.

6.6.1 The Systemic Constraints of the Charter Jus Ad bellum
In a 1999 article titled 'Computer Network Attack and the use of Force in International Law: Thoughts on a Normative Framework', Schmitt delves into a functional interpretation of the Charters prohibition of force. Finding that the focus on the instrument of coercion — i.e. the distinction between (prohibited) armed coercion (force in the sense of Article 2(4)) and economic or political coercion — constitutes a prescriptive short-hand put in place to avoid dealing with the more complicated process of dealing with the legality of acts purely based on their consequences.235

An example drawing from domestic law might serve to illustrate Schmitt’s reasoning: The criminal prohibition of inter-personal violence ultimately serves to uphold the higher values of individual/societal security and human dignity. However, since a blanket prohibition on all acts which endanger individual or societal security and/or human dignity is difficult indeed to practically apply, the prohibition is instead placed on an intermediate level, against the means which can endanger those values. Schmitt finds that the advent of cyber attacks challenges the Charter’s instrumental approach, since such attacks have the potential to wreak havoc without necessarily

qualifying as (armed) *force* in the sense of the Charter prohibition, let alone in the sense of Article 51.\textsuperscript{236}

In light of the Charter’s employment of a prescriptive short-hand to prohibit coercion by one instrument (forcible coercion), but allow it by others (political and economic coercion) Schmitt submits that, absent an utterly novel normative framework, the only way to treat cyber attacks for the purposes of determining whether they constitute a use of *force* or not is to trace the precise boundaries of the *force* concept, and determine whether or not a given cyber attack falls within or without the concept. To this end, Schmitt employs a two-pronged approach. The clear case, he argues, is when cyber attacks are intended to produce effects *equivalent* in nature to those which could have been caused by other weapons, i.e., physical damage or injury. In these cases, the fact that a cyber attack was the means by which the effect was achieved is immaterial. The more daunting case is when a cyber attack does not directly cause physical damage nor injury. Relying on the fact that the ICJ in *Nicaragua* suggested that the boundaries of the *force* concept extend just slightly beyond *armed force* to also include acts analogous to the direct use of armed force, namely *agency* over another actor’s armed force (in casu, arming and training *contras*), Schmitt argues that cyber attacks which produce effects negative analogous to those caused by armed force might qualify as *force* in the sense of Article 2(4) as well.\textsuperscript{237}

In regard to cyber attacks and the concept of *armed attack* however, Schmitt argues that since *armed attack* is a narrower concept than that of *force* — and deliberately so pursuant to the collective security regime’s relegation of unilateral force (in self-defence) to the rung of last-resort mechanism — there can be no treatment of cyber attacks which *do not* produce effects which are equivalent to those produced by *arms* as *armed attacks*. Put differently, acts which exclusively cause non-physical harm fall outside the typical effects of *arms*, and therefore cannot constitute *armed attacks*, irrespective of the non-physical devastation caused. Consequently, Schmitt asserts, cyber attacks can constitute *armed attacks* in and of themselves, but only when they are


\textsuperscript{237} *Ibid*, pp. 913-917, drawing from the ICJ *Nicaragua* case § 228, cited by Schmitt at p. 909.
used as *arms* in the Charter sense, i.e., intended to cause physical destruction or injury.\(^{238}\)

Contemporary scholarship on the jus ad bellum as it applies to the cyber context has largely built upon the normative framework proposed by Schmitt in 1999. The prevailing views on how international law applies to this context have arguably been authoritatively reflected in the ongoing Tallinn Manual project, in which the most renowned international law scholars and practitioners of the cyber field have set down a great number of *black-letter rules* on the international law applicable to cyber warfare and cyber operations.\(^{239}\) In line with Schmitt’s reasoning, the authors of the Tallinn Manual “agreed that a cyber operation that seriously injures or kills a number of persons or that causes significant damage to, or destruction of, property would satisfy the scale and effects requirement.”\(^{240}\)

As previously stated, cyber attacks pose somewhat of a problem to the effectiveness of the jus ad bellum, since they are capable of producing widespread negative effects without necessarily causing physical damage or injury. Resultantly, certain scholars — among them a number of the authors of the Tallinn Manual — have fielded the view that harm to persons or damage to physical property should *not* be seen as condition precedent to the characterisation of an incident as an armed attack. Instead,

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\(^{238}\) Schmitt, 'Computer Network Attack’, pp. 928-929. In a later article, Schmitt expresses this view more succinctly, stating that: "The facts that the use of force language in Article 2(4) is not qualified by the term "armed" and that the phrase "use of force" has been authoritatively interpreted as not necessarily implying a kinetic action allow for interpretive leeway […]. By contrast, the phrase "armed attack" tolerates little interpretive latitude.” Schmitt, Michael N., 'Cyber Operations and the Jus Ad Bellum Revisited', Villanova Law Review, vol. 56/no. 3, 2011, pp. 569; see p. 588.

\(^{239}\) It should be stressed that these rules are in no way binding, nor enforceable in themselves, but should be treated as scholarly writings. The aim of manuals on specific topics of international law is however to establish informal rules of the road with in the hope that states will in time recognise them. See Schmitt, Michael N. (ed.), 'Tallinn Manual on the International Law Applicable to Cyber Warfare', 1st edn., Cambridge University Press, 2013; and particularly, Schmitt, Michael N. (ed.), 'Tallinn Manual 2.0 on the International Law Applicable to Cyber Operations' 2nd edn., Cambridge University Press, 2017.

the argument goes, determinations of whether an act constitutes an *armed attack* or not should be based purely on the extent of the ensuing negative effects.\textsuperscript{241}

The present author agrees with the sentiment expressed by the authors taking this position, but cannot accept their conclusions. The systemic constraints on the Charter jus ad bellum have, with the advent of non-kinetic "weapons" such as cyber attacks and communications jamming equipment, become blatantly obvious. However, Schmitt’s functional interpretation of the Charter’s jus ad bellum provisions is utterly convincing. Indeed, economic or political coercion can be seen as a non-kinetic "weapons" in so far as these means of coercion undeniably have the potential to wreak havoc on the economic and political stability of a state. Nonetheless, the prevailing view is that every means of coercion save *armed* coercion, i.e., means liable to produce physical damage and injury, have been deliberately left without the ambit of the *armed attack* concept.\textsuperscript{242} The resultant gap between harmful acts and states’ ability to employ force to defend against them is, viewed from the perspective of victim states, undeniably unsatisfactory. However, as illustrated by historical examples of economic or political coercion, for instance the employment by Persian Gulf states of the "Oil Weapon” during the 1970’s,\textsuperscript{243} state’s taking advantage of this gap is nothing new. Advancements in technology have merely aggravated it.

Commenting on the crippling Distributed Denial of Service (DDoS) attacks levelled against Estonia in response to the Bronze Soldier incident in 2007, Schmitt

\textsuperscript{241} See 'Tallinn Manual 2.0’, p. 342. This view has been vocally advanced by Li, who considers the argument that the extension of *armed attack* to cover non-kinetic effects would overstep the systemic constraints of the Charter jus ad bellum to be "weak", arguing that the interpretation of the *armed attack* requirement has evolved in the face of novel contexts before, and is capable of doing so again. In particular, Li likens the possible devastating effects caused by Distributed Denial of Service (DDoS) attacks - such as the massive DDoS attack which crippled Estonia’s internet infrastructure in 2007 - to the widespread negative effects caused by naval blockades, and argues that the former should, by analogy, be regarded to qualify as *armed attacks* subject to similar requirements for when naval blockades are considered to do so. See Li, Sheng, 'When Does Internet Denial Trigger the Right of Armed Self-Defense?', vol. 38, Yale Journal of International Law, 2013, pp. 179; pp. 186 ff.

\textsuperscript{242} See Schmitt revisited, p. 588, stating that: "Clearly, an armed attack includes kinetic military force. Applying the consequence-based approach, armed attack must also be understood in terms of the effects typically associated with the term "armed." The essence of an armed operation is the causation, or risk thereof, of death or injury to persons or damage to or destruction of property and other tangible objects. Therefore, while an armed attack need not be carried out through the instrument of classic military force, its consequences (or likely consequences but for successful defensive action) must be analogous to those resulting from its employment. A cyber operation that does not risk these results may qualify as an unlawful use of force, but will not comprise an armed attack permitting forceful defensive action."

holds as conceivable that the ambit of the *armed attack* concept may extend to cover non-kinetic effects in the future, provided that customary law develops in this direction, but asserts that, at present, a shift to this effect is not discernible.\(^{244}\)

### 6.7 Armed Attacks against the External Manifestations of a State

**6.7.1 The Significance of the Locale of an Armed Attack**

When determining if an act constitutes an armed attack or not, the *locale* of the act in question has bearing upon the task of determination. In the case of an invasion, the mere crossing of an international border by the armed forces of state A into the territory of state B might in itself constitute an armed attack, if it is done with hostile intent and is sufficiently grave.\(^ {245}\) In other cases, State A might launch weapons from its territory or air and naval assets which strike targets within the territory of state B. The fact that the territory of a state has been intruded upon or targets therein struck is a convenient yardstick when determining if an armed attack has occurred. Such acts constitute *prima facie* evidence of an act of aggression, according to the Definition of Aggression.\(^ {246}\)

Notwithstanding the fact that the Definition of Aggression formally serves as a guideline for Article 39-determinations, and not Article 51, the evidentiary rule it employs holds as true for determinations of the existence of an *armed attack*.

Put differently, grave uses of force by a state against targets within another state’s territory creates a strong presumption toward the attacking state’s hostile intent, and allows the victim state to — absent indications to the contrary — safely presume that it is the target of an armed attack.\(^ {247}\) In contrast, the situation is less clear when persons or objects which are connected to a state but not situated within its territory are struck. Persons and objects which bear a connection to a state but which are situated outside its territory are referred to as "external manifestations" of a state in this context.\(^ {248}\) For example, would an attack on a military vessel on the high seas constitute an armed attack against the state it represents? How about embassies, or nationals

\(^{244}\) Schmitt, ‘Cyber Operations and the Jus Ad Bellum Revisited’, p. 588.

\(^{245}\) Dinstein, pp. 560-562.

\(^{246}\) See Arts. 2 and 3 of the Definition of Aggression, and *supra*, section 6.2.

\(^{247}\) See Dinstein, §§ 533, 560 ff.

\(^{248}\) In this paper, the term "external manifestations" is used in a wide sense, encompassing all persons and objects bearing an association to a state which are situated beyond its borders. Its use in this wide sense should not be taken to imply that the present author views attacks on persons or objects so referred to as automatically qualifying as attacks on the state itself.
abroad? It is certainly possible that such attacks could constitute armed attacks in the
sense of Article 51 of the Charter, but the task of determination becomes significantly
more complex.

The chief reason for this is that the presumption is reversed. While attacks
against the territory of a state may, absent evidence to the contrary, be treated as armed
attacks against that state, the opposite is true for attacks on persons or property beyond
the state’s territory. As a general matter of principle, states are not entitled to resort to
force in order to protect persons or property abroad. Certain legal grounds may
provide exceptions to this rule, for example extra-territorial law enforcement, or the
right to self-defence, but the exceptional nature of such acts must be stressed.

6.7.2 The Significance of the Targets of an Armed Attack
For self-defence, the question which must be asked is to what extent the persons or
objects in question qualify as external manifestations of the state, in the sense that an
attack against them can be regarded as an attack on the state itself for the purpose of
applying Article 51 of the Charter. Article 3(d) of the Definition of aggression
provides that “[a]n attack by the armed forces of a State against the land, sea or air […]
forces of another state” constitutes prima facie evidence of aggression. Similarly, the
notion that attacks on military units and installations outside the territory of a state may
be regarded to constitute attacks against the state itself is uncontroversial, evidenced by
state practice, court rulings and scholarly writings alike. In the Oil Platforms case,
when a US warship struck a mine in international waters, ICJ did not ”exclude the
possibility that the mining of a single military vessel might be sufficient to bring into
play the ”inherent right to self-defence””. The same cannot categorically be said in
the case of attacks on other kinds of external manifestations, such as embassies, civilian
aircraft and merchant vessels, or nationals abroad. To the contrary, these issues are
subject to much debate.

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249 See Shaw, p. 830; and Ruys, ’Armed Attack’, pp. 243-244, discussing the contested legality of the use
of force for the protection of nationals and property abroad.


252 ICJ Oil Platforms case, § 72.
6.7.2.1 The Link between Self-defence and the Concept of Sovereignty

In the present writer's opinion, the most interesting question to pose in this context is on what grounds, exactly, certain classes of external manifestations are treated differently than others. More fundamentally, what is the rationale behind treating persons and objects within the territory of a state differently than those without it? Unsurprisingly, the answer seems to be strongly related to the nebulous concept of sovereignty, and statehood itself. In Nicaragua, the ICJ observed that the "principle of respect for State sovereignty [...] is [...] closely linked with the principles of the prohibition of the use of force and non-intervention". 253

To be clear, the concept of the sovereign state is a legal fiction, although an undeniably powerful one. It constitutes the very fundament of the international legal order since the Peace of Westphalia. At the same time, its precise meaning is strikingly amorphous. Oppenheim famously stated that:

"There exists perhaps no conception the meaning of which is more controversial than that of sovereignty. It is an indisputable fact that this conception, from the moment when it was introduced into political science until the present day, has never had a meaning which was universally agreed upon." 254

However, a well-accepted definition of sovereignty was put forward by the Permanent Court of Arbitration in the Island of Palmas arbitral award, stating that:

"Sovereignty in the relations between States 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." 255

What is striking is that the numerous seemingly disparate elements most commonly, and perhaps intuitively, seen as forming part of the nucleus of statehood — inter alia territorial integrity, political independence, 256 and jurisdiction — can be seen as constituting different facets of the same concept, when framed as expressions of independence. At heart, the right of self-defence can thus be seen to flow from a state’s right to protect its independence. Put differently, the right of self-defence flows — as

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253 ICJ Nicaragua case, § 212.
255 Island of Palmas Case (or Miangas), United States v Netherlands, Award, Permanent Court of Arbitration, (1928) II RIAA, pp. 829; 256, p. 838.
256 Expressed e.g. by Article 2(4) of the United Nations Charter, and by Article 1 of the Montevideo Convention on the Rights and Duties of States, Montevideo, 26 December 1933, in force 26 December 1934.
expressed by the ICJ in its *Nuclear Weapons* advisory opinion — from the "fundamental right of every State to survival."\textsuperscript{257}

Nevertheless, it is evident that certain attacks strike closer to the heart of the legal fiction of the state than others, and there appears to be a strong correlation between the degree of association between the target of an attack and the legal fiction of the state on one hand, and the propensity to frame the act as an armed attack on the other. Contrary to the *jus in bello*, the *jus ad bellum*, as Dinstein puts it, does not differentiate between military and civilian targets, why an armed attack against a state triggers that state’s right to self-defence irrespective of the military or civilian nature of the target.\textsuperscript{258} While this is certainly true, the present writer humbly submits, in light of the above reasoning, that a differentiation of sorts is made with regard to attacks on different kinds of external manifestations of a state, in particular with regard to the degree of association of the target with the legal fiction of the state, and that this degree of association can be seen to highly correlate with the military or civilian nature of the target. To elaborate: A civilian target within a state’s territory is inexorably linked to the legal fiction of the state, by virtue of being situated within its sovereign territory. Thus, an attack of sufficient scale and effects against it will certainly be regarded as an attack on the state. However, as soon as the target is situated beyond the territory of a state, while still retaining some link to that state, the nature of the target becomes decisive for the purposes of determining whether an attack upon it can be regarded as an armed attack upon the state itself.

6.7.2.2 Attacks on External Military Assets
As previously stated, attacks on external manifestations of a military nature are commonly regarded to qualify as armed attacks on the sending state, provided they are intentional and sufficiently grave. Authors diverge somewhat in their descriptions of the theoretical justification for this treatment. However, most appear to cast it in terms of sovereignty. Ruys, for example, appears to view military units and installations abroad as territorial extensions, endowed with a "quasi-territorial connection to the sending state".\textsuperscript{259} Lowe, discussing attacks on warships, employs a functional approach, arguing

\textsuperscript{257} ICJ *Legality of Nuclear Weapons* advisory opinion, § 96.
\textsuperscript{258} Dinstein, § 573.
\textsuperscript{259} Ruys, 'Armed Attack', p. 201.
that an attack on such assets might be "assimilated to an attack on the state itself" since their loss would imperil a state’s means to protect its actual territory, and that any other treatment would risk rendering the right of self-defence itself quite meaningless.\textsuperscript{260}

Lowe’s argument is convincing. After all, if an attack on the metaphorical body of the Leviathan constitutes an armed attack, it would be unreasonable to treat attacks on its shield and sword differently. As to the question of what \textit{scale and effects} are required for attacks on external military assets to trigger Article 51, it is telling that the ICJ in \textit{Oil Platforms} entertained the notion that damaging just one military vessel might be sufficient.\textsuperscript{261}

\textbf{6.7.2.3 Attacks on External Civilian State Assets}

Somewhat more controversial is the question of whether attacks on external civilian state assets and functions, such as embassies, diplomatic envoys or high-level state officials can be taken as an attack on the state itself. The scholarship seems to be divided on this point.\textsuperscript{262} Such external manifestations of a state might not display the same "quasi-territorial" or functional connection to the territory of the home state as military units do. Yet, attacks on them are undeniably often viewed as directed at the state itself, although they are not always framed as armed attacks for the purposes of Article 51 of the Charter.

State practice shows that such events have at times been described as armed attacks, and at other times as criminal offences under international criminal law. The propensity to characterise attacks on this class of targets as \textit{armed attacks} rather than criminal offences would seem to vary with regard to the \textit{scale and effects} of the act in question. Attacks against diplomatic envoys and high-level state officials appear to generally have been framed as criminal acts.\textsuperscript{263} Large-scale attacks on embassies, on the

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{261} ICJ \textit{Oil Platforms} case, § 72.
\item \textsuperscript{262} See Ruys, 'Armed Attack', pp. 201-202.
\item \textsuperscript{263} \textit{Ibid}, p. 203.
\end{itemize}
\end{footnotesize}
other hand, have on several occasions been treated as armed attacks for the purposes of Article 51 of the Charter.  

A reasonable explanation for this, following the proposed degree of association model, lies in the obvious link between this class of external manifestations and the functions of a state. Contrary to the loss of military assets, the loss of a state dignitary or embassy does not directly imperil the independence of a state, but nevertheless certainly strikes at central state functions.

It might be tentatively concluded, in light of the above, that the further an external manifestation of a state is removed from the theoretical core attributes of statehood, the higher the gravity threshold becomes with regard to attacks upon them. It is conceded that this proposed theoretical model is fraught with the difficulties involved with tracing the boundaries of the nebulous concept of sovereignty. However, as an endeavour to seek the theoretical underpinnings of the different treatments of attacks on external manifestations in practice, it arguably serves quite well.

6.7.2.4 Attacks on External Civilian Private Assets

More controversial still is the question of whether attacks on external civilian private assets such as merchant vessels or civilian aircraft can be taken as attacks against their associated state. Such assets are associated with a state either by way of legal registration, or by virtue of being the property of physical or legal persons, which in turn have some link to a state. To complicate matters, registration and ownership might associate such assets with more than one state, as vessels and aircraft might very well be owned by a private entity in one state and be simultaneously registered in another. Not only is this often the case for vessels and aircraft, but for space objects such as satellites as well.  

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264 See e.g. the Tehran Embassy case, in which the assault against the U.S. embassy by militants was discussed by the ICJ as an armed attack. Case Concerning United States Diplomatic and Consular Staff in Tehran (United States v. Iran), ICJ Rep. 1980, p. 3; pp. 29, 42. On this, see Dinstein, § 567 and Ruys, 'Armed Attack', p. 201. Furthermore, the US response to the 1998 terrorist bombings of its embassies in Nairobi and Da Es Salaam was widely criticised; inter alia on the grounds of lack of evidence as to the attributability of the acts to Afghanistan and Sudan, as well as the particular targets in those states which the US subsequently struck. Nevertheless, no state contested the US claim that the embassy bombings qualified as armed attacks, and entitled a forcible response. See Ruys, 'Armed Attack', p. 202.

265 See supra, section 3

64
In the *Oil Platforms* case, one of the facts presented before the court concerned the mining of the tanker vessel *Texaco Caribbean*, which was owned by the US corporation Texaco inc., but flying Panamanian flag. The US asserted that the mining of the *Texaco Caribbean* was part of a pattern of Iranian use of force against the United States which "added to the gravity" of a subsequent missile strike against the US-flagged merchant vessel *Sea Isle City*, an act which the US considered to itself constitute an armed attack.\(^\text{266}\) In response to this assertion, the Court noted that "the *Texaco Caribbean*, whatever its ownership, was not flying a United States flag, so that an attack on the vessel is not in itself to be equated with an attack on that State."\(^\text{267}\) In doing so, it would seem that the ICJ regards registration, as opposed to ownership, as the decisive metric for determining what state a merchant vessel is to be viewed as associated with, and consequently, what state it can be regarded as an external manifestation of, for the purposes of determining whether an armed attack has occurred.

It should be stressed that, in the above excerpt, the Court was merely discussing whether an attack on a merchant vessel could, pursuant to the *accumulation of events* theory, be taken into account — together with attacks on military assets — in determining whether an armed attack had occurred. It is less clear if attacks directed *only* at commercial assets such as merchant vessels can constitute *armed attacks*.

As Lowe observes, "merchant ships are mere private chattels, lumps of steel often situated many miles from the flag State and having little connection, even of an economic nature, with that State, and it is more difficult to explain why they should come within the doctrine of self defence."\(^\text{268}\) Yet, it is evident from state practice that states *do* employ force to protect such assets, and that the use of force to ward off *ongoing* attacks on these assets is widely accepted as lawful.\(^\text{269}\) Lowe finds that, while authors have commonly failed to indicate on what legal grounds such uses of force are justified, the most plausible explanation is that there is a specific rule of international law which extends the right of self-defence to the protection of merchant ships.\(^\text{270}\) This should not be taken to imply that inter-state use of force is justified on a legal basis

\(^{266}\) ICJ *Oil Platforms* case, §§ 62, 63.
\(^{267}\) Ibid., § 64
\(^{268}\) Lowe, pp. 188-189.
\(^{270}\) Lowe, pp. 188-189.
separate from Article 51 of the Charter in this context, but merely that customary practice has established that, in certain instances, attacks on these targets can constitute armed attacks in the sense of Article 51.\textsuperscript{271}

What interest, precisely, motivates such an order? These kinds of civilian assets are neither instrumental for the defence of a state’s territory, nor do they perform any essential state functions. Article 3(d) of the Definition of Aggression lists ”an attack by the armed forces of a State on […] marine and air fleets of another State” as an act which may qualify as an act of aggression. While the Definition of Aggression does not purport to bear upon the armed attack concept, the drafters of the Definition were nonetheless highly cognisant of the fact that the resulting document would, in practice, have implications on the interpretation of Article 51 as well.\textsuperscript{272}

From the travaux of the definition document, it can be gleaned that the inclusion of external civilian assets into the enumeration of acts constituting aggression was made after several coastal states emphasised their economic dependance on fishing and marine traffic, arguing that attacks on these assets would imperil their survival just a blockade or an invasion would.\textsuperscript{273} However, the plural form of the word fleets is highly significant. The pluralisation was intended to strike a compromise between states’ interest of extending forcible protection to vital economic assets against the risk of setting the threshold for forcible self-help too low, and thereby allowing minor incidents or lawful boarding, search and seizure to be construed as armed attacks.\textsuperscript{274}

Thus, it would appear that justification for the extension of self-defence to the protection of external civilian assets can be traced to states’ interest of preserving their economic survival. Yet, if the pluralisation of the word fleets was intended to reserve the exercise of defensive measures to situations where a state’s economic survival is liable to be truly threatened, how is it that state’s use of force to repel attacks on single — as opposed to numerous — such assets is accepted as lawful?\textsuperscript{275} A possible explanation lies in the difference between self-defence in the form of repelling an attack on-the-spot, and defensive measures which go beyond that, as discussed in the following section.

\textsuperscript{271} See Ruys, ’Armed Attack’, p. 208.
\textsuperscript{273} Ibid, p. 204.
\textsuperscript{274} Dinstein, pp. 204-205.
\textsuperscript{275} Lowe, pp. 188-189.
7 The Relationship between the Gravity of an Armed Attack and Permitted Defensive Measures

This section will elaborate on the relationship between the scale and effects test and the legality of different kinds of defensive measures. To summarise the discussion so far, a number of (rationae materiae) facets to the armed attack concept can be identified: A state must fall victim to a use of armed force. That force must manifest itself in the form of territorial incursion, or physical damage or injury, although it need not actually succeed in causing harm, only be liable to do so. It does not matter what weapons are used, so long as they cause — or are liable to cause — physical harm. The presumptive attacker must act with hostile intent; honest mistakes are excluded. Moreover, a series of acts may be treated cumulatively, provided there is evidence of their interrelatedness. Lastly, the attack must be of a certain scale and effects. However, small-scale attacks are not necessarily excluded, begging the question if the gravity threshold which distinguishes force from armed attack is so high after all. Lastly, while self-defence cannot, as a rule, be invoked merely to protect nationals and property abroad, external manifestations of a military nature are a categorical exception, and certain external manifestations of functional or economic import appear to be partially included in the ambit of self-defence as well.

Undeniably, there are plenty of moving parts to the metaphorical armed attack apparatus. At this point, in order to connect the dots, it is appropriate to return to the question of the placement of the gravity threshold, and to elaborate on how the armed attack requirement, in conjunction with the limits to the exercise of self-defence (see section 6.2 and 4.3.1, respectively), can be seen to together comprise a comprehensive self-defence regime which balances states’ interest of defending themselves with the community interest of restricting unilateral uses of force.

Most authors agree with the essence of the Court’s finding in Nicaragua; that force and armed attack are not equatable concepts, and that some measure of gravity separates them. However, while the findings of the Eritrea-Ethiopia Claims Commission and Judge Simma in his Separate Opinion to the Oil Platforms judgement express support for the view that Article 51 can only be invoked if a large-scale armed

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276 See Ruys, ’Armed Attack’, pp. 146-147, and cited works.
attack occurs,\textsuperscript{277} state practice indicates that the gravity threshold is not set so high.\textsuperscript{278} The present author agrees with Ruys in his observation; that there is an undeniable link between the placement of the gravity threshold and the need, from a policy perspective, to allow for forcible responses to uses of force which do not rise above its level.\textsuperscript{279} It is conceivable that the opinions of Judge Simma and the Eritrea-Ethiopia Claims Commission were, to some extent, influenced by policy considerations, inasmuch as they would seem to disregard the numerous historical examples of when invocations of Article 51 in cases of small-scale attacks have been accepted by the international community without protest against the invocations as such, but often against the choice of response.

Ruys notes that there is an apparent schism between conceptions of the right of self-defence as described by scholars of international law on one hand, and by military handbooks and rules of engagement on the other.\textsuperscript{280} From the perspective of an individual military commander in the field, or even an individual soldier, the crucial consideration is under what circumstances he or she is permitted to open fire.\textsuperscript{281} These decisions are made in the heat of the moment, at a tactical level, far removed or even cut off from the strategic-level decision making which international law scholarship tends to focus on in the context of self-defence. In light of this quite important difference, certain authors have advanced the view that a distinction should be made between national self-defence and so-called unit self-defence.

Trumbull makes a compelling case for such a distinction in an article devoted to the issue, arguing that the gap between tactical and strategic-level decision making is so great that it a qualitative difference exists between them, and that, whereas national self-defence rests on the legal basis provided by Article 51 of the Charter, unit self-defence is justified on an entirely different legal ground, namely an independent right under customary law. As basis for this assertion, Trumbull points to the fact that military rules of engagement commonly make a distinction between unit and national self-defence, and this distinction is indicative of a customary rule to the effect. Furthermore,

\begin{flushleft}
\textsuperscript{277} See supra, at sections 6.4.2 and 5, respectively.
\textsuperscript{278} See generally section 6.4.
\textsuperscript{279} Ruys, 'Armed Attack', pp. 145, 148-149.
\textsuperscript{280} Ibid, pp. 179-180.
\textsuperscript{281} Ibid, pp. 179-180.
\end{flushleft}

68
Trumbull argues that the existence of such a customary rule would explain the ICJ’s somewhat odd dictum in *Nicaragua*, that uses of force not amounting to armed attacks might still be defended against by employment of force not amounting to self-defence (see *supra*, section 6x).²⁸²

However, it must be stressed that the evidentiary threshold which must be overcome in order to put forward an unwritten exception to the *lex scripta* and *jus cogens* norm which Article 2(4) of the Charter comprises is high indeed. As with other attempts at splitting up the legal basis for self-defence (see section 6x), the suggestion that drafters of the Charter meant to allow for unwritten exceptions to the absolute prohibition of inter-state force contradicts the prevailingly widespread conception of the Charter’s *jus ad bellum* provisions as a comprehensive regime.²⁸³ In the opinion of the present author, the evidence presented by Turnbull for the existence of an entirely different legal basis — besides Article 51 — for state’s lawful use of force does not approach this high evidentiary threshold. In addition, states have in practice treated even small-scale encounters as *armed attacks*, and invoked Article 51 as basis for forcible defensive measures, rather than any customary right to unit self-defence separate from Article 51 (see *supra*, section 6.4).

Instead, the more convincing model of explanation is that the forcible measures commonly referred to by military rules of engagement as unit self-defence should be viewed as a subset of the right to national self-defence set out by Article 51 of the Charter, although the conditions of necessity, proportionality and immediacy undoubtedly carry a different meaning at the tactical level compared with the strategic level. To elaborate, fulfilling the requirement of necessity at the tactical level might be to merely determine that the unit is, in fact, under deliberate fire from hostile forces. A proportionate response at that level might be to return fire with the aim of repelling the assault, but to not engage in pursuit of the attacker absent a decision from higher authority.

²⁸² For a comprehensive guide to the arguments pro and contra the existence of a customary right of unit self-defence, see Trumbull, Charles P. IV, ‘The Basis of Unit Self-Defense and Implications for the use of Force’, Duke Journal of Comparative & International Law, vol. 23/no. 1, 2012, pp. 121; *in extensio*.
The present author agrees with Dinstein, in his assertion that "[t]here is a quantitative but no qualitative difference between a single unit responding to an armed attack and the entire military structure doing so." After all, military rules of engagement serve precisely compile strategic-level decisions — taking into account the requirements of international law — into a format which can be easily converted into concrete measures at the tactical level.

Dinstein puts forward a framework for different "modalities" of self-defence, wherein the scale and effects of an armed attack give rise to a right to respond with a measure of force falling somewhere on a scale between "on-the-spot reaction" (i.e., repelling an ongoing attack) at the low end, and "war" (full-scale self-defence aimed at removing the attacker’s means of committing further aggression) at the highest. In between, Dinstein finds an option for what he calls "defensive armed reprisals", meaning forcible measures going beyond merely repelling an ongoing attack — such as striking an airfield from which an attacker launched an aerial raid — but nonetheless short of "war" and all the while subject to the strict constraints of necessity, proportionality and (somewhat extended) immediacy. In Dinstein’s conception, defensive armed reprisals are permitted when an attack has already taken place, in order to hinder recurrence. Similarly, Ruys also finds that such measures — striking at a time and perhaps place different from the original attack — are permitted so long as there is compelling evidence that additional attacks will imminently follow, and the measures are aimed at preventing them.

To clarify, it is helpful to stress the distinction between an actual "attack" and the legal concept of an armed attack. The latter, albeit initiated in concert with the former, does not necessarily cease as the former does when the dust has settled. If the attacker shows every sign of intending to launch additional "attacks", then arguably, the legal state of armed attack has not subsided.

It is important to stress that Dinstein is not suggesting that the unlawful acts commonly referred to merely as "armed reprisals" are lawful. The concept of armed

284 Dinstein, § 641.
285 See Dinstein, §§ 639-733.
286 Ibid, § 517.
reprisals denotes an unlawful use of force employed to punish past transgressions. Dinstein argues that there is a qualitative difference between such unlawful reprisals and what he coins “defensive armed reprisals” in that the latter — if directed against preventing impending additional attacks following shortly after an armed attack has occurred, and otherwise compliant with the requirements of necessity, proportionality and immediacy — are not unlawful uses of force, but lawful self-defence falling within the ambit of Article 51 of the Charter. Shaw agrees with this distinction. Indeed, defensive measures levelled against an attacker after an initial attack is clearly an accepted practice (see section 6.4). Dinstein’s choice of terminology is however liable to cause confusion. For this reason, the present writer is in agreement with Ruys, that the measures referred to by Dinstein as “defensive armed reprisals” should rather, if only for the sake of clarity, instead be referred to as ”post facto self-defence”.

Lastly, in Dinstein’s conception, employment of defensive measures amounting to ”war” (denoting a comprehensive use of force) are justified when an armed attack is sufficiently ”critical”. Oddly, Dinstein provides little guidance as to where this threshold would lie, save that an all-out invasion qualifies. In the opinion of the present author, the attack on Pearl Harbor arguably constituted a non-invasion armed attack which, due to its comparable scale and effects to that of an invasion, could also qualify. As would, arguably, a nuclear strike. Undoubtedly, a state of war is also likely to arise from a prolonged tit-for-tat of attacks and post facto counter-force.

As to the placement of the gravity threshold, Dinstein finds that, while force and armed attack are not equatable concepts, the lapse between them is quite small. He posits that: ”an armed attack presupposes a use of force producing (or liable to produce) serious consequences, epitomized by territorial intrusions, human casualties or considerable destruction of property”. By contrast, acts such as breaking into another state’s diplomatic bag or unlawfully detaining a foreign ship are brought up as examples of uses of force which are not liable to produce human casualties or considerable

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288 Dinstein, §§ 661-675.
289 Shaw, p. 819.
291 See Dinstein, §§ 695, 700.
destruction of property, and which therefore fall without the ambit of Article 51. This would seem to be in line with the ICJ’s conception of the gravity threshold in Oil Platforms. As previously discussed, the court did not exclude that the mining of a single military vessel might be sufficiently grave to trigger Article 51 of the Charter. In that incident, the USS Samuel B. Roberts was severely damaged, but no lives were lost, and the ship was not sunk. Thus, it would seem that material damage alone, of a severity equivalent to the crippling of a ship, might amount to an armed attack, at least when the target is of a military nature.

In sum, according to Dinstein’s conception, a small-scale attack is sufficient to bring into play Article 51, but the customary law constraints on the exercise of self defence — demanding that the use of force be necessary, proportionate and approximately immediate — regulate the nature range of permitted defensive responses, so that a small-scale attack merits only a forcible response on-the-spot, or a measured response post facto, when recurrence is apparently likely.

In the opinion of the present writer, the framework put forward by Dinstein is arguably the most compelling conception of the interplay between the scale and effects of an armed attack on one hand and the, so to speak, scale and effects of lawful defence on the other. Dinstein’s model avoids the pitfalls associated with a high-set gravity threshold; leaving states defenceless in the face of pin-prick tactics. At the same time, it concretises the meaning of the conditions of necessity, proportionality and immediacy as they apply to different scenarios, thereby making clear that an armed attack does not justify anything other than a carefully measured forcible response, and then only as a last resort.

Most importantly though, apart from being theoretically attractive, Dinstein’s model arguably reflects the way in which states themselves, generally speaking, appear to conceive of the right to self-defence, as evidenced by state practice. Therefore, in the view of the present author, it constitutes an apt illustration of the lex lata of self-defence.

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293 Dinstein, §§ 550-551.
294 ICJ Oil Platforms case, § 72.
295 See ICJ Oil Platforms case, § 77.
296 Ruys similarly arrives at this conclusion after a comprehensive study of state practice, see Ruys, 'Armed Attack', pp. 179-184.
Finally, with all these considerations in mind, we can turn our attention to how the law of self-defence applies to attacks against satellites. *Prima facie*, it should apply no differently than *vis-à-vis* attacks against terrestrial targets. However, the effect of the outer space context, as will be shown, is largely to amplify existing issues of interpretation, and this in a context where state practice, in the present regard, is virtually absent, making any attempt at drawing conclusions a difficult task.

The *armed attack* concept has been shown to be comprised of a great number of metaphorical moving parts. The satellite context significantly pushes the bounds of some of them: First, there is the issue of *arms*. There is an array of available methods for interference with satellite systems. The ones most closely resembling *arms* in the conventional sense are those which are physical themselves, and which produce familiar physical effects: Direct-ascent ASAT-interceptors and co-orbital ”space mines” typically slam into the body of a satellite or affect it by similar physical means, causing damage or more likely complete disintegration (see section 2.3). However, there are several non-kinetic means of interference which may or may not cause physical damage. These ”weapons” are more difficult to deal with, mirroring the difficulty encountered when attempting to legally classify cyber attacks.

Moreover, all satellites are *external manifestations* of a state, in the respect that they are, in varying degrees, associated with states, yet are situated beyond the territory of any state. Resultantly, the legal treatment of attacks upon them will certainly vary depending on the nature of the satellite system in question. However, it can in no way be taken for granted that the principles which hold true for attacks against terrestrial external manifestations translate unproblematically to satellites. The issue is compounded by the fact that most satellite systems can be — and many actively are — used for military and civilian purposes alike.

**8.1 The Challenge of Attributing an Attack to an Attacker**
It should be stressed that the undoubtedly greatest challenge facing a state endeavouring to determine whether it has suffered an attack on its satellite systems will be figure out why, precisely, that system is experiencing anomalies or has become unresponsive. Outer space is a dangerous environment, and any number of reasons could lie behind
satellite troubles. Orbital debris poses an ever-present and very significant threat toward satellites, and space weather events play havoc with delicate electronics.297

As outlined in section 4.3.1.1, states carry the burden-of-proof for showing that they have suffered an armed attack at the hands of an attacker, and the threshold for evidence is quite high in this regard. Confidently attributing an attack to an attacker is a prerequisite for invoking Article 51. Obtaining sufficient evidence to confidently attribute an attack might require systems for Space Situational Awareness which most states do not possess. Having noted this, we now turn to the matter of the material element of an armed attack.

8.2 The Armed Attack Concept: Thinking in Terms of Effects

8.2.1 Physical Effects as a Prerequisite for an Act to Qualify as an Armed Attack

As previously discussed, satellite systems are precariously fragile, and can with relative ease be interfered with. Means of interference can be divided into kinetic and non-kinetic attacks. The former means is liable to completely destroy or severely damage the fragile physical components of a satellite, very likely creating a cloud of debris in the process, endangering satellites in similar orbits. Whereas kinetic ASAT were the presumed means of attack during the high tensions of the Cold War — evidenced by recurring tests by both the US and the Soviet Union — today a non-kinetic attack is arguably the most attractive option for a prospective attacker. Since non-kinetic attacks can be scaled to produce only temporary effects, or only partial damage, and do not produce orbital debris, such weapons can be wielded to negate an adversary’s space-derived advantage at select times. Thus the threshold for their use — a prospective attacker’s ”self-deterrence” — is much lower than would be the case for kinetic ASAT.298

Non-kinetic attacks can take a number of forms, and can produce a range of possible consequences. Jamming or spoofing a satellite’s uplink temporarily interrupt communications. Laser dazzling or blinding temporarily or permanently blind optical sensors, either partially or totally. High-powered microwave attacks affect a satellite’s electronic components. At non-destructive intensities, they might cause temporary

disarray, for example by prompting a computer reset, while higher intensity attacks may cause permanent damage. Finally, as any digitally operated system, satellites are also susceptible to cyber attacks.

As previously discussed, the means of an attack are, in principle, not important for determining whether it might be classified as an armed attack for the purposes of self-defence. Following the reasoning behind the jus ad bellum treatment of biological, chemical, radiological and cyber weapons, what matters are the resultant effects. US military doctrine has developed useful terminology for classifying different kinds of effects following from purposeful interference with space systems along a roughly hewn scale of severity: Disruption, denial, degradation and destruction. Disruption connotes temporarily impairing a system without physical damage. Denial signifies temporarily but completely eliminating the utility of a system, without physical damage. Degradation refers to permanent impairment of a system, usually involving physical damage. Lastly, destruction refers to complete and permanent elimination of the utility of a system, typically involving physical damage.²⁹⁹

Applying this terminology, degradation and destruction of a satellite itself satisfy the physical effects precondition (see section 6.6.1) of the armed attack concept, while disruption and denial typically do not, since they aim to produce only temporary, non-physical effects. The authors of the Tallinn Manual similarly hold that: "cyber operations that involve brief or periodic interruption of non-essential cyber services […] do not qualify as armed attacks.”

This is not to say that an attempt at disruption or denial cannot result in permanent and physical effects if it is miscalculated, thereby resulting in degradation or destruction. For example, if an attempt at jamming blocks vital TT&C information from reaching a satellite, it might fail to hold correct attitude, i.e., keep its communications equipment facing towards its ground station, and thereby — unless it is able to autonomously correct — lose all future utility. In the opinion of the present writer, the physical effects requirement ought not to be taken to mean that actual disintegration of an object is required to for the effect to qualify as physical in the sense that it is equivalent to those effects which kinetic weapons typically produce. Arguably, a non-

kinetic attack which prompts a satellite to spin out of control, drift out of its designated orbit, or otherwise causes a satellite to become permanently unresponsive, has rendered physical effects quite equivalent to those which could have been produced by kinetic arms. Of course, just any physical damage is not sufficient to qualify as an armed attack, but only damage which is severe enough to pass the gravity threshold.

The Stuxnet malware incident of 2010 is the first example of a non-kinetic attack causing significant physical damage. Stuxnet was able to traverse public internet and infect computer programming systems at Iran’s nuclear facilities. Then, it was able to prompt centrifuges at the Natanz nuclear fuel enrichment plant to speed up so such an extent that a great number of the centrifuges were destroyed, slowing the facility’s enrichment capacity by as much as a fifth of total capacity for about a year. Stuxnet was never confidently attributed to any state or non-state actor. Viewed purely from a material perspective though, Stuxnet is widely regarded to have constituted a use of force in the sense of Article 2(4) of the Charter. The international community has however been divided over whether to classify the act as an armed attack. So were the experts behind the Tallinn Manual, although all considered the act to constitute a clear example of a use of force.

In this context, it is pertinent to reflect on an important difference between physical damage to satellites and physical damage to equipment on the ground. Whereas damaged equipment on the ground can be repaired, satellites, at present, cannot. Similar to equipment on the ground, they can however be replaced, albeit at significant cost and typically not as readily. Thus, limited physical damage to objects on the ground is ultimately reversible, whereas even limited physical damage to satellites is not. It is not clear whether the feasibility of repairing material damage ought to be taken into account when determining the gravity of an act for jus ad bellum purposes. The notion of reversibility has been discussed some in scholarly writings on cyber operations, but

301 Dev, pp. 398-399.
303 Mountin, p. 124.
to wit not specifically in the *vis-à-vis* the *armed attack* concept. The present study confines itself to pointing out that this issue merits further examination.

### 8.2.2 Looking Beyond the Immediate target: How to Treat Secondary Effects

In the opinion of the present author, when assessing the effects of interference with satellite systems, it is not enough to look merely to effects upon the satellite system itself. Satellite systems are service providers, and any effects on the ground which manifest as a proximate consequence of such interference must also be taken into account. Consider a scenario in which a satellite system relied on for aerial navigation is disrupted. The satellite itself suffers no physical effects, and soon resumes normal operations. However, absent the direction provided by the satellite, two commercial airliners collide over a densely populated area, causing severe loss of life and damage to property. Arguably, the causal link between the act of interference and the resulting harm is so apparent that the resulting damage can seen as proximately following from the act of interference. If the interference was done with hostile intent against the victim state(s), and the effects were reasonably foreseeable, the act may undoubtedly qualify as an *armed attack*.

Conversely, the effects of an attack on the ground station controlling a satellite must reasonably be seen to encompass not only any damage to the ground station, but also resulting effects on the satellite or satellites which are controlled by the station. Thus, if a satellite becomes permanently uncontrollable as a result of, for instance, a cyber attack against a ground station, then the satellite has undeniably suffered physical effects comparable to those which might have been rendered by a kinetic ASAT. What is striking is that satellite systems are *systems* in the true meaning of the word: The various segments are so interdependent that the elimination of one, even temporarily, risks resulting in the collapse of the whole, although military systems typically feature redundancies and other means of protection against interference.

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304 See, e.g., *Tallinn Manual 2.0*, p. 119; discussing reversibility as a requirement for the employment of countermeasures in response to an international wrongful act.

305 Mountin, p. 177. See also *Tallinn Manual 2.0*, p. 343, in which the International Group of Experts authoring the manual agreed that all reasonably foreseeable consequences following from a cyber operation should be taken into account when determining whether an act constitutes an armed attack, stating as example a cyber operation against a water purification plant, resulting in sickness and death caused by drinking contaminated water.
In light of the above discussion regarding the significance the of proximate effects of an act, speaking in terms of the *locale* and *target* of an attack becomes somewhat confusing. Indeed, the potential consequences of interfering with satellite systems are complex, and far removed from the plain-to-see consequences of, say, an artillery barrage. To accommodate the complexities involved in assessing attacks against satellite systems, one further distinction must be made; between the object against which an attack is immediately directed, and where the resulting effects are felt. To draw an example from the Stuxnet incident; the computers of the Natanz complex were (presumably) the immediate object of the attack, but the fuel-enrichment centrifuges were the objects which suffered physical damage. For attacks against satellite systems which can produce secondary physical effects that are felt on the ground, the range of possible scenarios can be illustrated in the following way:

<table>
<thead>
<tr>
<th>Physical harm? (Y/N)</th>
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<tr>
<th>Physical harm? (Y/N)</th>
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<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Persons/property on the ground</th>
<th>Satellite ground station</th>
<th>Satellite ground station</th>
<th>Satellite ground station</th>
</tr>
</thead>
</table>

In this table, **bold text** signifies the immediate object of an attack, either kinetic or non-kinetic.

The above matrix serves to show that there can be many potential outcomes to an attack against a satellite system, the particulars of which will depend on the specific function of the system in question. It should be stressed, again, that as discussed in this section and section 6.5, the actual consequences of an attack are less important for determining whether an attack can be viewed as an *armed attack* than are the effects which the attack are **liable to produce**.

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What if the primary act of interference was done with hostile intent, but the secondary effects of the interference were unintended? In a similar vein, the ICJ in *Oil Platforms* appeared to attach significance to whether an attack was "aimed specifically", or carried out with the "specific intention of harming" a certain target in the context of determining the existence of an armed attack.\(^{306}\) However, several authors have downplayed the Court’s statement, holding it to be inconceivable that the Court intended to, in effect, exclude indiscriminate attacks from the ambit of the armed attack concept. Instead, the Court’s somewhat unfortunate statement should probably be understood as referring to a requirement for a general hostile intent toward a state, rather than an intent to strike a specific target.\(^{307}\) On this point, a majority of the authors of the *Tallinn Manual* similarly agreed that intention *vis-à-vis* a particular set of consequences is irrelevant for qualifying an act as an armed attack.\(^{308}\)

If an attack is liable to produce severe physical effects on the territory of a state, and this is reasonably foreseeable, then arguably those effects ought to be seen as a use of *force* against the territory of the state itself, and not (only) against its *external manifestation* in the form of its satellite. Thus, these attacks are not much different — legally speaking — than a missile strike launched against the territory of a state. If the ensuing effects are sufficiently grave, the act might be classified as an *armed attack*.

Importantly, the same should apply if an attack against a satellite belonging to a third party causes physical harm in the territory of a state. For example, if state A were to disable a Global Navigation Satellite System (GNSS) registered to and operated by state B, and state C suffers loss of lives and severe damage to property as a (foreseeable) consequence, then it is entirely conceivable that state C can be seen to have suffered an armed attack at the hands of state A.

To be clear, there are not many satellite systems which serve such functions that their loss would liable to produce effects *on the ground* that are equivalent to those typically produced by *arms*. To wit, only loss of GNSS satellites, and perhaps communications satellites serving critical infrastructure, could have such devastating effects. As discussed in section 2.2.1, the services GNSS are so ingrained in modern

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\(^{306}\) ICJ *Oil Platforms* case, § 64.  
\(^{308}\) *Tallinn Manual 2.0’, pp. 343.
society that a sudden disruption of their services would cast transportation systems, communications and financial markets into disarray. It should however be noted that GNSS are quite resilient. Since they are comprised of many satellites, a GNSS would not degrade catastrophically, but gradually. For GPS, a loss of six out of the total number of 24 operational satellites would still allow users to navigate by it during most hours in a day, and timing information would still be disseminated globally, albeit at less regular intervals. Additionally, GNSS satellites typically orbit the earth at such high altitudes that interfering with them directly poses a significant challenge. An attacker who wishes to deny GNSS services from an adversary will likely instead attempt to locally jam the downlink, as outlined in section 2.3.309

8.3 Attacks on Different Types of Satellite Systems
As previously discussed, the armed attack concept applies differently to external manifestations of a state than it does to attacks against targets situated within the territory of a state. Leaving now the discussion pertaining to those effects of an attack which are felt on the ground, we move on to examine what attacks against satellites themselves could — seen in isolation — amount to armed attacks in the sense of Article 51 of the Charter.

8.3.1 Attacks on Military Satellite Systems
In the present author’s opinion, there is no significant difference between military satellites and other military external manifestations of a state. As outlined in section 6.7.2.2, attacks against military assets may be assimilated as an attack on the state itself, wherever those assets may be located. Military satellites are as instrumental for the defence of states’ territories today as are fighter aircraft and warships. Thus, there is no apparent reason attacks on them should not be treated equivalently.

Here, one important clarification is in order: military satellites should in this context be understood as those which are owned and operated by states’ militaries. At present, there is a prevailing trend for relying extensively on civilian satellite systems for military purposes. In the present author’s view, mere reliance does not confer upon those assets a military nature, perhaps jus in bello, but not jus ad bellum. Suggesting

309 Wright, Grego and Gronlund, pp. 165-166.
that it does would be akin to suggesting that the Internet or a strategic port belonging to a third party can be legally likened to a warship merely because military utility can be derived from those systems also.

Admittedly, this distinction is significantly complicated by the practice of employing so-called ”hosted payloads”. In the context of military uses of space, hosted payloads denotes the practice of entering into agreements with civilian satellite operators entailing that their satellites host components on the behalf of the military party. Thus, a regular commercial communications satellite might host a military transponder, sensor, or other component, which is operated by the military, independently from the operation of the satellite in general.\footnote{See generally Andraschko, Mark; Antol, Jeffrey; Horan, Stephen; Neil, Doreen, ’Commercially Hosted Government Payloads: Lessons from Recent Programs’, AERO ’11 Proceedings of the 2011 IEEE Aerospace Conference, pp. 1-15, available at \url{http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.456.2470&rep=rep1&type=pdf}.} This practice is motivated in part by economical considerations, but also by considerations or military resiliency and deterrence. Disaggregating military space systems from being housed in \textit{bona fide} military satellites in favour of dispersing capabilities across a large number of satellites undoubtedly makes for more resilient systems. Furthermore, an attacker seeking to strike those military components would likely have to strike the principal operator as well, risking unwanted horizontal escalation.\footnote{See generally Harrison, Todd, ’The Future of MILSATCOM’, Publication of the Center for Strategic and Budgetary Assessments (CSBA), 2013, available at \url{http://csbaonline.org/research/publications/the-future-of-milsatcom}; and Joint Publication 3-14 p. III-4 to III-5.}

In the opinion of the present author, the aim of deterrence is partially undermined by the legal challenges imposed by this practice. Undoubtedly, components which are owned and operated by states’ militaries are of a military nature. The \textit{jus ad bellum}-problem lies in determining whether — when such hosted payloads suffer damage as a result of attack against the host satellite — that attack was made with \textit{hostile intent} toward the state which the payloads belong to, and not in error, i.e., with hostile intent towards the civilian operator, or against another state entirely, unknowingly striking the ”wrong” target. Moreover, if military assets are thus fragmentised, clearly, an attack on a single such asset will fall far below the gravity threshold.
It is conceivable that hostile intent toward the payload-operator could be determined if a number of satellites hosting such payloads are attacked, in a pattern indicating that the payload-operator is the ultimate target of the endeavour. Similarly, by application of the accumulation of events theory (see section 6.5), it is entirely possible that a series of attacks, attributable to common attacker, which cause physical damage to a number of hosted payloads might, when taken together, constitute an unlawful use of force of such scale and effects that it qualifies as an armed attack.

This being said, we may conclude that attacks against military satellites — or military hosted payloads — by any means which produce physical effects equivalent to those produced by kinetic arms, that are of a certain scale and effects, and which are conducted with hostile intent, can undoubtedly constitute an armed attack against the state itself.\footnote{See also Vermeer, pp. 317-318; and Dinstein, § 571.}

With respect to the gravity threshold, it is clearly not possible to make a universal statement on what scale and effects are required for the right to self-defence to come into play. The significance of context can hardly be overstated. However, in light of the ICJ’s statement concerning the mining of the USS Samuel B. Roberts in the Oil Platforms judgement (see sections 6.7.2 and 7) it cannot be excluded that physical destruction or severe physical impairment of a single military satellite might, in principle, be sufficient to trigger Article 51.

Here, an inference regarding debris creation is due. As discussed, the gravity of an armed attack may be assessed by what effects an attack is liable to produce. In the context of outer space, risk assessments are complicated endeavours. It should nevertheless be recognised that any attack which creates orbital debris effectively puts all satellites traversing that area of space at risk. Thus, the destruction of a single satellite might — depending on the particulars of an attack — be viewed as more severe, insofar as other satellites belonging to the victim state are threatened as a result. Any more precise assessment would require a grasp of orbital mechanics far beyond that of the present writer.

In this context, the present author must indulge one small digression from the delimited subject matter to reflect on a jus in bello matter: In an article devoted to the
arms control and jus in bello implications of treaty-imposed NTM-protection (see section 2.2), Koplow makes an excellent argument to the effect that weapons and space activities liable to create debris in orbit are unlawful, insofar as they, deliberately or even inadvertently, risk impermissibly interfering with the operation of treaty-protected NTM satellites. Due to the danger, persistence, and unpredictable dispersement patterns of orbital debris, Koplow argues that this surprising but none the less plausibly valid implication of NTM-protection obligations *de facto* outlaws all uses of debris-creating anti-satellite weapons by states bound by the treaties. This interpretation is admittedly unorthodox, but Koplow’s conclusions are arguably sound, and undoubtedly befit attention in discussions pertaining to the jus in bello element of the military uses of outer space.

**8.2.2 Attacks on Civilian Satellite Systems**

In contrast with attacks on military satellite systems, attacks on civilian satellite systems cannot as a rule be assimilated as an attack on the state itself, since they do not display that link to the territory of a state which military assets do. Of course, there may be exceptions to this rule. As discussed above, if an attack on a satellite system results in injury, death or damage to persons or property within the territory of a state, this should arguably be viewed as a use of *force* against the state itself, and if sufficiently grave, as an *armed attack*. What about damage solely to satellites?

Pursuant to Article VIII of the Outer Space Treaty, states retains jurisdiction over the satellites carried on their national registries, regardless of what entity owns them as a matter of private law. Thus, similar to the flag states of the law of the sea, every satellite is under the jurisdiction of a state, and this information is consolidated in a publicly available central registry maintained under the auspices of the Secretary General of the United Nations (see section 3). Jurisdiction and sovereignty are not equatable concepts. Yet, in the specific context of outer space and self-defence, the difference would seem to be negligible. In *Oil Platforms*, the ICJ implicitly

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313 See generally, Koplow, ’An Inference about Interference’, *in extenso*; in particular the advancement of his thesis at pp. 807-827.

314 “Jurisdiction” is not synonymous with ‘sovereignty,’ since the latter is permanent while the former may change as, for example, in the case of a ship in a foreign port. However, in the unique case of outer space, where there are no ‘foreign ports,’ the difference between ‘jurisdiction’ and ‘sovereignty’ may, at east as regards the right of self-defense, be insignificant.” Hurwitz, Bruce A., ’ The Legality of Space Militarization’, North-Holland, 1986, at p. 74, note 84; cited by Petras, p. 1255, note 225.

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recognised that an attack on a merchant vessel can be equated with an attack on that vessel’s state of registry (although an attack on a single such asset would hardly constitute an armed attack of such gravity that it would justify post facto defensive measures).\textsuperscript{315}

Thus, analogous to how attacks against merchant vessels on the high seas may, at times, constitute an attack against the state of registry, states should — in principle — be within their rights to exercise force in self-defence in response to against non-military satellites which are carried on their national registries.\textsuperscript{316} How grave the attack or attacks in question must be for Article 51 to come into play is however another question.

In the opinion of the present author, there is cause for a distinction between civilian satellite systems which are registered to and operated by a state itself for the purpose of performing important state functions on one hand, and purely commercial systems on the other, although admittedly this distinction is not always easy to make. Nevertheless, some cases are quite clear. For example, a remote sensing satellite operated by a state’s civilian intelligence services, or a satellite comprising part of a tsunami warning system is arguably more obviously associated with the functions of the state itself than is a privately operated communications satellite. Following the degree of association model put forward in section 6.7, the present author would argue that, whereas the destruction of a few military satellite systems directly imperil a state’s ability to defend itself, and may thus be seen as constituting an armed attack, a large-scale attack against a state’s civilian space assets could conceivably also qualify, insofar as it strikes against central state functions. This would be in line with how states have sometimes treated attacks against embassies and high-level state officials in the past, as discussed in section 6.7.2.3.

What of other civilian satellite systems? Here too, an analogy to attacks on terrestrial external manifestations seems apt. As discussed in section 6.7.2.4, Article 3(d) of the Definition of Aggression names ”an attack by the armed forces of a State on […] marine and air fleets of another State” as an act which may qualify as an act of

\textsuperscript{315} ICJ Oil Platforms case § 64. See also supra, section 6.7.2.4.
\textsuperscript{316} Petras, pp. 1255 f.
aggression, and the pluralisation of the word *fleets* has been taken to signify that attacks on such private chattels, which have little connection, even of an economic nature, with the state of registration, must be quite large-scale in order to justify a forcible response.

In light of the fact that attacks on civilian assets were included in the Definition of Aggression with the apparent aim of protecting states’ vital economic interests, arguably the question of gravity is best approached in terms of economic effects, although — *nota bene* — these economic effect must still be rendered through means liable to produce physical damage, per the systemic constraints of the Charter jus ad bellum (see section 6.6.1). Another paragraph of Article 3 of the Definition of Aggression may be able to provide some guidance as to just how grave such economic damage must be, in order for attacks which bring about such effects to amount to an *armed attack*.

Article 3(c) lists "[t]he blockade of the ports or coasts of a State by the armed forces of another State" as an example of aggression. Commenting on Egypt’s closing of the Straits of Tiran in 1967, which virtually imposed a partial blockade against Israel, Gill holds that a blockade can be tantamount to an armed attack. However, Gill emphasises that a blockade must be of a comprehensive nature to do so, and implies that the risk of "strangulation or economic ruin" is the decisive metric to be considered in this regard. Similarly, Constantinou argues that self-defence may be justified when an unlawful blockade results in a strong negative impact on the economy of a state.

Viewed from the perspective that the right to self-defence is a logical extension of the right to survival, existence-threatening economic damage to a state seems an appropriate metric to depart from when determining if attacks which are liable to produce such damage constitute *armed attacks*. Thus, arguably, even attacks against purely commercial satellite systems may — by insofar as these systems are in some

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317 To paraphrase Lowe, see Lowe, pp.188 f.
318 Gill, p. 138.
319 *Ibid*.
320 Constantinou, pp. 77-81.
321 In the ICJ *Nuclear Weapons* advisory opinion, the ICJ suggested that the right to self defence flows from the "fundamental right of every State to survival." See *Nuclear Weapons* § 96.
measure instrumental for the survival of a state — constitute an armed attack against the state of registry, if that state faces economic ruin as a result.

Framing the problem in terms of strategic economic importance rather than merely in terms of the number of assets damaged or destroyed furthermore reflects the reality that states display different degrees of reliance upon such assets, and that the vulnerability of the state in question to the effects of attacks against those assets must reasonably be taken into consideration when determining whether it has suffered an armed attack.322 For instance, a blockade against an island state would be devastating, and an attack against the sole communications satellite of a small state would strike it harder than would an identical attack on a state which wields hundreds.

Naturally, pursuant to the accumulation of events theory, attacks on civilian and military satellite systems may, if attributable to the same attacker, be weighed together to comprise an armed attack.

8.4 Attacks on Satellite Systems as Preparation of the Battlefield
Of course, the most serious scenarios in which satellites would attacked on a large scale are do not those of attacks on satellites occurring in complete isolation. In light of states’ high degree of dependence on satellite systems for military purposes, satellites would likely become the first casualties in a large-scale armed attack.

Most authors interpret the right to self-defence to extend somewhat beyond responding to an armed attack which has already been suffered; so-called anticipatory self-defence. The present writer rejects those interpretations which necessitate a deviation from the text of Article 51. The requirement for exercising force in self-defence is that an armed attack "occurs". As previously discussed, there is much contention in the field of the customary law of self-defence. In the opinion of the present author, conceptions of self-defence which rely on a separate legal basis than that of Article 51 and its customary equivalent are unfounded (see section 5). However, if with "anticipatory" is meant responding to the early stages of an armed attack which has already been launched, then this is arguably within the bounds of the text of Article 51, in the sense that the armed attack is presently occurring.323

322 See Li, following a similar line of reasoning, at p. 197.
323 Dinstein labels defensive measures aimed at intercepting an attack which is already underway "interceptive self-defence". On this notion, see Dinstein, pp. 538 ff.
Thus, if satellite systems are struck in a manner which evidences that the attacker is preparing the battlefield for a large-scale assault, such as through simultaneously disrupting communications, blinding a number of military remote sensing satellites, etc., and the victim can confidently attribute the attacks to an attacker, and can verify that they are indeed the early stages of an impending larger attack, then the victim may undoubtedly determine that an armed attack of some magnitude is underway. Importantly, this would be true even for cases where none of the attacks against the satellites themselves would amount to armed attacks, such as attacks by non-kinetic means.

In these kinds of situations, the specific nature of the satellite systems affected can bear upon the process of determination. For instance, if a number of satellites comprising part of a state’s National Technical Means of verification (NTM, see section 2.3), or anti-ballistic missile defence were to suffer a series of attacks, this would no doubt be indicative of an impending, more serious attack.

8.5 Exercising Self-defence in Response to Attacks on Satellite Systems
Determining the existence of an armed attack is one thing. Determining to what extent force may lawfully be exercised in self-defence is entirely another, and will depend greatly on the context of the conflict. The principles of necessity, proportionality and immediacy will under all circumstances place constraints on the extent of permitted defensive measures.

Careful consideration of the principle of proportionality is particularly important in this context. According to Dinstein’s model for the “modalities” of self-defence (see section 7), the extent of permitted exercises of self-defence is limited, ultimately, by the scale and effects of the armed attack which justifies them. In Dinstein’s conception, armed attacks which are “short of war”, i.e., small-scale, do not justify any other defensive responses than those which are themselves “short of war”. As previously discussed, permitted defensive responses to small-scale armed attacks either take the form of defensive reactions on-the-spot, or post facto defensive measures. The former are what military rules of engagement commonly dub “unit self-defence”, and involve simply repelling an ongoing attack.

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324 See Dinstein, §§ 641 ff.
The observant reader will note that satellites are quite defenceless, so the option of repelling an attack on-the-spot ought to be out of the question. Satellites are however far from unique in this aspect. There are many types of military assets which lack defences of their own; cargo vehicles, reconnaissance UAV:s, and field radio mast systems, to name a few. The mere circumstance that on-the-spot self defence cannot be exercised in a given case is immaterial. However, provided that the legal conditions are satisfied, post facto defensive measures may be permitted.

Post facto defensive measures denotes those measured forcible responses which take place after an attack has occurred. Such measures are of course only lawful when they meet the conditions of necessity, proportionality and immediacy. The condition of necessity is met if all feasible pacific means for redress have been exhausted, and the purpose of the response is to prevent impending additional attacks, which the victim is certain will ensue unless forcible action is taken to prevent them. Proportionality moreover demands that the response is, quantitatively speaking, proximately proportional to the scale and effects of the armed attack which prompted it, and immediacy precludes forcible actions undertaken after undue delay from being justified.325

Thus, if a state suffers an armed attack against its satellite systems (which will, as seen above, mean very different things depending on the assets struck), and provided there are no feasible means of pacific redress, and it has compelling evidence that additional attacks are impending, then it may in principle undertake a post facto defensive response with an aim of preventing additional attacks. This might mean seeking to disable the facility or facilities which launched the attack. However, here a very delicate problem of proportionality presents itself. Satellites are unmanned systems, so unless an attack causes injury or death on to persons on the ground, it would arguably exceed the bounds of proportion to launch a counter-attack which causes human casualties. Moreover, when assessing proportionality, the actual harm suffered is the point of departure, as distinct from how an armed attack may be determined based on what effects it is liable to produce.326

325 See section 4.3.1.3.
326 Dinstein, § 658.
Furthermore, while a response in-kind in the form of striking the attacker’s satellites might seem an appropriate response, it is hard to see how such a measure would directly contribute to the prevention of further attacks, and would thus likely exceed the bounds of necessity. In addition, the prevailing sense among scholars studying the jus in bello implications of conflict involving space is that any act against a belligerent’s satellites will have to weigh in the associated risks to civilians dependant on those systems, as well as the likely catastrophic consequences of significantly aggravating the already serious problem of orbital debris.\footnote{327}{See generally, e.g, Blount; Freeland; Koplow, 'ASAT-Isfaction’ and Vermeer, \textit{in extensio}.}

When a series of attacks on satellites herald the commencement of a large-scale armed attack — as outlined in the previous section — or when an attack against satellites causes large-scale physical harm within the territory of a state, or when such a quantity of satellite systems are destroyed that the attack approaches ”Pearl Harbor” proportions,\footnote{328}{See \textit{supra}, section 7.} crippling that state’s ability to defend itself or otherwise imperilling its survival, then undoubtedly that armed attack can no longer be classified as small-scale. In such a situation, a state of the condition of proportionality applies more flexibly than in the case of a small-scale attack, in Dinstein’s terminology, ”short of war”.\footnote{329}{\textit{Ibid}.} In a state of full-scale conflict, i.e., ”war”, proportionality no longer requires proximately symmetrical defensive responses. Instead, it allows the victim to employ full-scale self-defence aimed at removing the attacker’s means of committing further aggression.\footnote{330}{Dinstein, §§ 697-707}
9 The Way Forward

In light of the enormous reliance of contemporary society on the services of satellites, it could be argued that the best way forward would be for states to undertake to limit the proliferation and testing of ASAT weapons through binding instruments. An additional protocol to the Convention on Certain Conventional Weapons might be an appropriate avenue. The debate on the military uses of space frequently focuses on the prevention of the placement of weapons in outer space itself. While this effort is commendable, it unduly overshadows the more pressing issue of coming to terms with weapons on Earth which pose a threat to satellite systems and all who depend on them. In the opinion of the present writer, the proposal for an international code of conduct for outer space activities (ICoC) constitutes a step in the right direction, providing non-binding rules of the road dealing inter alia with harmful interference and the mitigation of orbital debris. However, its development would seem to have halted.

A greater understanding of the dynamics of such attacks is vital, precisely in order to prevent such attacks and limit escalation in their wake. In the realm of research, very promising work is being done. Organisations such as the Secure World Foundation are spearheading efforts to better understand the multi-layered intricacies of space security, and presently, a project is underway under the auspices of McGill University and the University of Adelaide for the development of a Manual on International Law Applicable to Military uses of Outer Space (MILAMOS). The present writer wishes these endeavours the greatest success.

331 Admittedly, this is greatly complicated by the fact that many of the means of interference with satellite systems are either adaptions of regular missile or civilian space technology, or difficult to recognise as "weapons" at all in the conventional sense of the word, see section 2.3). Nevertheless, steps to limit the proliferation and use of such means should, were feasible, be taken.


334 See Jaaku, Steer and Chen, pp. 15 f.

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