

# Opaque Deterrence in Orbit: How North Korea Uses Space to Project Power and Challenge Arms Control

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Published January 2026

Editor: Aden Couture, IE University

## Abstract

The existing international norms concerning the exploration and utilisation of space, which have remained unupdated since the conclusion of the Cold War, reveal critical vulnerabilities in the security of the space domain. This situation is presently marked by the evolution of strategic ambiguity. The present study employs an analytical approach, examining the Democratic People's Republic of Korea's dual-use space programme, to theorise the concept of opaque deterrence, that is, the deliberate employment of ambiguity regarding capabilities and intentions. The case of North Korea serves as a prime example of this phenomenon, as the Pyongyang regime has utilised satellite launches to develop its missile capabilities, while portraying these launches as scientific and technological tests. Ergo, each launch can be interpreted in either a civilian or military context, creating a state of uncertainty among international actors. Furthermore, an analysis of scientific literature pertaining to the offence-defence balance demonstrates that the opaque deterrence in orbit implemented by North Korea engenders a verification gap: current space governance and monitoring mechanisms are unable to distinguish peaceful missions from covert ballistic tests. The objective of this study is to propose policy options that address this discrepancy and enhance transparency, which is the fundamental prerequisite for deterrence.

Keywords: North Korea, space governance, dual-use technologies, opaque deterrence, strategic ambiguity.

## 1. Introduction: Ambiguity as Strategy in the Space Domain

In November 2023, the Democratic People's Republic of Korea (hereinafter referred to as 'North Korea' or 'DPRK') announced that its satellite mission was a success, with the deployment of its first military reconnaissance

satellite, Malligyong-1, into orbit.<sup>1</sup> Though the regime termed the feat a "peaceful space exploration" milestone, the launch used ballistic-missile technology, thereby violating several United Nations Security Council

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<sup>1</sup> Korea Institute for National Unification (KINU), *Analysis of North Korea's Third Military Spy Satellite (CO 23-36)*(Seoul: KINU, 2023), 1, <https://repo.kinu.or.kr/bitstream/2015.oak/14901/1/CO23-36>.

resolutions.<sup>2</sup> This is but one illustration of a major sequence of enigmatic North Korean space-related activities. These launches are widely interpreted by external observers as tests of long-range missile technology and as signals of potential escalation. In this respect, the actions of North Korea serve to illuminate a more extensive transformation in the politics of deterrence. That is to say, the capacity to exploit dual-use technologies and technical ambiguity in the space domain in order to influence the perceptions and calculations of other states. In this study, the space domain is understood as a set of orbital trajectories, satellites, vehicle launches, ground stations, and command-and-control networks that enable military activities in space. This domain constitutes an arena that intersects with the land, maritime, air, and cyberspace domains. The use of satellites in modern military operations is of great importance for transmitting communications, alerts, and implementing intelligence and targeting functions. Nevertheless, it is important to consider that the same satellites that perform these military functions also have the potential to be used as civilian infrastructure or scientific tools. The dual-use nature of the means used in the space domain makes it fertile ground for military strategies based on ambiguity.<sup>3</sup>

Most studies of North Korea's deterrence heavily emphasise its nuclear and missile capabilities, while only a

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<sup>2</sup> Steven A. Hildreth, *North Korea's Space Launch and Ballistic Missile Programs* (Washington, DC: Congressional Research Service, 2023), 3-5.

<sup>3</sup> Francesco Ancona, "Astropolitics and Weaponisation of Space—Drawing Past Lessons to Address Space Arms' Escalation," *Frontiers in Political Science* 7 (October 2025): 1-14, <https://doi.org/10.3389/fpos.2025.1653205>.

handful of them acknowledge how the regime uses its space programme to broadcast power and upset the international order.<sup>4</sup> North Korea's regime frames its satellite launches as scientific experiments conducted under its sovereign right; however, in reality, such acts are mere demonstrations of dual-use capability and defiance.<sup>5</sup> By blurring the lines between civilian and military aims, Pyongyang exploits gaps in the verification of space governance to make deterrent and diplomatic moves without openly engaging in nuclear confrontation. This particular strategic move, which hinges on deliberate opacity, uncovers a new coercive-diplomacy era where space technology serves as a medium of deterrence.<sup>6</sup>

This paper sets out to examine the operational mechanisms of North Korea's dual-use space programme as a strategy of opaque deterrence and to analyse the verification gaps it exposes within the existing space governance regime. The central argument is twofold. Firstly, the space programme functions as a tool of statecraft that enables North Korea to manage domestic legitimacy, challenge international sanctions and project an image of latent escalation capability, without crossing the threshold of overt aggression. Secondly, this strategy highlights a fundamental weakness in the current system of

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<sup>4</sup> Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton, NJ: Princeton University Press, 2014), 379.

<sup>5</sup> Associated Press, "North Korea Says It Successfully Put Spy Satellite into Orbit," 22 November 2023, <https://apnews.com/article/north-korea-spy-satellite-japan-5e16266707e0e4034eca022fde44ffa7>.

<sup>6</sup> "The Dual-Use Nature of Space Launch Vehicles and Ballistic Missiles — and the Complexities," *S.A.I.S. Review of International Affairs* (Johns Hopkins University), 2023, <https://saisreview.sais.jhu.edu/the-dual-use-nature-of-space-launch-vehicles-and-ballistic-missiles-and-the-complexities/>.

space governance, namely the difficulty of distinguishing between civilian satellite launches and covert ballistic missile tests when dealing with an actor who purposefully maintains ambiguity.<sup>7</sup> The article employs an analytical approach to substantiate this claim. In sections 2 and 3, it develops the concept of opaque deterrence and situates it within the more comprehensive context of deterrence theory and North Korea's dual-use space programme. Normatively, in sections 4 and 5, it identifies a verification gap in contemporary space governance and outlines policy recommendations for revising an obsolete framework, using legal and diplomatic tools.

## 2. Background: Deterrence Theory and Strategic Opacity

Deterrence has long been one of the key elements of international security studies, conventionally defined as a function of threatened punishment that can prevent one's adversary from taking an action.<sup>8</sup> However, the twenty-first century has seen a paradigm shift in this very notion of deterrence due to the emerging areas of technology that have blurred this demarcation, namely space and cyber, which have caused this phenomenon of deterrence to increasingly operate within conditions of 'ambiguity' and not 'certainty' anymore. Today, states can inflict deterrence not only through capability but through that 'zone of

uncertainty,' namely, an environment of possible 'misinterpretation' itself.<sup>9</sup>

This theoretical section examines the role of deterrence as it has evolved within authoritarian systems and emerging technological domains, beginning with an explanation of the history of classical deterrence theory and its decay as a theoretical framework for multi-domain challenges before examining authoritarian systems that lack democratic pressures, and rely on this ambiguity as a tool of deliberate signaling.<sup>10</sup> These forces are drawn together through the evolving notion of opaque deterrence, and this paper introduces this notion as one that captures the ways in which countries such as North Korea wield power through dual-use technology and information system ambiguity. Moreover, this act of doing brings deterrence theory into a world of dual-use technology, authoritarian psychology, and degrading verification communities as originally formulated during and through the Cold-War Era.<sup>11</sup>

### 2.1 Deterrence Theory in Transition

Since the advent of the Cold War, the concept of deterrence has been based on the idea of risk management in a rational manner. In his 1960 book *The Strategy of Conflict*, Thomas Schelling described deterrence as a mechanism for a state to show both its ability and its

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<sup>7</sup> Michael J. Mazarr, "Understanding Deterrence," in *NL ARMS*, 2020, 13-28, [https://doi.org/10.1007/978-94-6265-419-8\\_2](https://doi.org/10.1007/978-94-6265-419-8_2).

<sup>8</sup> Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1960), 3-6.

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<sup>9</sup> Lawrence Freedman, *Deterrence* (Cambridge: Polity Press, 2004), 36-37.

<sup>10</sup> James M. Acton, "Escalation through Entanglement: How the Vulnerability of Command-and-Control Systems Raises the Risks of an Inadvertent Nuclear War," *International Security* 43, no. 1 (2018): 56-59.

<sup>11</sup> "The Dual-Use Nature of Space Launch Vehicles," *SAIS Review of International Affairs*.

willingness to cause unacceptable harm to an opponent.<sup>12</sup> Robert Jervis subsequently emphasized that the notion of deterrence is not solely dependent on material power, but rather on the perception of the power in question. Therefore, the credibility of threats and reassurances relies on the shared psychological framework. Realist deterrence theory is founded on a combination of transparency, clarity, and a certain level of predictability. That implies that the adversary must be able to comprehend what actions could trigger a reaction.<sup>13</sup>

However, this logic began crumbling apart after the end of the Cold War, when new domains of conflict blurred the boundary between deterrence and coercion. The emergence of cyberspace and outer space as arenas of conflict has rendered the conventional assumptions of transparency and predictable retaliation unwarranted. Technologies are increasingly dual-use and often indistinguishable in their purpose, while the attribution process remains uncertain. As a result, deterrence has shifted from a relationship of explicit threat to one of managed ambiguity.<sup>14</sup>

The concept of entanglement, theorised by James M. Acton, provides a critical bridge between traditional and contemporary deterrence. Acton argues that with the growing interdependence of nuclear and non-nuclear systems, especially with regard to the command control structure of satellites, there are motives for preventive or

inadvertent escalation.<sup>15</sup> This means that, within the context of space, where communication, observation, and missile warning are mixed together, destruction or disruption of a single satellite can be misinterpreted as a precursor to a nuclear strike. The overall impact is that the deterrence regime, stabilized by mutual transparency, becomes undermined by the opacity within dual-use systems.<sup>16</sup>

This emerging mechanism has even more relevance than that concerning great powers. In the case of a smaller or more isolated state, ambiguity may very well serve as an advantage rather than a weakness, such that such states are able to maintain ambiguity concerning the intentions behind a launch, whether it is the launch of a civilian satellite or a ballistic missile.<sup>17</sup> The exploitation of verification gaps inherent in space governance is a key mechanism in which such behavioural signals are achieved.<sup>18</sup> In this sense, the concept of deterrence has undergone a shift, transitioning from the realm of transparent communication to that of coercion through opacity.<sup>19</sup> While previous scholars have described deterrence environments as being increasingly marked by ambiguity and strategic uncertainty, this paper introduces the concept of 'opaque deterrence' to denote a deliberate form of coercive signalling in which authoritarian regimes

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<sup>12</sup> Schelling, *The Strategy of Conflict*, 5.

<sup>13</sup> Robert Jervis, *Perception and Misperception in International Politics* (Princeton University Press, 1976).

<sup>14</sup> Acton, "Escalation through Entanglement," 63-65.

<sup>15</sup> Acton, "Escalation through Entanglement," 63-65.

<sup>16</sup> Acton, "Escalation through Entanglement," 67-69.

<sup>17</sup> "The Dual-Use Nature of Space Launch Vehicles," *SAIS Review of International Affairs*.

<sup>18</sup> Ancona, "Astropolitics and Weaponisation of Space—Drawing Past Lessons to Address Space Arms' Escalation,"

<sup>19</sup> Acton, "Escalation through Entanglement," 67-69.

exploit technological and informational ambiguity to enhance deterrent credibility without overt escalation.<sup>20</sup>

### 2.2 Authoritarian Signalling and Strategic Opacity

A notable distinction emerges between authoritarian regimes and democratic states in the manner in which they establish and convey their credibility in relation to deterrence. In systems where power is centralised and information is strictly controlled, the reporting of any significant event, such as the launch of a missile, is not primarily intended to reassure through transparency. Evidently, it is done to influence the people's view of the situation via selective ambiguity.<sup>21</sup> The scholar Jessica L. Weeks explains this process in very substantial terms, stating that authoritarian leaders operate under a different set of dynamics of "audience costs": instead of electoral punishment. These leaders are accountable to the elites or military coalitions whose loyalty depends on the perception of the regime's strength.<sup>22</sup> Thus, coercive signalling serves as a tool for the internal legitimisation of the regime and the manipulation of behaviour externally.

The case of North Korea is an extreme example of such a dynamic, amplified by the fact that the people are denied any sort of dissent.<sup>23</sup> Victor D. Cha and Ken E. Gause have

pointed out that the leadership style of Kim Jong-Un can be described as a psychological mixture of risk-taking and strategic calculation that is most notably reflected in the use of crises for the purposes of domestic control and international resilience-building<sup>24</sup>. This phenomenon was referred to by Andrew Scobell as a "cult of strategic defiance" through which irrational behaviour is employed for a rational purpose.<sup>25</sup> Hence, in such a situation, deterrence is not considered a viable tool; instead, it is thought of as a performative form of unpredictability that facilitates the deliberate manipulation of the perceptions of one's intentions and capabilities.

This performative ambiguity is inherently transferable to the technological sphere. As scholars Song, Cho and Seo have observed, North Korea's space programme exemplifies strategic ambiguity as an operational tool designed to blur the line between peaceful exploration and militarisation.<sup>26</sup> The regime's employment of civilian rhetoric – for instance, the characterisation of satellite launches as "scientific successes" – enables it to sustain its domestic prestige while concurrently conducting experimentation with technologies that, while having potential military

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<sup>20</sup> Lawrence Freedman, *Deterrence* (Cambridge: Polity Press, 2004), 36–37; Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton, NJ: Princeton University Press, 2014), 38.

<sup>21</sup> Schelling, *The Strategy of Conflict*, 3-6; Jervis, *Perception and Misperception in International Politics*, 58-61.

<sup>22</sup> Jessica L. Weeks, "Strongmen and Straw Men: Authoritarian Regimes and the Initiation of International Conflict." *American Political Science Review* 106, no. 2 (2012): 326-47, <https://doi.org/10.1017/S0003055412000111>.

<sup>23</sup> Freedom House, "Freedom in the World 2024: North Korea," *Freedom House Reports*, 2024.

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<sup>24</sup> Victor D. Cha, *The Impossible State: North Korea, Past and Future* (New York: Ecco/HarperCollins, 2012), 45-52; Ken E. Gause, *North Korean House of Cards: Leadership Dynamics under Kim Jong-un* (Washington, DC: Committee for Human Rights in North Korea, 2015), 15-18.

<sup>25</sup> Andrew Scobell, *Kim Jong Il and North Korea: The Leader and the System* (Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2006), 19-21.

<sup>26</sup> Sechan Song, Sangkeun Cho, and Yongseok Seo, "North Korea's Space Militarization and Foresight of Security Dilemma on the Korean Peninsula," *Korean Journal of Defense Analysis* 37, no. 3 (September 2025): 407-430, <https://doi.org/10.22883/kjda.2025.37.3.004>.

applications, are overtly civilian in nature.<sup>27</sup> In the context of the DPRK, opacity functions as both a domestic propaganda instrument and a means of deterring foreign entities.

Strategic opacity as a notion thus inherently links political behavior to technological ability. Put simply, it stands for the deliberate production and handling of uncertainty with the aim of applying force in a way that is believable. Lawrence Freedman has already indicated that modern deterrence "may rely less on explicit threats and more on maintaining a certain level of ambiguity about intentions and capabilities".<sup>28</sup> Authoritarian regimes make it a rule to practice this principle: they meddle with information radically, hold absolute control over the narrative, and employ ambiguity rather than giving clear signals.<sup>29</sup> For the DPRK, the paradox of total secrecy, selective revelation, and intentional provocations turns the absence of transparency into the language of power that is performative.

### 2.3 Militarisation and Dual-Use Space Technologies

Outer space militarisation is today a structural reality of the twenty-first-century security environment. Since the early Cold War, space assets have been used for both civil and military purposes. But the development of advanced reconnaissance, navigation and antisatellite (ASAT)

technologies has blurred the line between peaceful and military use.<sup>30</sup>

The issue of the dual-use nature of launch vehicles is a major factor in the case of North Korea. As emphasized by Song, Cho, and Seo, Pyongyang's space program is a clear example of how one can use technological means to maintain strategic ambiguity.<sup>31</sup> Each satellite launch is an advancement of the civilian research program and the testing of the missile components such as multi-stage propulsion, guidance systems, and re-entry technologies.<sup>32</sup> The 2023 Malligyong-1 launch was a perfect example of this double nature: while the state media was hailing a "scientific success", the international community was pointing out ballistic-missile features in the very same operation.<sup>33</sup>

Dual-use technologies have also highlighted the weaknesses of the current governance systems. The Outer Space Treaty (1967) bans the placement of weapons of mass destruction in orbit but does not say anything about conventional and dual-use systems.<sup>34</sup> Verification relies on national reporting and voluntary transparency, both of

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<sup>27</sup> Reuters, "North Korea Says Satellite Launch Part of Peaceful Right to Space Development," 22 November 2023.

<sup>28</sup> Freedman, *Deterrence*, 36-37.

<sup>29</sup> Ken E. Gause, *North Korean House of Cards: Leadership Dynamics under Kim Jong-un* (Washington, DC: Committee for Human Rights in North Korea, 2015), 10-15.

<sup>30</sup> Bleddyn E. Bowen, *War in Space: Strategy, Spacepower, Geopolitics* (Edinburgh: Edinburgh University Press, 2020).

<sup>31</sup> Song, Cho, and Seo, "North Korea's Space Militarization."

<sup>32</sup> United Nations Security Council, *Report of the Panel of Experts Pursuant to Resolution 1874 (2009) concerning the Democratic People's Republic of Korea* (S/2024/215, 7 March 2024).

<sup>33</sup> Reuters, "North Korea Says Satellite Launch Part of Peaceful Right."

<sup>34</sup> United Nations Office for Outer Space Affairs (UNOOSA), *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* ("Outer Space Treaty"), 1967, Article IV, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html>.

which are weak, if not completely ineffective, especially when dealing with secretive or sanctioned states. According to the SAIS Review of International Affairs, even very sophisticated monitoring systems cannot always clearly discern a civilian satellite from a military test vehicle.<sup>35</sup> The "verification gap" thus results in mistrust of a strategic nature and the possibility of coercive signalling, especially among those regimes that derive benefits from the continuance of the state of uncertainty.

The North Korean example is, therefore, a typical case of what James M. Acton calls entanglement: the mutual dependence of nuclear and non-nuclear systems that complicates the risk of unveiling escalation unintentionally.<sup>36</sup> One reckless act in orbit – for instance, a malfunction during a launch or a deliberate test – could be seen as the initiation of a conflict, thereby confusing the line between deterrence and provocation.<sup>37</sup>

### 3. Analysis of North Korea's Space Programme: Evolution and Dual-Use Dynamics

North Korea's space programme has evolved significantly over time. Initially considered a marginal and largely symbolic endeavour, it has become a key pillar of the regime's technological ambition and strategic position. Under Kim Jong-Un, the series of failed launches that had been going on since the late 1990s was presented as a challenge to the nation's resilience and legitimacy. The outburst of launches after 2012, culminating with the 2023 deployment of the Malligyong-1 reconnaissance

satellite, is a clear indication that technical proficiency is being steadily raised. This is also supported by the deliberate use of space as a theatre for political communication and strategic deterrence.<sup>38</sup> In order to comprehend how North Korea incorporates space assets into its wider repertoire of coercive diplomacy and opaque deterrence, it is imperative to retrace this trajectory.

#### 3.1 Evolution of the DPRK Space Programme (1998–2025)

In 1998, a maiden space mission was launched by North Korea when the country launched Kwangmyŏngsŏng-1, which used the Taepodong-1 launch vehicle to IOC a satellite. The mission, according to reports from the state media, was a success; however, analysis from external quarters suggested that the satellite did not go into orbit, which cast a shadow over the success of the mission.<sup>39</sup> This particular incident brings to the forefront the different strategic intentions of the government of North Korea, where the political and symbolic importance of a "successful launch" overrode the technological aspect of the event. In the early 2000s, satellite launches continued, but the results were far from satisfactory. The failed attempts of 2006 and 2009 brought challenges in the development of a multi-stage rocket and its control systems into perspective but, at the same time, offered a chance to develop different parts of ballistic missiles successively.<sup>40</sup>

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<sup>35</sup> "The Dual-Use Nature of Space Launch Vehicles," *SAIS Review*.

<sup>36</sup> Acton, "Escalation through Entanglement," 56-99.

<sup>37</sup> Acton, "Escalation through Entanglement," 63-69.

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<sup>38</sup> Song, Cho, and Seo, "North Korea's Space Militarization."

<sup>39</sup> Hideyuki Yamamoto, "North Korea's Space Development and Military Strategy: An Overview," *Research Journal for Social Affairs* 3, no. 6 (2025): 199-229.

<sup>40</sup> "The Dual-Use Nature of Space Launch Vehicles," *SAIS Review*.

The most significant event came in December 2012, with the orbiting of Kwangmyŏngsŏng-3 Unit 2, which saw the country's first orbiting success recognized by international standards.<sup>41</sup> This development came during a period when Kim Jong-Un rose to power, which saw space science take a back seat as a strategic priority, from which point onwards it ceased to be a symbolic aim but a direct product of the modernization process initiated by the regime. Even the launch of Kwangmyŏngsŏng-4 in 2016 fell into this category, where the event, billed as a success of scientific development within the country, came as a disguised development of an intercontinental ballistic missile within the international arena.<sup>42</sup>

In the 2020s, North Korea introduced reforms in the institutional and legal framework in order to pursue more ambitious goals in space. The national space agency began to utilise increasingly militaristic language, while reviewing national space law, thus establishing a wider legal foundation for the integration of satellite development into national defence.<sup>43</sup> This crucial moment was followed by a surge in rocket launch activity employing novel platforms, notably the Chollima-1 rocket, introduced in 2023.<sup>44</sup>

The launch of Malligyong-1 in November 2023 represented a significant qualitative shift. The Korean Central News Agency interpreted the operation as a "scientific success" and a step towards peaceful space

exploration. However, independent observers pointed out that the launch used ballistic-missile technologies that were under UN sanctions.<sup>45</sup> In 2024-2025, the regime made even more ambitious plans for multi-satellite networks, military optical systems, and enhanced launch vehicles, which suggested that it intended to regard space activity as a regular, and strategically ambiguous, part of its national security policy.<sup>46</sup>

This process was characterised by discernible actions on the part of the North Korean regime, with space launches being the most prominent of these actions. The North Korean populace is encouraged to perceive Kim Jong-Un as the primary figure responsible for the nation's scientific advancement through these launches. Simultaneously, the global community is presented with an opportunity to observe North Korea's technological capabilities, while the sanctions are disregarded and, by implication, the testing of dual-use technologies persists.<sup>47</sup> In summary, the North Korean space programme serves as a paradigmatic example of a scenario where technological advancement, political symbolism and authoritarian signalling are intertwined.

### *3.2 Dual-Use Capabilities and the Missile-Space Convergence*

The dual-use nature of North Korea's space programme is the primary factor contributing to its strategic advantage. The DPRK has historically pursued concurrent development of both satellite technology and missiles, utilising technologies that are commonly found in both

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<sup>41</sup> Yamamoto, "North Korea's Space Development and Military Strategy."

<sup>42</sup> Hildreth, *North Korea's Space Launch and Ballistic Missile Programs*, 4-7.

<sup>43</sup> Yamamoto, "North Korea's Space Development and Military Strategy."

<sup>44</sup> UN Panel of Experts, S/2024/215, 31-33.

<sup>45</sup> Reuters, "Satellite Launch Part of Peaceful Right."

<sup>46</sup> Vipin Narang and Pranay Vaddi, "The North Korean Way of Proliferation," *Foreign Affairs*, June 24, 2025.

<sup>47</sup> Narang and Vaddi, "North Korean Way of Proliferation."

domains.<sup>48</sup> It is clear that rockets of all kinds, whether for satellite deployment or long-range missile application, are contingent on analogous technologies. Such technologies include multi-stage propulsion systems, guidance systems, staging mechanisms, and re-entry capabilities.<sup>49</sup> As a consequence, each launch of a so-called "civilian" satellite represents an opportunity for Pyongyang to acquire crucial information, technological expertise and even to test materials for its military programme.<sup>50</sup>

Evidence suggests that North Korean scientists are developing technologies that could enhance missile accuracy, range and payload capacity. This is indicated by the upper stage thrust, vehicle shape, and guidance layout of the missile.<sup>51</sup> Even unsuccessful launches were found to be of operational use, as each malfunction provided an opportunity to identify and address potential stress points, fuel-system issues, or structural weaknesses. This approach enabled the development of a more reliable missile.<sup>52</sup> In an environment where one must read between the lines, failure is not regarded as a drawback but rather as another indication in the ongoing testing cycle.

The reconnaissance satellite Malligyong-1 serves as a case in point, illustrating the close interconnection between civilian and military objectives.<sup>53</sup> The satellite, which was

presented at the outset as a scientific mission with the stated aim of improving agricultural planning and resource mapping is, in fact, a ruse. The functions of the satellite, as stated on its board, are in reality military reconnaissance and targeting operations. In essence, the disparate rocket stages of a lofted-trajectory missile test bear a striking resemblance to the flight path of an object in orbit.<sup>54</sup> Hence, when the regime is separating its payload under orbital conditions, it acquires invaluable insights pertaining to stability and re-entry behaviour.<sup>55</sup> However, the international community faces significant challenges in distinguishing between a purely scientific activity and a clandestine ballistic test, given the similarity in the hardware involved.<sup>56</sup>

The issue of dual-use ambiguity is not exclusive to North Korea; however, Pyongyang has demonstrated a more systematic approach in its exploitation of this ambiguity compared to most states.<sup>57</sup> The absence of explicitly defined space law restrictions on the use of conventional weapons, in conjunction with the limitation of verification mechanisms, provides the DPRK with the opportunity to engage in such activities, which would be politically unfeasible under more stringent monitoring

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<sup>48</sup> Song, Cho, and Seo, "North Korea's Space Militarization."

<sup>49</sup> "The Dual-Use Nature of Space Launch Vehicles," *S AIS Review*.

<sup>50</sup> Hildreth, *North Korea's Space Launch and Ballistic Missile Programs*, 4-7.

<sup>51</sup> Yamamoto, "North Korea's Space Development and Military Strategy."

<sup>52</sup> Acton, "Escalation through Entanglement," 63-69.

<sup>53</sup> Reuters, "North Korea Says Satellite Launch Part of Peaceful Right to Space Development," 22 November 2023.

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<sup>54</sup> Vipin Narang and Pranay Vaddi, "The North Korean Way of Proliferation," *Foreign Affairs*, June 24, 2025.

<sup>55</sup> Hildreth, *North Korea's Space Launch and Ballistic Missile Programs*.

<sup>56</sup> "The Dual-Use Nature of Space Launch Vehicles," *S AIS Review*.

<sup>57</sup> Ancona, "Astropolitics and Weaponisation of Space—Drawing Past Lessons to Address Space Arms' Escalation,"

regimes.<sup>58</sup> Inevitably space becomes a lawful, permissive environment, in which the regime is able to test missile-relevant systems without openly violating its obligations. This dynamic establishes a strategic environment where technological advancement, political communication, and coercive diplomacy interpenetrate, therefore rendering dual-use activities a central component of opaque deterrence.<sup>59</sup>

### 3.3 Political Signalling: Domestic Legitimacy and External Coercion

The regime demonstrates its capabilities through satellite launch operations because these events prove its technological advancement as it strives to become a top nation, which archives important scientific discoveries while staying free from foreign control.<sup>60</sup> Because of that, the launches receive promotion through a wider message about national independence, which shows technological advancement as the result of national strength. The regime celebrates every successful mission as a shared achievement which all citizens can claim as their own.<sup>61</sup>

In the international area, the DPRK uses its space programme as a tool of strategic coercion. It has been observed that satellite launches are commonly conducted when there is heightened tension in the region or during prolonged negotiation sessions. This is because, by such

launches, the regime is capable of applying leverage on neighboring nations, as well as the United States government, without necessarily going for a full-blown military threat.<sup>62</sup> The logic behind this is the natural association that exists between satellite development and missile development; therefore, each launch every satellite launch is a potential display of missile strength and a threat of escalation in case of a particular need.<sup>63</sup>

The relationship between domestic legitimacy and the need for external coercion is fundamental to the enhanced strategy of opaque deterrence pursued by North Korea. The state can thus maintain a level of ambiguity with regard to the intention behind its space programme, thereby ensuring that perceptions are at parity with capabilities.<sup>64</sup> The line separating scientific progress from military development is purposefully blurred, with a need to consider strategic implications with regard to a new development. For instance, a satellite launch might be presented as a peaceful exploration of outer space, while concurrently demonstrating technological sophistication with potential military applications.<sup>65</sup>

In conclusion, the political role of the space programme in North Korea is, in effect, inextricably linked with its strategic role. Every launch that occurs has a set of domestic as well as international purposes, strengthening the regime's authority within the nation and influencing the

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<sup>58</sup> UNOOSA, Outer Space Treaty, Art. IV; "The Dual-Use Nature of Space Launch Vehicles," *S AIS Review of International Affairs*; Ancona, "Astropolitics and Weaponisation of Space."

<sup>59</sup> Ancona, "Astropolitics and Weaponisation of Space."

<sup>60</sup> Yamamoto, "North Korea's Space Development and Military Strategy."

<sup>61</sup> Song, Cho, and Seo, "North Korea's Space Militarization."

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<sup>62</sup> Gause, *North Korean House of Cards*, 10-15.

<sup>63</sup> "The Dual-Use Nature of Space Launch Vehicles," *S AIS Review*; Acton, "Escalation through Entanglement," 63-69.

<sup>64</sup> Mazarr, "Understanding Deterrence," 13-28

<sup>65</sup> Song, Cho, and Seo, "North Korea's Space Militarization"; UN Panel of Experts, S/2024/215; Hildreth, *North Korea's Space Launch and Ballistic Missile Programs*, 4-7.

strategic calculations of foreign governments. This means that the role of space research is neither purely scientific nor merely a cover for missile development, but has been specifically designed to maintain a strategic position within an increasingly contested regional environment.

#### 4. Discussion on Findings: Why Space Governance Matters for Nuclear Stability

This section identifies and defines the problem that arises from opaque deterrence in the space domain: the verification gap. While the nuclear non-proliferation regime has historically produced clear and distinct boundaries, the violation of which is easily identifiable, the space domain is currently regulated by standards that were designed for a different technological era. These standards provide for limited monitoring dependent on voluntary reporting and are ineffective against actors who intentionally act ambiguously.<sup>66</sup>

From the perspective of policymakers, the challenge can be viewed in two distinct dimensions. Firstly, the presence of ambiguity in orbit serves to exacerbate the pre-existing instability in the realm of offence and defence within Northeast Asia. Secondly, the case of North Korea demonstrates how opacity can be exploited to circumvent international sanctions and alter perceptions of threats.<sup>67</sup>

##### 4.1 Offence-Defence Balance and the Escalatory Potential of Dual-Use Space Technologies

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<sup>66</sup> Narang, *Nuclear Strategy in the Modern Era*, 37-39; Kaldor and Rangelov, "Introduction: Global Security Policy in the Twenty-First Century," 1-8; UNOOSA, *Outer Space Treaty*, Art. IV.

<sup>67</sup> Hildreth, *North Korea's Space Launch and Ballistic Missile Programs*; UN Panel of Experts, S/2024/215; Vipin Narang and Pranay Vaddi, "The North Korean Way of Proliferation."

The major direct effect of the DPRK's space program with dual use is the shift in the balance of offense and defense in the region. Robert Jervis, who developed the theory of the balance of offense and defense in 1978, states that "the highest level of stability in international politics is achieved when two conditions are met: a state's defense structure surpasses, quantitatively and qualitatively, its offense structure, and a distinction is easy to make between military systems for defense and military systems for offense".<sup>68</sup> In effect, when a state's defense structure is overtaken by its offensive structure, but the two are difficult to distinguish, the international community's behavior toward the state leans toward worst-case scenarios, which increase the odds of an arms race.

It is apparent that the requirement for space control is not meeting the two conditions set by Jervis concerning prerequisites for stability because of the ambiguity involved with dual use technologies. It is necessary that a strategic assessment of every launch made by the government of North Korea is carried out, irrespective of whether such a launch is scientific in nature.<sup>69</sup>

Moreover, the dependence on space-based systems is gradually transforming the strategic environment from defense superiority to offense dominance. The use of satellites has potential applications in the development of early warning systems, targeting, and short reaction times, combined with the vulnerability of the interdependence of

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<sup>68</sup> Robert Jervis, "Cooperation Under the Security Dilemma," *World Politics* 30, no. 2 (1978): 167-214.

<sup>69</sup> Bleddyn E. Bowen, *War in Space*; Ancona, "Astropolitics and Weaponisation of Space"; Song, Cho, and Seo, "North Korea's Space Militarization."

orbital sensors with nuclear command and control systems, which increase the likelihood of misjudgment in a crisis situation.<sup>70</sup> In such a scenario, even the failure of a satellite with unclear launches might serve as a first escalation move. For a weak state such as North Korea, epistemic uncertainty works as a multiplication of deterrence, which, through lack of clarity on intentions and capabilities, maintains a force posture without indulging in a provocation.<sup>71</sup>

#### 4.2 *The Verification Gap as a Structural Weakness in Space Governance*

The current governance of space has been established within a strategic environment in which security has been conceptualised as a means of preventing interstate war and regulating arms. Nonetheless, as scholars Mary Kaldor and Iavor Rangelov have noted, contemporary global security policy concerns not only state actors, but also the concepts and instruments through which security is implemented at a local, national, and global level.<sup>72</sup> In the specific case of space domain, however, these instruments have failed to keep pace with the dual-use nature of contemporary technologies. For instance, the Outer Space Treaty proscribes the placement of weapons of mass destruction in orbit, yet it fails to establish regulations for both conventional and dual-use space systems. In consequence, notification and registration of launches are voluntary, and

the mechanisms for distinguishing space activities from civilian activities are rather rudimentary.<sup>73</sup>

This institutional architecture is indicative of a more extensive tension that has been identified in the extant literature on global security and international law. In this regard, author Richard Falk advances the argument that actors within the international law regime frequently exhibit a discrepancy between rhetorical adherence and practical implementation, a phenomenon that is especially pronounced when individual security interests are at stake.<sup>74</sup> In the context of regimes such as nuclear non-proliferation, the use of force, and climate change, international norms are frequently susceptible to interpretative manipulation and expedient violation, owing to the state-centric logic inherent in the prevailing international order.<sup>75</sup> The governance of space is subject to analogous conditions, with the legal framework providing support for the peaceful utilisation of space. Yet, the enforcement of this framework is contingent upon state consent, national reporting, and the political will of leaders. In the context of a state that is both secretive and sanctioned, such as North Korea, these limitations engender the optimal conditions for the exploitation of ambiguity.

It can thus be concluded that the verification gap that constitutes a core aspect of space governance is

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<sup>70</sup> Acton, "Escalation through Entanglement"; Bowen, *War in Space*.

<sup>71</sup> Hildreth, *North Korea's Space Launch and Ballistic Missile Programs*.

<sup>72</sup> Mary Kaldor and Iavor Rangelov, "Introduction: Global Security Policy in the Twenty-First Century," in *The Handbook of Global Security Policy*, ed. Mary Kaldor and Iavor Rangelov (Chichester: Wiley-Blackwell, 2014), 1-8.

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<sup>73</sup> UNOOSA, *Outer Space Treaty*, Art. IV; "The Dual-Use Nature of Space Launch Vehicles," *SAIS Review*.

<sup>74</sup> Richard Falk, "Global Security and International Law," in *The Handbook of Global Security Policy*, ed. Mary Kaldor and Iavor Rangelov (Chichester: Wiley-Blackwell, 2014), 321-339.

<sup>75</sup> Falk, "Global Security and International Law", 321-323.

characterised by both technical and political factors. From a technical perspective, even the most sophisticated monitoring techniques are unable to determine whether a North Korean launch constitutes a genuine civilian mission or a covert ballistic missile test.<sup>76</sup> From a political perspective, however, the current instruments for arms control and non-proliferation treat space and missile development as two distinct policy areas, despite the increasing interconnection between them.<sup>77</sup> As a result, the DPRK is able to exploit this ambiguity by strategically leveraging the opacity of dual-use technologies and the inherent structural weaknesses within international law, which hinders the implementation of transparent deterrence measures. Addressing this verification gap necessitates not only enhanced technical monitoring, but also a reconceptualisation of the policy tools mobilised in response to dual-use challenges in orbit.

### **5. Policy Recommendations: Managing Opacity and Strengthening Verification**

Considering the structural deficiencies identified above, policy responses to North Korea's space programme must consider the potential limitations of depending exclusively on conventional arms control frameworks or the expectation that the DPRK will spontaneously adopt existing norms at a future point. Instead, it is imperative to combine various global security tools – legal, diplomatic and technical – in ways that can ensure both the

persistence of state sovereignty and rationality and the need for more efficient multilateral governance.<sup>78</sup> This section proposes a set of policy recommendations aimed at reducing the risk of opaque deterrence developing in orbit.

In the first instance, a call for adaptation of international law to suit the nature of challenges that come with dual-use space technologies cannot be overemphasized. This is not seeking a complete overhaul of a space treaty, which is highly unlikely in the short run. Instead, states might use supplementary mechanisms with fresh perspectives on how pre-existing norms can be applied concerning the launching of reconnaissance aircraft as well as satellites.<sup>79</sup> For instance, one might consider giving the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) a mandate to develop guidelines on how such space is linked with non-proliferation obligations, especially when such systems have a relevance that is characteristic of missiles. The use of soft law mechanisms is not for the sake of adding ambiguity; it is meant to minimize strategic manipulation by ensuring that such dual-use systems are part of what is monitored.

Secondly, verification mechanisms should be reinforced via initiatives with a regional outlook that support but do not replace existing international frameworks on the matter. Via analogues with the development of peacekeeping, which evolved from simple ceasefire

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<sup>76</sup> Hildreth, *North Korea's Space Launch and Ballistic Missile Programs*.

<sup>77</sup> Maria Rost Rublee, "Nuclear Disarmament and Nonproliferation," in *The Handbook of Global Security Policy*, ed. Mary Kaldor and Iavor Rangelov (Chichester: Wiley-Blackwell, 2014), 105-122.

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<sup>78</sup> Kaldor and Rangelov, "Introduction: Global Security Policy in the Twenty-First Century," 2-5.

<sup>79</sup> Rublee, "Nuclear Disarmament and Nonproliferation," 105-107.

arrangements to more complicated mechanisms on the ground, it is possible for regions to develop a space-monitoring system within the United Nations or other international bodies.<sup>80</sup> This would not necessarily require ratification from the government of the DPRK, but would also serve as a common platform for the government of South Korea, Japan, the United States, and possibly European allies to compare launcher observation data. The presence of such a system might, with the passage of time, persuade the government of the DPRK to make some sort of limited disclosure, perhaps with a promise of economic benefits.

Thirdly, diplomatic and mediation tasks need to clearly include space issues in overall denials on security and sanctions, rather than the latter being considered a distinct realm. The importance of continuing a dialogue, even when the scope for mediation is constrained, has been emphasized by Alvaro De Soto, who believes that, in a post-Cold War era, the scope for mediation is limited but still remains one of the very few instruments at our disposal. In future negotiations with the North, it is essential to recognize that satellites and the rhetoric of space are integral to the force of coercion exercised by the regime.<sup>81</sup> This can be responded to with a calibration of negotiations that might include partial constraints on launch, dissemination of telemetry, or moratoriums on

particular types of tests, in return for a relaxation of overall sanctions.

Finally, external actors need to get on board with supporting civil society efforts towards independent analysis of dual-use technologies. In particular, as scholars Kaldor and Rangelov argue, a rising reality within the realm of global security policy is the blurring of boundaries within the private/public divide, where non-state actors are becoming actively involved in problem definition and norm construction.<sup>82</sup> In the domain of space, think tanks, academic networks, and technical NGOs can play a crucial role in refining open-source verification methods, disseminating information on North Korean launches and proposing actionable confidence-building measures. These initiatives, it must be noted, cannot supplant the actions of state actors; nevertheless, they can assist in the reduction of information asymmetries and the dissemination of knowledge, thereby facilitating more effective policy-making.

## 6. Conclusion

When considered as a whole, these recommendations do not succeed in eliminating North Korea's opaque strategy in orbit. Nevertheless, a methodology is proposed for its management, which would entail the following measures: the consolidation of the connection between space governance and non-proliferation, the augmentation of multilateral verification, the incorporation of space-related issues into diplomatic processes, and the

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<sup>80</sup> Renata Dwan, "The Evolution of International Peacekeeping," in *The Handbook of Global Security Policy*, ed. Mary Kaldor and Iavor Rangelov (Chichester: Wiley-Blackwell, 2014), 247-263.

<sup>81</sup> Alvaro de Soto, "Diplomacy and Mediation," in *The Handbook of Global Security Policy*, ed. Mary Kaldor and Iavor Rangelov (Chichester: Wiley-Blackwell, 2014), 301-318.

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<sup>82</sup> Kaldor and Rangelov, "Introduction: Global Security Policy in the Twenty-First Century," 2-3.

mobilisation of a more extensive array of global security instruments. In circumstances where complete transparency is not feasible, as is the case in space, the policy objective must be to narrow the scope for strategic manipulation and to prevent instability caused by ambiguity.

## Acknowledgements

I would like to express my sincere and profound gratitude to the team of the *IE International Policy Review*, and in particular to the IR Chapter. I am especially grateful to Henri Klein, Agustín Plaza de los Reyes and Maria Sofia Affronti, whose talent and support have been invaluable both for my work as an Officer of the IR Chapter and for this research project. I could not have wished for a better team with whom to undertake this journey.

Since joining IPR, I have learned more academically, professionally and personally than I could ever have anticipated, and it is a privilege to be part of this project. I am particularly indebted to Matilde Romagnoli, Editor-in-Chief and one of my dearest friends, for the trust she places in me and for consistently encouraging me to have greater confidence in my own work.

A special word of thanks goes to my dear friend Martina, who from the very beginning of our shared university path has inspired me whenever I felt uncertain and supported me whenever I stumbled. I am grateful to have her by my side and to share with her an academic interest in international relations and global security; this research has also been inspired by her and by the first academic paper we wrote together in our second year of university.

Finally, I wish to thank Daniele, my life partner and constant source of strength, who is always the first to celebrate my achievements, even before I fully recognise them myself. Without his support, this publication would not have been possible.

Any remaining errors and interpretations are entirely my own responsibility.

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