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**ROGUE SPACE ACTORS: IS THERE A PROBLEM IN OUR CURRENT DOMESTIC
REGULATIONS THAT MIGHT ALLOW FOR AN UNAUTHORISED PLANETARY
DEFENCE MISSION?**

Judith S. Jahnke¹⁾,

⁽¹⁾ Institute of Air and Space Law, McGill University, Room 207, 3690 rue Peel, Montréal, QC, H3A 1W9 Canada, +4676 195 30 53.

Abstract

The regulation of private space activities has long been the subject of debate within the legal community. On the one hand, private actors are not subject to international conventions. On the other hand, States are responsible for the actions of non-governmental actors under the Outer Space Treaty. Adopting national legislation is one way for States to strike a balance between their responsibility under the international regulations and the interests of private actors. However, as a case in 2018 has shown, national legislation is not always as effective in regulating private actors as it might first appear. This paper examines the current regimes that regulate potentially unauthorised private planetary defence activities. The main objective is to assess whether our current regimes, primarily focused on the United States, allow a private actor to launch a planetary defence mission without State approval. It will do this by examining the unauthorised launch and use of US frequencies by Swarm Technologies as a case study to determine where a problem in our current regimes might arise. However, broader international issues will also be addressed, such as how the Outer Space Treaty governs State responsibility and how this international responsibility might change if a private actor launches an unauthorised mission. In doing so, it seeks to establish a complete picture of what might happen if a private actor launches an unauthorised planetary defence mission.

Keywords: Space Law, Private Actors, Responsibility, Domestic Legislation.

1. Introduction

Private space actors have been part of the space community for a long time. However, the development of their launch capabilities in the early 2000s, as well as the number of satellites they are placing into orbit, has once again raised questions about how to regulate them and, more importantly, how private actors might escape regulation. Who

will pay, who is responsible for these actors, and how can we ensure that these actors are held accountable for their actions? These are some of the questions circulating in the space law community. At the same time, many of those “older” questions had been previously settled, until recently. However, there still seems to be a general fear regarding unauthorised space actors in the community.

This paper will place this debate about unauthorised private actors into a planetary defence context. It will use the case study of Swarm Technologies' first SpaceBEE launch as an example of an unauthorised space actor and examine the fallout caused by the unauthorised launch of a telecommunications satellite. These consequences will then be considered within the broader legal framework, both national and international, in the context of planetary defence, considering the potential fallout of an unauthorised planetary defence mission that only partially mitigates the trajectory of asteroids.

To this end, this paper will be divided into three parts. First, it will present the background to the case study, namely, what happened in the case of the first four SpaceBEEs. Second, it will examine the international law aspect of the issue. Here, a distinction will be made between responsibility, the main subject of this paper, and liability. Finally, it will examine national regulations and determine whether they are sufficient to dissuade actors in the space sector from taking unauthorised measures to deflect an asteroid.

2. Setting the scene

In early 2018, Swarm Technologies, an American space start-up, launched its first four prototype telecommunications satellites.¹ A month before the launch, the satellite's use of American frequencies, which required a licence from the Federal Communications Commission (FCC), was rejected.² The licence was refused because the proposed

¹ Michael Sheetz, “Former Google engineer’s start-up slammed by FCC for unauthorized satellite launch” (9th March 2018) CNBC news, online: <www.cnbc.com/2018/03/09/swarm-technologies-slammed-by-fcc-for-unauthorized-satellite-launch.html>.

² *Ibid.*

satellites were too small to be locatable once in orbit, noting that this might cause space traffic management and debris mitigation problems.³

Even after the FCC rejected the licence for using their frequencies in December 2017, Swarm Technologies decided to proceed with the launch planned as planned in January 2018 on board a PSLV-40 rocket operated by the commercial division of the Indian Space Research Organisation (Antrix).⁴ The investigation into the unauthorised frequency use started in March 2018, after Swarm Technologies had tested the SpaceBEEs and ground stations.⁵

After discovering the unauthorised use of their frequencies, the FCC immediately suspended a previously granted licence for launching four more satellites as part of a Rocket Lab mission in April 2018.⁶ The case was resolved in December of the same year; Swarm Technologies had to admit its guilt and pay a civil fine of 900,000 US dollars.⁷ After the conflict was resolved, Swarm Technologies obtained further FCC licences to launch more (improved) cube sats.⁸ Two years later, the company merged with SpaceX.⁹

³ FCC, “FCC REACHES \$900,000 SETTLEMENT WITH SWARM FOR UNAUTHORIZED SATELLITE LAUNCH” (accessed 31 March 2025), online (pdf): <docs.fcc.gov/public/attachments/DOC-355578A1.pdf>; FCC, “Letter to Sara Spangelo” (12 December 2017) online(pdf): <apps.fcc.gov/els/GetAtt.html?id=203152&x=.>; Federal Communications Commission, “ORDER” (20 December 2018), online(pdf): <docs.fcc.gov/public/attachments/FCC-18-184A1.pdf>.

⁴ Sheetz, *supra* note 1.

⁵ FCC, *supra* note 3.

⁶ Anthony Serafini, “email to Ms. Spangelo, Mr. Scheffler” (7 March 2018) online(pdf): <apps.fcc.gov/els/GetAtt.html?id=205987&x=.>.

⁷ FCC, *supra* note 3.

⁸ Debra Werner, “Swarm of tiny satellites could relay messages by year’s end” (2 October 2019) SpaceNews, online: <spacenews.com/swarm-of-tiny-satellites-could-relay-messages-by-years-end/>.

⁹ Jeff Foust, “SpaceX to acquire Swarm Technologies” (9 August 2021), SpaceNews, online: <spacenews.com/spacex-to-acquire-swarm-technologies/>.

The operation of satellites using a US frequency requires a license from the FCC.¹⁰ Thus, there was little doubt about the illegality of Swarm Technologies' actions.¹¹

3. The Law on International Responsibility

3.1 States

Before going into the responsibility over the activities of private actors, which often leads to the adoption of domestic legislations, the responsibility of States should be considered. There is frequent confusion between responsibility and liability when discussing space law. Still, it is advisable to distinguish between these two terms in this context. Under international space law, liability is damage-based, meaning that the liability clauses can be invoked if there is damage, whether or not there was an internationally unlawful act. This liability obligation can be found in Article VII of the Outer Space Treaty, which states that “each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party ...by such object or its component parts.”¹² In addition, the Liability Convention differentiates between different types of liability based on where the damage occurred.¹³ Suppose the damage occurs on the surface of the Earth or in the air. In that case, the launching State has an absolute liability, meaning there is no question of fault or responsibility over the actions that caused the damage.¹⁴ In contrast, it is a fault-based regime if the damage occurs anywhere else, meaning outer space or on a celestial body.¹⁵ This regime also takes effect even if a private actor launched the space object that caused the damage.¹⁶ Furthermore, the ad

¹⁰ 47 U.S. Code § 301; United States Federal Communications Commission, “Satellite Licensing and Enforcement Involving Non-Governmental Entities” (accessed 31 March 2025) online(pdf): <www.unoosa.org/documents/pdf/copuos/lsc/2024/TechnicalPresentations/April_18_Afternoon/1_-_06_-_USA_Technical_Presentation_PPT_Slides_.pdf>.

¹¹ Federal Communications Commission, *supra* note 3.

¹² *Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, 27 January 1967, 610 UNTS 205 at art VII, [*Outer Space Treaty*].

¹³ *Convention on the international liability for damage caused by space objects*, 29 March 1972 961 UNTC 187 at arts II & III [*Liability Convention*].

¹⁴ *Ibid* at art II; Henry Hertzfeld, “Chapter 19 Critical Issues and Future Perspectives on Liability in the Context of Planetary Defence” in Irmgard Marboe, ed, *Legal Aspects of Planetary Defence* (Leiden; Boston; Brill Nijhoff, 2021) 313.

¹⁵ *Ibid*; *Liability Convention*, *supra* note 13 at art III.

¹⁶ There is no difference between State and private actors in the conventions.

hoc legal working group of SMPAG has also argued that it extends to damage caused by an asteroid in case the impact trajectory was changed due to a partially failed NEO deflection mission.¹⁷

This can be contrasted with responsibility. Article VI of the Outer Space Treaty gives international responsibility to all State parties for their space activities. While responsibility can include damage, the definition of international responsibility is based on other considerations. The International Law Commission (ILC) has noted that international responsibility requires a wrongful act.¹⁸ A wrongful act, in turn, requires two elements: that the “conduct consisting of an action or omission is attributable to the State under international law; and constitutes a breach of an international obligation of the State.”¹⁹ The first element, that the act or omission has to be “attributable to the State,” will be the primary focus of this paper. However, before going into those discussions, two different scenarios can be given to demonstrate the difference between these liability and responsibility.

An NEO with a diameter of more than 40 metres is heading towards Earth with a risk of impact of more than 5%, and a prediction that it will land in State C.²⁰ IAWN and SMPAG have coordinated information for impact and mitigation assessments.²¹ In response, State A, which has a planetary defence programme, launches a deflection mission similar to DART. Although the mission successfully moves the NEO from its original orbit, the impact still occurs, hitting State B instead of State C. Assuming that the affected State (State B) and State A are parties to the Liability Convention, State A must compensate

¹⁷ SMPAG Ad Hoc Legal Working Group, “Planetary Defence Legal Overview and Assessment” (8 April 2020), online(pdf): <www.cosmos.esa.int/documents/336356/336472/SMPAG-RP-004_1_0_SMPAG_legal_report_2020-04-08.pdf> [SMPAG report].

¹⁸ ILC, “Responsibility of States for Internationally Wrongful Acts” (2001), online(pdf): <legal.un.org/ilc/texts/instruments/english/draft_articles/9_6_2001.pdf> at art 1.

¹⁹ *Ibid* at art 2.

²⁰ Note that these measurements were decided on due to including IAWN and SMPAG in the discussions.

²¹ “About IAWN” (28 January 2025) online: <iawn.net/about.shtml>; “SPACE MISSION PLANNING ADVISORY GROUP” (5 February 2025), online: <www.cosmos.esa.int/web/smpag>.

State B.²² However, in this case, State A has no responsibility under the definition of the ILC, as it is argued that no internationally wrongful act has been committed. Furthermore, the same legal result would be obtained whether a State or a private actor launched the initial mission.²³

In contrast, let us suppose that, in the same scenario of the threat of impact of a near-Earth object, State A launches a nuclear device instead of a mission similar to DART. This device manages to deflect the near-Earth asteroid entirely. Although the result might suggest that there would be no problem in this scenario, the law leads to a different result. According to the reasoning of the SMPAG ad hoc legal working group, the detonation of a nuclear device in space constitutes a violation of international law.²⁴ This, in turn, constitutes the second element of an internationally wrongful act, the first, attribution, being automatically fulfilled by the basis that a State launched the nuclear device.²⁵ As such, legally, an international wrongful act has been committed, and the State is responsible for this breach regardless of the positive outcome.²⁶

One might ask why it would matter that there was an internationally wrongful act since the NEO was deflected and the danger averted. Let us consider the above situation. The use of a nuclear device, in general, is a highly controversial issue politically and legally at the international level. So, if one State uses such a device to help another State, a third party that was not involved in the agreement or the mission planning could have a problem with the potential violation of the law. In this case, the State that committed the wrongful act is State A, although it may have a contractual recourse against State C if it has an agreement for the deflection mission in the first place. Nevertheless, the first course of action will be against State A. Of course, the use of a nuclear device is not the only internationally wrongful act in the context of a planetary defence mission. However, it is

²² *Liability Convention*, *supra* note 13 at art II.

²³ See the discussion above.

²⁴ SMPAG report, *supra* note 17.

²⁵ See *supra* note 18 and accompanying discussion.

²⁶ *Ibid* at art 1.

the simplest example illustrating the difference between responsibility and liability at the State level.

One final point should be noted before moving on to private actors: responsibility and liability are not mutually exclusive. Thus, for example, if the nuclear device deflects the near-earth object but partially fails and hits State B, State A is both liable under the Outer Space Treaty and the Liability Convention but also held responsible for violating the international prohibition on the use of nuclear devices in outer space.

3.2 Private Actors

The Outer Space Treaty is clear as to the responsibility of States for their own actions. The question that recently arose again in the space law community about responsibility concerns the international responsibility for activities conducted by private actors. The majority of academics have long held that Article VI of the Outer Space Treaty, which notes that “States Parties to the Treaty shall bear international responsibility for national activities ...whether such activities are carried on by governmental agencies or by non-governmental entities”²⁷ assigns international responsibility to States, both for their actions and the actions of private actors.²⁸ This is also supported by the definition of international responsibility given above, according to which a responsible State is responsible for a violation of international law attributable to the State.²⁹ Thus, a natural consequence of assigning international responsibility to States is that private activities are attributable to them, which has recently been reopened for debate.

²⁷ *Outer Space Treaty*, *supra* note 12 at art VI.

²⁸ See, for example, Ram Jakhu & Maria Buzdugan for Article VI attribution. Ram Jakhu & Maria Buzdugan, “The Role of Private Actors: Commercial Development of the Outer Space Resources, Including Those of the Moon and other Celestial Bodies: Economic and Legal Implications” (2006), online(pdf): <www.mcgill.ca/iasl/files/iasl/Moon-Proceedings-Part_2_2006.pdf>.

²⁹ See the discussion above for the definition of responsibility and discussion below for attribution.

That being said, before going into the debate on attribution, it should be noted that Article VI includes a limitation. States are only responsible for their “national activities.”³⁰ The treaty itself is silent as to which activities constitute the national activity of that specific State. However, turning to scholarship on that topic, the definition of national activities seems clear. Bin Cheng, for example, argues that national activity “must refer to activities that have some special connection with the nation.”³¹ He finds this special connection in the State jurisdiction, or what he calls the State’s “competence to control.”³² Thus, it can be held that a State’s ability to judicially control a private actor, meaning jurisdiction, is a prerequisite for it being a “national activity” of that State.

Turning to the question of attribution. While it has long been a settled question that a State is responsible for the actions of the private actors within its jurisdiction, over the past two years, some academics have argued that Article VI does not directly attribute responsibility for those actions. Guoyu Wang and Yifan Hu, for example, argue that Article VI does not constitute a special rule for attribution when considering the law on the international use of force.³³ They differentiate between allocating responsibility to States and attributing private activities to the State, arguing that Article VI only provides for the former. The latter must be decided by general rules of international law, which, as will be discussed, would be a much stricter standard than Article VI.³⁴ The reason one might oppose Article VI establishing a norm of attribution is simple if one considers the definition of the term. Wang and Hu note that attribution in international law means considering the actions of a private actor as those of the State.³⁵ In simple terms, attributing all space activities under Article VI would mean that international law considers all actions to be those of States, even when carried out by private actors. This could, in turn, pose

³⁰ Article VI states: “shall bear international responsibility for **national activities**” *Ibid* at art VI (emphasis added).

³¹ Bin Cheng, “ARTICLE VI OF THE 1967 SPACE TREATY REVISITED: “INTERNATIONAL RESPONSIBILITY”, “NATIONAL ACTIVITIES”, AND “THE APPROPRIATE STATE”” (1998) 26 J Space L 7 at 20.

³² *Ibid*.

³³ Guoyu Wang & Yifan Hu, “Allocation and Attribution of Commercial Space (Activities in Armed Conflict)” (2025) 50:1 Air and Space Law 1.

³⁴ *Ibid*.

³⁵ *Ibid*.

problems for other international rights, such as the right to self-defence when one State has used force against another State, which is a central issue in Wang and Hu's article.

However, these arguments are not only unsupported by Article VI but also dangerous. If Article VI does not establish a standard of attribution, as the aforementioned authors argue, the general principles of international law apply.³⁶ General international law attributes the activities of private actors based on "effective control."³⁷ The International Court of Justice in *Nicaragua* shows precisely how high the threshold for effective control is.³⁸ In this case, the United States financed and provided logistical support to a private actor who attacked Nicaragua. However, the Court found that even in this case, the United States did not have effective control over the private actor.³⁹ A similar problem, although more explicit in the analysis, was also raised in the *Bosnian Genocide* case, where again, the court highlighted that it is the effective control of a State over a private actor that can attribute responsibility unless there is a *lex specialis* rule that holds otherwise.⁴⁰ The high threshold of effective control would, arguably, make it almost impossible to hold a State responsible for private space activities. Thus, effectively, under general international law, a private actor might breach international law in conducting a planetary defence mission without any international consequences, noting that international space law is not binding on private actors directly.

That being said, Article VI is clear. States are responsible for private actors' activities that fall within their jurisdiction. Because international responsibility requires attribution, Article VI must be considered to set an attribution standard. As such, the next step is to consider the State's other obligations under Article VI and how a State guarantees that the private actor does not breach international law.

³⁶ If there is no *lex specialis*, the rules in *lex generalis* apply.

³⁷ James Crawford, *Brownlie's principles of public international law*, 9th ed (Oxford; Oxford University Press, 2019) at ch 25.

³⁸ *Military and Paramilitary Activities in and against Nicaragua (Nicaragua v. United States of America)*, Judgement, [1986] I.C.J. Reports 1986, p. 14.

³⁹ *Ibid* at para 115 ff.

⁴⁰ *Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosnia and Herzegovina v. Serbia and Montenegro)*, Judgment, I.C.J. Reports 2007, 43 at para 209. Note that Article VI of the Outer Space Treaty establishes just a *lex specialis* rule.

4. Private Actors Beyond the Law on Responsibility

Beyond conferring responsibilities on States regarding national activities, Article VI also obliges the “appropriate State” to “require authorization and continuing supervision” of the activity of a private actor.⁴¹ This obligation has been considered separate from the general responsibility set out in the first sentence of the Article, although arguably, it is a way for States to ensure that they can regulate their responsibility. This section of Article VI has also been at the centre of the debate on national legislation. Joel Lisk, for example, in his recent article, notes that many States have responded to this particular wording in Article VI by adopting national legislation and introducing a licensing regime.⁴² Similarly, the United Nations Committee on the Peaceful Uses of Outer Space notes in its resolution on national legislation that the wording of Article VI lends itself to adopting national laws to regulate non-State space actors.⁴³

However, each space-faring nation is far from having national legislation in place. Germany, for example, although currently considering adopting national space legislation, still lacks a regulation for anything not directly related to remote sensing.⁴⁴ Canada has the same legislation limits.⁴⁵ These cases illustrate that there is no direct requirement for domestic space legislation; for example, a State could adopt policy considerations as an alternative. That being said, this paper will focus more on the States

⁴¹ *Outer Space Treaty*, *supra* note 12 at art VI.

⁴² Joel Lisk, “A New Way to Regulate Space? Evolving the Licensing Regimes for Space Activities” (2024) 49 *Annals Air & Space* L 371.

⁴³ UNGA, “Resolution adopted by the General Assembly on 11 December 2013” (2013), A/RES/68/74 online(pdf):< https://www.unoosa.org/pdf/gares/A_RES_68_074E.pdf>.

⁴⁴ Auswärtiges Amt, Germany, “Weltraumrecht” (10 February 2025), online: <[www.auswaertiges-amt.de/de/aussenpolitik/regelbasierte-internationale-ordnung/voelkerrecht-internationales-recht/einzelfragen/weltraumrecht#:~:text=An einem deutschen Weltraumgesetz, das,wenig praktische Bedeutung erlangt haben.>](http://www.auswaertiges-amt.de/de/aussenpolitik/regelbasierte-internationale-ordnung/voelkerrecht-internationales-recht/einzelfragen/weltraumrecht#:~:text=An%20einem%20deutschen%20Weltraumgesetz, das,wenig praktische Bedeutung erlangt haben.>)>.

⁴⁵ Government of Canada, “Consulting Canadians on a modern regulatory framework for space” (23 April 2024) online: <www.asc-csa.gc.ca/eng/transparency/consultations/consulting-on-modern-regulatory-framework-for-space.asp>; Government of Canada, “Space policy and the Remote Sensing Space Systems Act (RSSSA)” (14 September 2022), online: <www.international.gc.ca/world-monde/issues_developpement-enjeux_developpement/peace_security-paix_securite/space-espace.aspx?lang=eng>.

with national legislation, specifically the US, which was directly implicated in the SpaceBEE case.

The case of the four SpaceBEEs shows the potential limit of domestic space regulation. While the US has generally been argued to have one of the most complex space legislations, a question raised by this case is whether this complexity has created loopholes that private actors can abuse. US regulations are structured in such a way as to separate communication technologies from the launch. The space object must obtain a license from the FCC to use a US frequency and orbital position.⁴⁶ However, it could, arguably, launch without an FCC licence if it wants to use another State's frequency. Separating the use of international frequencies from the actual space activity is nothing unusual for a State, also noting the international distribution of areas of responsibility between the International Telecommunications Union and the United Nations Committee on the Peaceful Uses of Outer Space.⁴⁷

However, what makes the US system unique, and arguably it was here that the issue with the SpaceBEEs arose, is the licensing requirements for space objects. Many States, such as Sweden, France, and Austria, do not distinguish between the launch of a space object and the operation of the said object when it is in outer space.⁴⁸ This licence, in turn, is connected to having the appropriate other licences, such as the presumably required telecommunications licence, in place.⁴⁹ In contrast, US legislation, technically, does not require an operation licence for an object once it is in outer space. Note that they require a telecommunications licence to use US frequencies, which has other added requirements such as space debris mitigation.⁵⁰ This, however, is arguably not the same as an operations licence under the aforementioned space acts.

⁴⁶ 47 U S Code § 301.

⁴⁷ Note that the ITU is responsible for international frequencies and orbital positions while other space regulations and resolutions were adopted through UNCOPUOS.

⁴⁸ Lag om rymdverksamhet, 1982:963 (Sweden; LOI no 2008- 518 du 3 juin 2008 relative aux opérations spatiales, JO, 4 June 2008, no 0129; Weltraumgesetz, 2011/132.

⁴⁹ *Ibid.*

⁵⁰ FCC, "FAQ: Orbital Debris" (2025), online: <www.fcc.gov/space/faq-orbital-debris#:~:text=New licensees and existing applicants, and non-U.S. licensed satellites.>.

Furthermore, and here is the problem that the SpaceBEE case highlighted, getting a license to launch a mere payload on a foreign rocket outside the US is not required. §50904 of Title 51 of the US Code contains the four categories of operators that require a launch licence:

(1) for a **person to launch a launch vehicle** or to operate a launch site or reentry site, or to reenter a reentry vehicle, **in the United States**.

(2) for a **citizen of the United States** (as defined in section 50902(1)(A) or (B) of this title) to **launch a launch vehicle** or to operate a launch site or reentry site, or to reenter a reentry vehicle, **outside the United States**.

(3) for a **citizen of the United States** (as defined in section 50902(1)(C) of this title) to **launch a launch vehicle** or to operate a launch site or reentry site, or to reenter a reentry vehicle, **outside the United States** and outside the territory of a foreign country unless there is an agreement between the United States Government and the government of the foreign country **providing that the government of the foreign country has jurisdiction over the launch or operation or reentry**.

(4) for a **citizen of the United States** (as defined in section 50902(1)(C) of this title) to **launch a launch vehicle** or to operate a launch site or reentry site, or to reenter a reentry vehicle, **in the territory of a foreign country** if there is an agreement between the United States Government and the government of the foreign country **providing that the United States Government has jurisdiction over the launch or operation or reentry**.⁵¹

As can be seen, all four subsections limit the licence requirements to those looking to “launch a launch vehicle.” A launch vehicle, in turn, is defined as “a vehicle built to operate in, or place a payload or human beings in, outer space.”⁵² As the definition includes placing a payload in outer space, it could be argued that a payload is not considered a launch vehicle.

So, what happened in the Swarm Technologies case? Since the launch licence is limited to the operation of a launch vehicle, the re-entry part is irrelevant to this paper. No launch

⁵¹ 51 US Code § 50904.

⁵² 51 US Code § 50902(11).

licence was required for the launch of SpaceBEEs.⁵³ Since they did not require a launch licence, they were never subjected to a payload review that would have determined that their FCC licence was rejected.⁵⁴ Therefore, even if the company's telecommunications licence had been refused, the launch itself was perfectly legal under the domestic legislation. This, in turn, illustrates the larger argument that if an American private actor has a payload on a foreign launch vehicle, no launch licence is required. Thus, no verification of the payload is required under US law, resulting in cases like Swarm Technologies slipping through the cracks.⁵⁵ That being said, one may wonder why India authorised the launch of this payload if it did not have the appropriate licences for its use. This raises the question of who is responsible for the actors in such a scenario.

It is argued that the State with jurisdiction is required to issue the licence, which arises from the specific wording of Article VI. Under the first sentence of Article VI, States are only responsible for their national activities.⁵⁶ Furthermore, the “appropriate State,” not just any State, should authorise and supervise.⁵⁷ Although these two sentences are generally considered separately, they come to a similar conclusion: the State with international jurisdiction over the private operator is the appropriate State, and it is a national activity of a State if it falls within the jurisdiction of that State.

To reach this conclusion, one can consider the debate on the definition of an “appropriate State.” Michael Gerhard, for example, argues in the Cologne Commentary that the State that has jurisdiction over the private actor also has an obligation to monitor the activity.⁵⁸ Other scholars, such as Bin Cheng, also support this position.⁵⁹ Jurisdiction, in turn, has

⁵³ Note that by launching only a payload, they did not fall within the wording “launch operating a launching vehicle.” Furthermore, the launch vehicle was operated by a non-American citizen outside the US and thus does not fall within the requirements of § 50904 of Title 51 US Code.

⁵⁴ Note through policy considerations, the payload review is connected to the launch licence.

⁵⁵ Other domestic legislations might require the actor to get a licence to launch from their territory. This was just not the case for India.

⁵⁶ See the discussion above.

⁵⁷ See the particular wording of Article VI; *Outer Space Treaty*, *supra* note 12 at art VI.

⁵⁸ Micheal Gerhard “Article VI” in Stephan Hobe et al, eds, *Cologne Commentary on Space Law Vol 1* (Cologne: Carl Heymanns Verlag, 2009) 103.

⁵⁹ Cheng, *supra* note 31.

been internationally divided into three distinct categories: territorial (i.e., all activities that occur within the territory of a State fall under its jurisdiction), quasi-territorial (when the territory is artificially extended through various forms of registration; see, e.g. the quasi-territorial considerations of the flag State for a ship) and personal (States have jurisdiction over their nationals, even if they are not within the territorial jurisdiction of the State).⁶⁰ The focus in the space sector is mainly on the third category and nationals of the State, for example, bearing in mind the wording cited above in the US Code, which states that a US citizen needs a licence to launch a launch vehicle.⁶¹

For a natural person, finding their nationality is generally straightforward, looking at things like the right to a passport of a specific State. However, in the case of a company with several international branches, nationality is somewhat more complicated. In the *Barcelona Traction* case, the International Court of Justice ruled that the State in which the company is incorporated is the State of nationality of that company.⁶² Although this is a generally accepted definition, some national space laws have gone further. For example, Austria states that an Austrian citizen or a legal entity based in Austria requires a licence.⁶³ France has a more explicit definition of a registered office in France. Article 2(3) states that a “juridical person whose headquarters are located in France” needs a licence.⁶⁴ While there is a general discussion on what constitutes national activities in outer space, there is a certain consensus among States that this includes the place of incorporation (as defined by the *Barcelona Traction* process to determine the nationality of a legal entity) and, depending on the State, possibly other aspects such as the location of the headquarters.

⁶⁰ Sergio Marchisio, “NATIONAL JURISDICTION FOR REGULATING SPACE ACTIVITIES OF GOVERNMENTAL AND NON-GOVERNMENTAL ENTITIES” (16-19 November 2010 Bangkok, Thailand), online(pdf): <www.unoosa.org/pdf/pres/2010/SLW2010/02-02.pdf> at 4.

⁶¹ 51 US Code § 50904.

⁶² *Barcelona Traction, Light and Power Company, Limited (Belgium v. Spain) (New Application: 1962) [1964] I C J Reports 1964, 6.*

⁶³ Austrian Space Act, *supra* note 48 at art 1.

⁶⁴ French Space Act, *supra* note 48 at art 2(3).

Looking at the above-mentioned restrictions in Title 51 of the US Code, which only considers citizenship and no other criteria, the conclusion is simple. In the case of Swarm Technologies, as a Silicon Valley start-up, it is arguably incorporated within the US and thus a US citizen.⁶⁵ Thus, the US is the “appropriate State” to authorise and supervise their activities. India, which only launched the payload, would not have this judicial control over Swarm Technologies and would, therefore, not be the appropriate State under the space treaty for that specific payload. It would also be inappropriate for India to exercise such responsibility under international law. Therefore, India is not legally obliged to prevent the launch of that specific payload. However, in view of the diplomatic implications, it can be argued that it could have done so as a political gesture towards the US.

5. Deterrence

So, what happens if a private actor violates the licensing requirements set by the State or, due to a restriction of the State's licensing requirements, violates the space treaty? Effective regulation of a private actor includes appropriate deterrence if the actor violates the regulation.⁶⁶ While the general legal consequences will be discussed in the next section, the actual consequences should be considered first.

In the case of SpaceBEE, as stated above, the fine was limited to \$900,000.⁶⁷ This is roughly equivalent to the minimum cost of launching three 50-kg payloads with SpaceX into SSO.⁶⁸ Furthermore, the license to launch the next SpaceBEEs was suspended. Still, after the company admitted its misconduct and paid the fine, the FCC reinstated the licences. Swarm Technologies had launched a total of 120 satellites at the time of the merger with SpaceX.⁶⁹ A question, therefore, arises as to whether the risk of a sanction is high enough to prevent this behaviour in the future, which is questionable at this point.

⁶⁵ Werner, *supra* note 8.

⁶⁶ See Michael J Mazarr on deterrence theory. Michael J. Mazarr, “Understanding Deterrence” (accessed 31 March 2025), online:

<www.rand.org/content/dam/rand/pubs/perspectives/PE200/PE295/RAND_PE295.pdf> at 2.

⁶⁷ Federal Communications Commission, *supra* note 3.

⁶⁸ “SMALLSAT RIDESHARE PROGRAM” (2025) online: <www.spacex.com/rideshare/>.

⁶⁹ Foust, *supra* note 9.

However, this is not a specific limitation for the US. Other national space laws are limited to authorising launches and re-entry into the atmosphere, such as those in Australia, which impose similar restrictions.⁷⁰ The possible sanctions their law provides are limited to the prevention of the launch and a limited fine, which is undoubtedly ineffective in a case such as the one mentioned above, since the launch was never in question. Only the use of the frequencies was illegal. Other laws, such as the Norwegian or Swedish space acts, do not provide for possible sanctions.⁷¹

Is it reasonable to require States to have deterrents to prevent the activity in the first place? Probably yes. Does the absence of such deterrents affect Article VI? Probably yes, as well. If one looks at the wording “shall require authorization and continuing supervision,” in good faith, it can be argued that it includes appropriate means of deterrence. However, whether it impacts the attribution of responsibility under Article VI remains questionable.

6. What does this mean for the larger picture?

This discussion has shown a potential gap between what States are responsible for and what their national laws regulate. However, before we continue discussing the problems that this gap could cause, it should be noted that the SpaceBEE case was a unique and extraordinary event that was declared unlawful. While it is always possible that a private actor may abuse the system, this probability is generally limited.

Nevertheless, the question remains as to whether the State remains responsible for the activities of the private actor if the launch or operation was not authorised or even rejected outright. These questions must be examined separately since there are two different legal consequences. The first question is whether the State remains responsible if the activity

⁷⁰ Space (Launches and Returns) Act [2018].

⁷¹ Swedish Space Act, *supra* note 48; *Förordning om rymdverksamhet 1982/1069, (Sweden)*; *Lov om oppskyting av gjenstander fra norsk territorium m.m. ut i verdensrommet, 1969 (Norway)*.

was not prohibited but violated international law. The answer is clearly yes.⁷² During the preparatory work, Article VI was drafted in such a way as to avoid this situation. It was a compromise between the US, which wanted to allow private actors unrestricted use of outer space, and the USSR, which wanted to prohibit private space activities. Responsibility for these activities is assigned to States, along with the obligation to ensure that private actors comply with all the obligations of the space treaty, including international law as set out in Article III.⁷³ This should ensure that a State cannot circumvent its obligations by using private actors. Furthermore, it can be argued that if a State has not prevented a private actor from violating international law, it has itself violated the obligation to authorise and supervise compliance with international law through space activities.

The second situation is more complicated. Article VI provides no direct indication of the extent of this responsibility. However, under general international law, there is a standard known as “due diligence,” which requires States to take all appropriate measures to prevent their nationals from causing harm to foreigners. Robert Barnidge emphasises that this includes the obligation of States to “protect and apprehend and punish when non-state actors commit injuries against foreign nationals”⁷⁴ Similarly, Neil McDonald notes that “[d]ue diligence” is a term used by States to describe prudent steps taken by them to avoid a range of bad outcomes,” such as the violation of an international obligation. In this regard, it can be argued that part of the duty of due diligence of States consists of taking all appropriate measures to prevent private actors from causing international harm. This may include, inter alia, adopting appropriate national legal requirements, which was, arguably, not the case when SpaceBEEs were launched, as noted above. Therefore, part of the due diligence standard for the US in this case would have been to amend their

⁷² See discussion on responsibility above.

⁷³ Outer Space Treaty Article III states: “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...” *Outer Space Treaty*, *supra* note 12 at art III.

⁷⁴ Robert Barnidge, “The Due Diligence Principle Under International Law” (2006) 8:1 *International Community Law Review* 81 at 93.

national licences so that a review is required for the launch of the payload, even if the payload is not launched on a US launch vehicle.

However, due diligence goes beyond the mere existence of effective legislation. Taking all appropriate measures would involve considering all options available to the US in this case to prevent these activities from taking place. These possibilities include asking India to prevent the launch of this specific payload, for which there is no public evidence that they did so. Another aspect to be considered in this case is the knowledge the United States as a State probably had before the launch. US export controls require the Department of Commerce to license the export of a space object like the SpaceBEEs.⁷⁵ In addition, the four SpaceBEEs are listed in the US notification to the Secretary-General of objects launched under the Registration Agreement.⁷⁶ This paper, therefore, argues that rejecting the communication licence does not relieve the US of its international responsibilities to prevent its private actors from causing harm to other States. Furthermore, their knowledge of the launch obliged them to take necessary measures to monitor the activity, even if the initial authorisation had been rejected.

While it is clear that the US has not fulfilled its due diligence obligations in the SpaceBEEs case, this may not be so clear in another case. In the SpaceBEEs case, the argument for the US's responsibility was based on the State's knowledge of the private actor's activities. The question, therefore, arises as to whether, in a case where the State had no explicit knowledge of the private actor's activities, it is still obliged to comply with Article VI. In such a case, it is argued that the State should have known about these activities. In today's space industry, it should be impossible for a private actor to conduct a space activity involving a launch without the government being informed. Therefore, the same consideration as above would apply, with the provision that the State should have known about it.

⁷⁵ Yun Zhao, "Law related to intellectual property and transfer of technology" in Ram Jakhu & Paul Dempsey, eds, *Routledge Handbook on Space Law* (Abingdon; New York; Routledge 2017) 321.

⁷⁶ "Information Furnished in Conformity with the Convention on Registration of Objects Launched into Outer Space" (31 January 2019), ST/SG/SER.E/877.

7. Implications for Planetary Defence

While this is undoubtedly an issue that concerns the entire space law community, not just the planetary defence division, three arguments are highlighted for special consideration by the planetary defence community. First is the likelihood that a private actor would circumvent its rejected licence and proceed with the mission. The space law community has long debated whether a State is obligated to act in an NEO impact situation.⁷⁷ Most lawyers agree that nothing in our current international rules obliges a State to launch a deflection mission unless it does so voluntarily. Furthermore, and this may have a more direct bearing on the question, the liability rules for outer space would make any State hesitant to act if it is not directly in the estimated impact corridor.⁷⁸ Therefore, it is not unreasonable to argue that a private actor is more likely to take the risk and attempt to mitigate the impact of an asteroid than a State actor.

Furthermore, the private actor's compliance with the regulations and having the authority to carry out the planetary defence mission is not a prerequisite for State responsibility. On the contrary, as explained above, the State would still bear responsibility in this case. The same argument applies to liability. There is no difference between a private actor's liability and a State's liability, which means that a State would be liable for the damage caused by the NEO if the deflection mission were to fail.⁷⁹ Combined with the probability that the private actor will take the risk, the launch and/or telecommunications licence will likely be rejected. This could lead to a situation similar to the one discussed in this paper if the deterrent is insufficient to avoid the risk in the first place.

Secondly, who has the capabilities to launch a planetary defence mission? As for deflection missions in general, only one test has been publicly conducted for

⁷⁷ For example, see the presentations made by space lawyers at the PDC or the ad hoc legal working group report from SMPAG.

⁷⁸ See the liability discussions above.

⁷⁹ *Ibid.*

approximately \$324.5 million.⁸⁰ Thus, arguably, a few private space actors might have the technological and economic capabilities to launch a planetary defence mission. Some of these costs are also due to the fact that private players currently dominate the US launch industry.⁸¹ So, to add another element to the mission capabilities, one has to ask who is in a position to launch such a mission. Again, a handful of private space companies arguably have the capabilities to launch a planetary defence mission. Combined with the first argument, this shows that they have the capabilities and the marketing incentive to take the risk and launch such a mission.

Third, there are general issues with private actors and outer space. When discussing outer space law, we generally talk about international law. By definition, this only binds States and does not extend to private actors within those States.⁸² Therefore, all provisions of international law, including the five space treaties, are technically not binding on private actors. To prevent this distinction between the obligation and the potential actors, Article VI contains the responsibility “for assuring that national activities are carried out in conformity with the provisions outlined in the [Outer Space Treaty].”⁸³ So, if a private actor can get around the domestic regulatory idea contained in the second part of Article VI, they are not technically violating international law. Rather, it is the State that bears this responsibility. On the one hand, some of the violations of international law that may be included in a planetary defence mission are highly political issues;⁸⁴ there are potentially serious consequences for a State that cannot prevent an uncontrollable private actor from launching a planetary defence mission. On the other hand, the private actor is somewhat protected from the direct international legal consequences that could arise from the situation. This is not to ignore the likely domestic political consequences, the potential

⁸⁰ Note that was the cost of DART. “DART, NASA's test to stop an asteroid from hitting Earth” (2025) online: <[www.planetary.org/space-missions/dart#:~:text=How much did DART cost, of NASA's planetary defense budget.>](http://www.planetary.org/space-missions/dart#:~:text=How%20much%20did%20DART%20cost,%20of%20NASA's%20planetary%20defense%20budget.>).

⁸¹ Note the frequency of SpaceX launches in recent years.

⁸² John H Currie, *Public international law*, 2nd ed (Toronto; Irwin Law, 2008).

⁸³ *Outer Space Treaty*, *supra* note 12 at art IV.

⁸⁴ For example, the use of a nuclear device to deflect an NEO as suggested above. Although, it is unlikely that a private actor would be able to use a nuclear device to deflect an NEO.

marketing issue, or other considerations along those lines, but rather to focus on the purely international legal implications.

That said, the legal situation is not as inadequate as it may have seemed. Rather, it can be argued that the above case represents a minor exception to a larger regulatory framework. A launch licence would be required if a private actor were to launch a planetary defence mission with their launch vehicle.⁸⁵ This limits the applicability of the second argument. Furthermore, this paper did not address the other regulations that could prevent a private actor's mission launched by a foreign State to defend the planet. The US has stringent export controls that require a license to bring the payload out of the US.⁸⁶ This was noted in passing to prove, in the event of the launch of SpaceBEEs, that the US, due to its extensive requirements for export licences, was aware of the payload or should have been aware of it. However, it can also be seen as a further control mechanism of the regulatory authorities to prevent the situation considered in this paper.⁸⁷ Furthermore, the nature of the mission that has been launched could change export control requirements, adding another dimension to the discussions in this paper. However, these arguments are only briefly highlighted in this paper as they fall outside the scope of the main question and may deserve a paper of their own.⁸⁸

7. Conclusion

In summary, the SpaceBEE case has highlighted that it is a general problem for States when a private actor ignores the denial of a licence and launches anyway. It has been argued that the State is still responsible for the actions of this private actor. Due to the nature of any space activity, the industry is generally highly regulated or should be. Therefore, the State knew or should have known about the space activity and is thus, as required by their due diligence obligation, obliged to take all possible measures to prevent a violation of international law.

⁸⁵ See the discussion above.

⁸⁶ Zhao, *supra* note 75.

⁸⁷ A State might be able to prevent the export of the object used in a mission, even if they don't regulate the launch.

⁸⁸ Note the difference between the EARs and ITAR regulations. Zhao, *supra* note 75.

Two considerations had to be taken into account in reaching this conclusion. Firstly, liability in space law is distinct from responsibility. While responsibility may involve damage, this is not required, unlike liability. Rather, the obligation requires a breach of international law attributable to a State. From this, the second argument follows. Since Article VI clearly states that a State is internationally responsible, the actions of the private actor must be attributed to the State. This Article also establishes the State's obligation to supervise and authorise the private actor. This obligation is generally implemented by requiring a licence for various space activities.

The question was whether the domestic regulation includes licence requirements to launch a payload, and what happens if the private actor ignores the rejection of the licence. Noting that SpaceBEEs launch was not illegal, only using the frequencies once the objects were in space was a violation of the US regulations. It was argued that the State would still be responsible for the activity even if one of the licences were refused, as it is responsible for ensuring that its national legislation prevents such an actor from engaging in such activities.

These issues could become particularly relevant in the field of planetary defence. Since a State is unlikely to act depending on the impact corridor, a private actor may be tempted to take the opportunity to "save the world" and ignore the denial of a required licence. Therefore, in this sector, it is even more critical for State regulators to ensure that a private actor is not inclined to take this risk. In particular, this means stricter sanctions in the event of an unauthorised launch. In this paper, it has been argued that the sanctions imposed in the SpaceBEE case were too low to deter the risk in the first place. However, this is only one example of this problem; other examples that have not been considered include the failure of DISH Operating L.L.C.'s space debris mitigation programme, which cost only \$150,000.⁸⁹ In both cases, the commercial risk taken by the companies was less than the result they would have obtained if they had violated the licensing requirements, which, in

⁸⁹ "FCC TAKES FIRST SPACE DEBRIS ENFORCEMENT ACTION" (2 October 2023), online(pdf): <docs.fcc.gov/public/attachments/DOC-397412A1.pdf>.

the case of a planetary defence mission, could have had extreme consequences. Of course, this does not consider the potential impact of continued non-compliance, which was not the case with SpaceBEEs.

Therefore, this paper concludes with a warning. Although Asteroid YR4 2024 has not raised any further questions beyond the right to primary information, such as who acts when an asteroid threatens to hit Earth, the question of preventing rogue actors in space remains open. Since the State will be responsible for the behaviour, this should be seriously considered before the next potential planetary defence situation.