

# Get Your Filthy Hands off My Asteroid: Priority and Security in Space Resources

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## 1. Introduction

In the song “Get Your Filthy Hands Off My Desert,” lyricist Roger Waters of Pink Floyd sums up the geopolitics of the late 1970s and early 1980s:

*Brezhnev took Afghanistan.  
Begin took Beirut.  
Galtieri took the Union Jack.  
And Maggie, over lunch one day,  
Took a cruiser with all hands.  
Apparently, to make him give it back*

What is striking is that all of these references are disputes over territory that range across political systems: the Soviet invasion of Afghanistan, the ousting of the Palestinian Liberation Organization from Lebanon, and the Falklands/Malvinas war between the United Kingdom and Argentina. Waters makes light of these incidents with a simple play on words between dessert (a tasty treat) and desert (a sandy arid desolation). This highlights an interesting trend in geopolitics: States are willing to fight over territory (or confectionary treasures) despite the relative value of that territory. This is the result of an international system that places territory at the heart of the legal framework. Territory and its inviolability are linked directly to the legal personhood and legitimacy upon which sovereign equality rests.

This trend is a major reason that states incorporated the non-appropriation principle into space law, which is found in Article II of the Outer Space Treaty (OST). By making space non-territorial under international law, the drafters disincentivized the land rush ethos that drove the pre-1945 imperial system. Despite the non-appropriation principle, at least two states, with more to follow, have enacted laws that allow for the exploitation of

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extraterrestrial resources. Discussions on the issue have intensified in the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS).

While commercial technology still lags behind the law in this field, these new laws and the growing international consensus on the legality of space-resource activities are just the beginning of the legal frameworks necessary for people to responsibly engage in these activities. This is because the emerging law of space resources is based on the bifurcation of “property rights in the resource” from the territorial rights in the underlying exploited region. While this bifurcation solves the immediate problem posed by Article II, which is concerned with the appropriation of territory, it presents another problem in the allocation of rights to those resources.<sup>1</sup> This is because the legal regime of property and the related legal regimes of territory are designed to allow for the exclusion of others in order to protect the rights of those within. The bifurcation of the resource from the underlying area in the space environment means that force is the only way to exclude an encroaching competitor without further development of the law. Such a situation runs counter to the underlying principles of International Space Law, which is focused on the peaceful use of outer space.

This paper will argue that in order to maintain international peace and security in space a notice and registration system should be developed to keep space resource actors from coming into conflict with each other. Without such a system, the security framework established under the space-treaty regime will be at risk as both commercial actors and their respective States seek to establish their primacy with regards to resources. We argue that a notice and registration system is the most pragmatic way to manage space resource activities in their initial stages and can prevent mercantilist policies that lead to potential international conflict. This paper will first present an overview of the current development of space resource law and its projected near-term evolution. Next, it will analyze the security risks created from the bifurcation of resources from real property, and how that risk may threaten the international order. Finally, this paper will suggest the adoption of a notice and registration system for space resource activities as a way to mitigate risks when these activities finally materialize.

We also note at the outset of this paper that we assume that the international community will reach consensus that space resource extraction is consistent with Article II of the OST. There are numerous papers and manuscripts that explore the arguments for and against space resource extraction. However, we will not delve into that debate here. Rather, we will look further down the

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1 On Article II and territoriality see P. J. Blount and Christian J. Robison, “One Small Step: The Impact of the US Commercial Space Launch Competitiveness Act of 2015 on the Exploitation of Resources in Outer Space,” *North Carolina Journal of Law & Technology* 18 (2016): 160–233.

line to examine what measures will be necessary on the understanding that space resource extraction is, at the fundamental level, legal.

## 2. National Laws

The outer-space legal framework operates on two levels, namely international and national. The general rules for space activities are found in international treaties, which impose legal obligations on States. It is then up to States to give effect to these treaties for their citizens through national laws and regulations. In this case, how commercial activities comply with international law is wholly dependent on an individual State's approach to the outer space treaties. We should, therefore, first examine the national laws for authorizing space resource activities.

### 2.1. The US Space Competitiveness Act – Title IV

The first country to pass a law recognizing property rights in space resources was the United States in its Commercial Space Launch Competitiveness Act (hereinafter referred to as the Space Competitiveness Act).<sup>2</sup> At its most basic, the Space Competitiveness Act is legislation intended to spur and protect investment in the US space sector. This is a common practice whereby States offer legal stability and predictability for investments in the hopes of attracting larger sums and longer commitments to the national economy. This objective is evident from the full title of the Act:

*“To facilitate a pro-growth environment for the developing commercial space industry by encouraging private sector investment and creating more stable and predictable regulatory conditions, and for other purposes.”*

Title IV of the Act, entitled “Space Resource Exploration and Utilization,” contains three short sections plus a disclaimer. First, it defines an “asteroid resource” as a “space resource” found within a single asteroid. A “space resource” is defined as “an abiotic resource *in situ* in outer space” and explicitly includes both minerals and water. In other words, Title IV of the Space Competitiveness Act covers all minerals and water that are found in space, either on the Moon or any other celestial body, that do not qualify as being “biotic” or alive.

Title IV goes on to state that:

*“A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid*

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2 U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114–90 (2015).

*resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.”*

This provision can be broken down into three distinct parts:

- recognition of the legitimacy of US citizens (not other citizens) to engage in commercial recovery of asteroid and space resources;
- specific rights to “obtained” resources; and
- limitations under applicable law, including US international obligations.

There has never been legislation like this for outer space activities and many are still wondering what these assertions might mean. On the first point, it is assumed that US companies will be able to go to celestial bodies, like the Moon or an asteroid, and physically remove materials like minerals or water. On the second point, there is concern that the rights to minerals in space could be secured by detecting a celestial body (i.e. merely looking at it) and claiming it. However, Representative Brian Babin (R-TX), Chairman of the Space Subcommittee of the House Committee on Science and one of the sponsors of the Space Competitiveness Act, added some clarity:

*“The term “obtain” was ultimately chosen because it carried no presumption about the technical means with which the resource was to be recovered. However, it was never our intent that ‘obtainment’ would allow a company to remotely sense a resource and assert a right of possession. Only through physical recovery does this right manifest.”<sup>3</sup>*

This explanation confirms that the rights to possess, own, transport, use or sell a space resource can only be incurred by physical acquisition and control, whether that be by robot or human form.

The third and final point, however, is most relevant to our examination because it explicitly recognizes that the US has international obligations that it must honor. In this regard, it should also be noted that, as a matter of policy, the final provision of the Space Competitiveness Act directs the President of the US to:

- promote the right of United States citizens to engage in commercial exploration for and commercial recovery of space resources free from harmful interference.

This paragraph authorizes the President to use the full force of his office to facilitate space mining. As a matter of policy, enforcing the rights of space miners will be a fundamental aspect for inviting investment. Yet what does this mean for other space-miners? Does it mean that the President must use

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3 Brian Babin, remarks at the 10th Eileine M. Galloway Symposium, Washington, D.C., 9 December 2015.

the full force of his Office to protect US space-miners from harmful interference? What is harmful interference when it comes to space mining? This particular provision will play a significant role in the relationship between the US and other countries engaged in space mining activities. How the President achieves these goals will also be determined by US international obligations.

## **2.2. Luxembourg's Space Resources Law**

In 2016, Luxembourg followed the United States with the passage of its own law legalizing space resource activities.<sup>4</sup> This law, similar to the U.S. law made resource extraction legal. There are two core differences between the US law and the Luxembourg law. First, the Luxembourg law does not limit this activity to Luxembourgish individuals. Companies with a registered office in Luxembourg, even if foreign owned may take advantage of the law. Second, the Luxembourgish law lays out a licensing and authorization process and vests the competency to grant a license in a government authority.

Similar to the US law, the Luxembourgish statute indicates that these activities must be compliant with the international obligations of Luxembourg (Art. 2(3)). Clearly, both the US and Luxembourg see their laws as compatible with the Outer Space Treaty, which is binding on both of them. This is because both states rely on the aforementioned need to bifurcate the resource from the underlying area, so as to make the resource exploitable without exerting sovereignty over the area thereby converting it to territory.

This bifurcation though leaves an interesting question. To what extent can the authorizing state act to protect its licensee from interference with its operations?

## **3. International obligations**

Having examined the national laws, we must now turn to the obligations under international law. What do international treaties like the Outer Space Treaty (OST) require from those who might engage in space mining?

As noted above, Article II of the OST prohibits national appropriation by a State. As also noted above, this paper assumes that the international community will find that space resource extraction is consistent with that provision. On that basis, we will examine other provisions that will apply to this activity.

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<sup>4</sup> Luxembourg Draft Law on the Exploration and Use of Space Resources, July 13, 2017, <http://library.blountsfolly.com/space/items/show/213>.

### 3.1. Article I – “Access”

Article I OST lists three freedoms for all States, namely the freedoms of “exploration”, “use” and “access.”<sup>5</sup> There is significant debate as to what “exploration” and “use” mean. Is “exploration” scientific in nature and “use” commercial? Does “exploration” imply that some activities are for their own sake while “use” means that there is a tangible, economic benefit?<sup>6</sup> The widespread practice of selling satellites and launch services suggests that the “exploration” and “use” of outer space does include commercial, for-profit activities.<sup>7</sup> This implies that, fundamentally, space mining is permissible, or at least not impermissible, by virtue of being commercial in nature. Indeed, there is a small but limited amount of state practice in the realm of resource activities that includes some commercial transactions.<sup>8</sup>

Regarding “access”, it could be argued that if a party were to occupy a spot on the Moon with a probe and did not allow another party to use that same spot, they would be denying “access” to others. However, the use of orbits and frequencies over the last forty years implies that States have accepted a “first come first serve” framework in space, at least for a temporary period, and that once a space object is in place, it cannot thereafter be interfered with.<sup>9</sup> A similar interpretation could be used for space mining, whereby Party A would not be denying “access” to Party B if Party A arrives first and is actively conducting space mining activities. Yet once the activities are done, Party A will be in a weaker position to claim that it is not denying access to Party B. As a result, Party A may have to consent to removing their equipment. This is in line with the International Telecommunications Union’s practice, which oversees the allocation of orbits to States for satellites.<sup>10</sup> Under this logic, if Party A isn’t mining, then it will likely be blocking access to another actor in violation of Article I, and maybe even Article II, of the Outer Space Treaty.

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5 Outer Space Treaty, available at: <http://www.unoosa.org/pdf/publications/STSPACE11E.pdf>.

6 Lee, Ricky, “Law and Regulation of Commercial Mining of Minerals in Outer Space”, Springer Publishing (2012), p. 164.

7 Tronchetti, Fabio, “The Exploitation of Natural Resources of the Moon and Other Celestial Bodies”, Marthinus Nijhoff Publishing (2009), p. 223.

8 See P.J. Blount, “Outer Space and International Geography: Article II and the Shape of Global Order,” *52 New England Law Review* 95 (2019).

9 Henri, Yvon, “Orbit/Spectrum Allocation Procedures Registration Mechanism”, ITU Radiocommunication Bureau: Biennial Radiocommunication Seminar, 30 October - 3 November 2006, Geneva, Switzerland, p. 2.

10 International Telecommunications Union – Radio Regulations, Article 9.1, 2012.

### 3.2. Article III – International Law and the UN Charter

One of the most important provisions of the OST is found in Article III, which states that:

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

This provision ensures that all aspects of international law, including the laws of armed conflict, translate to outer space. It also ensures that the terms of the Geneva Convention, a part of the UN Charter, also apply to space activities. This includes two key provisions.

First, Article 2.4 of the UN Charter states that:

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

This provision demonstrates the ambiguity of space resource utilization under traditional concepts of international law. Article 2.4 specifically refers to the “territorial integrity” of any state, yet there is no territory on the Moon or on an asteroid. Does this mean that harmful interference against a space-mining operation cannot be considered as the “threat or use of force” on a state under the terms of the UN Charter? Does this specification limit the application of the UN Charter only to those areas where “territory” exists?

### 3.3. The Liability Convention

While the Outer Space Treaty does establish the fundamental principles of liability in space, there was plenty of ambiguity left over, particularly for issues like liability for damages. To create additional certainty, the Convention on International Liability for Damage Caused by Space Objects (hereinafter referred to as the *Liability Convention*) was adopted in 1972.<sup>11</sup> Its purpose is to ensure compensation for any damages related to space activities. It has 92 ratifications, including the US, almost as many as the Outer Space Treaty.<sup>12</sup> In particular, the Liability Convention establishes two types of liability on the “launching State”: fault-based liability for damage

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11 Convention on International Liability for Damage Caused by Space Objects, available at: <http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introliability-convention.html>.

12 Status of International Agreements relating to activities in outer space as at 1 January 2016, A/AC.105/C.2/2016/CRP.3, (4 April 2016), available at: [http://www.unoosa.org/documents/pdf/spacelaw/treatystatus/AC105\\_C2\\_2016\\_CRP03E.pdf](http://www.unoosa.org/documents/pdf/spacelaw/treatystatus/AC105_C2_2016_CRP03E.pdf).

caused to other space objects (Art. 3) and absolute liability for damage caused on the surface of the Earth or to aircraft in flight (Art. II).

In the context of space mining, under the Liability Convention, companies will only be liable for damage to other space objects if they are at fault. This could become an issue in situations where competing mining operations are located closely. However, what is more concerning is the possibility that some mining sites will be so valuable that it will still be cost effective to incur damages. For example, if Party A, whose mining equipment costs US\$X, arrives at a site first, it may still be worth it to Party B to incapacitate and remove Party A if the value of the site is US\$5X. This is an even bigger problem if Party B is from a disproportionately greater military power, leaving few avenues for restitution.

#### **4. The Problem Space**

The above legal analysis can be summed up with the idea that there is broadly speaking tacit acceptance that commercial space resource operations are not *de jure* prohibited by the Outer Space Treaty, but there is no international consensus on the rights and duties of these enterprises and of their responsible states. The commercial interests backing the domestic laws got the legal certainty they desired, but are still exposed to uncertainty within the international community as to how best to coordinate these types of activities.

While a bevy of futuristic scenarios can be thought up to illustrate these risks, it might be most useful to look at a plausible situation in the near term. In the near to midterm, space resource utilization missions will be bespoke enterprises. Requirements of the craft will be driven by the destination and the resources available for exploitation, as the craft will need to be suited to survive and function. This will be particularly true of the exploitation of asteroids based on their varied composition, mass, and shape. Let's say that a company from a state where these activities are affirmatively legal, pulls data from a public astronomy database and determines a target for a robotic mining mission. They make significant investment in research and development of a craft designed primarily for that target. Since there is no way to legally notify other parties about their intended goal, they are left with two options. First, the company discloses the information in hopes that other companies will voluntarily respect the claim, but with the risk that the disclosure brings attention to the target that other companies can exploit. Or, they can treat their target as a trade secret, which for the sake of this hypothetical we will assume the company chooses to do. Weeks out from launch, a state owned company from another state, launches a mission and announces that it has the same target. As one can see, the first company is left without legal recourse to enforce rights, because there is no legal or political



mechanism for coordinating such activities, but is also left with significant losses because of the law's inability to provide efficiency in the market by producing rights and obligations among market actors.

Our space mining company realizes that formal objections to the competing space mission are not going to be effective. They do some math and decide that the selected target is big enough for two operations to co-exist, and they also launch. At this point, the state of the competing mission can engage in consultations under Art. IX of the Outer Space Treaty, but nothing in that clause requires the states involved to come to a resolution. As our company lands their craft, its thrusters kick up regolith, and, in the low gravity environment, the regolith travels to and damages the competing mining operation which has established itself as first in time. The competing company then uses one of its mining robots to disable part of our company's operation. As noted above, such actions are a real possibility when one considers the potential value of certain mining destinations, possibly making it cost effective to incur damages. Back on Earth, the two states connected with these two companies are having heated exchanges and invoking the right to self-defense in both the terrestrial and extraterrestrial spheres.

The above hypothetical is possible because there are no formal mechanisms that allow space actors to coordinate activities to avoid interference and reduce risk. It should also be noted that the risk is not borne entirely by the private companies but also by the state responsible for those companies, based on Article VI of the Outer Space Treaty. Unfortunately, this is part of the narrative that gets lost when international frameworks for resource utilization are discussed. The focus in these discussions often drifts towards the principle of benefits sharing found in international space law rather than towards the need for coordination.

## 5. Notice and Registration

To be clear, a fully-fledged legal framework governing outer space resources is unlikely to emerge from contemporary geopolitics. States have favored domestic laws and soft law mechanisms in the development of space law, rather than the elaboration of new treaties or principles.<sup>13</sup> Further, the negotiating space for such an agreement would be a minefield. This however, should not stop states and commercial actors from seeking a framework that allows at least some sort of showing of priority rights that can assist in dispute settlement.

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13 Brian Israel, "Treaty Stasis [Agora: The End of Treaties?]," *AJIL Unbound* (blog), May 8, 2014, <https://www.asil.org/blogs/treaty-stasis-agora-end-treaties>; and P. J. Blount, "Renovating Space: The Future of International Space Law," *Denv. J. Int'l L. & Pol'y* 40 (2012): 515–686.

Indeed, as noted above, such a system is already used by the ITU for Geosynchronous orbit. The ITU maintains a master registry in which states can enter registrations for orbital slots and the frequencies assigned to those respective slots. This gives notice to the international community that a state or one of its private companies intends to use a slot. The registering state then has a limited amount of time to bring the assignment into use, but a sufficient amount of time to procure the satellite.<sup>14</sup> Notably, though the ITU is a treaty based organization, its dispute resolution mechanism is nonbinding.<sup>15</sup>

Despite the lack of clear enforcement powers vested in the ITU, the notice and registration systems is very successful at coordinating the use of the Geosynchronous orbit. This is because the system is designed to bring several favorable outcomes into telecommunications market. First, it protects investment on the front end, by assuring the slot is available if the satellite is procured in a timely manner. Second, it protects the satellite operation from harmful interference, and grants priority rights, which are strongly indicative of who is at fault.<sup>16</sup> Finally, it brings transparency to the orbit itself, which encourages actors to coordinate with each other on orbit to avoid interference or collision.

It is submitted that a similar system could be adopted for space resource activities to protect investment in planned space resource operations. Such a regime would need to be carefully devised to ensure that companies do not abuse the system, a problem that the ITU dealt with in regards to “paper satellites.” Specifically, a notice and registration system would require negotiating answers to the following issues.

- What is the threshold for making a claim to a space resource?
- Will states act as the intermediary between the companies and the space resource register (as they do in the ITU regime)?
- What is the threshold for bringing into use of a space resource claim?
- Conversely, what is the threshold for losing one’s registered claim for lack of activity?
- What type of dispute resolution should apply in the regime?
- How can the regime be developed to both protect investors, but also ensure minimum requirements of equity?

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14 See generally, Tanja Masson-Zwaan, “Orbits and Frequencies: The Legal Context,” in Mahulena Hofmann, ed. *Dispute Settlement in the Area of Space Communication* (Nomos 2015)

15 See generally, Gerry Oberst, “Dispute Resolution before the ITU: The Operator’s Experience,” in Mahulena Hofmann, ed. *Dispute Settlement in the Area of Space Communication* (Nomos 2015).

16 *Id.* at 44-45.

This is not an exclusive list of issues to be addressed, but serves as a strong starting point for establishing a system that protects commercial activity, avoids interstate conflict, and keeps states compliant with the underlying goal of Article II.

## **6. Conclusion**

Commercial space activities are an important economic driver for many states, and the law of outer space should not stand in the way of those activities. At the same time those activities should not result in the disruption of international peace and security. At its heart the international space law regime is a security regime intended to reduce the risk of conflicted resulting from space activities. The current attitude that all law and regulation are bad for commercial development in space is misguided. Law is needed specifically to protect commercial actors from each other and also from the effects of State conflict. As such, legal solutions will be needed to ensure that the economic benefits of space resource exploitation do no conflict with the security imperatives of the space domain.